# ANTS COLLECTED DURING THE SCIENTIFIC EXPEDITION GROUP SURVEY BS 1028, WITCHELINA RESERVE, CAMP PUG HUT, SEPTEMBER 2015.

Annette Vincent Email: *annette.h.vincent@gmail.com* 

#### **INTRODUCTION:**

The Scientific Expedition Group (SEG) in conjunction with the Nature Foundation SA (NFSA), conducted a biodiversity survey on NFSA's property at Witchelina, west of Lyndhurst, in the north of the state of South Australia. The reserve protects ecosystems that are widespread in arid Australia, but were previously underrepresented in Australia's Reserves System. Witchelina also contributes to the Trans-Australian Ecolink and the Flinders-Olary Nature Links corridors. The property has a varied landscape with areas of gibber plain, sand hills, rocky outcrops and salt lake shoreline.

This report is only concerned with the invertebrates, especially the Formicidae (ants). These were collected from 154 of 168 micro-pits put out at 14 sites and left open over a four-night period. The sites were chosen for their diversity of vegetation. The 96 micro-pits put out during Week 1 collected 1,836 ants (11 had no ants but other invertebrates were present). Formicidae formed 65.48% of total number of invertebrates collected (2,804). In Week 2, 72 micro-pits collected 1,571 ants (3 had no ants, but other invertebrates were present). Formicidae formed 56.61% of total number of invertebrates collected (6,018). Overall, a total of 12 genera of ants were collected in micro-pits.

#### LOCATION:

Witchelina Pastoral Station is located between the NE shore of Lake Torrens and the Township of Marree, 427 km NW of Adelaide, South Australia. Base camp was at the historical Pug Hut ( $30^{\circ}$  18' 17.8" S, 138° 07' 59.8" E), approximately 20 km W of Lyndhurst. This survey was in dune and swale areas in the southern portion of the reserve.

#### **HISTORY:**

Overgrazing and predation by domestic and feral animals has caused declines and extinctions of animals and plants across southern Australia. Witchelina Pastoral Station was purchased by the NFSA in 2010. The reserve covers an area of 4,219 square km. No systematic survey was carried out prior to 2010. The management of Witchelina Reserve has focused on the reduction of grazing pressure from cattle, sheep, goats, and control of feral predators.

#### **CLIMATE:**

The annual rainfall for 2015 at Leigh Creek (40 km SE of Witchelina) was 265 mm. The average annual rainfall (over last 10 years) was 223.4 mm and the mean (over 20 years) was 189 mm. Witchelina has more fine days than wet ones. The annual mean rainfall at Leigh Creek Airport (station 017110, opened in 1982, 30.60° S 138.42° E, elevation 259 m) was 224.2 mm. Good rains (higher than the annual mean

of 224.2 mm) fell in 2000 (297.8 mm), 2001 (320.8 mm), 2010 (496 mm), 2011 (278.4 mm), and 2012 (260.8 mm).

In 2015 they had a total of 265 mm rain, but 36.6 mm fell after the survey time. The mean maximum September temperature was  $23.5^{\circ}$  C and the highest mean September temperature was  $28^{\circ}$  C. The mean lowest temperature in September was  $19^{\circ}$  C (BOM 2015).

#### **METHOD:** Micro-pitfalls

Fourteen sites were surveyed. Sites PUG010 and PUG011 were not surveyed owing to a shortage of time and the distances needed to travel between the sites. All sites had two lines of 6 micro-pits (total of 12 micro-pits per site) set out 10 m apart on the outside of the macro-pit lines and 2 m away from the macro-pit line. The micro-pits were all numbered and were <sup>3</sup>/<sub>4</sub> filled with 75% ethanol.

The 8 sites PUG001–007 and PUG014 had the micro-pits set up during **Week 1** and left open over 4 nights, 21–24 September. During **Week 2**, the micro-pits of 6 sites PUG008–009, PUG012–013, PUG015–PUG016, were left open 4 nights, 26–29 September. Little opportunistic collecting was carried out owing to lack of time because of the greater distance needed to travel on difficult terrain between the sites. Opportunistic collecting was made at site PUG016 on the edge of Lake Torrens. The ants were identified and counted into genera using Shattuck 1999.

#### **RESULTS:**

#### Weather: (Table 1)

**Week 1:** The average daily maximum temperature was  $20.5^{\circ}$  C (range  $19.5-21.5^{\circ}$  C) while the average minimum was  $7.5^{\circ}$  C (range  $5.7-9.3^{\circ}$  C). The average relative humidity at 9 a.m. was 45.5% (range 36-65%) and at 3 p.m. was 25% (range 21-31%). The maximum wind gust, recorded during the time of the survey, was 57 km/h from the SSW on Monday, 21 September.

Week 2: The average maximum daily temperature was  $27.3^{\circ}$  C (range  $25.5-28.5^{\circ}$  C), while the average minimum was  $9.0^{\circ}$  C (range  $6.9-10.4^{\circ}$  C). The average relative humidity at 9 a.m. was 22% (range 20-26%) and at 3 p.m., 15.3% (range 11-18%). (BOM 2015, Leigh Creek).

Wk 1	Temp.		R.H.	R.H.	Wk 2	Tei	np.	R.H.	R.H.	
Sept., 2015	Min. °C	Max. °C	9.00 a.m.	3.00 p.m.	Sept., 2015	Min. °C	Max. °C	9.00 a.m.	3.00 p.m.	
21	9.3	20.7	65%	31%	26	6.9	25.5	26%	18%	
22	6.9	21.5	41%	24%	27	10.4	26.8	22%	15%	
23	8.1	19.5	40%	21%	28	8.8	28.5	20%	11%	
24	5.7	20.2	36%	24%	29	9.9	28.2	20%	17%	
Ave.	7.5	20.5	45.5	25.0	Ave.	9.0	27.3	22.0	15.3	

 TABLE 1: Max. & min. temperatures plus relative humidity during the survey.

#### Ant numbers and genera:

A total of 3,407 ants were collected in micro-pits during the two weeks. Week 1 totalled 1,836, with 10 genera represented, over 8 sites. Week 2 totalled 1,571, also with 10 genera represented, over 6 sites. Fewer ants were recorded (average per site of 230) in Week 1 compared to (average per site 262) Week 2.

Opportune ants were collected 200 m in from the edge of the salt encrusted Lake Torrens.

The *abundance* for the survey was 3,407: Week 1 (1,836) and Week 2 (1,571). The *richness* for the survey was 12 genera.

The *richness* of Week 1 was 10 with two of these genera, *Doleromyrma* and *Ponera* not being collected in Week 2. The *richness* of Week 2 was also 10; two of these genera, *Polyrhachis* and *Tapinoma*, were not collected in Week 1. (**Tables 2 & 3**)

Week 1 FORMICIDAE Genera	PUG01	PUG02	PUG03	PUG04	PUG05	PUG06	PUG07	PUG14	Total	%	Sites
Camponotus	49				1			1	51	2.78	3
Doleromyrma	13							1	14	0.76	2
Iridomyrmex	15	13	26	24	110	15	330	873	1406	76.58	8
Melophorus	5	1		1	13	1	14	20	55	3.00	7
Meranoplus				1	2	4			7	0.38	3
Monomorium	17	55	3	1	32	3	58	32	201	10.95	8
Pheidole	2		2	13	4	1	4	15	41	2.23	7
Ponera					1				1	0.05	1
Rhytidoponera	17	1	3	10	3	3	3	6	46	2.51	8
Tetramorium	3	3			2			6	14	0.76	4
Total No.	121	73	34	50	168	27	409	954	1836		
No. of Genera	8	5	5	6	9	6	5	8	10		

TABLE 2: Summary of ant genera collected in micro-pits at sites during Week 1.

#### TABLE 3: Summary of ant genera collected in micro-pits at sites during Week 2.

Week 2 FORMICIDAE Genera	PUG08	PUG09	PUG12	PUG13	PUG15	PUG16	Total	%	Sites
Camponotus	1	1		4		1	7	0.45	4
Iridomyrmex	205	263	25	54	54	41	642	40.87	6
Melophorus	59	25	11	75	12	105	287	18.27	6
Meranoplus			1			2	3	0.19	2
Monomorium	34	36	16	146	134	5	371	23.62	6
Pheidole	6	34	13	37	39	26	155	9.87	6
Polyrhachis					1		1	0.06	1
Rhytidoponera	7	25	2	38		2	74	4.71	5
Tapinoma		3					3	0.19	1
Tetramorium	4			23	1		28	1.78	3
Total	316	387	68	377	241	182	1571		
Genera	7	7	6	7	6	7	10		

During the opportunistic collecting on Lake Torrens, (a hard-crusted salt lake), about 100 m out onto the salt encrusted surface this turret (**Figs 1, 2 & 3**) was found and the ant captured was a *Camponotus* species. Further out, about 200 m, onto the salt lake, a small dark *Melophorus* species was dug up; it had only a tiny opening onto the salt encrusted surface.





Figs 1 & 2: An ant turret out on the salt encrusted Lake Torrens: (Micro-pit is 8 cm tall and 2.5 cm in diameter). Photo: Peter Forward



**Fig.3:** Close-up view of the top of the ant nest shown in Figs 1 & 2. Although difficult to see, the arrow points to one of the ants (*Camponotus* species) which produced the nest. **Photo:** *Peter Forward* 

Title: "Red Witchelina 2015" by Annette Vincent. Medium: Pen and red ink drawings of 14 sites at Witchelina 2015. Photos: by Black & White Photographers





**PUG001** 

**PUG002** 



**PUG003** 



**PUG004** 



**PUG006** 

See the coordinates and dominant vegetation types at each of these sites on p. 48.



**PUG007** 



PUG008



**PUG009** 



**PUG012** 



PUG013



PUG014



**PUG015** 



**PUG016** 

### SITES, GPS COORDINATES & VEGETATION:

### <u>Week 1</u>:

## PUG001: 30° 14' 39.3" S, 137° 56' 32.5" E

Very open chenopod dominated shrubland with emergent Acacia aneura.

# PUG002: 30° 14' 23.5" S, 137° 58' 45"E

Gibber plain. Low, very open chenopod dominated shrubland.

# PUG003: 30° 16' 17.7" S, 137° 59' 06.2" E

Gibber plain with scrub. Low, very open *Maireana sedifolia* shrubland.

# PUG004: 30° 18' 11.2" S, 138° 02' 44.7" E

Closed herbland with emergent Maireana aphylla.

### PUG005: 30° 17' 13.4" S, 138° 06' 03.1" E

Low, very open Maireana shrubland with emergent Acacia tetragonophylla.

# PUG006: 30° 14' 24.8" S, 138° 05' 47.5" E

Low open herbland.

### PUG007: 30° 21' 34.8" S, 137° 59' 31.2" E

Open Zygochloa paradoxa hummock grassland with emergent Acacia sp.

### PUG014: 30° 19' 44.2" S, 138° 06' 3.2" E

Low, very open shrubland with emergent Acacia aneura.

### Week 2:

### PUG008: 30° 23' 12.3" S, 137° 55' 42" E

On the south-facing sandy ridge. Open *Zygochloa paradoxa* hummock grassland with emergent *Acacia* sp.

### PUG009: 30° 25' 14.6" S, 137° 51' 35.8" E

Very open Acacia calamifolia/A. ligulata shrubland

### PUG012: 30° 23' 18.3" S, 138° 06' 01.6" E

Hard packed sand, flat area in a swale. Low, very open *Acacia aneura* shrubland.

### PUG013: 30° 23' 0.9" S, 138° 07' 09.6" E

Hard packed sand, flat area in a swale. Low open shrubland with emergent *Hakea leucoptera* and *Acacia aneura*.

### PUG015: 30° 30' 48.1" S, 137° 46' 01.5" E

Low chenopod shrubland.

### PUG016: 30° 25' 11.7" S, 138° 09' 50.1" E

Open chenopod shrubland with emergent Hakea leucoptera and Acacia sp.

### CONCLUSION:

Ant numbers in this area are very dependent on temperature. The two genera *Doleromyrma* and *Ponera* may be more adventurous in the cooler weather. The first week was considerably cooler, average maximum temperature was  $20.5^{\circ}$  C (range

19.5–21.5° C). PUG001 had very open chenopod-dominated shrubland with emergent *Acacia aneura*. This vegetation may have also favoured the *Doleromyrma*. While only one specimen of *Ponera* was found during the survey at PUG005, which had low, very open *Maireana* shrubland with emergent *Acacia tetragonophylla*.

Thus, fewer ants (229) per site, Week 1 compares to (263) per site, Week 2 which had an average maximum temperature of  $27.3^{\circ}$  C (range  $25.5-28.5^{\circ}$  C). This  $6.8^{\circ}$  C warmer supported the *Melophorus* genera, considered a warm weather genus. Even though Week 2 only had 6 sites the total number of *Melophorus* genera ants was 287 (range 11–105 per site) and only a total of 55 Week 1 (range 0–20 per site). Also, *Polyrhachis* and *Tapinoma* may be more adventurous in warmer weather, or it could be purely chance of the vegetation, when *Acacia* was flowering at the sites. PUG009 had very open *Acacia calamifolia*, and *A. ligulata* shrubland. PUG012 also had low, very open *Acacia aneura* shrubland.

These two sites, PUG007 and PUG014, sampled during Week 1 had much greater total numbers of the *Iridomyrmex* genera, 330 and 873 respectively, more than any of the sites of week 2, which ranged 35–263. The micro-pits at PUG 014 may have been near an *Iridomyrmex* nest or a good source of food. Site PUG007 had open *Zygochloa paradoxa* hummock grassland with emergent *Acacia* sp. While site PUG014 had low very open shrubland with emergent *Acacia aneura*.

During Week 2 at site PUG008 *Iridomyrmex* numbered 205 and PUG009 had 263 specimens. The aspect and vegetation of these two sites may favour this genus. Thus, PUG008 is on the south facing sandy ridge with open *Zygochloa paradoxa* hummock grassland with emergent *Acacia* sp. while PUG009 was very open *Acacia calamifolia* and *A. ligulata* shrubland. The other four sites total 184 *Iridomyrmex*, an average of only 46 per site (range 35–54).

*Iridomyrmex* and *Monomorium* occurred at every site of the survey, while *Melophorus, Pheidole,* and *Rhytidoponera* occurred at 13 of the 14 sites. (See Table 4)

These five *Formicidae* genera dominated the survey with a total of 3,278 specimens (96.2% of survey). (**Tables 4 & 5**)

Genera	Week 1	%	Week 2	%	Wk 1+ Wk 2	%			
Iridomyrmex	1406	80.39	642	41.99	2048	62.48			
Monomorium	201	11.49	371	24.26	572	17.45			
Melophorus	55	3.14	287	18.77	342	10.43			
Pheidole	41	2.34	155	10.14	196	5.98			
Rhytidoponera	46	2.63	74	4.84	120	3.66			
Most abundant genera.	1749		1529		3278				
Total No. of ants in Survey	1836		1571		3407	96.21			

TABLE 4: Ant numbers of 5 most abundant genera that occur at most sites.

*Iridomyrmex* dominated the Week 1 with 76.6% of the week's survey and dropped in Week 2 to 40.9%. Whereas the warm weather loving genera, *Monomorium* went from 10.9% in Week 1 to 23.6% in Week 2, *Melophorus* went from 3% in Week 1 to 18.3% in Week 2 and *Pheidole* went from 2.2% to 9.9% of the respective weekly surveys.

Rhytidoponera, a solitary ant that occurred at 13 of the 14 sites went from 2.5% to 4.7% of the total ant numbers.

	Wk 1	%	Wk 2	%	Wk 1+Wk 2	%				
Formicidae	1836	65.48	1571	48.88	3407	56.61				
Collembola	666	23.75	1237	38.49	1903	31.62				
Other Invertebrates	302	10.77	406	12.63	708	11.76				
Total No. Invertebrates	2804		3214		6018					

**TABLE 5 Total number of invertebrates** 

The other 7 genera seem incidental, forming only 3.8% of *Formicidae* in the survey.

The *Camponotus* genus had 49 specimens at site PUG001, but only occurred at two other sites in Week 1 and only at four sites during Week 2, with a total of 58 specimens collected in micro-pits during the survey. All these sites had emergent *Acacia* species.

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