

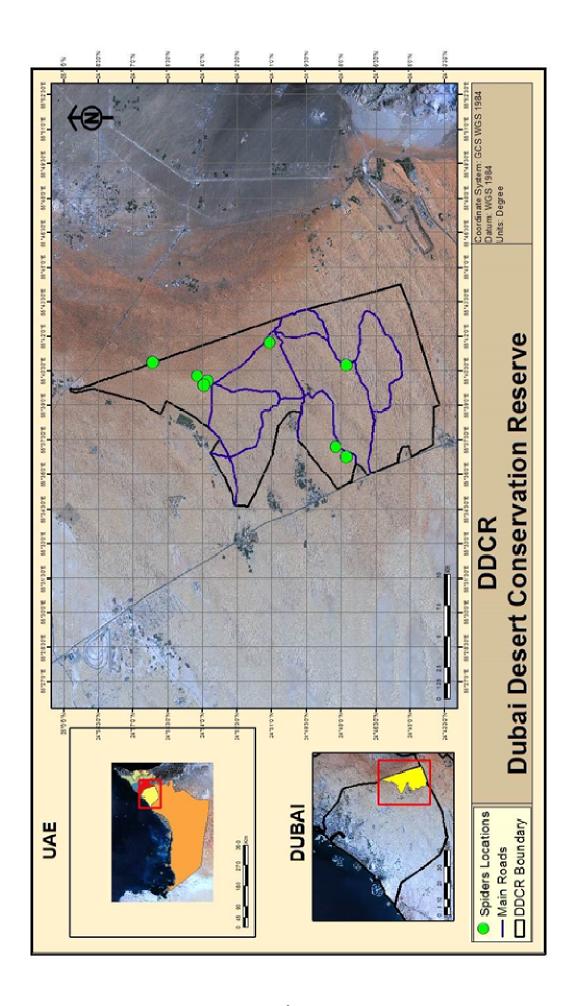
Spiders of an open desert eco-systems.

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Abstract

The Arachnid Survey in the DDCR was done over several days. A total of Nine Families was recorded; Araneidae, Eresidae, Gnaphosidae, Lycosidae, Oxyopidae, Pholcidae, Salticidae, Sparassidae, and Zodariidae. The specimens that were not confirmed were sent off for further identification. A total of nine locations were visited during the summer months and two of these locations were revisited in the middle of November, where the abundance was much lower than in the summer. Spiders were found on/in many different habitats but the large diversity and abundance was collected on the irrigated gravel plains, this will indicate that the spiders prey species are more prevalent. The *Evippa arenaria* was most prevalent and dominant spider species on the survey area. A large number of specimens were collected, 99 specimens was collected during the survey but only 52specimens where kept either in the DDCR reference collection and 24specimens was kept by Gary Feulner where in turn was send for species confirmation.

Introduction

During a prior Arthropods survey (Roosenschoon 2011), which consisted of 43 sites and covered all areas of the DDCR any spiders that were trapped were collected and if possible identified. However only 10 spiders were collected, and identified into five families this was mainly due to a lack of reference material. As the Arthropod survey had limited success in trapping spiders due to the selected survey technique, one of the recommendations was for a dedicated survey of the spiders in the DDCR.

Therefore the focus of this survey was on the spiders found typically in an open desert environment. Furthermore any observations of whether the spiders constructed a web, to form silk sleeves (tube) in the sand, egg cases, or just merely for a safety line was also recorded.

This survey only account for a number of spiders that are in the open eco-systems. Spiders are elusive and many of the species are tiny. Taken as a whole and given the diversity of species assemblages in most ecosystems, spiders' primary niche in nearly every ecosystem is controlling insect populations. Some families, like orb weavers, do this through passive hunting with their signature webs. Others, like wolf- and huntsman spiders, do this through active hunting. It is also known that spiders are feeding of other spiders and other invertebrates such as scorpions thus having spiders in an inland desert eco-system have definite benefits. Furthermore Spiders fall prey to Soliphuga, Birds, Lizards, snakes and other mammals.

Study region

The Dubai Desert Conservation Reserve (DDCR) is a representation of an inland Desert ecosystem which has been protected since 2003.

The reserve comprising 5% of the Emirate of Dubai, and is located in the south-east corner of the Emirate. It is bordered by Abu Dhabi Emirate in the south and Sharjah Emirate to the east. The western and northern boundaries border on national roads.

The survey covered most of the habitats of the reserve which included the *Prosopis cineraria* (*PC*) forest, this unique habitat supports a larger number of species of Insecta, Arachnida and other Classes Therefore making it an ideal environment for spiders. Other habitats surveyed were sand dunes, vegetated sand dunes and the gravel plains with or without artificial irrigation.

On the gravel plains vegetation varied but predominant species found were *Haloxylon salicornicum(RI)*, *Heliotropium kotschyi(H)*, *Limeum arabicum(L)*, *Dipterygium glaucum(DP)* and *Cyperus conglomeratus(C)*. In the areas that were irrigated the vegetation was more abundant and grew much faster. These artificial accelerated areas allowed Arthropod communities to establish themselves therefore creating a more suitable habitat for the many different Spider species. The last habitat that was surveyed was the sand dune and vegetated sand dunes, these habitats had limited vegetation, however scattered throughout these habitats were the *Leptadenia pyrotechnica(LE)*, *Cyperus conglomeratus* and *Limeum arabicum* plants.

Methodology

Spiders are found in many different habitats natural and artificial; in this survey the objective was to locate spiders in their natural habitat in an area of the deserts which had little or no impact from urbanization. The most common prey species for spiders are soft bodied arthropods such as Diptera, Hymenoptera and Hemiptera which need vegetation to feed off. Therefore selection of the site locations was done based on the abundance of vegetation, and based on knowledge of previously observations on vegetation and habitats. Nine sites were selected four of which were re-visited during the survey.

The survey was conducted on four separate nights over the period between September – November 2015; the survey was done during the crepuscular times either in the afternoon (17:30-03:00) or early morning (02:00-09:30) or on one occasion through both crepuscular periods (17:30-09:30).

The survey was conducted by three researchers who searched the selected sites on foot using torches to locate and capture spiders.

As there are many different types of spiders found within an arid desert eco-system there are therefore different techniques for the spiders to avoid predation. Primarily spiders in the DDCR used two predator avoidance techniques; Ground dwelling spiders will flee and go into holes or disappear into their silk-lined tubes in the sand. Other spiders, which are mainly, plant dwelling, utilize a drop-down method to avoid their predators. The arboreal spiders

produce silk strands which act as safety lines when they jump. Keeping that in mind a collection method had to be developed to catch and collect the different types of spiders.

The method that was used for the collection of the spiders that have a drop-down habit was to place a container diagonally under the branch and then close the container from above causing the spider to drop down into the container. This proved to be the most effective way of collecting our specimens. The method used to catch the ground dwelling spiders such as the Wolf spiders and Huntsman spider that have a habit of fleeing into holes and crevices was to place a plastic container over them, then to slide a board to close off the container, making it easy to lift up the spiders, and closing off the container with the lid.

The pitfall traps have previously had a little success on ground dwelling spiders, which were collected and kept.

Specimens that were collected were either kept for future reference and identification or species that were easily identified in the field were released on site.

Results

A total of 99 specimens were recorded during this survey for Spiders in the Dubai Desert Conservation Reserve they comprised a total of 9 Families and 20 species. Only 5 specimens were unable to be identified to species level but we were able to identify them to the nearest Genus level and 1 specimen was only identified to the nearest Family. (Appendix 2)

To have a better understanding of the habitat and the representative of Arachnid species a list of the abundance of species related to the habitat. The follow table indicates the relation between the vegetation and habitat.

Location:	Habitat:	Abundance:	
Site A	Dunes	7	
Site B	Irrigated Gravel plains	19	
Site C	Irrigated Gravel plains	14	
Site D	Vegetated Sand dunes	3	
Site E	Vegetated Sand dunes	6	
Site F	Irrigated Gravel plains, Vegetated Sand dunes	10	
Site G	Gravel plains	12	
Site H	Vegetated Sand dunes	14	
Site I	Lake shores	14	

Table 1: Abundance of spiders recorded at each location.

The survey indicated that there are many species of spiders in the reserve; the most dominant species that was found on the reserve was the *Evippa arenaria*. This species was found in all habitats throughout the reserve, where they were observed to have the same habits of locating themselves under vegetation. Finding these spiders was especially easy as their eyes reflected the torch light.

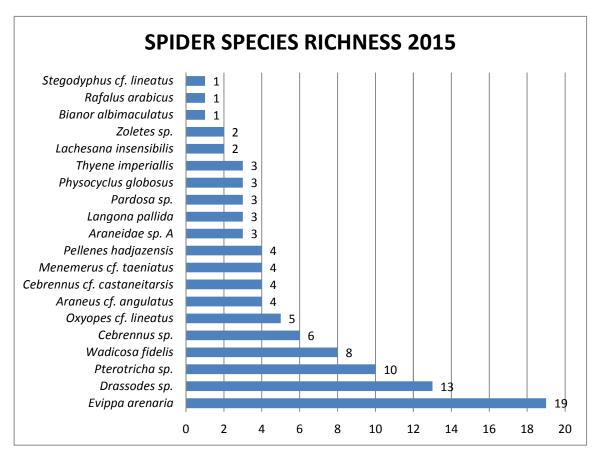


Chart 1: Species richness on reserve.

The distribution of spiders collected on the reserve indicated that there is an association between the abundance of spiders and their habitat. Irrigated gravel plains showed the greatest abundance (38%), followed by Vegetated Sand dunes (28%), Lake Shore (14%), Gravel plains (12%) and the lowest abundance on Dune habitat (7%).

Site B (Irrigated Gravel Plain) had a larger diversity of vegetation which consequently draws a large number of prey species therefore a large number of species was collected around this area. Site H being a more natural habitat with vegetated sand dunes and natural growing *Prosopis cineraria* indicated that a number of species are active around the forest area. Site I is once again a favourable area near the water edge with a large diversity of plants and insects around the lake providing a good habitat for spiders.

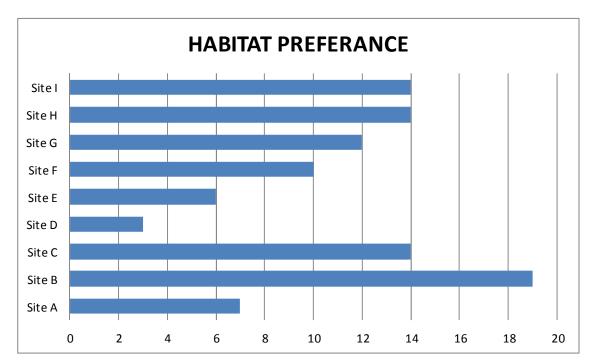


Chart 2: Habitat preference

Often spiders are seen in the desert even though it reaches well over 40°C in summer. On the sand dunes without any vegetation spiders are not often seen, while conducting this survey we did not locate any spiders in the barren areas. Most of the spiders that were located were mostly active near the edge of the gravel plains, and on the well vegetated sand dunes. Whilst walking on the gravel plains and sand dunes it was observed that the species of the Family Sparassidae will construct silk lined tubes, tubes varied in sizes, the largest tube entrance was 22mm in diameter. Many of the smaller Salticidae, Araneidae species were collected off the vegetation.

Findings

During the evenings in September and October we collected a larger number of specimens. The areas that were irrigated produced a lot more vegetation which in turn gave much more stability for the arboreal spider species.

On the gravel plains with denser vegetation, spiders were found near the outer parts of the plants, where they settled with a face-down position, this is not only to catch their prey but also to avoid predation on themselves. Smaller Araneidae and Oxyopidae spiders were found on the lower growing plants whereas the *Leptadenia pyrotechnica* has shown much more abundance of Araneidae spiders.

The evening survey conducted in the middle of November proved to be less of a success where only a few spiders were found, therefore it could indicate that the spiders either change their behavior to be more active during the warmer parts of the year or are dormant during cooler times of the year. We surveyed the same areas as during warmer months but only found one Sparassidae sp. under the only *Prosopis cineraria* in the area. Which was surprisingly as we thought before it was an open sand dune species.

Conclusion

A large number of specimens were collected during the survey nights, the specimens that were easily confirmed were kept in the DDCR curation, specimen that was not confirmed were sent for confirmation and once these results are receive the status of the Spiders found on the DDCR will be updated.

The collecting of the spiders was done on all habitats of the reserve and it was noticed that the spiders were more active during the warmer parts of the year, Further studies during the summer and winter months need to be conducted to obtain knowledge and the understanding regards to the behavior and habits of the Spiders which are found within the reserve. Further studies will also allow building up a much required reference library not only for the reserve but also for the UAE. This will entail collecting more samples to establish a data base of Spider populations in the reserve and that of the U.A.E.

In Appendix 3 a total account of the Spider species found in the Dubai Desert Conservation Reserve, which include historical capture and records. The total species that has been recorded on the reserve, a total of 11 Families and 31 Species of which a few still pending identification. The spider families that are present on the reserve are;

A total of 11 Families;

- ARANEIDAE (Orb web spiders),
- ERESIDAE (Velvet spiders),
- GNAPHOSIDAE (Ground spiders),
- LYCOSIDAE (Wolf spiders),
- OXYPIDAE (Lynx spiders),
- PHOLCIDAE (Daddy Long-legs),
- SALTICIDAE (Jumping spiders),

- SPARASSIDAE (Huntsman spiders),
- ZODARIIDAE (Ant Spider),
- THOMISIDAE (Crab spiders),
- THERIDIIDAE (Tangle-web spiders)

Appendix 1: Species abundance

Site locations Abundance:

	Site locations Abundance:									
		Site								
	Name:	Α	В	С	D	E	F	G	Н	- 1
	Araneidae									
1	Araneus cf. angulatus	1		2						1
2	Araneidae sp. A		1			2				
	Eresida									
3	Stegodyphus cf. lineatus								1	
	Gnaphosidae									
4	Drassodes sp.		4	1	1		1	2	4	
5	Pterotricha sp.	1	5				3	1		
6	Zoletes sp.		1						1	
	Lycosidae									
7	Evippa arenaria	2	2	1	1	3	4	3	2	1
8	Wadicosa fidelis									8
9	Pardosa sp.									3
	Oxypidae									
10	Oxyopes cf. lineatus	1		2	1		1			
	Pholcidae									
11	Physocyclus globosus		1						2	
	Salticidae									
12	Langona pallida	1					1		1	
13	Menemerus cf. taeniatus			3					1	
14	Pellenes hadjazensis		1	1				2		
15	Rafalus arabicus							1		
16	Thyene imperiallis		1						2	
17	Bianor albimaculatus									1
	Sparassidae									
18	Cebrennus cf. castaneitarsis			2				2		
19	Cebrennus sp.	1	3	2						
	Zodariidae									
20	Lachesana insensibilis					1		1		
•		7	19	14	3	6	10	12	14	14

Appendix 2: Species recorded during the survey period.

	Name:	Number recorded	Sites recorded	Host Plants	Collection time	specimen Collected
	<u>Araneidae</u>					
1	Araneus cf. angulatus	4	C;A;I	DP/L/C	Pm	2(GF)
2	Araneidae sp. A Eresida	3	E;B	DP/L/C	Pm	2(DDCR)
3	Stegodyphus cf. lineatus	1	Н	PC	Am	1(GF)
4	Gnaphosidae Drassodes sp.	13	<i>B;H;G;C;D;F</i>	C	Am	2(DDCR) 4(GF)
5	Pterotricha sp.	10	B;F;A;G	DP/L/C	pm	2(DDCR) 4(GF),
6	Zoletes sp. Lycosidae	2	B;H	RI/PC	pm	1 DDCR)
7	Evippa arenaria	19 8	ALL I	LE/C/RI/H	Am & pm	2(DDCR) 2(GF) 2(DDCR) 2(GF)
8	Wadicosa fidelis	O	1	Lake shore	Am & Pm	2(DDCR) 2(GF)
9	Pardosa sp.	3	I	Lake shore	Am & Pm	2(GF)
10	Oxypidae Oxyopes cf.	5	<i>C;A;D;F</i>	C/L/DP	Am	2(GF)
11	Pholcidae Physocyclus globosus	3	Н;В	PC	Pm	2(DDCR)
12	<u>Salticidae</u> Langona pallida	3	A;F;H	PC/RI	Am & Pm	2(DDCR)
13	Menemerus cf.	4	C;H	PC	Pm	2(GF)
10	taeniatus	,	0,11	10	1 111	2(01)
14	Pellenes hadjazensis	4	<i>G;B;C</i>	PC	Pm	2(GF)
15	Rafalus arabicus	1	G	GP/C/DP		1(DDCR)
16	Thyene	3	H;B	LE/C/DP/L	Pm	2(DDCR)
17	imperiallis Bianor albimaculatus	1	I	LE	Am	1(DDCR)
18	Sparassidae Cebrennus cf. castaneitarsis	4	C;G	H/L/RI	Am	2(DDCR) 2(GF)
19	Cebrennus sp.	6	B;C;A	H/L/RI		2(DDCR) 2(GF)
20	Zodariidae Lachesana insensibilis	2	E;G	L/DP/PC		1(DDCR) 1(GF)

Appendix 3: Catalogue of all Spider species found on the Reserve.

In the following section a total account of the Spider species found on the Dubai Desert Conservation Reserve, which include historical capture and records. The total species that has been recorded on the reserve, a total of 11 Families and 31 Species of which a few still pending identification. The spider families that are present on the reserve are; ARANEIDAE (Orb web spiders), ERESIDAE (Velvet spiders), GNAPHOSIDAE (Ground spiders), LYCOSIDAE (Wolf spiders), OXYPIDAE (Lynx spiders), PHOLCIDAE (Daddy legs), SALTICIDAE (Jumping spiders), **SPARASSIDAE** (Huntsman spiders). ZODARIIDAE (Ant Spider), THOMISIDAE (Crab spiders), and THERIDIIDAE (Tangleweb spiders). A brief description of the identified species found on the reserve, if no identification was possible and were pending they were labeled as Unknown

FAMILY: Araneidae (Orb weaver spiders)

Argiope sector

Arboreal spider, Body is large generally black and yellow upper parts and a very pale dorsal side. The head is small, 8 eyes situated in the front in two horizontal rows, Third pair of legs noticeable shorter than the rest. The abdomen has a spiny oval shape. These spiders are typically found on Acacia trees.



Araneus cf. (compare) angulatus.

This orb-weaving spider has proved to be both common and widespread in the UAE, although our indicative identification remains to be confirmed. It is characterized by described in the Tribulus (2015) publications.

This species was found on the *Leptadenia pyrotechnica* on the reserve, and can be assumed that this species related. These species are small and not often noticed therefore not easy to identify or photograph. (Photo by Binish Roobas)



Araneidae sp. A

This species was frequently found on *Cyperus conglomeratus*, *Limeum arabicum* and *Dipterygium glaucum*. This is a very tiny orb spider that was mostly found in late evening and early morning where they disappear before sunrise.



FAMILY: Eresidae (Velvet Spiders)

Stegodyphus cf. lineatus.

We encountered *S. lineatus* unexpectedly in a burrow in large *Prosopis cineraria* within the reserve in early summer. The flared entrance of cribellate (non-venomous spider) silk at first made us suppose it was a burrow of the crevice spider *Sahastata nigra*, but the resident spider emerged briefly while Binesh Roobas was able to capture the species and get some photos. To our surprise it was a *Stegodyphus*, we were able to extract it and confirm that it was a small, pale morph.

-----Pending Photo-----

FAMILY: Gnaphosidae (Ground spider)

Drassodes sp.

This small, pale spider lives in sand and is found widespread throughout the reserve on the edge of the gravel plains and on the open sand dune where vegetation is found.

These small spiders can be lured out by sprinkling sand in the small tube where the spider will rush out and catch their prey. On the reserve these spiders was observed feeding on large-winged flying insects, probably Hymenoptera, prey includes *Komarowia concolor* that were attracted by lights. Suggested identification by Dr. Helen Prokopenka.



Pterotricha sp.

These species was originally found by Ryan Ingram and Peter Phellen, also of the DDCR, in 2006. It's part of the Arthropods Collection.

Some account for the behavior of the *Pterotricha* sp. on the reserve has been observed that burrows were generally found on the edge of the gravel plains toward the vegetation. Burrows are seen open or closed with scratch marks. If a burrow was open, you can drop sand into the burrow where the spider will react by jumping out and investigating if there is any pray if not will start closing their burrows rapidly, this is early morning. Once you find holes at night with black light and wait till insects get attracted you will see the spider pouncing out to catch them. They follow the same procedure when not hunting, closing the shelter and letting the sand drift over the cover. Often has been seen that silk cover sand balls are located around the hole in a fan shape with silk strands leading back into the burrow.



Zoletes sp.

These spiders are mostly nocturnal, often found near vegetation. This specimen was found near the *Haloxylon salicornicum* and numerous other Zoletes sp. similar to this was found near the Prosopis cineraria. They range in colors from dark brown to pitch black. Abdomen slightly Hairy. The cephalothorax is smooth and shiny; this spider can reach up to 15mm. These spiders are harmless to humans.



FAMILY: Lycosidae (Wolf Spiders)

Evippa arenaria.

These species are predominantly nocturnal hunter and often found hiding under the vegetation in old or abandoned beetle holes. It is easy to find these species, as their eyes reflect in the flash-lights. They vary in size and some can reach about 6 centimeters. It has also been found on the gravel plains under the *Haloxylon salicornicum* and the *Heliotropium kotschyi* which is spread throughout the DDCR, and surprisingly fairly often found during the cooler parts of the year.



Widicosa fidelis.

These are small spiders that vary in colour. These species are found near the water and are able to catch and feed on small aquatic insects. Around the manmade lake several of these species was seen and only a few were collected.



Pardosa sp.

These spiders are common in the wadi's near Hatta which is less than 80km. away from the reserve. These species are commonly found near the waterholes and the large manmade lakes on the reserve. One could only speculate how these species establish themselves here on the reserve. (Photo by Ryan Ingram.)



FAMILY: Oxyopidae (Lynx Spiders)

Oxyopes cf. lineatus.

Two tan-and-white striped female lynx spiders were observed on the *Cyperus conglomeratus* having a typically downwards position, the dune grass was found mainly around the artificial irrigation areas within the reserve. Other vegetation found in the area was the *Heliotropium kotschyi*, and where drip irrigation of *Prosopis cineraria* tree seedlings.

Comparison with a large number of online photos permits relatively confident identification of these spiders as *Oxyopes lineatus*, and it shows a wide variety of coloration from region to region. (Photo by Binish Roobas)



FAMILY: Pholcidae (Daddy Long-legs)

Physocyclus globosus

These spiders are commonly found near human settlements throughout the region, and it was surprisingly found in a crevasse of large *Prosopis cineraria* located on sand dunes about 2km away from any human settlements. These species are known from Iran and only recently recorded in the UAE. (Zamani et al. 2015, El-Hennawy 2014)



FAMILY: Salticidae (Jumping Spiders)

Menemerus cf. taeniatus.

These spiders are commonly found in the *Prosopis cineraria* and throughout the year. Majid Sarhaddi filmed it extensively during the days while he was here. These jumping's spiders feed on all kinds of insects, from Lepidoptera and Hemiptera species that is associated with the *Prosopis cineraria*. (Photo by Binish Roobas)



Pellenes hedjazensis.

We found a single male in mid-June on a small shrub of the spreading *Limeum arabicum* within the reserve, in a hollow among rolling sand dunes in the northern part of the reserve. Captive in a plastic container, the spider made a small silken shield in a corner, behind which it retreated.

-----Pending Photo-----

Langona pallida.

Medium-sized with a greyish colour. The Eye field is black. Two light lines of white hair extend to the thoracic (chest) part. Anterior eyes have white hair around. Large Eyes that is located in the front. Abdomen of the male is brown with light stripe from back to front and the female has a dark brown stripe on the abdomen with light greyish brown colour on either side.



Rafalus arabicus.

Small jumping spider only reaching up to 3mm in length. Body and legs are covered in fine greyish brown hair and the lateral sides are white to light beige. The male's front pair of legs is color and has distinctive bands of hair. Carapace darkish brown hairs with lighter color in between to appear as a brown and beige zigzag pattern. Large black eyes that is protected by spiky straight black hair.



Thyene imperialis.

This is a small jumping spider that will feed on anything from Moths, Butterflies, wasps and flies. Being an active predator similar to all other jumping spiders. The will take shelter from the sun in the dense vegetation and has been observed several places throughout the year and mostly active during the day. These species are found on several different plant species being the *Prosopis cineraria*, *Cyperus conglomeratus*, *Leptadenia pyrotechnica* and the *Limeum arabica*.



Bianor albimaculatus

This is a very small jumping spider that was found on *Leptadenia pyrotechnica* near the water's edge. Being a predator and near water it has been observed feeding on Dipterans. This specimen was collected during the early morning just before sunrise.



Salticidae sp. A

This small spider was collected early morning hiding in the *Limeum arabicum*. Only one specimen was found in this survey still waiting for identification. The spider has a characteristic large globous abdomen and large carapace with brown stripes with white colour flowing on the abdomen.



Salticidae sp. B

This *Salticidae sp.* was found after sunrise on the Calotropis procera. Being an active hunter was trying to catch *Dacus longistylus*. Still pending identification.



Salticidae sp. C

Similar to that of Salticidae sp. A was found on *Limeum arabicum* on the gravel plains. Only this one specimen was found. Pending identification.



FAMILY: Sparassidae (Huntsman Spiders)

Cebrennus cf. castaneitarsis.

A large Spider with an eye pattern consistent with this genus, There were several specimens collected and found on gravel plains, and on vegetated sand dune. These spiders have the ability to produce silk tubes in the sand that reaches depth of 15 centimeters, in the sand and the gravel plains. This is a large predacious spider which can run very fast. Sightings have been recorded throughout the year, in between the *Heliotropium kotschyi* and the *Prosopis cineraria*.



Cebrennus sp.

This species are commonly found in the reserve, it vary from habitat thus you can find it around the vegetated sand dune and the edges of the gravel plains where there are plants, the plains that are bare or have been disturbed by Tree planting projects we did not find these species. The plants that are scattered throughout the reserve are the *Heliotropium kotschyi*, on the gravel plains and the *Cyperus conglomeratus*, *Limeum arabicum* and the *Dipterygium glaucum*.

These spiders are easily captured and are harmless to humans, these small Sparrasids makes small silk tube in the sand that is as deep as 10-15cm deep. Entrance opening is about 6mm wide.



FAMILY: Theridiidae. (Tangle-web spiders)

Latrodectus dahli

Small spider resembles a button spider, although it is as harmful as the black button. Abdomen is a large button shape with yellowish brown markings and distinct black dots, with long legs. Distinctive 'untidy' web. Find often under vegetation, and buildings. This specimen was found near Nazwa rock, between the rock and nearby was a *Cyperus conglomeratus* supporting the web.



Theridiidae sp.

This spider was found on an underside of a soda can by Ryan Ingram which was thrown out in the desert; Small spider that also has a real distinct globular abdomen, the web is a messy arrangement that covered the whole bottom of the can.



FAMILY: Thomisisae (Crab spiders)

Thomisus spectabilis

These are typical spiders that have bright colours that enable them to sit and wait for bees and wasps to pollinate the flowers and the grab them as they go past. This spider was seen on Nazwa rocky outcrops. They will construct egg cases in the plants that look like white cups. (Photo by Greg Simkins)



<u>FAMILY:</u> Zodariidae (Ant Spider) *Lachesana insensibilis.*

This species is known to us only from a male specimen collected in a pitfall trap and curated at the DDCR collection. Another specimen was collected and was sent away for further identification. The abdomen of the specimen is shriveled, at first we thought was incomplete but once we found the second specimen it was found we could confirm that this species has in fact a small abdomen. They are very active throughout the night and the first specimen was found on gravel plain were there was little vegetation was present, the second specimen was found also on gravel plain near *Limeum arabicum*, *Prosopis cineraria* and *Dipterygium glaucum*.



Unknown sp. A



Unknown sp. B



Unknown sp. C



Unknown sp. D



Acknowledgements

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Appreciation goes out for the photo contributors, photos of Ryan Ingram, Greg Simkins, and Binish Roobas.

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