

Witchelina Expedition II – Biological Survey 2016

Data Report for the Nature Foundation

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1 Introduction

1.1 Background

Witchelina was operated as a commercial pastoral station until it was purchased by the Nature Foundation of South Australia in 2010. Following purchase, the Foundation removed all domestic stock and the majority of feral goats have been controlled. Witchelina Nature reserve has been added to the National Reserve System and is managed by the Foundation to save, protect and restore its diverse and unique habitats.

In order to assess the performance of the conservation actions undertaken at Witchelina a comparison with conditions that existed prior can add valuable insight. A number of biological surveys and assessments for a range of purposes and requirements have been undertaken at Witchelina and some of these extend to the period prior to the removal of stock and the majority of goats by the foundation. The range of surveys undertaken at Witchelina include the following;

- initial pastoral condition assessment completed by the Pastoral Land Management Unit of the Department of Environment Water and Natural Resources, in 1999
- 2011 biological survey by consultancy firm EBS Ecology (EBS 2012)
- a repeat of the pastoral assessments and addition of new sites by Flinders University in 2014
- Witchellina I – unreported survey using BSSA methods by the Scientific Expedition Group in 2015 (Sharrod, 2016)

The purpose of this survey was to consolidate this historical work into a repeatable format that can be used to assess the performance of the conservation actions that have been implemented by the Foundation.

1.2 Objectives

The objectives of the Witchelina survey are to;

1. Align historical datasets where possible to establish a series of biological survey sites that can be used to describe and document the biological resources of Witchelina Station and provide a general indicator of changes that may occur as a result of conservation actions.
2. Incorporate historical data where possible to establish a vegetation monitoring program that can be used to measure the change in vegetation composition and structure as a result of conservation actions.
3. Contribute to the biological inventory of the reserve.

1.3 Scope of this report

This data report provides a formal record of the data collected and the essential metadata describing how when and where these data were collected to allow the survey methods to be repeated efficiently and accurately. No attempt is made to analyse the data, draw conclusions or provide advice and recommendations. However, a summary of the data is presented and a basic survey report on the highlights of the survey is attached in Appendix L.

2 Method

The range of historical survey methods were reduced to just two methods that were applied to Witchelina Expedition II. A fauna survey using the Biological Survey of South Australia (BSSA) methodology (Owens, 2000) and a Flora Condition survey (Jessup) using the pastoral condition methodology developed by the Pastoral Unit of Natural Resources SA (2011).

2.1 BSSA Survey Sites

The survey methodology followed the methodology that has been applied by the Department of Environment, Water and Natural Resources to survey the biodiversity of South Australia since the 1980's (Owens, 2000). Survey sites were selected to align with the EBS sites (EBS 2011) where they could fit in to the BSSA survey design. (i.e. where EBS had a flora and fauna site within the same land form and within 1 km (1 sq km is the BSSA definition of a survey site) they were integrated to represent the one BSSA site, with line A and Line B.

The methodology from previous surveys was adjusted to align with the BSSA methodology so that flora and fauna data could be integrated for analysis and comparison with other BSSA sites around South Australia. The EBS pit grids were not used for this survey. Photo points were established and photos taken at both the A and B pit line. The official SA Government survey site identifier discs were attached to the A Line Photo point sighter peg. An up photo (BSSA method) centered on the top of the sighter peg (Appendix N) and a down photo (Pastoral Unit Method) was centered on the bottom of the sighter peg for each photo point location. Where survey sites were integrated with the EBS site a photo was also take at the EBS photo point to allow comparison with the historical EBS survey data. Only the up photos (BSSA) have been included in this report (Appendix N).

The prefix WIT is applied to site codes as Witchelina Homestead was used as the base camp for the duration of the survey. A map of the BSSA sites established on Witchelina during this survey and the sites proposed for the next survey are shown in Figure 1.

2.2 Fauna Survey

The Fauna survey followed the methods described by Owens (2000) and sites were established using the BSSA survey methodology. A single AM and PM bird survey was completed at each WIT site and the survey area aggregated to include both the A and B pit lines. However, a PM bird survey was the only fauna data collected at WIT 04, WIT 05 and WIT 06 as extensive rainfall prevented further access during the survey period. Fauna taxonomy follows the DEWNR Census of South Australian Vertebrates 2017, <http://www.environment.sa.gov.au/>.



Figure 1: Map of BSSA sites setup and surveyed during the current survey (Yellow) and proposed sites for the next survey (white).

2.3 Flora Condition (Jessup) survey

The vegetation survey method was modified for the 2016 survey (Witchelina II). Rather than the BSSA flora survey methods that were used for the 2015 SEG survey, an alternative approach following the Rangeland condition monitoring methods that have been applied by the Pastoral Land Management Unit (2011) were used. These methods have been used to assess pastoral condition at sites established across South Australia by the Pastoral Unit predecessors dating back to the 1970's (Lay, 1979), and a number of these sites were established on Witchelina during the initial Pastoral Lease Assessment in 1999. The method was also repeated at Witchelina by Flinders University in 2014 see (Flinders University, 2015). An overview of the survey methods applied during Expedition II is provided in the Expedition Manual attached in Appendix K. A detailed explanation of the Jessup method is provided in Pastoral Land Management Unit (2011).

An additional modification was added during this survey by including perennial grasses that have distinct tussocks or butts in the Jessup counts. These grasses were including in the method as an indicator of seasonal production in the absence of sheep grazing in 2010 (Pastoral Land Management Unit, 2011). The grass species included were *Sporobolus actinocladus*, *Astrebala pectinata*, *Diacantheum sericeum*, *Chloris truncata* and *Panicum decompositum*. It is assumed that these grasses were either not included, were not present due to grazing, or were indistinguishable during previous surveys.

A summary of the survey history for each site is provided in Table 1 and Table 2. Flora taxonomy follows the DEWNR Census of South Australian Flora, <http://www.environment.sa.gov.au>. The location of the Jessup survey sites on Witchelina are shown in Figure 2 and the GPS locations are provided in Table 2.

TABLE 1: Site History Summary for biological surveys undertaken at Witchelina. (See Appendix F and H for coordinates of WIT sites)

	Site No.	BSSA Pit Line	BSSA Veg Quadrat	EBS Site Code Equivalent	EBS Pitgrid	Comment
1	WIT001	SEG 2016 SEG 2016		M9 (Plant)		
2	WIT002			B3 (Fauna)		
3	WIT003		EBS 2011	M1 (Plant) M1(Fauna)	EBS 2011	
4	WIT004			B2 (Fauna)		PM bird survey only by SEG 2016
5	WIT005			B1 (Fauna)		PM bird survey only by SEG 2016
6	WIT006		EBS 2011	M2 (Plant) M2 (Fauna)	EBS 2011	PM bird survey only by SEG 2016
7	WIT007	SEG 2016 SEG 2016		B4 (Fauna)		
8	WIT008	SEG 2016 SEG 2016	EBS 2011	M3 (Plant)		
9				M3 (Fauna)	EBS 2011	950m, NNE from WIT008 01B in different habitat (Floodplain)
10	WIT009	SEG 2016 SEG 2016	EBS 2011	M10 (Plant)		
12	WIT010	SEG 2016 SEG 2016	EBS 2011	M11 (Plant)		
13	WIT011	SEG 2016 SEG 2016		B5 (Fauna)		
14	WIT012	SEG 2016 SEG 2016		B6 (Fauna)		
15	WIT013	SEG 2016 SEG 2016		M12 (Plant)		
	WIT014		EBS 2011	M13 (Flora)		
16	PUG001	SEG 2015	SEG 2015			
17	PUG002	SEG 2015	SEG 2015	B7 (Fauna)		
18	PUG003	SEG 2015	SEG 2015 EBS 2011	M4 (Fauna) M4 (Plant)	EBS 2011	
19	PUG004	SEG 2015	SEG 2015	B8 (Fauna)		
20	PUG005	SEG 2015	SEG 2015 EBS 2011	M5 (Fauna) M5 (Plant)	EBS 2011	
21	PUG006	SEG 2015	SEG 2015	B9 (Fauna)		
22	PUG007	SEG 2015	SEG 2015 EBS 2011	M6 (Fauna) M6 (Plant)	EBS 2011	
23	PUG008	SEG 2015	SEG 2015	B11 (Fauna)		
24	PUG009	SEG 2015	SEG 2015	B12 (Fauna)		
25	PUG010	SEG 2015	SEG 2015 EBS 2011	B10 (Fauna) B10 (Plant)		
26	PUG011	SEG 2015	SEG 2015			
27	PUG012	SEG 2015	SEG 2015			
28	PUG013	SEG 2015	SEG 2015			
29	PUG014	SEG 2015	SEG 2015			
30	PUG015	SEG 2015	SEG 2015			
31	PUG016	SEG 2015	SEG 2015			
32			EBS 2011	M7 (Plant)		
33			EBS 2011	M8 (Plant)		

NOTE: **Bold** = Traps or survey pegs remain in place; **Green** – Recommended follow-up to complete program;
EBS 2011 – EBS (2011); SEG 2015 – Sharrad (2016); SEG 2016 –This report

TABLE 2: Site history summary for Jessup transects undertaken at Witchelina

	Site No.	Pastoral Unit 1999	Flinders Uni 2014	SEG 2016	Lat	Long	Comments
1	6797		✓		-30.1254	137.8547	SEG 2016 – inaccessible due to rain
2	6788		✓	✓	-29.9682	138.1014	
3	6789	✓	✓	✓	-29.9350	138.1741	
4	6790	✓	✓		-29.8067	138.0224	SEG 2016 – site couldn't be found
5	6791		✓	✓	-29.9481	137.9474	
6	6792		✓	✓	-29.8599	137.9023	
7	6794		✓	✓	-29.9557	137.7344	
8	6795	✓	✓	✓	-29.9981	137.7222	
9	6796		✓		-30.1150	137.7477	SEG 2016 – inaccessible due to rain
10	6798		✓		-30.0874	137.8448	SEG 2016 – inaccessible due to rain
11	6799	✓	✓	✓	-30.0119	137.7953	
12	6800		✓	✓	-29.9903	137.8458	
13	7301		✓	✓	-30.0307	137.9173	
14	7302		✓	✓	-30.0597	138.0123	
15	7303		✓	✓	-30.0549	138.0894	
16	7321		✓		-30.1383	138.1346	SEG 2016 – inaccessible due to rain
17	7322		✓		-30.2333	138.0961	SEG 2016 – inaccessible due to rain
18	7324		✓		-30.2912	138.0809	SEG 2016 – inaccessible due to rain
19	7325		✓		-30.3038	138.0495	SEG 2016 – inaccessible due to rain
20	7326		✓		-30.1855	137.9149	SEG 2016 – inaccessible due to rain
21	7576	✓	✓	✓	-29.9798	138.0147	
22	813		✓	✓	-29.8473	137.8986	
23	814		✓		-29.8990	137.8958	SEG 2016 – site couldn't be found
24	815		✓	✓	-29.9689	137.8790	

Green – Recommended follow-up to complete survey program

EBS 2011 – EBS (2011)

SEG 2015 – Sharrad (2016)

SEG 2016 – This report

Flinders Uni 2014 – Flinders University (2015)

3 Results and Discussion

3.1 Fauna Survey

A total of 93 species were observed over the 12 day survey (Table 3). This included 58 birds, 8 mammals, 25 reptiles and 2 amphibians. The total number of observations was much lower than Expedition I, but as shown in Table 3, the number of different species observed was high. The number of bird species was significantly higher than Witchelina I. The number of reptile species was also supported by an intensive opportunist search effort. Highlights for the survey include the first Great Desert Slider (*Lerista desertorum*) ever recorded at Witchelina and the first Eastern Striped Skink (*Ctenotus spaldingi*) collected from the property for the South Australian Museum. A summary of all fauna records is provided in Table 4.

An important subfossil site was also located in a number of shallow recesses on a rocky slope near Lisbon Well. The sites were found by Garry and Michelle Trethewey while on an opportunistic search. Details of the records and location of the sites are provided in Appendix O. Graham Medlin from the SA Museum identified 10 native mammal species including;

Greater Stick Nest Rat (*Leproillus conditor*) Extinct
 Lesser Stick Nest Rat (*L. apicalis*) Extinct
 Spinifex Hopping Mouse (*Notomys alexis*) (probable)
 Long-tailed Hopping Mouse (*N. longicaudatus*) Extinct
 Western Barred Bandicoot (*Perameles bougainville*)
 Gould's Mouse (*Peudomys gouldii*) Extinct
 Plains Mouse (*P. australis*) (probable)
 Bolam's or Sandy Inland Mouse (*P. bolami* or *P. hermannsburgensis*)
 Long-haired Rat (*Rattus villosissimus*)
 Fat-tailed or Striped Faced Dunnart (*Smithopsis crassicaudata* or *P. macroura*)

TABLE 3: Number of species and total number of records (in brackets) collected during Witchelina Expedition I and Expedition II.

	Witchelina I	Witchelina II
Mammals*	11 (80)	8 (21)#
Birds	39	58
Reptiles	32 (421)	25 (109)
Amphibians	0 (0)	2 (2)
TOTAL	82 (501)	93 (132)

* includes introduced species

does not include sub fossil records

3.2 Flora Condition (Jessup) Survey

A total of 26 rangeland conditions monitoring sites have been established on Witchelina. Of these, 24 have been established with Jessup transects. Five were established by the original pastoral lease assessment in 1999 and 19 were added by Flinders University in 2014. A total of 14 were repeated during the current survey and provide direct comparisons of perennial shrub/grass numbers and changes in floristic composition reflecting species richness (Table 5). Of the 14 sites visited, four (6799, 7576, 6789 and 6795) were setup with Jessup transects during the initial Pastoral Lease Assessment in 1999, thus providing long term comparison of perennial shrub populations covering 17 years. However, no such analysis has been made in this report. Between the two most recent surveys (2014 and 2016) there were population increases of the main rangeland condition indicator (decreaser) species as follows.

The abundance of mature *A. vesicaria* increased at 10 of the 11 sites supporting this species, with significant increases at;

6792 (7 – 86 mature),
 6799 (18 – 50 mature)
 6794 (215 – 247 mature)
 7576 (29 – 41 mature)

The abundance of mature *M. astrotriche* increased at 10 of the 12 sites supporting this species, with significant increases at;

6792 (13 – 115 mature)

7301 (2 – 9 mature)

7302 (9 – 15 mature & 1 – 21 juvenile)

7576 (55 – 85 mature and 31 – 46+ juveniles; may reflect the survival of the 31 original juveniles recorded in 1999).

The change in the less palatable species (increasers) was much less pronounced. The number of sites showing an increase in *M. pyramidata* was seven, with five sites showing a decrease.

Other chenopod shrubs of low palatability including *Maireana appressa* and *Sclerolaena tatei* showed an increase at five sites and a decrease at two.

These results indicate that the conservation efforts implemented by the Nature Foundation SA are improving the rangeland condition at Witchelina and delivering the environmental outcomes they are chasing.

NOTE: Flora condition survey sites may have been prefixed with the letters QS. This prefix denotes the site as a Quantitative Survey site using the methods of Pastoral Land Management Unit (2011). As all sites used in this survey were quantitative the prefix has not been included here.

TABLE 4: Summary of Vertebrate Species Records (note count is number of records. Each record may include an observation of multiple individuals).

		WIT1	WIT3	WIT4	WIT5	WIT6	WIT7	WIT8	WIT9	WIT10	WIT11	WIT12	WIT13	WIT OPP	TOTAL
MAMMALS															
<i>Felis catus</i>	Domestic Cat (Feral Cat)											1		1	2
<i>Macropus robustus</i>	Euro													1	1
<i>Macropus sp.</i>												1	2		3
<i>Mus musculus</i>	House Mouse								2		2		2		6
<i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)											2	2	1	5
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart									1					1
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart							1							1
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna													1	1
<i>Vulpes vulpes</i>	Fox (Red Fox)											1			1
REPTILES															
<i>Cryptoblepharus australis</i>	Desert Wall Skink						1		1					1	3
<i>Ctenophorus pictus</i>	Painted Dragon											1			1
<i>Ctenophorus vadrappa</i>	Red-barred Dragon													1	1
<i>Ctenopus olympicus</i>	Saltbush Ctenopus	1					1							1	3
<i>Ctenopus regius</i>	Eastern Desert Ctenopus						1						1	2	4
<i>Ctenopus spaldingi</i>	Eastern Striped Skink								1						1
<i>Ctenopus strauchii</i>	Short-legged Ctenopus							4			2	1			7
<i>Diplodactylus tessellatus</i>	Tessellated Gecko													3	3
<i>Egernia stokesii</i>	Gidgee Skink	1												2	3
<i>Gehyra versicolor</i>	Eastern Tree Dtella						1		2					5	8
<i>Heteronotia binoei</i>	Bynoe's Gecko												4	2	6
<i>Lerista desertorum</i>	Great Desert Slider						1							4	5
<i>Lerista timida</i>	Dwarf Three-toed Slider	1					1				1			1	4
<i>Lucasium byrnei</i>	Pink-blotched Gecko							1		1	1				3
<i>Menetia greyii</i>	Dwarf Skink								1	1				1	3
<i>Morethia adelaidensis</i>	Adelaide Snake-eye										1				1
<i>Morethia boulengeri</i>	Common Snake-eye	2						1	1						4
<i>Pogona vitticeps</i>	Central Bearded Dragon								1				2	5	8
<i>Pseudonaja aspidorhyncha</i>	Patch-nosed Brown Snake													1	1
<i>Strophurus intermedius</i>	Southern Spiny-tailed Gecko												1		1
<i>Suta suta</i>	Curl Snake													1	1
<i>Tiliqua rugosa</i>	Sleepy Lizard								1					2	3
<i>Tympanocryptis intima</i>	Smooth-snouted Earless Dragon					1								3	4
<i>Underwoodisaurus milii</i>	Barking Gecko													2	2
<i>Varanus gouldii</i>	Sand Goanna													1	1
BIRDS															
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater						2			1				2	5

		WIT1	WIT3	WIT4	WIT5	WIT6	WIT7	WIT8	WIT9	WIT10	WIT11	WIT12	WIT13	WIT OPP	TOTAL
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill													1	1
<i>Anthochaera carunculata</i>	Red Wattlebird	2													2
<i>Anthus australis</i>	Australian Pipit							2							2
<i>Apelolophus leucopsis</i>	Southern Whiteface						1								1
<i>Aquila audax</i>	Wedge-tailed Eagle													1	1
<i>Artamus cinereus</i>	Black-faced Woodswallow	2								1	1	1	2	3	10
<i>Barnardius zonarius</i>	Australian Ringneck													1	1
<i>Cacatua sanguinea</i>	Little Corella	1					2	1	1			1		1	7
<i>Calamanthus campestris</i>	Rufous Fieldwren				1	1					1				3
<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo													1	1
<i>Cheramoeca leucosterna</i>	White-backed Swallow		1										1	1	3
<i>Cincloramphus cruralis</i>	Brown Songlark					1									1
<i>Cincloramphus mathewsi</i>	Rufous Songlark												2	2	4
<i>Cinclosoma cinnamomeum</i>	Cinnamon Quailthrush	1						1				1			3
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike						1	1					1	2	5
<i>Corvus bennetti</i>	Little Crow													1	1
<i>Corvus coronoides</i>	Australian Raven						1	1					2	2	6
<i>Dromaius novaehollandiae</i>	Emu	1					1			2		2	1		7
<i>Egretta novaehollandiae</i>	White-faced Heron													1	1
<i>Elseya melanops</i>	Black-fronted Dotterel													1	1
<i>Eolophus roseicapilla</i>	Galah	2		1			1	1	1				2	3	11
<i>Epthianura aurifrons</i>	Orange Chat				1	1									2
<i>Falco berigora</i>	Brown Falcon				1									1	2
<i>Falco cenchroides</i>	Nankeen Kestrel	2					1		1	1		1		1	7
<i>Gavialis virescens</i>	Singing Honeyeater	1	1	1				2		2			2	3	12
<i>Geopelia cuneata</i>	Diamond Dove													1	1
<i>Grallina cyanoleuca</i>	Magpie													1	1
<i>Gymnorhina tibicen</i>	Australian Magpie	1											1	1	3
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard						1							1	2
<i>Hieraaetus morphnoides</i>	Little Eagle													1	1
<i>Hirundo neoxena</i>	Welcome Swallow												1	2	3
<i>Lalage tricolor</i>	White-winged Triller							1					1	2	4
<i>Malurus lamberti</i>	Variegated Fairywren						2	1	1				1	2	7
<i>Malurus leucopterus</i>	White-winged Fairywren		1	1	1	1		1		1	2	2	2	1	13
<i>Manorina flavigula</i>	Yellow-throated Miner	2					1							1	4
<i>Melanodryas cucullata</i>	Hooded Robin													1	1
<i>Melopsittacus undulatus</i>	Budgerigar	2					2	2	2	2	1	2	1	4	18
<i>Milvus migrans</i>	Black Kite					1	1								2
<i>Neophema elegans</i>	Elegant Parrot						1								1
<i>Ninox boobook</i>	Southern Boobook													1	1

		WIT1	WIT3	WIT4	WIT5	WIT6	WIT7	WIT8	WIT9	WIT10	WIT11	WIT12	WIT13	WIT OPP	TOTAL
<i>Ocyphaps lophotes</i>	Crested Pigeon	2					2							1	5
<i>Oreoica gutturalis</i>	Crested Bellbird													2	2
<i>Pardalotus rubricatus</i>	Red-browed Pardalote													1	1
<i>Pardalotus striatus</i>	Striated Pardalote	1					1		1					1	4
<i>Petrochelidon nigricans</i>	Tree Martin						2		2			1			5
<i>Phaps chalcoptera</i>	Common Bronzewing	1													1
<i>Podargus strigoides</i>	Tawny Frogmouth													1	1
<i>Pomatostomus superciliosus</i>	White-browed Babbler												1	2	3
<i>Psephotus varius</i>	Mulga Parrot	1												1	2
<i>Psophodes cristatus</i>	Chirruping Wedgebill			1									2		3
<i>Ptilotula penicillata</i>	White-plumed Honeyeater		1				2		3					1	7
<i>Pyrrholaemus brunneus</i>	Redthroat													1	1
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	1				2		2				2	3	11
<i>Taeniopygia guttata</i>	Zebra Finch	1	1	1	1	1	2	2	1		1	2	3	4	20
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	2	1						1				2	2	8
<i>Turnix velox</i>	Little Buttonquail												1		1
FROGS															
<i>Litoria rubella</i>	Desert Tree Frog													1	1
<i>Neobatrachus sudelli</i>	Sudell's Frog						1								1
TOTAL No. Species		22	7	5	5	7	27	16	19	10	10	15	27	66	93

TABLE 5: Jessup Survey Data Summary

Photo point site																																								
Survey date		6797	6788	6788	6789	6789	6790	6791	6791	6792	6792	6794	6794	6795	6795	6796	6798	6799	6799	6800	6800	7301	7301	7302	7302	7303	7303	7321	7322	7324	7325	7326	7576	7576	813	813	814	815	815	
		2014	2014	2016	2014	2016	2014	2014	2016	2014	2016	2014	2016	2014	2016	2014	2014	2016	2016	2014	2016	2014	2016	2016	2016	2014	2016	2014	2014	2014	2014	2014	2016	2014	2016	2014	2016	2014	2016	2016
	<i>Acacia oswaldii</i>			1																																				
j	<i>Acacia victoriae</i>	-	(-)		-			1		-						-	-	-											-	-					-		-	-	-	
m	<i>Acacia victoriae</i>	-	-9	11	-			7	2	-		-		-		-	-	-								1						1	-			1	-	-	-	
m	<i>Alectryon oleifolius</i>	-	(-)		-			-			1	1	-	-		-	-	-											-	-					-		-	-	-	
	<i>Astrebla pectinata</i>																									8														
m	<i>Atriplex nummularia</i>	-	(-)		-			-	-	-				-		4	-	-																						
j	<i>Atriplex vesicaria</i>	-	(-)		-			127	20+	-	2	16		2		-	-	-	5	-		34		3			26	2	-	-	217	6	5	-		18	-			
m	<i>Atriplex vesicaria</i>	-	(-)		-	3	47	44	48	7	86	215	247	8	13	1	-	18	50	-		32	35	3	7	-	0	51	20	-	-	71	29	41	3	2	57	1	2	
	<i>Chloris truncata</i>																									9														
	<i>Diacantium sericeum</i>																								46+															
	<i>Enchylaeon tomentosa</i>																																1							
m	<i>Eragrostis setifolia</i>										1															25+									62+					
m	<i>Eremophila duttonii</i>	-	(-)		-			1	-	-		-		1	2	-	-	-										-	2	13	-	-	-		-		2	-		
m	<i>Eremophila glabra</i>	1	(-)		-			-	-	-	-	-		-		-	-	-										-	-	-	-	-	-		-	-	-	-	-	
m	<i>Eremophila maculata</i>	1	(-)		-			-	-	-	-	-		-		-	-	-										-	-	-	-	-	-		-	-	-	-	-	
j	<i>Frankenia serpyllifolia s.l.</i>	-	(-)		-			-	-	-	-	-		-		2	-	-										-	-	-	-	-	-		-	1	-	-	-	
m	<i>Frankenia serpyllifolia s.l.</i>	-	(-)		-			-	-	-	1	-		-		9	16	-	2	-		3	8	23	27	-	-	-	-	-	-	-	-		6	9	-	-	-	
m	<i>Frankenia spp</i>	-	(-)		-			-	-	-	-	-		-		-	-	-										-	-	-	-	-	-		8	-	-	-	-	
m	<i>Gunniopsis quadrifida</i>	-	(-)		2	4	-	-	-	-	-	-		-		-	-	-										-	-	-	-	-	-	-		-	-	-	-	
j	<i>Maireana aphylla</i>	58	(-)		-			-	-	-	-	-		-		2	-	-										-	-	-	-	-	-		-	-	-	-	-	
m	<i>Maireana aphylla</i>	142	(-)		1			-	-	-	-	-		-		87	3	-							38	44	-	10	-	28	-	-	-		-	-	-	-	-	
m	<i>Maireana appressa</i>	-	(-)		-			-	-	4	7	-		-		-	-	-										-	-	-	-	-	-	14	22	18	-	-	-	
j	<i>Maireana astrotricha</i>	-	(10)	96+	-	30	-	-	-	-	-			1		-	-	-	47	-		-		1	21	-	-	-	-	-	-	4	31	46+	-	8	6			
m	<i>Maireana astrotricha</i>	-	(99)	107	2	8	112	2	3	13	115	2	2	54	47	-	-	47	54	-		2	9	9	15	-	17	-	20	-	-	55	85	-	1	29	36	39		
j	<i>Maireana pyramidata</i>	-	(-)		-	15	-	1	20	-	-	-		-		-	3	-				4	-	-	-			-	-	-	-	-	-	-	-	-	-	9		
m	<i>Maireana pyramidata</i>	-	(-)	2	16	28	12	145	113	48	235	-	1	-		-	3	6	5	-		37	31	7	13	-	1	52	1	63	-	3	2	4	5	11	-	76	72	
	<i>Maireana turbinata</i>								1										3						1															
	<i>Minuria cunninghamii</i>					1																				4														
m	<i>Myoporum montanum</i>	-	(-)		-			-	-	-	-	-		-		-	-	-										-	-	-	-	-	-		4	2	-	-	-	
j	<i>Myoporum montanum</i>																																			1				
m	<i>Osteocarpum acropterum</i>																			1		65													5					
m	<i>Nitraria billardieri</i>	-	(-)		-			-	-	-	-	-		-		-	-	-									-	-	-	-	-	-	-		6	7	-	-	-	
	<i>Panicum decompositum</i>																							2			10													
m	<i>Ptilotus obovatus</i>	-	(-)		-			-	-	-	-	-		2		-	-	-				-		-	1	-		-	-	-	-	-	-	-	-	-	-	3		
m	<i>Rhagodia spinescens</i>	-	(1)	1	-			3	2	1	-	-		-		-	-	-				4	-	-	-		-	-	-	-	-	-	-	-		2	-	-	-	
m	<i>Sclerolaena eriacantha</i>	-	(-)		-			-	-	-	-	-		-		-	-	-				-						-	-	-	-	-	-	-	-	-	-	-	-	

Photo point site		Survey date																																					
		6797	6788	6788	6789	6789	6790	6791	6791	6792	6792	6794	6794	6795	6795	6796	6798	6799	6799	6800	6800	7301	7301	7302	7302	7303	7303	7321	7322	7324	7325	7326	7576	7576	813	813	814	815	815
		2014	2014	2016	2014	2016	2014	2014	2016	2014	2016	2014	2016	2014	2016	2014	2014	2016	2016	2014	2016	2014	2016	2014	2016	2014	2016	2014	2014	2014	2014	2014	2016	2014	2016	2014	2016	2014	2016
j	<i>Sclerolaena tatei</i>	-	(-)		-		-	-		-		-		-		-	-	2		-		-		-		-		-	-	-	-	-		-	-	-	-	-	4
	<i>Sclerolaena tatei</i>	-	(3)		-		-	-		-		-		-		-	-	48	118	-		-		-		-		-	-	-	-	-		-	-	-	-	-	-
	<i>Sida intricata</i>			6							13				2											3													
	<i>Sporabolus actinocladus</i>											8						3					42		100		100												
m	<i>species 1</i>	-	(-)		-		-	-		-		-		-		-	-	-	3			4		-		-		-	-	-	-	-	-	-	-	-	-	-	-
m	<i>species 2</i>	-	(-)		-		-	-		-		-		-		-	-	-			3		-		-		-		-	-	-	-	-	-	-	-	-	-	-
m	<i>species 4</i>	-	(-)		-		-	-		-		-		-		-	-	-					-		-		-		-	-	-	-	-	-	-	-	-	-	-
m	<i>Tecticornia sp. 1</i>	-	(-)		-		-	-		-	24	-		-		-	-	-					-		-		-		-	-	-	-	-	-	35	14	-	-	-
j	<i>Tecticornia sp. 2</i>	-	(-)		-		-	-		-		-		-		-	-	-					-		-		-		-	-	-	-	-	-	2	2	-	-	-
m	<i>Tecticornia sp. 2</i>	-	(-)		-		-	-		-		-		-		-	-	-					-		-		-		-	-	-	-	-	-	116	102	-	-	-
m	Density	144	(112)	128	21	44	172	201	169	74	283	217	258	65	64	101	22	119	235	0	1	85	217	43	164	39	180	120	33	96	28	79	86	165	199	170	100	116	117
j	Density	58	(10)	0	0	45	0	129	41	0	2	16	0	3	0	4	3	2	52	0	0	38	0	4	21	0	0	26	2	0	0	221	37	51+	2	2	26	15	
	Total Density	202	(122)	128	21	89	172	330	210	74	285	233	258	68	64	105	25	121	287	0	1	123	217	47	185	39	180	146	35	96	28	300	123	216	201	172	126	131	117
	Species Richness	3	(4)	6	4	5	4	5	6	6	9	2	4	4	4	4	3	4	7	0	1	7	10	5	8	2	9	3	4	3	1	4	3	6	8	10	6	4	4

NOTES;

j = juvenile
m = mature
- = absent

4 References

Flinders University (2015). Witchelina Soil Seedbank Project - Supplementary Material for Final Report. Unpublished report for the nature Foundation.

Department of Environment Water and Natural Resources (2016) Vascular plants BSSA taxonomy. http://www.environment.sa.gov.au/Science/Information_data/Biological_databases_of_South_Australia/informationsharing. Accessed (10th May 2017) DENR 2017. Online taxonomy record.

EBS (2012). Witchelina Reserve Flora and Fauna Survey, Spring 2011. Report to Client. EBS Ecology, Adelaide.

Lay, B.G. (1979). Shrub population dynamics under grazing: a long-term study. In: Graetz, RD; Howes, KMW. Chenopod shrublands. Proceedings of a Symposium held by the Rangelands Research Unit of the Division of Lands Resources Management at the Riverina Laboratories, Deniliquin, N.S.W., 15-17 October, 1975. Studies of the Australian Arid Zone. In: Melbourne, Vic: CSIRO Division of Land Resources Management: 196p

Medlin, G. (2016). Analysis of small bones from an old owl roost on Witchelina. *SEGments* Vol. 32. No.3, December. Scientific Expedition Group Inc. Adelaide.

Niejalke, D.P. (2017). Survey Report: Witchelina Expedition II. *SEGments* Vol. 32. No.4, March. Scientific Expedition Group Inc. Adelaide.

Owens, H (2000) Guidelines for vertebrate surveys in South Australia using the biological survey of south Australia, Department for Environment and Heritage SA.

Pastoral Land Management Unit (2011). Pastoral Lease Assessment Technical Manual: Technical detail for the methods to be used for the second round of pastoral assessments in SA. Version 3, Department of Environment Water and Natural Resources, Adelaide.

Sharrad, B (2016). The Witchelina Biological Survey: Phase 1 - 20 September – 3 October 2015. *SEGments* Vol. 31. No. 4, March. Scientific Expedition Group, Adelaide.