

BushBlitz

SPECIES DISCOVERY PROGRAM



BUSH BLITZ SPECIES DISCOVERY PROGRAM



Witchelina Reserve SA

10–23 October 2010



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Australian Biological
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What is Bush Blitz?

Bush Blitz is a four-year, multi-million dollar partnership between the Australian Government, BHP Billiton and Earthwatch Australia to document plants and animals in selected properties across Australia's National Reserve System.

This innovative partnership harnesses the expertise of many of Australia's top scientists from museums, herbaria, universities, and other institutions and organisations across the country.

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Abbreviations

ANIC

Australian National Insect Collection

EPBC Act

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

IBRA

Interim Biogeographic Regionalisation for Australia

NPW Act

National Parks and Wildlife Act 1972 (South Australia)

NRS

National Reserve System



Summary

A two week Bush Blitz biodiversity survey was conducted at Witchelina Reserve in South Australia during October 2010. In total, 695 species were identified, of which 475 had not previously been recorded at the reserve. Added to existing records, 928 species are now known from this area. Of these, 175 are putative species new to science, including 1 gecko (Gekkonidae), 27 bees and wasps (Hymenoptera), 110 morphospecies of moths (Lepidoptera), 28 true bugs (Heteroptera) and 9 jumping plantlice (Psyllidae).

Five species that are listed under South Australia's *National Parks and Wildlife Act 1972* (NPW Act) as of conservation significance were documented at Witchelina, all for the first time. Eichler's Saltbush (*Atriplex eichleri*), Lee's Swainson-pea (*Swainsona leeana*), Western Tar-vine (*Gilesia biniflora*) and Australian Broomrape (*Orobanche cernua* var. *australiana*) are all rated as rare, while Prickly Speargrass (*Austrostipa pilata*) is considered vulnerable.



At the summit (Left–Right: Rebecca Kittel, Sarah Mantel, Federica Colombo, Andy Young, Kate Gillespie), R. Kittel © University of Adelaide

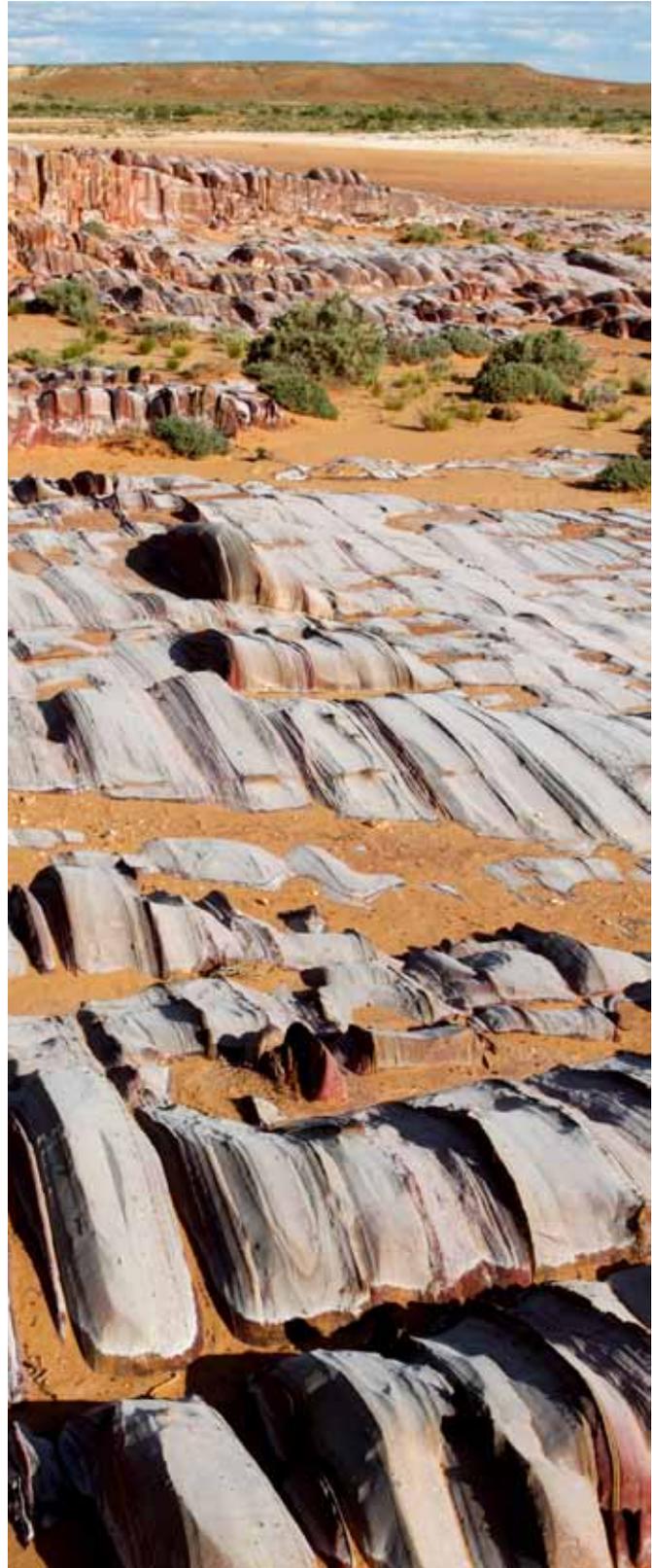


Introduction

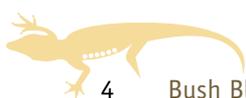
This is a report of the Bush Blitz program, which aims to survey recent additions to the National Reserve System (NRS). Bush Blitz is an initiative of the Australian Government, through the Australian Biological Resources Study, in partnership with BHP Billiton and Earthwatch Australia. The Bush Blitz objectives are:

- + to promote, publicise and demonstrate the importance of taxonomy through species discovery;
- + to undertake a national species discovery program targeted at recently acquired properties of the National Reserve System of Australia;
- + to support the science of taxonomy in Australia through training of students and early career researchers, provision of grants for species description and resolution of taxonomically problematic, nationally important groups;
- + to promote partnerships between science, government, industry and non-government organisations; and
- + to inform the National Reserve System, reserve managers and other stakeholders of the results of the Bush Blitz Project.

This survey was undertaken 10–23 October 2010. Due to poor weather conditions and the size of the property, not all areas were accessible and thus a comprehensive survey was not possible. It is expected that more intensive sampling across all seasons would result in the detection of many more species.



Banded rock formation, Minagoona Paddock, P. Lang
© Department of Environment, Water and Natural Resources



Reserve Overview¹



Witchelina Reserve

Nature Foundation SA

Date of purchase

2010

Area

421,900 ha

Description

Witchelina Reserve is the largest private nature reserve in South Australia. The reserve is owned and managed by Nature Foundation SA. The property extends from the edge of Lake Torrens in the south to Marree in the north, and covers three distinct environmental associations—Willouran, Mulgarie and Marree—which in turn are divided into nine land systems. The varied landscape of Witchelina includes salt lake frontage transitioning to sandy or clay flats, extensive dunefields, stony hills, flats and valleys, and gibber tableland.

National Reserve System conservation values

Witchelina Reserve includes a significant proportion of the Willouran Ranges, an important refuge for arid zone species. The reserve protects the habitat of several species and ecological communities identified as under threat in the South Australian Arid Lands Biodiversity Strategy.

The property makes an important contribution to Australia's National Reserve System, protecting ecosystems found in few other parks and reserves. The addition of Witchelina to the National Reserve System has significantly increased the area of habitat conserved in two of Australia's most underprotected bioregions. The area protected in the Flinders Lofty Block bioregion has increased from 5.6% to almost 9%, and in the Stony Plains bioregion to 7.35%.

Witchelina forms part of a vital habitat link from South Australia's Lake Torrens to the Northern Territory. It is also part of the world's first transcontinental wildlife corridor that is being created through the heart of Australia's outback.

¹ Information sourced from Nature Foundation SA <<http://naturefoundation.org.au/our-work/witchelina>> and Department of Sustainability, Environment, Water, Population and Communities <<http://www.environment.gov.au/parks/nrs/getting-involved/case-studies/witchelina.html>>, accessed 9 April 2013.



Methods

Collection and observation sites were selected based on land classes, supplemented by identification of suitable microhabitat during the field visit. Site selection also depended on access, suitability for trapping, and time restrictions. Site locations were recorded using global positioning systems.

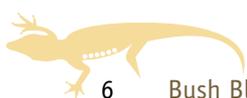
A number of taxonomic groups were identified as targets for study. Table 1 lists the groups surveyed and the specialists who undertook the field work.



Setting a trapline, K. Gillespie

Table 1: Taxonomic groups surveyed and personnel

| Group | Common names | Expert | Affiliation |
|-----------------|-----------------------------|---|---|
| Vertebrates | Mammals, Frogs and Reptiles | Mark Hutchinson, David Stemmer, Chelsea Sims | South Australian Museum |
| Hymenoptera | Bees | Remko Leijds | South Australian Museum |
| Hymenoptera | Wasps | Rebecca Kittel, Gary Taylor, Sarah Mantel, Federica Colombo | University of Adelaide |
| Lepidoptera | Butterflies and Moths | Andy Young | South Australian Museum |
| Coleoptera | Beetles | Jo Wood | South Australian Museum |
| Psyllidae | Jumping Plantlice | Gary Taylor | University of Adelaide |
| Heteroptera | True Bugs | Anna Namyatova, Michael Elias, Gerry Cassis | University of New South Wales |
| Odonata | Dragonflies and Damselflies | Andy Young | South Australian Museum |
| | | Rebecca Kittel | University of Adelaide |
| Vascular Plants | Vascular Plants | Peter Lang, Helen Vonow, Nick Neagle | South Australian Department of Environment, Water and Natural Resources |
| Fungi | Fungi | Helen Vonow | South Australian Department of Environment, Water and Natural Resources |





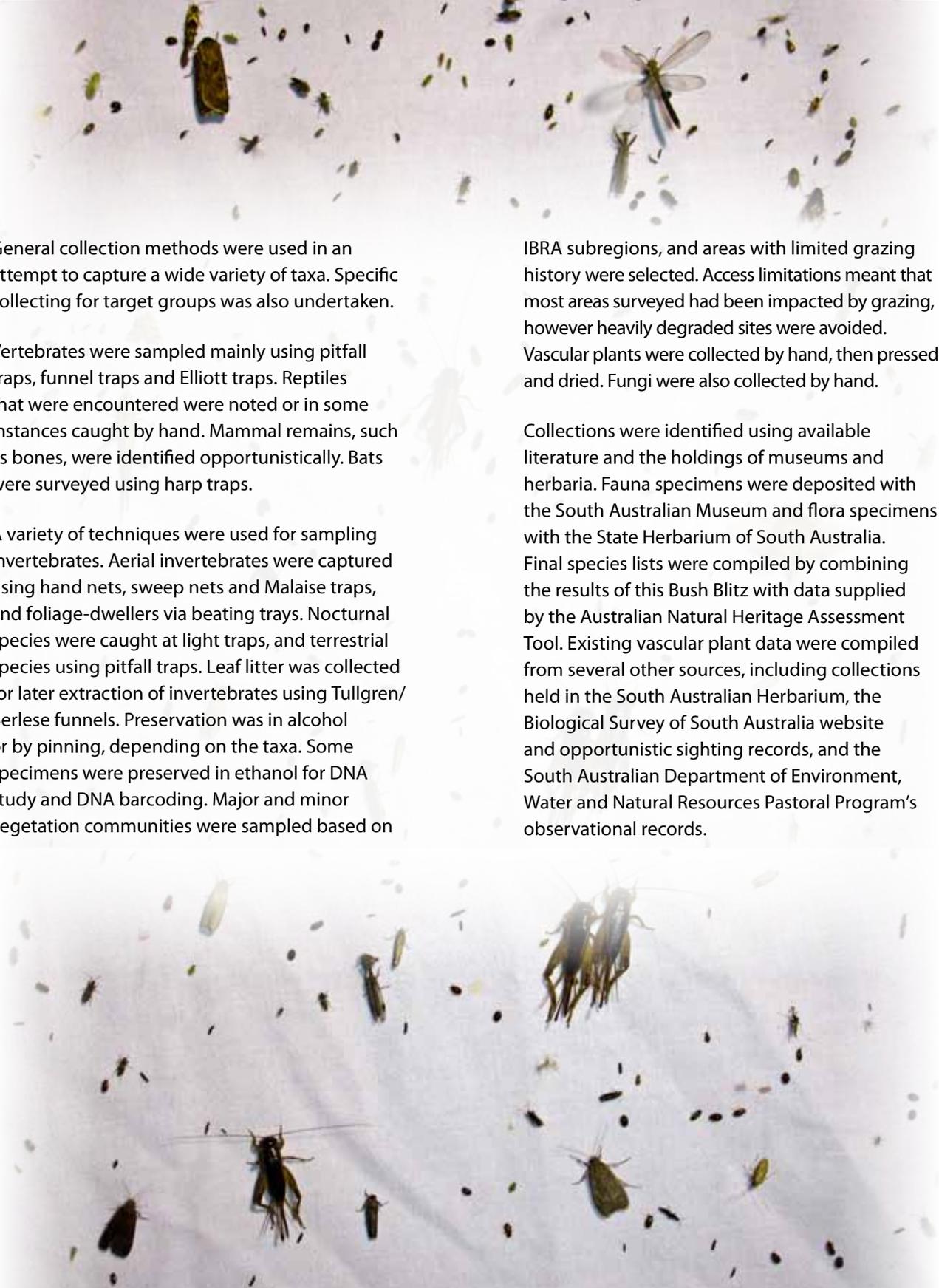
General collection methods were used in an attempt to capture a wide variety of taxa. Specific collecting for target groups was also undertaken.

Vertebrates were sampled mainly using pitfall traps, funnel traps and Elliott traps. Reptiles that were encountered were noted or in some instances caught by hand. Mammal remains, such as bones, were identified opportunistically. Bats were surveyed using harp traps.

A variety of techniques were used for sampling invertebrates. Aerial invertebrates were captured using hand nets, sweep nets and Malaise traps, and foliage-dwellers via beating trays. Nocturnal species were caught at light traps, and terrestrial species using pitfall traps. Leaf litter was collected for later extraction of invertebrates using Tullgren/Berlese funnels. Preservation was in alcohol or by pinning, depending on the taxa. Some specimens were preserved in ethanol for DNA study and DNA barcoding. Major and minor vegetation communities were sampled based on

IBRA subregions, and areas with limited grazing history were selected. Access limitations meant that most areas surveyed had been impacted by grazing, however heavily degraded sites were avoided. Vascular plants were collected by hand, then pressed and dried. Fungi were also collected by hand.

Collections were identified using available literature and the holdings of museums and herbaria. Fauna specimens were deposited with the South Australian Museum and flora specimens with the State Herbarium of South Australia. Final species lists were compiled by combining the results of this Bush Blitz with data supplied by the Australian Natural Heritage Assessment Tool. Existing vascular plant data were compiled from several other sources, including collections held in the South Australian Herbarium, the Biological Survey of South Australia website and opportunistic sighting records, and the South Australian Department of Environment, Water and Natural Resources Pastoral Program's observational records.



Light trapping, R. Kittel © University of Adelaide



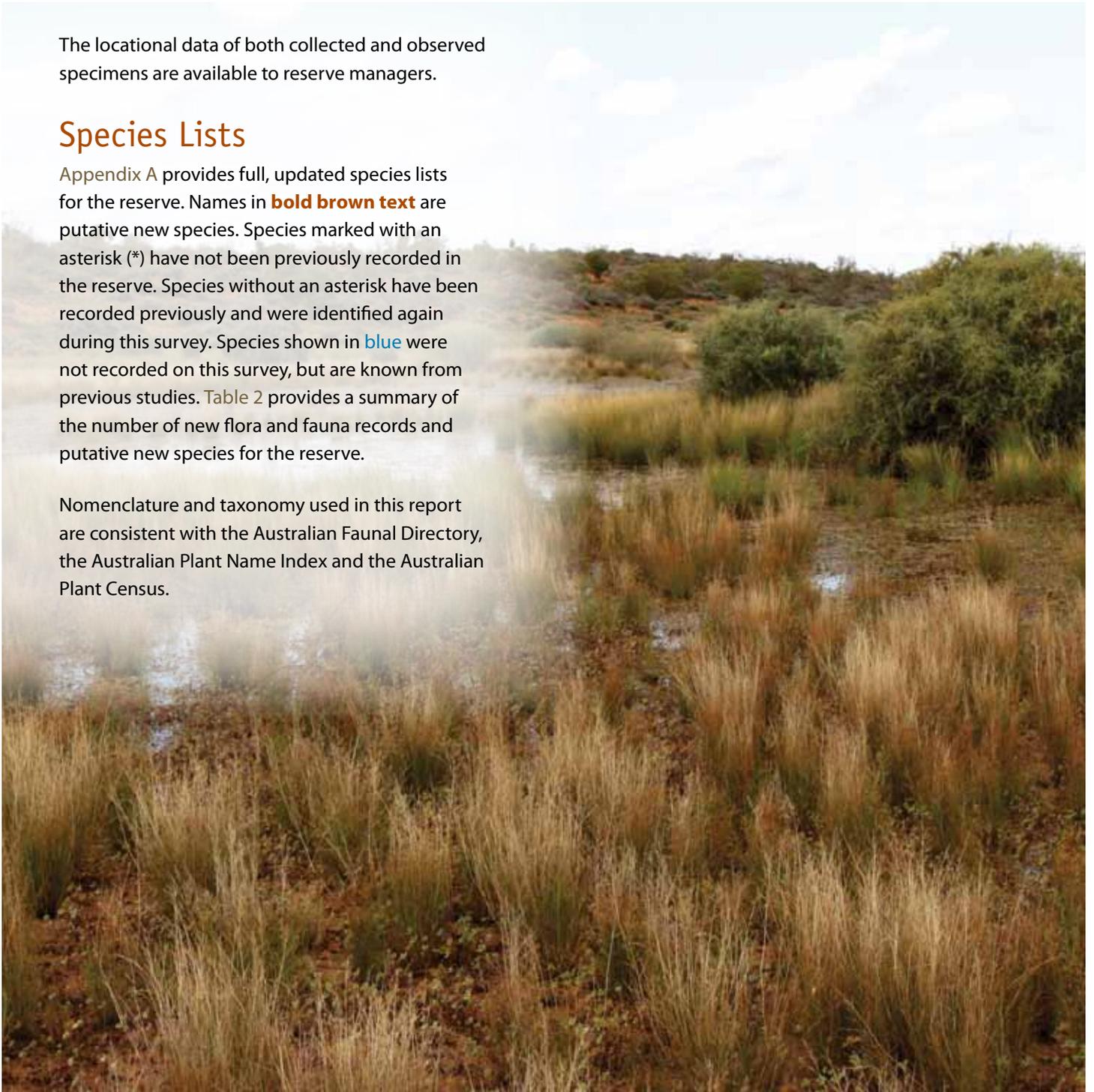
Results

The locational data of both collected and observed specimens are available to reserve managers.

Species Lists

Appendix A provides full, updated species lists for the reserve. Names in **bold brown text** are putative new species. Species marked with an asterisk (*) have not been previously recorded in the reserve. Species without an asterisk have been recorded previously and were identified again during this survey. Species shown in **blue** were not recorded on this survey, but are known from previous studies. Table 2 provides a summary of the number of new flora and fauna records and putative new species for the reserve.

Nomenclature and taxonomy used in this report are consistent with the Australian Faunal Directory, the Australian Plant Name Index and the Australian Plant Census.



Temporary wetland with *Chenopodium nitriaceum*, *Eragrostis* spp., and *Marsilea* spp., P. Lang © Department of Environment, Water and Natural Resources





Table 2: Summary of flora and fauna records and putative new species

| Group | Common name | Total number of species | Species new to reserve | Putative new species |
|------------------|-------------------------------|-------------------------|------------------------|----------------------|
| Mammalia | Mammals | 12 | 6 | 0 |
| Aves | Birds | 133 | 0 | 0 |
| Amphibia | Frogs | 3 | 1 | 0 |
| Reptilia | Reptiles | 39 | 9 | 1 |
| Pisces | Fish | 1 | 0 | 0 |
| Hymenoptera | Bees | 24 | 24 | 22 |
| Hymenoptera | Wasps | 9 | 9 | 5 |
| Lepidoptera | Butterflies | 17 | 2 | 0 |
| Lepidoptera | Moths | 166 | 166 | 110 ² |
| Trichoptera | Caddisflies | 1 | 1 | 0 |
| Diptera | Flies | 9 | 9 | 0 |
| Coleoptera | Beetles | 16 | 13 | 0 |
| Neuroptera | Net-winged Insects | 4 | 4 | 0 |
| Heteroptera | True Bugs — Terrestrial | 78 | 78 | 28 |
| Heteroptera | True Bugs — Aquatic | 4 | 4 | 0 |
| Psyllidae | Jumping Plantlice | 10 | 10 | 9 |
| Hemiptera | Leafhoppers and Plant-hoppers | 3 | 3 | 0 |
| Blattodea | Cockroaches | 1 | 1 | 0 |
| Orthoptera | Crickets | 1 | 1 | 0 |
| Dermaptera | Earwigs | 1 | 1 | 0 |
| Odonata | Damselflies and Dragonflies | 11 | 11 | 0 |
| Zygentoma | Silverfish | 1 | 1 | 0 |
| Araneae | Spiders | 3 | 1 | 0 |
| Gastropoda | Snails and Slugs | 2 | 0 | 0 |
| Flowering Plants | Flowering Plants | 371 | 117 | 0 |
| Conifers | Conifers | 1 | 0 | 0 |
| Ferns | Ferns | 6 | 2 | 0 |
| Fungi | Fungi | 1 | 1 | 0 |
| Total | | 928 | 475 | 175 |

2 Most of the moth species surveyed could be identified only to morphospecies, the majority of which are likely to represent new or previously undescribed species.



Threatened Species

Appendix B gives the species listed as threatened under the NPW Act of South Australia recorded from the reserve. No species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded. A summary of threatened species identified during the study is provided in Table 3.

Table 3: Summary of threatened species identified

| Group | Total number of species | Species new to reserve |
|-------|-------------------------|------------------------|
| Fauna | 0 | 0 |
| Flora | 5 | 5 |

Exotic and Pest Species

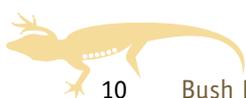
Appendix C lists the exotic and pest species recorded from the reserve. A summary of exotic and pest species identified during the study is provided in Table 4.

Table 4: Summary of exotic and pest species identified

| Group | Total number of species | Species new to reserve |
|-------|-------------------------|------------------------|
| Fauna | 8 | 7 |
| Flora | 29 | 20 |



Sturt's Desert Pea (*Swainsona formosa*), R. Kittel © University of Adelaide





Discussion

Putative new species

A total of 475 species were added to those previously recorded from the reserve, including 175 putative species new to science that were discovered during this Bush Blitz. A putative species new to science is one that has been recognised by an expert as never having been named or described in the scientific literature. Until a species is named and its description published, it is not confirmed as a new species. A breakdown of the groups in which putative new species were discovered is given in Table 5.

A putative new reptile species discovered at Witchelina is one of several new web-toed geckos (*Gehyra* spp.) known from inland Australia, all previously identified as Tree Dtella (*Gehyra variegata*). Work in progress indicates

that eastern populations may be taxonomically distinct from western populations. A manuscript is in preparation (M. Sistrom *et al.*) with submission anticipated in 2013.

Most of the species of bees and wasps (Hymenoptera), moths (Lepidoptera) and jumping plantlice (Psyllidae) collected during the survey were new records for the reserve, and many of them are, putatively, new to science. Most of the moth species surveyed could only be identified to morphospecies, the majority of which are likely to represent new or previously undescribed species. A morphospecies is a group of individuals that are considered to belong to the same species on the grounds of physical features alone, but further study is needed to confirm their species status.

Table 5: Putative new species by group

| Group | Common name | Total number of species | Species new to reserve | Putative new species |
|-------------|-------------------------|-------------------------|------------------------|----------------------|
| Reptilia | Reptiles | 39 | 9 | 1 |
| Hymenoptera | Bees | 24 | 24 | 22 |
| Hymenoptera | Wasps | 9 | 9 | 5 |
| Lepidoptera | Moths | 166 | 166 | 110 |
| Heteroptera | True Bugs — Terrestrial | 78 | 78 | 28 |
| Psyllidae | Jumping Plantlice | 10 | 10 | 9 |
| Total | | 326 | 296 | 175 |



Threatened Species

Five vascular plant species listed under the NPW Act were recorded on Witchelina for the first time during the 2010 survey. Eichler's Saltbush (*Atriplex eichleri*), Lee's Swainson-pea (*Swainsona leeana*), Western Tar-vine (*Gilesia biniflora*) and Australian Broomrape (*Orobanche cernua* var. *australiana*) are all rated as rare, while Prickly Spear-grass (*Austrostipa pilata*) is considered vulnerable.

Eleven bird species listed as rare and two listed as vulnerable under the NPW Act had previously been recorded at Witchelina Reserve. Birds were not a target taxon for this survey and as a result a bird specialist was not present. Therefore, none of these species were recorded during this survey.



Lee's Swainson-pea (*Swainsona leeana*), P. Lang
© Department of Environment, Water and Natural Resources

Exotic and Pest Species

Invasive species have a major impact on Australia's environment, threatening our unique biodiversity and reducing overall species abundance and diversity.³ The number of vertebrate pest species

³ Department of Sustainability, Environment, Water, Population and Communities, accessed 9 April 2013, <<http://www.environment.gov.au/biodiversity/invasive/index.html>>.

recorded on Witchelina Reserve during the 2010 survey was considered low. The paucity of pest species may indicate that the site is relatively stable, however populations need to be monitored over time to confirm this. The House Mouse (*Mus musculus*) was common and sighted at all trapping sites. Rabbits (*Oryctolagus cuniculus*) were uncommon but there were several sightings as well as evidence of recent warren activity. Only the remains of several Feral Goats (*Capra hircus*), shot the previous year, were found around Spring Gully, north-east of the homestead.

Of the 306 plant taxa recorded on Witchelina during this survey 29 (or 9.5%) are exotic. Twenty weed species (some potentially invasive) were newly recorded, providing new data on their abundance and distribution. Paterson's Curse (*Echium plantagineum*) is a very common and widespread weed in the Flinders Ranges and agricultural districts of South Australia. It is rarely recorded outside these areas in South Australia, though there are a few records from along the Stuart Highway and in the vicinity of railway sidings on the Nullarbor. Two plants were observed on this survey, in the creekline approximately 1.1 km east of the shearers' quarters. If allowed to establish, this species has the potential to be a serious problem on Witchelina.

Couch (*Cynodon dactylon* var. *dactylon*) is widely established in South Australia along roadsides, watercourses and around stock watering points. It was recorded at five locations on this survey and observed to be well established in numerous creeklines.

Native Thorn-apple (*Datura leichhardtii*) was noted to be locally abundant in several creeklines. Its status as an exotic species in Australia is uncertain. It is considered to be an early introduction to





Paterson's Curse (*Echium plantagineum*) © C.G. Wilson & Department of Sustainability, Environment, Water, Population and Communities

Australia from Central America, despite having been first described by F. Mueller in 1854 from an early collection by Leichhardt. It is likely to be conspecific with the American species *D. pruinoso*.

Araby Grass (*Schismus arabicus*) was found in a disturbed area around the shearers' quarters, but it is possibly more widespread across the reserve. This species was a new record for Witchelina and also for the Flinders Ranges Herbarium Region, the nearest previous record being from Marree in South Australia. Araby Grass is a problem weed in arid environments, as it is known to germinate and produce seed in seasons when native annual species fail to germinate. The grass also limits nutrients for other plants and increases the frequency and extent of fire.⁴

Other Points of Interest

Vertebrates

Terrestrial vertebrates of the region were already moderately well known prior to this survey, due largely to the extensive vertebrate faunal survey work that has occurred in South Australia since the 1980s. Witchelina is on the fringe of areas surveyed in the early 1990s, and the Lake Eyre South survey conducted later in the same decade. However, Witchelina has not been the primary focus for any particular survey and detailed knowledge of the total diversity and patterns of habitat

use within the reserve is at a preliminary stage. The occurrence of many vertebrate species is very patchy over the landscape and thus they are very difficult to detect without sustained programs of live trapping carried out under good seasonal conditions.

Accordingly, the Bush Blitz vertebrate survey was exploratory in nature. Most species are known from single records or single locations, or from fewer than five such records. For optimum management of the reserve, more detailed survey work is needed.

The work of the Biological Survey of South Australia has concentrated on areas of continuous habitat in order to generate broad conclusions concerning the patterns of habitat association among South Australian vertebrates. Areas judged as transitional between two ecological communities have been avoided so as not to sample mixed assemblages of species. However, such mixed assemblages are likely to be richer and areas such as Witchelina could be expected to support especially diverse fauna, with sandy desert, stony desert and rocky range faunas combining in the same area.

During the Witchelina survey rain was frequent, producing cold conditions on most days, and consequently low levels of reptile activity. Rain also curtailed fieldwork due to closure of the tracks.

Following a recent taxonomic revision, the Strap-snouted Brown Snake (*Pseudonaja aspidorhyncha*) is now recognised as distinct from the Northern Brown Snake (*P. nuchalis*) and confirmed for Witchelina. The Sandy Inland Mouse (*Pseudomys hermannsburgensis*) is also a new species for Witchelina.

⁴ Global Invasive Species Database, accessed 9 April 2013, <<http://www.issg.org/database/species/ecology.asp?si=553&..>>.



Invertebrates

Research on Australian invertebrates has increased significantly over the last 20 years, but it is estimated that less than 15% of species have been formally described. In general, about a third of the species collected in any area are found to be new to science.

Findings of this survey included: 24 species of native bees from four families of which at least 22 are expected to be new species; 8 species of Chelonine wasps, of which 5 are believed to be new to science; 166 suspected morphospecies of moths, most of which represent new or previously undescribed taxa; 82 species of true bugs from 16 families, including at least 28 new species; and 10 species of jumping plantlice (psyllids), of which 9 are putative new species.

Bees

Native bees are important pollinators of Australian plants, and are therefore essential for ecosystem health and maintenance of biodiversity. Twenty-four species of native bees from four families were collected from Witchelina Reserve, of which 22 species are believed to be new to science. Although the diversity of bee species was higher than expected, most were found in relatively low numbers. This might be due to low population sizes caused by prolonged drought, coupled with large numbers of plants flowering after recent rain causing populations to disperse. This could also explain why the majority of species were found in only a few localities, and suggests that the 24 species recorded is an underestimate of the total number occurring within the reserve. Native bees were particularly attracted to flowering *Swainsona* species that were abundant in the southern part of the reserve. One species, *Amegilla chlorocyanea*, a



Blue Banded Bee (*Amegilla chlorocyanea*), E. Lake © Department of Sustainability, Environment, Water, Population and Communities

blue-banded bee species common in the southern half of Australia, was found throughout the reserve, foraging on nightshades (*Solanum* spp.). This bee is an important pollinator of many agricultural crops and has been investigated as a potential natural replacement for manual pollination in greenhouse-grown tomatoes.⁵

Wasps

About 160 wasp specimens were collected at Witchelina, representing at least nine species. Of these, five are believed to be new species, all belonging to the Cheloninae, a subfamily of parasitic wasps. Prior to this Bush Blitz, 42 species of native wasps belonging to the subfamily Cheloninae had been described in Australia, of which only two were previously recorded in South Australia. Due to insufficient species descriptions of Chelonine wasps, it is difficult to identify specimens to species level. This survey and the following research will help to revise the naming protocols for the Australian chelonine group.

Moths

During the survey, 166 morphospecies of moths (Lepidoptera) were recorded. These were further identified to species where possible. Preliminary results suggest that many of the specimens collected represent new or undescribed taxa. For example, none of the 25 cosmet moth species (Cosmopterigidae) identified on the survey are believed to be previously named.

⁵ Hogendoorn, K., Bartholomaeus, F. and Keller, M. A. 2010, 'Chemical and sensory comparison of tomatoes pollinated by bees and by a pollination wand', *Journal of Economic Entomology* **103**(4): 1286–1292.

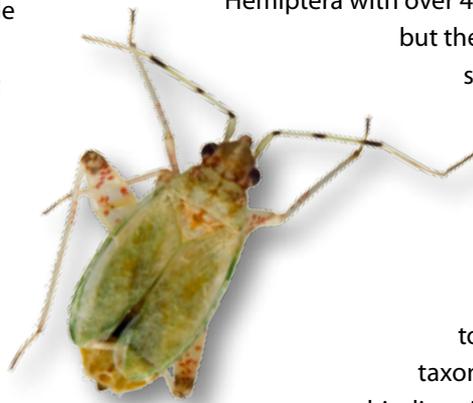




A Geometrid likely to be within the subfamily Ennominae and the tribe Boarmiini was collected on several occasions at Witchelina. The species does not appear to be present in the Australian National Insect Collection (ANIC). The females have distinctive genitalia and it is likely that the species is new to science.

At least four species in the genus *Taxeotis* were collected, all of which are putative new species. One of these appears to represent a South Australian member of a species complex known from the Western Australian goldfields, where there are several species in the group. One of the difficulties with identification in this genus is that they are highly dimorphic (the male and female do not resemble each other in wing pattern). A further two male moths appear to represent two additional species of *Taxeotis*, one of which is entirely unlike any other specimens examined in any collection.

Special emphasis was placed on obtaining a series of small moths from the genus *Scopula* (Geometridae), the currently recognised species of which appear to be large, lumped assemblages.



It is hard to reconcile the material held at the ANIC with any sort of meaningful, species level distinctions. More material has been sought from Witchelina Reserve, and it is hoped that further genetic work may assist in resolving these issues.

True Bugs

Heteroptera (True Bugs) are a diverse suborder of Hemiptera with over 40,000 described species, but the majority of Australian species are probably undescribed. This was the first survey of true bugs at Witchelina, and the substantial diversity recorded represents a major contribution to understanding their taxonomy and value in biodiversity conservation. For example, the vast majority of Miridae feed on plants and are usually highly host-specific. They are consequently at significant co-extinction risk when their host plants are endangered.

The survey yielded 82 species from 16 families. Only 12 species could be identified as described species. Twenty-eight species are putatively new to science, all but one of which belong to the family Miridae. A new genus *Witchelinamiris*, containing two species *W. mchughi* and *W. viridimaculatus*, found for the

Witchelinamiris viridimaculatus © University of New South Wales
 Top: male without green markings on dorsum
 Middle: female
 Bottom: male with green markings on dorsum



Mallee Military Dragon (*Ctenophorus fordi*) and Pale rumped Ctenotus (*Ctenotus regius*) in a pitfall trap
 © Department of Sustainability, Environment, Water, Population and Communities

first time at Witchelina, has now been described.⁶ The description of another new species *Stenotus witchelina* is currently in press.⁷ *Stenotus* has a mostly Old World distribution, and no species have previously been recorded from Australia. A remarkable new species in the tribe Austromirini was also found which undoubtedly represents a new genus, although it is currently only known from females. A new species from the family Tingidae may also represent a new genus.

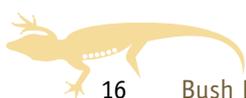
Jumping Plantlice

Psyllids, or jumping plantlice, are small plant-feeding insects that tend to be host specific, feeding on only one or two species. Surprisingly, a number of psyllid species were collected from more than one plant species. Ten morphospecies were collected at Witchelina, nine of which are expected to represent new, undescribed species.

The data collected from this Bush Blitz survey will contribute significantly to the study of the psyllid taxa and psyllid/plant host relationships. For example, seven of the nine new species discovered at Witchelina belong to the genus *Acizzia*. This genus is very diverse, with over 200 species worldwide, but only about 20 Australian species have been described. The family Triozidae is represented by one undescribed species in the genus *Trioza*, of which there are only five described species in Australia.

6 Namyatova, A. A., Elias, M. & Cassis, G. 2011, 'A new genus and two new species of Orthotylinae (Hemiptera: Heteroptera: Miridae) from central Australia', *Zootaxa* **2927**: 38–48.

7 Namyatova, A. A., Schwartz M. D. & Cassis, G. In press, 'First record of the genus *Stenotus* Jakovlev from Australia, with two new species, and a list of mirine species from Witchelina Reserve (Insecta: Heteroptera: Miridae: Mirinae: Mirini)', *Journal of Natural History*.





Vascular plants and fungi

Many previously recorded species were not sampled during this survey. Poor weather and consequently reduced time in the field meant that only limited coverage of the property was possible. In particular, only the very margin of the extensive southern dunefield and a small percentage of the higher ranges in the north were visited. While it was unfortunate that sampling was restricted, significant new flora data were still obtained. One hundred and seventeen flowering plant species were newly recorded for the property, including four that are listed as rare and one as vulnerable in South Australia. Two new fern and one new fungus species were also recorded.

Several specimens of the Clustered *Lawrenzia* (*Lawrenzia glomerata*) species complex were collected, which will aid in the revision of the group currently being undertaken. Eight species within this complex of perennial herbs have been recognised across the southern and western arid and semi-arid areas of Australia. Two of the previously unnamed species were found at Witchelina. Observations of these two taxa growing close to each other, without evidence of intergradation, provides valuable support for their separation as species.

The survey also recorded a number of new regional records for South Australia, including two new vascular plant records for the Lake Eyre Region, four for the Gairdner-Torrens Region and four for the Flinders Ranges Herbarium Region (see Table 6).



Two unnamed species of the *Lawrenzia glomerata* complex growing side by side, P. Lang © Department of Environment, Water and Natural Resources



Poached-egg Daisy (*Polycalymma stuartii*), P. Lang © Department of Environment, Water and Natural Resources

Table 6: New vascular plant records for the Lake Eyre, Gairdner-Torrens and Flinders Ranges herbarium regions of South Australia

| Family name | Species name | Common name | Lake Eyre | Gairdner-Torrens | Flinders Ranges |
|----------------|--|---------------------------|-----------|------------------|-----------------|
| Asparagaceae | <i>Thysanotus baueri</i> | Mallee Fringe-lily | X | | |
| Asteraceae | <i>Brachyscome ciliaris</i> var. <i>brachyglossa</i> | Bushy Cut-leaf Daisy | X | | |
| Asteraceae | <i>Vittadinia cuneata</i> var. <i>morrisii</i> | Fuzzy New Holland Daisy | | X | |
| Chenopodiaceae | <i>Einadia nutans</i> subsp. <i>eremaea</i> | Dryland Climbing Saltbush | | | X |
| Chenopodiaceae | <i>Enchylaena tomentosa</i> var. <i>glabra</i> | Smooth Ruby Saltbush | | | X |
| Convolvulaceae | <i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i> | Australian Bindweed | | X | |
| Goodeniaceae | <i>Goodenia glauca</i> | Pale Goodenia | | X | |
| Poaceae | <i>Leptochloa fusca</i> subsp. <i>fusca</i> | Brown Beetle-grass | | X | |
| Poaceae | <i>Schismus arabicus</i> ^ | Araby Grass | | | X |
| Portulacaceae | <i>Portulaca filifolia</i> | Slender Pigweed | | | X |

^ = Exotic/Pest





Appendix A: Species Lists

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at March 2013



Fauna



Red Kangaroo (*Macropus rufus*), R. Kittel © University of Adelaide

Vertebrates

| Mammals | | |
|------------------|--------------------------------------|----------------------------|
| Family | Species | Common name |
| Bovidae | <i>Capra hircus</i> ^ * | Goat |
| Dasyuridae | <i>Sminthopsis macroura</i> * | Stripe-faced Dunnart |
| Leporidae | <i>Oryctolagus cuniculus</i> ^ * | Rabbit |
| Macropodidae | <i>Macropus fuliginosus</i> | Western Grey Kangaroo |
| | <i>Macropus robustus</i> | Common Wallaroo |
| | <i>Macropus rufus</i> | Red Kangaroo |
| Molossidae | <i>Tadarida australis</i> | White-striped Freetail-bat |
| Muridae | <i>Leggadina forresti</i> * | Forrest's Mouse |
| | <i>Mus musculus</i> ^ * | House Mouse |
| | <i>Pseudomys hermannsburgensis</i> * | Sandy Inland Mouse |
| Vespertilionidae | <i>Chalinolobus gouldii</i> | Gould's Wattled Bat |
| | <i>Nyctophilus geoffroyi</i> | Lesser Long-eared Bat |

| Birds | | |
|--------------|-----------------------------------|-----------------------------|
| Family | Species | Common name |
| Acanthizidae | <i>Acanthiza uropygialis</i> | Chestnut-rumped Thornbill |
| | <i>Aphelocephala leucopsis</i> | Southern Whiteface |
| | <i>Aphelocephala nigricincta</i> | Banded Whiteface |
| | <i>Aphelocephala pectoralis</i> ~ | Chestnut-breasted Whiteface |
| | <i>Pyrrholaemus brunneus</i> | Redthroat |
| | <i>Smicronis brevirostris</i> | Weebill |
| Accipitridae | <i>Accipiter cirrhocephalus</i> | Collared Sparrowhawk |
| | <i>Accipiter fasciatus</i> | Brown Goshawk |
| | <i>Aquila audax</i> | Wedge-tailed Eagle |
| | <i>Circus assimilis</i> | Spotted Harrier |

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| Birds | | |
|---------------|------------------------------------|--------------------------------|
| Family | Species | Common name |
| Accipitridae | <i>Haliastur sphenurus</i> | Whistling Kite |
| | <i>Hamirostra melanosternon</i> ~ | Black-breasted Buzzard |
| | <i>Hieraaetus morphnoides</i> | Little Eagle |
| | <i>Milvus migrans</i> | Black Kite |
| Aegothelidae | <i>Aegotheles cristatus</i> | Australian Owlet-nightjar |
| Alcedinidae | <i>Todiramphus pyrrhopygius</i> | Red-backed Kingfisher |
| Anatidae | <i>Anas gracilis</i> | Grey Teal |
| | <i>Anas rhynchotis</i> ~ | Australasian Shoveler |
| | <i>Anas superciliosa</i> | Pacific Black Duck |
| | <i>Aythya australis</i> | Hardhead |
| | <i>Biziura lobata</i> ~ | Musk Duck |
| | <i>Chenonetta jubata</i> | Australian Wood Duck |
| | <i>Cygnus atratus</i> | Black Swan |
| | <i>Malacorhynchus membranaceus</i> | Pink-eared Duck |
| | <i>Oxyura australis</i> ~ | Blue-billed Duck |
| | <i>Tadorna tadornoides</i> | Australian Shelduck |
| Ardeidae | <i>Ardea modesta</i> | Eastern Great Egret |
| | <i>Ardea pacifica</i> | White-necked Heron |
| | <i>Egretta novaehollandiae</i> | White-faced Heron |
| Artamidae | <i>Artamus cinereus</i> | Black-faced Woodswallow |
| | <i>Artamus leucorhynchus</i> | White-breasted Woodswallow |
| | <i>Cracticus tibicen</i> | Australian Magpie |
| | <i>Cracticus torquatus</i> | Grey Butcherbird |
| Cacatuidae | <i>Cacatua sanguinea</i> | Little Corella |
| | <i>Eolophus roseicapillus</i> | Galah |
| | <i>Nymphicus hollandicus</i> | Cockatiel |
| Campephagidae | <i>Coracina maxima</i> | Ground Cuckoo-shrike |
| | <i>Coracina novaehollandiae</i> | Black-faced Cuckoo-shrike |
| | <i>Lalage sueurii</i> | White-winged Triller |
| Caprimulgidae | <i>Eurostopodus argus</i> | Spotted Nightjar |
| Casuariidae | <i>Dromaius novaehollandiae</i> | Emu |
| Charadriidae | <i>Charadrius australis</i> | Inland Dotterel, Inland Plover |
| | <i>Charadrius ruficapillus</i> | Red-capped Plover |
| | <i>Eseyornis melanops</i> | Black-fronted Dotterel |
| | <i>Erythrogonys cinctus</i> | Red-kneed Dotterel |
| | <i>Vanellus miles</i> | Masked Lapwing |
| | <i>Vanellus tricolor</i> | Banded Lapwing |
| Columbidae | <i>Geopelia cuneata</i> | Diamond Dove |
| | <i>Geopelia striata</i> | Peaceful Dove |
| | <i>Ocyphaps lophotes</i> | Crested Pigeon |
| | <i>Phaps chalcoptera</i> | Common Bronzewing |



| Birds | | |
|---------------------------|--|---------------------------|
| Family | Species | Common name |
| Corvidae | <i>Corvus bennetti</i> | Little Crow |
| | <i>Corvus coronoides</i> | Australian Raven |
| Cuculidae | <i>Cacomantis flabelliformis</i> | Fan-tailed Cuckoo |
| | <i>Cacomantis pallidus</i> | Pallid Cuckoo |
| | <i>Chalcites basalis</i> | Horsfield's Bronze-Cuckoo |
| | <i>Chalcites osculans</i> | Black-eared Cuckoo |
| Estrildidae | <i>Emblema pictum</i> ~ | Painted Finch |
| | <i>Taeniopygia guttata</i> | Zebra Finch |
| Falconidae | <i>Falco berigora</i> | Brown Falcon |
| | <i>Falco cenchroides</i> | Nankeen Kestrel |
| | <i>Falco hypoleucos</i> ~ | Grey Falcon |
| | <i>Falco longipennis</i> | Australian Hobby |
| | <i>Falco subniger</i> | Black Falcon |
| Glareolidae | <i>Stiltia isabella</i> | Australian Pratincole |
| Hirundinidae | <i>Cheramoeca leucosterna</i> | White-backed Swallow |
| | <i>Hirundo neoxena</i> | Welcome Swallow |
| | <i>Petrochelidon ariel</i> | Fairy Martin |
| | <i>Petrochelidon nigricans</i> | Tree Martin |
| Laridae | <i>Chlidonias hybrida</i> | Whiskered Tern |
| | <i>Chroicocephalus novaehollandiae</i> | Silver Gull |
| | <i>Gelochelidon nilotica</i> | Gull-billed Tern |
| Maluridae | <i>Amytornis modestus</i> | Thick-billed Grasswren |
| | <i>Malurus lamberti</i> | Variiegated Fairy-wren |
| | <i>Malurus leucopterus</i> | White-winged Fairy-wren |
| Megaluridae | <i>Cincloramphus cruralis</i> | Brown Songlark |
| | <i>Cincloramphus mathewsi</i> | Rufous Songlark |
| | <i>Megalurus gramineus</i> | Little Grassbird |
| Meliphagidae | <i>Acanthagenys rufogularis</i> | Spiny-cheeked Honeyeater |
| | <i>Ashbyia lovensis</i> | Gibberbird |
| | <i>Epthianura albifrons</i> | White-fronted Chat |
| | <i>Epthianura aurifrons</i> | Orange Chat |
| | <i>Epthianura tricolor</i> | Crimson Chat |
| | <i>Ptilotula penicillatus</i> | White-plumed Honeyeater |
| | <i>Ptilotula plumulus</i> | Grey-fronted Honeyeater |
| | <i>Gavicalis virescens</i> | Singing Honeyeater |
| | <i>Manorina flavigula</i> | Yellow-throated Miner |
| <i>Purnella albifrons</i> | White-fronted Honeyeater | |

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| Birds | | |
|-------------------|-------------------------------------|--------------------------------------|
| Family | Species | Common name |
| Meropidae | <i>Merops ornatus</i> | Rainbow Bee-eater |
| Monarchidae | <i>Grallina cyanoleuca</i> | Magpie-lark |
| | <i>Myiagra inquieta</i> ~ | Restless Flycatcher |
| Motacillidae | <i>Anthus novaeseelandiae</i> | Australasian Pipit, Australian Pipit |
| Nectariniidae | <i>Dicaeum hirundinaceum</i> | Mistletoebird |
| Neosittidae | <i>Daphoenositta chrysoptera</i> | Varied Sittella |
| Otididae | <i>Ardeotis australis</i> ~ | Australian Bustard |
| Pachycephalidae | <i>Oreica gutturalis</i> | Crested Bellbird |
| | <i>Pachycephala rufiventris</i> | Rufous Whistler |
| Pardalotidae | <i>Pardalotus rubricatus</i> | Red-browed Pardalote |
| | <i>Pardalotus striatus</i> | Striated Pardalote |
| Pelecanidae | <i>Pelecanus conspicillatus</i> | Australian Pelican |
| Petroicidae | <i>Melanodryas cucullata</i> | Hooded Robin |
| | <i>Petroica goodenovii</i> | Red-capped Robin |
| Phalacrocoracidae | <i>Microcarbo melanoleucos</i> | Little Pied Cormorant |
| | <i>Phalacrocorax carbo</i> | Great Cormorant |
| | <i>Phalacrocorax sulcirostris</i> | Little Black Cormorant |
| Phasianidae | <i>Coturnix pectoralis</i> | Stubble Quail |
| Podargidae | <i>Podargus strigoides</i> | Tawny Frogmouth |
| Podicipedidae | <i>Poliiocephalus poliocephalus</i> | Hoary-headed Grebe |
| | <i>Tachybaptus novaehollandiae</i> | Australasian Grebe |
| Pomatostomidae | <i>Pomatostomus superciliosus</i> | White-browed Babbler |
| Psittacidae | <i>Barnardius zonarius</i> | Australian Ringneck |
| | <i>Barnardius zonarius barnardi</i> | Australian Ringneck |
| | <i>Melopsittacus undulatus</i> | Budgerigar |
| | <i>Neophema chrysostoma</i> ~ | Blue-winged Parrot |
| | <i>Northiella haematogaster</i> | Blue Bonnet, Bluebonnet |
| | <i>Psephotus varius</i> | Mulga Parrot |
| Psophodidae | <i>Cinclosoma cinnamomeum</i> | Cinnamon Quail-thrush |
| | <i>Psophodes cristatus</i> | Chirruping Wedgebill |



Orientation — Kate Gillespie and Sarah Mantel, R. Kittel © University of Adelaide



| Birds | | |
|-------------------|--------------------------------------|--------------------------|
| Family | Species | Common name |
| Rallidae | <i>Fulica atra</i> | Eurasian Coot |
| | <i>Porzana fluminea</i> | Australian Spotted Crake |
| | <i>Tribonyx ventralis</i> | Black-tailed Native-hen |
| Recurvirostridae | <i>Himantopus himantopus</i> | Black-winged Stilt |
| | <i>Recurvirostra novaehollandiae</i> | Red-necked Avocet |
| Rhipiduridae | <i>Rhipidura albiscapa</i> | Grey Fantail |
| | <i>Rhipidura leucophrys</i> | Willie Wagtail |
| Scolopacidae | <i>Actitis hypoleucos</i> ~ | Common Sandpiper |
| Strigidae | <i>Ninox novaeseelandiae</i> | Southern Boobook |
| Threskiornithidae | <i>Platalea flavipes</i> | Yellow-billed Spoonbill |
| | <i>Plegadis falcinellus</i> ~ | Glossy Ibis |
| | <i>Threskiornis spinicollis</i> | Straw-necked Ibis |
| Turnicidae | <i>Turnix pyrrhоторax</i> ~ | Red-chested Button-quail |
| | <i>Turnix velox</i> | Little Button-quail |
| Tytonidae | <i>Tyto javanica</i> | Eastern Barn Owl |



Sudell's Frog (*Neobatrachus sudellae*), R. Kittel © University of Adelaide

| Frogs | | |
|----------------|--------------------------------|---------------------------------|
| Family | Species | Common name |
| Hylidae | <i>Cyclorana platycephala</i> | Water-holding Frog |
| | <i>Litoria rubella</i> | Desert Tree Frog, Red Tree Frog |
| Myobatrachidae | <i>Neobatrachus sudellae</i> * | Sudell's Frog |

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| Reptiles | | |
|------------------|--------------------------------------|--|
| Family | Species | Common name |
| Agamidae | <i>Ctenophorus fordi</i> | Mallee Military Dragon |
| | <i>Ctenophorus gibba</i> | Gibber Dragon |
| | <i>Ctenophorus pictus</i> | Painted Dragon |
| | <i>Ctenophorus vadrappa</i> | Red-barred Dragon |
| | <i>Diporiphora winneckeii</i> | Blue-lined Dragon, Canegrass Dragon |
| | <i>Pogona vitticeps</i> * | Central Bearded Dragon |
| | <i>Tympanocryptis intima</i> | Gibber Earless Dragon, Smooth-snouted Earless Dragon |
| | <i>Tympanocryptis tetraporophora</i> | Eyrean Earless Dragon |
| Carphodactylidae | <i>Nephurus levis</i> | Smooth Knob-tailed Gecko, Three-lined Knob-tail |
| Elapidae | <i>Pseudonaja aspidorhyncha</i> * | Strap-snouted Brown Snake |
| Gekkonidae | <i>Gehyra lazelli</i> | Southern Rock Dtella |
| | <i>Gehyra sp. nov.</i> * | Dtella |
| | <i>Gehyra cf. variegata</i> | Tree Dtella |
| | <i>Heteronotia binoei</i> | Bynoe's Gecko |
| | <i>Lucasium byrnei</i> | Gibber Gecko |
| Gekkonidae | <i>Lucasium damaeum</i> * | Beaded Gecko |
| | <i>Underwoodisaurus milii</i> | Barking Gecko, Thick-tailed Gecko |
| Pygopodidae | <i>Lialis burtonis</i> * | Burton's Snake-lizard |
| Scincidae | <i>Cryptoblepharus australis</i> | Inland Snake-eyed Skink |
| | <i>Cryptoblepharus ochrus</i> | Pale Snake-eyed Skink |
| | <i>Ctenotus leae</i> * | Orange-tailed Finesnout Ctenotus |
| | <i>Ctenotus olympicus</i> | Spotted Ctenotus Skink |



Stumpy-tails (*Tiliqua rugosa*), R. Kittel © University of Adelaide



| Reptiles | | |
|-------------------------|---|--|
| Family | Species | Common name |
| Scincidae | <i>Ctenotus regius</i> | Pale-rumped Ctenotus, Royal Ctenotus |
| | <i>Ctenotus robustus</i> | Robust Ctenotus |
| | <i>Ctenotus saxatilis</i> | Rock Ctenotus, Stony-soil Ctenotus |
| | <i>Ctenotus schomburgkii</i> | Barred Wedgesnout Ctenotus, Schomburgk's Ctenotus |
| | <i>Ctenotus strauchii</i> | Eastern Barred Wedgesnout Ctenotus |
| | <i>Ctenotus taeniatus</i> | Eyrean Ctenotus |
| | <i>Egernia stokesii</i> | Gidgee Skink, Stokes' Skink |
| | <i>Eremiascincus richardsonii</i> | Broad-banded Sand-swimmer |
| | <i>Lerista aericeps</i> | Desert Plain Slider |
| | <i>Lerista labialis</i> * | Southern Sandslider |
| | <i>Lerista taeniata</i> | Ribbon Slider |
| | <i>Lerista timida</i> | Timid Slider |
| | <i>Menetia greyii</i> | Common Dwarf Skink, Grey's Menetia |
| | <i>Morethia boulengeri</i> | Boulenger's Snake-eyed Skink, South-eastern Morethia Skink |
| <i>Tiliqua rugosa</i> * | Bobtail, Boggi, Pinecone Lizard, Shingle-back, Sleepy Lizard, Stumpy-tail | |
| Typhlopidae | <i>Ramphotyphlops bituberculatus</i> | Prong-snouted Blind Snake |
| Varanidae | <i>Varanus gouldii</i> * | Gould's Goanna |



Burton's Snake-lizard (*Lialis burtonis*), R. Kittel © University of Adelaide

| Fish | | |
|----------|-------------------------------|-------------|
| Family | Species | Common name |
| Gobiidae | <i>Chlamydogobius eremius</i> | Desert Goby |

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Invertebrates

| Bees | |
|------------------------------------|--|
| Family | Species |
| Apidae | <i>Amegilla chlorocyanea</i> * |
| Colletidae | <i>Hylaeus sp. 1</i> * |
| | <i>Hylaeus sp. 2</i> * |
| | <i>Hylaeus sp. 3</i> * |
| | <i>Hylaeus sp. 5</i> * |
| | <i>Hylaeus sp. 6</i> * |
| | <i>Trichocolletes sp. 4</i> * |
| | <i>Trichocolletes sp. 5</i> * |
| | <i>Leioproctus capito</i> * |
| | <i>Leioproctus sp. 3</i> * |
| | <i>Leioproctus sp. 8</i> * |
| <i>Leioproctus sp. 12</i> * | |
| Halictidae | <i>Lasioglossum (Chilalictus) sp. 3</i> * |
| | <i>Lasioglossum (Chilalictus) sp. 6</i> * |
| | <i>Homalictus sp. 1</i> * |
| | <i>Homalictus sp. 3</i> * |
| | <i>Homalictus sp. 8</i> * |
| Megachilidae | <i>Megachile sp. 1</i> * |
| | <i>Megachile sp. 4</i> * |
| | <i>Megachile sp. 5</i> * |
| | <i>Megachile sp. 7</i> * |
| | <i>Megachile sp. 9</i> * |
| | <i>Megachile sp. 12</i> * |
| | <i>Megachile sp. 13</i> * |

| Wasps | |
|----------------------------|--|
| Family | Species |
| Braconidae (Cheloninae) | <i>Ascogaster n. sp. 2</i> * |
| | <i>Chelonus sp. (curvimaculatus?)</i> * |
| | <i>Chelonus n. sp. 2</i> * |
| | <i>Chelonus n. sp. 3</i> * |
| | <i>Chelonus n. sp. 4</i> * |
| | <i>Phanerotoma sp. (behriae?)</i> * |
| | <i>Phanerotoma sp. (leeuwinensis?)</i> * |
| | <i>Phanerotoma n. sp. 4</i> * |
| Sphecidae | unid. sp. * |

| Butterflies | |
|--------------|--------------------------------------|
| Family | Species |
| Lycaenidae | <i>Jalmenus icilius</i> |
| | <i>Lampides boeticus</i> |
| | <i>Nacaduba biocellata</i> |
| | <i>Ogyris amaryllis meridionalis</i> |
| | <i>Theclinesthes miskini</i> |
| | <i>Theclinesthes serpentatus</i> |
| | <i>Zizina otis labradus</i> |
| Nymphalidae | <i>Danaus petilia</i> |
| | <i>Junonia villida</i> * |
| | <i>Vanessa itea</i> |
| | <i>Vanessa kershawi</i> |
| Papilionidae | <i>Papilio demoleus sthenelus</i> |
| Pieridae | <i>Belenois java teutonia</i> |
| | <i>Delias aganippe</i> * |
| | <i>Eurema hecabe</i> |
| | <i>Eurema smilax</i> |
| | <i>Pieris rapae</i> ^ |

| Moths | |
|----------------------|---|
| Family | Species |
| Anthelidae | unid. sp. * |
| Carposinidae | <i>Carposinidae sp. B</i> * |
| Choreutidae | <i>Tebenna micalis</i> * |
| Cosmopterigidae | <i>Macrobathra sp. 1</i> * |
| | <i>Macrobathra sp. 2</i> * |
| | <i>Mimodoxa sp. 1</i> * |
| | <i>Mimodoxa sp. 2</i> * |
| | unid. genus (<i>Mimodoxa?</i>) * |
| | unid. sp. A * |
| | unid. sp. B * |
| | unid. sp. C * |
| | unid. sp. D * |
| | unid. sp. E * |
| | unid. sp. F * |
| unid. sp. G * | |
| unid. sp. H * | |
| unid. sp. I * | |



| Moths | |
|-----------------|--|
| Family | Species |
| Cosmopterigidae | unid. sp. J * |
| | unid. sp. K * |
| | unid. sp. L * |
| | unid. sp. M * |
| | unid. sp. N * |
| | unid. sp. O * |
| | unid. sp. P * |
| | unid. sp. Q * |
| | unid. sp. S * |
| | unid. sp. T * |
| | unid. sp. AR * |
| Crambidae | <i>Hellula hydralis</i> * |
| | <i>Nomophila corticalis</i> * |
| | <i>Hygraula nitens</i> * |
| | unid. sp. A (subfamily Crambinae) * |
| | unid. sp. B (subfamily Crambinae) * |
| | unid. sp. C (subfamily Pyraustinae) * |
| | unid. sp. D (subfamily Pyraustinae) * |
| | unid. sp. F (subfamily Pyraustinae) * |
| | unid. sp. G (subfamily Crambinae) * |
| | unid. sp. H (subfamily Crambinae) * |

| Moths | |
|----------------------|---|
| Family | Species |
| Gelechiidae | Anarsia sp. 1 * |
| | Anarsia sp. 2 * |
| | Anarsia sp. 3 * |
| | <i>Aproaerema simplexella</i> * |
| | <i>Aproaerema</i> sp. * |
| | <i>Ardozyga haemaspila</i> * |
| | <i>Ardozyga</i> sp. (<i>gypsocrana</i> ?) * |
| | Ardozyga sp. 1 * |
| | Ardozyga sp. 2 * |
| | <i>Dichomeris cirrhostola</i> * |
| | <i>Ephysteris</i> sp. * |
| | <i>Ephysteris subdiminutella</i> * |
| | <i>Pexicopia nephelombra</i> * |
| | <i>Pexicopia</i> sp. (<i>desmanthes</i> ?) * |
| | <i>Scrobipalpa aptatella</i> * |
| | unid. genus (Thiotricha sp.?) 4 * |
| | unid. genus (Thiotricha sp.?) 5 * |
| | unid. genus (Thiotricha sp.?) 6 * |
| | unid. genus (Thiotricha sp.?) 7 * |
| | unid. sp. B * |
| unid. sp. C * | |
| unid. sp. D * | |
| unid. sp. E * | |
| unid. sp. F * | |



Andy Young pinning insects, K. Gillespie

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| Moths | |
|-----------------------------|---|
| Family | Species |
| Geometridae | (no available genus) plectoneura * |
| | <i>Anomocentris trissodesma</i> * |
| | <i>Boarmiini</i> sp. * |
| | <i>Chlorocoma halochlora</i> * |
| | <i>Epicyme rubropunctaria</i> * |
| | <i>Euloxia pyropa</i> * |
| | <i>Paramelora lychnota</i> * |
| | <i>Phrissogonus laticostata</i> * |
| | <i>Scopula lydia</i> * |
| | <i>Scopula</i> sp. (<i>rubraria</i> complex) * |
| | Scopula sp. 1 * |
| | Scopula sp. 2 * |
| | Scopula sp. 3 * |
| | Taxeotis sp. 1 * |
| | Taxeotis sp. 2 * |
| | Taxeotis sp. 3 * |
| | Taxeotis sp. 5 * |
| | unid. genus (<i>Prasinocyma</i> sp?) * |
| | unid. sp. A (subfamily <i>Ennominae</i>) * |
| | Unplaced <i>hieroglyphica</i> * |
| Gracillariidae | Gracillariidae sp. A * |
| | Gracillariidae sp. B * |
| | Gracillariidae sp. D * |
| | Gracillariidae sp. E * |
| Hypertrophidae | Eupselia sp. 1 * |
| | Eupselia sp. 3a * |
| | Eupselia sp. 3b * |
| Lasiocampidae | <i>Genduara acedesta</i> * |
| | <i>Symphyta psaropis</i> * |
| Lyonetiidae | <i>Bedellia somnulentella</i> * |
| Noctuidae | <i>Acontia</i> sp. * |
| | <i>Calophasidia</i> sp. * |
| | <i>Diatenes</i> sp. * |
| | <i>Ericeia subsignata</i> * |
| | <i>Eublemma</i> sp. (<i>pusilla</i> ?) * |
| | Eublemma sp. 2 * |
| | <i>Ophiusa tirhaca</i> * |
| | <i>Stenoprora</i> sp. (<i>triplax</i> ?) * |
| Unplaced <i>euryinpha</i> * | |

| Moths | |
|-----------------------|--|
| Family | Species |
| Oecophoridae | Chrysonoma sp. 3 * |
| | <i>Illidgea</i> sp. * |
| | Maroga sp. 1 * |
| | Maroga sp. 2 * |
| | <i>Oenochroa</i> sp. * |
| | <i>Phloeograptis</i> sp. * |
| | <i>Piloprepes</i> sp. * |
| | <i>Telanepsia</i> sp. * |
| | <i>Trisyntopa euryspoda</i> * |
| | unid. genus (<i>Chrysonoma</i> sp?) * |
| | unid. genus (<i>Coesyra</i> sp?) * |
| | unid. genus (<i>Olbonoma</i> sp?) * |
| | unid. sp. (<i>Philobota</i> group) 1b * |
| | unid. sp. (<i>Philobota</i> group) 2 * |
| | unid. sp. (<i>Philobota</i> group) 3 * |
| | unid. sp. (<i>Wingia</i> group 1) * |
| | unid. sp. * |
| | unid. sp. M * |
| | unid. sp. N * |
| | unid. sp. O * |
| | unid. sp. P * |
| | unid. sp. Q * |
| | unid. sp. R * |
| | unid. sp. S * |
| | unid. sp. T * |
| | unid. sp. U * |
| | unid. sp. V * |
| | unid. sp. W * |
| | unid. sp. AD * |
| | unid. sp. AE * |
| unid. sp. AF * | |
| unid. sp. AG * | |
| unid. sp. AH * | |
| unid. sp. AI * | |
| unid. sp. AJ * | |
| unid. sp. AK * | |
| Opostegidae | Opostegidae sp. A * |
| Pterophoridae | unid. sp. A * |



| Moths | |
|----------------------|--|
| Family | Species |
| Pyralidae | <i>Ephestiopsis oenobarella</i> * |
| | <i>Etiella behrii</i> * |
| | <i>Faveria tritalis</i> * |
| | <i>Heliothela</i> sp. * |
| | <i>Meyrickiella homosema</i> * |
| | <i>Nephoterix melanostyla</i> * |
| | <i>Titanoceros</i> sp. * |
| | unid. genus (subfamily Peorinae) * |
| | unid. sp. * |
| | unid. sp. 3 (subfamily Phycitinae) * |
| | unid. sp. A * |
| Suborder Glossata | unid. sp. (division Ditrysia) * |
| Tineidae | <i>Edosa</i> sp. * |
| | <i>Monopis argillacea</i> * |
| | <i>Monopis meliorella</i> * |
| | Tineidae sp. C * |
| | Tineidae sp. F * |
| Tortricidae | <i>Crociosema plebejana</i> * |
| | <i>Cryptophlebia ombrodelta</i> * |
| | <i>Epiphyas postvittana</i> * |
| | Epiphyas sp. 2 * |
| | Tortricinae sp. A * |
| | Tortricinae sp. B * |
| | Tortricinae sp. C * |
| | unid. sp. (subfamily Olethreutinae) * |
| | unid. sp. (tribe Grapholitini) * |
| | <i>Zomariana doxasticana</i> * |

| Caddisflies | |
|--------------|-------------|
| Family | Species |
| Leptoceridae | unid. sp. * |

| Flies | |
|---------------|--|
| Family | Species |
| Agromyzidae | unid. sp. * |
| Asilidae | unid. sp. * |
| Bombyliidae | unid. sp. * |
| Culicidae | unid. sp. * |
| Odiniidae | unid. sp. * |
| Pyrgotidae | unid. sp. * |
| Sarcophagidae | unid. sp. (subfamily Miltogramminae) * |
| Tachinidae | unid. sp. * |
| Tephritidae | unid. sp. * |

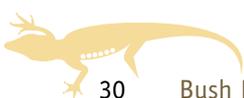
| Beetles | |
|-------------------------------|-------------------------------------|
| Family | Species |
| Belidae | unid. sp. * |
| Carabidae | unid. sp. (subfamily Paussinae) * |
| Chrysomelidae | unid. sp. * |
| Cleridae | unid. sp. * |
| Coccinellidae | unid. sp. * |
| Dytiscidae | <i>Eretes australis</i> |
| | <i>Necterosoma undecimlineatum</i> |
| | <i>Rhantus suturalis</i> |
| | unid. sp. * |
| Meloidae | unid. sp. * |
| Melyridae | unid. sp. (subfamily Malachiinae) * |
| Mordellidae | unid. sp. * |
| Ripiphoridae | unid. sp. * |
| Staphylinidae | unid. sp. (subfamily Omaliinae) * |
| Superfamily Cucujoidea | unid. sp. * |
| Superfamily Curculionoidea | unid. sp. * |

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| Net-winged Insects | |
|--------------------|-------------|
| Family | Species |
| Berothidae | unid. sp. * |
| Chrysopidae | unid. sp. * |
| Coniopterygidae | unid. sp. * |
| Mantispidae | unid. sp. * |

| True Bugs — Terrestrial | |
|--------------------------------|---|
| Family | Species |
| Berytidae | unid. sp. * |
| Coreidae | <i>Amorbus</i> sp. * |
| | <i>Mictis profana</i> * |
| | unid. sp. * |
| Cymidae | unid. sp. * |
| Cydnidae | unid. sp. 1 * |
| | unid. sp. 2 * |
| | unid. sp. 3 * |
| Geocoridae | <i>Geocoris</i> sp. * |
| | <i>Germalus</i> sp. 1 * |
| | <i>Germalus</i> sp. 2 * |
| | <i>Germalus</i> sp. 3 * |
| Lygaeidae | unid. sp. (subfamily Ischnorhynchinae) * |
| | <i>Nysius vinitor</i> ^ * |
| | unid. sp. * |
| Miridae | Austromirini n. gen. n. sp. * |
| | <i>Campylomma liebknechti</i> ^ * |
| | <i>Campylomma</i> sp. * |
| | <i>Chimsunchartella schwartzi</i> * |
| | <i>Coridromius chenopoderis</i> * |
| | <i>Creontiades dilutus</i> * |
| | Democoris n. sp. * |
| | <i>Democoris</i> sp. * |
| | <i>Engytatus nicotianae</i> ^ * |
| | Jiwarli n. sp. * |
| | <i>Jiwarli</i> sp. * |
| | Mirini unid. n. gen. n. sp. 1 * |
| | Mirini unid. n. gen. n. sp. 2 * |
| | Mirini unid. n. gen. n. sp. 3 * |
| | Mirini unid. n. sp. 1 * |
| Mirini unid. n. sp. 2 * | |
| Mirini unid. n. sp. 3 * | |

| True Bugs — Terrestrial | |
|--|---|
| Family | Species |
| Miridae | Orthotylini n. gen. n. sp. * |
| | Orthotylini unid. n. sp. * |
| | Phylini unid. n. gen. n. sp. 1 * |
| | Phylini unid. n. gen. n. sp. 2 * |
| | Phylini unid. n. sp. 1 * |
| | Phylini unid. n. sp. 2 * |
| | Phylini unid. n. sp. 3 * |
| | Phylini unid. n. sp. 4 * |
| | Phylini unid. n. sp. 5 * |
| | Phylini unid. n. sp. 6 * |
| | Phylini unid. n. sp. 7 * |
| | Phylini unid. n. sp. 8 * |
| | Phylini unid. n. sp. 9 * |
| | Phylini unid. n. sp. 10 * |
| | Phylini unid. n. sp. 11 * |
| | Phylini unid. n. sp. 12 * |
| | Phylini unid. sp. * |
| | Phylini unid. sp. * |
| | <i>Sejanus</i> sp. * |
| <i>Singhalesia</i> sp. * | |
| <i>Taylorilygus apicalis</i> * | |
| unid. sp. * | |
| <i>Wallabicoris</i> sp. * | |
| Witchelinamiris mchughi * | |
| Witchelinamiris viridimaculatus * | |
| Nabidae | <i>Nabis kinbergii</i> * |
| Oxycarenidae | <i>Oxycarenus</i> sp. * |
| Pachygronthidae | <i>Stenophyella macreta</i> * |
| Pentatomidae | Halyini unid. sp. * |
| | <i>Oechalia schellenbergii</i> ^ * |
| | <i>Oncocoris</i> sp. * |
| | <i>Oncocoris</i> sp. * |
| | <i>Poecilometis nigriventris</i> * |
| | <i>Poecilometis</i> sp. * |
| | unid. genus (<i>Eribotes?</i>) * |
| | unid. genus (<i>Sciocoris?</i>) * |
| | unid. sp. * |
| | unid. sp. * |
| Reduviidae | <i>Ectomocoris</i> sp. * |
| | unid. sp. * |



| True Bugs — Terrestrial | |
|-------------------------|--|
| Family | Species |
| Rhyparochromidae | Myodochini sp. * |
| | Myodochini sp. * |
| | <i>Plinthisus</i> sp. * |
| Tingidae | unid. genus (<i>Tingis?</i>) n. sp. 1 * |
| | unid. genus (<i>Tingis?</i>) sp. 2 * |
| | unid. genus (<i>Tingis?</i>) sp. 3 * |

| True Bugs — Aquatic | |
|---------------------|----------------------|
| Family | Species |
| Corixidae | Micronecta sp. * |
| | unid. sp. * |
| Notonectidae | Notonectidae sp. 1 * |
| | Notonectidae sp. 2 * |

| Jumping Plantlice | |
|-------------------|------------------------------------|
| Family | Species |
| Psyllidae | <i>Acizzia</i> sp. 1 * |
| | <i>Acizzia</i> sp. 2 * |
| | <i>Acizzia</i> sp. 3 * |
| | <i>Acizzia</i> sp. 6 * |
| | <i>Acizzia</i> sp. 7 * |
| | <i>Acizzia</i> sp. 11 * |
| | <i>Acizzia</i> sp. 12 * |
| | <i>Anoeconeossa</i> sp. 1 * |
| | unid. sp. * |
| Triozidae | <i>Triozia</i> sp. 2 * |

| Leafhoppers and Plant-hoppers | |
|-------------------------------|-------------------------------------|
| Family | Species |
| Cicadellidae | unid. sp. * |
| | unid. sp. (subfamily Eurymelinae) * |
| Flatidae | unid. sp. * |

| Cockroaches | |
|-------------|-------------|
| Family | Species |
| Blattidae | unid. sp. * |

| Crickets | |
|---------------|--|
| Family | Species |
| Trigonidiidae | unid. sp. (subfamily Trigonidiinae) * |

| Earwigs | |
|-------------|-------------|
| Family | Species |
| Labiduridae | unid. sp. * |

| Damselflies | |
|----------------|------------------------------------|
| Family | Species |
| Coenagrionidae | <i>Ischnura aurora</i> * |
| | unid. sp. * |
| | <i>Xanthagrion erythroneurum</i> * |
| Lestidae | <i>Austrolestes annulosus</i> * |
| | <i>Austrolestes aridus</i> |
| | unid. sp. * |

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| Dragonflies | |
|-----------------|--------------------------------|
| Family | Species |
| Aeschnidae | <i>Hemianax papuensis</i> * |
| Hemicorduliidae | <i>Hemicordulia tau</i> * |
| Libellulidae | <i>Diplacodes bipunctata</i> * |
| | <i>Orthetrum caledonicum</i> * |
| | <i>Tramea loewii</i> * |

| Silverfish | |
|-----------------|-------------|
| Family | Species |
| Order Zygentoma | unid. sp. * |

| Spiders | |
|-------------|--------------------------------|
| Family | Species |
| Lycosidae | <i>Lycosa australicola</i> |
| Sparassidae | <i>Pediana horni</i> |
| Theridiidae | <i>Latrodectus hasseltii</i> * |

| Snails and Slugs | |
|------------------|----------------------------|
| Family | Species |
| Camaenidae | <i>Cupedora lorioliana</i> |
| | <i>Sinumelon hamiltoni</i> |



Redback Spider (*Latrodectus hasseltii*), R. Kittel © University of Adelaide



Flora



Sarah Mantel, Federica Colombo and Rebecca Kittel checking a malaise trap, K. Gillespie

| Flowering Plants | |
|------------------|--|
| Family | Species |
| Aizoaceae | <i>Gunniopsis papillata</i> * |
| | <i>Gunniopsis quadrifida</i> |
| | <i>Gunniopsis tenuifolia</i> |
| | <i>Tetragonia eremaea</i> |
| | <i>Trianthema triquetra</i> |
| | <i>Zaleya galericulata</i> |
| Amaranthaceae | <i>Amaranthus grandiflorus</i> |
| | <i>Alternanthera denticulata</i> * |
| | <i>Ptilotus nobilis</i> subsp. <i>nobilis</i> |
| | <i>Ptilotus obovatus</i> |
| | <i>Ptilotus polystachyus</i> |
| | <i>Ptilotus sessilifolius</i> |
| Amaryllidaceae | <i>Crinum flaccidum</i> * |
| Apiaceae | <i>Daucus glochidiatus</i> |
| Apocynaceae | <i>Sarcostemma viminale</i> subsp. <i>australe</i> |
| Asparagaceae | <i>Thysanotus baueri</i> * |
| Asphodelaceae | <i>Bulbine alata</i> |
| Asteraceae | <i>Anemocarpa podolepidium</i> |
| | <i>Angianthus brachypappus</i> |
| | <i>Angianthus tomentosus</i> |
| | <i>Brachyscome ciliaris</i> var. <i>brachyglossa</i> * |
| | <i>Brachyscome ciliaris</i> var. <i>lanuginosa</i> * |
| | <i>Brachyscome dichromosomatica</i> var. <i>dichromosomatica</i> * |
| | <i>Brachyscome iberidifolia</i> * |
| | <i>Brachyscome lineariloba</i> * |

| Flowering Plants | |
|------------------------------|--|
| Family | Species |
| Asteraceae | <i>Calotis cymbacantha</i> |
| | <i>Calotis hispidula</i> |
| | <i>Calotis porphyroglossa</i> |
| | <i>Calotis scabiosifolia</i> var. <i>scabiosifolia</i> * |
| | <i>Centaurea melitensis</i> ^ * |
| | <i>Centipeda thespidioides</i> * |
| | <i>Chrysocephalum apiculatum</i> |
| | <i>Dimorphocoma minutula</i> |
| | <i>Eriochlamys eremaea</i> * |
| | <i>Euchiton sphaericus</i> * |
| | <i>Gnephosis arachnoidea</i> * |
| | <i>Gnephosis tenuissima</i> |
| | <i>Helichrysum luteoalbum</i> |
| | <i>Ixiochlamys cuneifolia</i> |
| | <i>Lactuca serriola</i> ^ * |
| | <i>Leiocarpa leptolepis</i> * |
| | <i>Leiocarpa semicalva</i> subsp. <i>semicalva</i> * |
| | <i>Leiocarpa tomentosa</i> * |
| | <i>Leiocarpa websteri</i> * |
| | <i>Lepidium oxytrichum</i> |
| | <i>Lepidium phlebopetalum</i> |
| | <i>Minuria cunninghamii</i> |
| | <i>Minuria denticulata</i> |
| | <i>Minuria integerrima</i> |
| <i>Minuria leptophylla</i> * | |
| <i>Minuria rigida</i> * | |
| <i>Podolepis capillaris</i> | |

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| Flowering Plants | |
|-----------------------------------|--|
| Family | Species |
| Asteraceae | <i>Polycalymma stuartii</i> |
| | <i>Pterocaulon sphacelatum</i> |
| | <i>Pycnosorus pleiocephalus</i> |
| | <i>Rhodanthe corymbiflora</i> |
| | <i>Rhodanthe floribunda</i> |
| | <i>Rhodanthe microglossa</i> |
| | <i>Rhodanthe moschata</i> |
| | <i>Rhodanthe pygmaea</i> |
| | <i>Rhodanthe stricta</i> |
| | <i>Rhodanthe uniflora</i> |
| | <i>Schoenia ayersii</i> |
| | <i>Senecio glossanthus</i> |
| | <i>Senecio gregorii</i> * |
| | <i>Senecio lanibracteus</i> |
| | <i>Senecio magnificus</i> |
| | <i>Senecio pinnatifolius</i> |
| | <i>Sonchus oleraceus</i> ^ |
| | <i>Vittadinia cuneata</i> var. <i>morrisii</i> * |
| | <i>Vittadinia eremaea</i> |
| | <i>Vittadinia pterochaeta</i> |
| Boraginaceae | <i>Echium plantagineum</i> ^ * |
| | <i>Heliotropium asperrimum</i> |
| | <i>Omphalolappula concava</i> |
| | <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> |
| Brassicaceae | <i>Arabidella glaucescens</i> * |
| | <i>Arabidella nasturtium</i> |
| | <i>Blennodia pterosperma</i> * |
| | <i>Brassica tournefortii</i> ^ * |
| | <i>Carrichtera annua</i> ^ * |
| | <i>Phlegmatospermum cochlearinum</i> |
| | <i>Sisymbrium erysimoides</i> ^ |
| | <i>Sisymbrium irio</i> ^ * |
| | <i>Stenopetalum lineare</i> |
| | Campanulaceae |
| <i>Wahlenbergia communis</i> | |
| <i>Wahlenbergia gracilentia</i> * | |
| <i>Wahlenbergia tumidifruca</i> | |
| Caryophyllaceae | <i>Spergularia diandroides</i> * |
| | <i>Spergularia marina</i> * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Casuarinaceae | <i>Casuarina pauper</i> |
| Chenopodiaceae | <i>Atriplex angulata</i> * |
| | <i>Atriplex eardleyae</i> |
| | <i>Atriplex eichleri</i> ~ * |
| | <i>Atriplex fissivalvis</i> |
| | <i>Atriplex holocarpa</i> |
| | <i>Atriplex leptocarpa</i> |
| | <i>Atriplex limbata</i> |
| | <i>Atriplex lindleyi</i> subsp. <i>lindleyi</i> * |
| | <i>Atriplex nummularia</i> subsp. <i>nummularia</i> * |
| | <i>Atriplex pseudocampanulata</i> |
| | <i>Atriplex spongiosa</i> |
| | <i>Atriplex velutinella</i> |
| | <i>Atriplex vesicaria</i> |
| | <i>Chenopodium curvispicatum</i> |
| | <i>Chenopodium desertorum</i> |
| | <i>Chenopodium desertorum</i> subsp. <i>anidiophyllum</i> |
| | <i>Chenopodium murale</i> ^ * |
| | <i>Chenopodium nitrariaceum</i> |
| | <i>Dissocarpus biflorus</i> var. <i>biflorus</i> |
| | <i>Dissocarpus paradoxus</i> |
| | <i>Dysphania cristata</i> |
| | <i>Dysphania plantaginella</i> |
| <i>Einadia nutans</i> subsp. <i>eremaea</i> * | |
| <i>Enchylaena tomentosa</i> var. <i>glabra</i> * | |
| <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> | |



Nulla Nulla (*Ptilotus nobilis*), R. Kittel © University of Adelaide



| Flowering Plants | |
|--------------------------------|--|
| Family | Species |
| Chenopodiaceae | <i>Eriochiton sclerolaenoides</i> |
| | <i>Maireana aphylla</i> |
| | <i>Maireana appressa</i> * |
| | <i>Maireana astrotricha</i> |
| | <i>Maireana cannonii</i> |
| | <i>Maireana ciliata</i> |
| | <i>Maireana eriantha</i> |
| | <i>Maireana erioclada</i> * |
| | <i>Maireana georgei</i> * |
| | <i>Maireana integra</i> |
| | <i>Maireana lobiflora</i> |
| | <i>Maireana melanocarpa</i> |
| | <i>Maireana ovata</i> |
| | <i>Maireana pentatropis</i> |
| | <i>Maireana pyramidata</i> |
| | <i>Maireana radiata</i> * |
| | <i>Maireana sedifolia</i> * |
| | <i>Maireana spongiocarpa</i> |
| | <i>Maireana trichoptera</i> |
| | <i>Maireana turbinata</i> * |
| | <i>Osteocarpum acropterum</i> var. <i>acropterum</i> |
| | <i>Osteocarpum dipterothecum</i> |
| | <i>Rhagodia spinescens</i> |
| | <i>Rhagodia ulicina</i> |
| | <i>Salsola australis</i> |
| | <i>Sclerolaena bicornis</i> |
| | <i>Sclerolaena brachyptera</i> |
| | <i>Sclerolaena constricta</i> |
| | <i>Sclerolaena cuneata</i> |
| | <i>Sclerolaena decurrens</i> |
| | <i>Sclerolaena diacantha</i> |
| | <i>Sclerolaena divaricata</i> |
| <i>Sclerolaena intricata</i> | |
| <i>Sclerolaena lanicuspis</i> | |
| <i>Sclerolaena limbata</i> | |
| <i>Sclerolaena longicuspis</i> | |



Twin-leaf Pigface (*Gunnipopsis papillata*), P. Lang
© Department of Environment, Water and Natural Resources

| Flowering Plants | | |
|------------------------------|--|--|
| Family | Species | |
| Chenopodiaceae | <i>Sclerolaena obliquicuspis</i> | |
| | <i>Sclerolaena parallelicuspis</i> * | |
| | <i>Sclerolaena patentiscuspis</i> | |
| | <i>Sclerolaena tatei</i> | |
| | <i>Sclerolaena uniflora</i> | |
| | <i>Sclerolaena ventricosa</i> | |
| | <i>Tecticornia disarticulata</i> | |
| | <i>Tecticornia indica</i> subsp. <i>leiostachya</i> | |
| | <i>Tecticornia medullosa</i> * | |
| | <i>Tecticornia nitida</i> | |
| | <i>Tecticornia pluriflora</i> | |
| | <i>Tecticornia pruinosa</i> | |
| | <i>Tecticornia</i> sp. | |
| | <i>Tecticornia tenuis</i> | |
| | Colchicaceae | <i>Wurmbea centralis</i> |
| | Convolvulaceae | <i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i> * |
| <i>Convolvulus eyreanus</i> | | |
| <i>Convolvulus remotus</i> * | | |
| Crassulaceae | <i>Crassula colligata</i> subsp. <i>lamprosperma</i> * | |
| | <i>Crassula colorata</i> var. <i>colorata</i> * | |
| Cucurbitaceae | <i>Citrullus</i> sp. ^ * | |
| | <i>Cucumis myriocarpus</i> ^ | |
| Cyperaceae | <i>Cyperus bulbosus</i> | |
| | <i>Cyperus laevigatus</i> | |
| | <i>Eleocharis pallens</i> * | |

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- ~ = NPW Act listed

Colour coding for entries:

- Black = Previously recorded on the reserve and found on this survey
- Brown** = Putative new species
- Blue = Previously recorded on the reserve but not found on this survey





| Flowering Plants | |
|------------------|--|
| Family | Species |
| Euphorbiaceae | <i>Euphorbia australis</i> * |
| | <i>Euphorbia drummondii</i> |
| | <i>Euphorbia stevenii</i> |
| | <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> |
| Fabaceae | <i>Acacia aneura</i> |
| | <i>Acacia brachystachya</i> * |
| | <i>Acacia calcicola</i> |
| | <i>Acacia clelandii</i> |
| | <i>Acacia ligulata</i> |
| | <i>Acacia minyura</i> |
| | <i>Acacia oswaldii</i> |
| | <i>Acacia ramulosa</i> |
| | <i>Acacia salicina</i> |
| | <i>Acacia sibirica</i> |
| | <i>Acacia tarculensis</i> |
| | <i>Acacia tetragonophylla</i> |
| | <i>Acacia victoriae</i> subsp. <i>victoriae</i> |
| | <i>Crotalaria cunninghamii</i> subsp. <i>sturtii</i> * |
| | <i>Crotalaria eremaea</i> subsp. <i>eremaea</i> |
| | <i>Cullen australasicum</i> |
| | <i>Cullen cinereum</i> * |
| | <i>Cullen discolor</i> |
| | <i>Cullen graveolens</i> * |
| | <i>Cullen pallidum</i> |
| | <i>Glycine canescens</i> |
| | <i>Lotus cruentus</i> |
| | <i>Petalostylis labicheoides</i> |
| | <i>Senna artemisioides</i> subsp. <i>alicia</i> |
| | <i>Senna artemisioides</i> subsp. <i>filifolia</i> |
| | <i>Senna artemisioides</i> subsp. <i>helmsii</i> |
| | <i>Senna artemisioides</i> subsp. <i>oligophylla</i> |
| | <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> |
| | <i>Senna artemisioides</i> subsp. <i>x coriacea</i> * |
| | <i>Senna artemisioides</i> subsp. <i>x petiolaris</i> |

| Flowering Plants | |
|--------------------------------|--|
| Family | Species |
| Fabaceae | <i>Senna artemisioides</i> subsp. <i>x sturtii</i> * |
| | <i>Swainsona adenophylla</i> |
| | <i>Swainsona campylantha</i> * |
| | <i>Swainsona flavicarinata</i> |
| | <i>Swainsona formosa</i> * |
| | <i>Swainsona leeana</i> ~ * |
| | <i>Swainsona oroboides</i> |
| | <i>Swainsona stipularis</i> |
| | <i>Templetonia egena</i> |
| | <i>Tephrosia sphaerospora</i> |
| <i>Trigonella suavissima</i> * | |
| Frankeniaceae | <i>Frankenia</i> sp. |
| | <i>Frankenia foliosa</i> |
| | <i>Frankenia serpyllifolia</i> |
| Gentianaceae | <i>Centaurium tenuiflorum</i> ^ * |
| Geraniaceae | <i>Erodium aureum</i> ^ * |
| | <i>Erodium carolinianum</i> |
| | <i>Erodium cicutarium</i> ^ * |
| | <i>Erodium crinitum</i> * |
| Goodeniaceae | <i>Goodenia fascicularis</i> |
| | <i>Goodenia glauca</i> * |
| | <i>Goodenia lunata</i> |
| | <i>Scaevola parvibarbata</i> |
| | <i>Scaevola spinescens</i> |
| Juncaginaceae | <i>Triglochin isingiana</i> |
| Lamiaceae | <i>Prostanthera striatiflora</i> |
| | <i>Teucrium racemosum</i> |
| Loranthaceae | <i>Amyema preissii</i> |
| | <i>Lysiana exocarpi</i> subsp. <i>exocarpi</i> |



White Scurf-pea (*Cullen pallidum*), P. Lang
 © Department of Environment, Water and Natural Resources



| Flowering Plants | |
|------------------------|--|
| Family | Species |
| Malvaceae | <i>Abutilon fraseri</i> subsp. <i>diplotrichum</i> * |
| | <i>Abutilon leucopetalum</i> |
| | <i>Abutilon malvaefolium</i> * |
| | <i>Abutilon otocarpum</i> |
| | <i>Gilesia biniflora</i> ~ * |
| | <i>Hibiscus brachysiphonius</i> * |
| | <i>Hibiscus krichauffianus</i> * |
| | <i>Lawrencia glomerata</i> |
| | <i>Malva parviflora</i> ^ |
| | <i>Malva preissiana</i> |
| | <i>Malvastrum americanum</i> var. <i>americanum</i> |
| | <i>Sida ammophila</i> |
| | <i>Sida fibulifera</i> |
| | <i>Sida intricata</i> |
| | <i>Sida petrophila</i> |
| <i>Sida trichopoda</i> | |
| Myrtaceae | <i>Eucalyptus camaldulensis</i> |
| | <i>Eucalyptus camaldulensis</i> subsp. <i>minima</i> * |
| | <i>Eucalyptus intertexta</i> |
| | <i>Eucalyptus oleosa</i> |
| | <i>Eucalyptus socialis</i> subsp. <i>socialis</i> |
| | <i>Melaleuca glomerata</i> |
| Nyctaginaceae | <i>Boerhavia coccinea</i> |
| | <i>Boerhavia schomburgkiana</i> * |
| | <i>Commicarpus australis</i> |
| Orobanchaceae | <i>Orobanche cernua</i> var. <i>australiana</i> ~ * |
| Oxalidaceae | <i>Oxalis perennans</i> |
| Papaveraceae | <i>Papaver somniferum</i> ^ * |
| Phyllanthaceae | <i>Phyllanthus fuernrohrii</i> * |
| | <i>Phyllanthus lacunellus</i> * |
| Pittosporaceae | <i>Pittosporum angustifolium</i> |
| Plantaginaceae | <i>Plantago drummondii</i> |

| Flowering Plants | |
|--|--|
| Family | Species |
| Poaceae | <i>Aristida anthoxanthoides</i> |
| | <i>Aristida capillifolia</i> |
| | <i>Aristida contorta</i> |
| | <i>Aristida holathera</i> var. <i>holathera</i> * |
| | <i>Aristida strigosa</i> * |
| | <i>Austrostipa eremophila</i> * |
| | <i>Austrostipa nitida</i> * |
| | <i>Austrostipa pilata</i> ~ * |
| | <i>Austrostipa scabra</i> subsp. <i>scabra</i> * |
| | <i>Chloris pectinata</i> * |
| | <i>Cymbopogon ambiguus</i> |
| | <i>Cynodon dactylon</i> var. <i>dactylon</i> ^ * |
| | <i>Dactyloctenium radulans</i> |
| | <i>Dichanthium sericeum</i> |
| | <i>Dichanthium sericeum</i> subsp. <i>sericeum</i> * |
| | <i>Digitaria ammophila</i> * |
| | <i>Digitaria brownii</i> |
| | <i>Digitaria coenicola</i> * |
| | <i>Enneapogon avenaceus</i> |
| | <i>Enneapogon caeruleus</i> |
| | <i>Enneapogon cylindricus</i> |
| | <i>Enneapogon polyphyllus</i> |
| | <i>Enteropogon acicularis</i> * |
| | <i>Enteropogon ramosus</i> |
| | <i>Eragrostis australasica</i> |
| | <i>Eragrostis barrelieri</i> ^ |
| | <i>Eragrostis dielsii</i> |
| | <i>Eragrostis leptocarpa</i> * |
| | <i>Eragrostis minor</i> ^ * |
| | <i>Eragrostis xerophila</i> |
| | <i>Eriachne mucronata</i> |
| | <i>Eulalia aurea</i> |
| <i>Iseilema membranaceum</i> * | |
| <i>Leptochloa fusca</i> subsp. <i>fusca</i> * | |
| <i>Panicum decompositum</i> var. <i>decompositum</i> * | |

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Lawrenčia glomerata aggregation near Coronation Bore, P. Lang
© Department of Environment, Water and Natural Resources

| Flowering Plants | |
|------------------|--|
| Family | Species |
| Poaceae | <i>Paractaenum novae-hollandiae</i> subsp. <i>reversum</i> |
| | <i>Paractaenum refractum</i> |
| | <i>Phragmites australis</i> |
| | <i>Rostraria pumila</i> ^ |
| | <i>Schismus arabicus</i> ^ * |
| | <i>Schismus barbatus</i> ^ |
| | <i>Setaria dielsii</i> |
| | <i>Sporobolus actinocladius</i> * |
| | <i>Sporobolus caroli</i> * |
| | <i>Sporobolus virginicus</i> |
| | <i>Themeda triandra</i> |
| | <i>Tragus australianus</i> * |
| | <i>Tripogon loliiformis</i> * |
| | <i>Triraphis mollis</i> * |
| | <i>Zygochloa paradoxa</i> |
| Polygonaceae | <i>Acetosa vesicaria</i> ^ |
| | <i>Muehlenbeckia florulenta</i> |
| | <i>Polygonum plebeium</i> * |
| Portulacaceae | <i>Calandrinia remota</i> * |
| | <i>Portulaca filifolia</i> * |
| | <i>Calandrinia eremaea</i> * |
| | <i>Portulaca oleracea</i> |
| Primulaceae | <i>Lysimachia arvensis</i> ^ * |
| Proteaceae | <i>Hakea leucoptera</i> subsp. <i>leucoptera</i> |
| Santalaceae | <i>Santalum lanceolatum</i> |

| Flowering Plants | |
|---------------------------|--|
| Family | Species |
| Sapindaceae | <i>Alectryon oleifolius</i> subsp. <i>canescens</i> |
| | <i>Dodonaea lobulata</i> |
| | <i>Dodonaea microzyga</i> var. <i>microzyga</i> |
| | <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> |
| Scrophulariaceae | <i>Eremophila duttonii</i> |
| | <i>Eremophila freelingii</i> |
| | <i>Eremophila glabra</i> subsp. <i>glabra</i> |
| | <i>Eremophila latrobei</i> subsp. <i>glabra</i> |
| | <i>Eremophila longifolia</i> |
| | <i>Eremophila scoparia</i> |
| | <i>Eremophila serrulata</i> |
| <i>Myoporum montanum</i> | |
| Solanaceae | <i>Datura leichhardtii</i> ^ * |
| Solanaceae | <i>Nicotiana glauca</i> ^ * |
| | <i>Nicotiana simulans</i> |
| | <i>Nicotiana velutina</i> |
| | <i>Solanum ellipticum</i> |
| | <i>Solanum esuriale</i> |
| | <i>Solanum lycopersicum</i> ^ * |
| | <i>Solanum nigrum</i> ^ |
| | <i>Solanum oligacanthum</i> |
| <i>Solanum simile</i> | |
| <i>Solanum sturtianum</i> | |
| Thymelaeaceae | <i>Pimelea microcephala</i> subsp. <i>microcephala</i> |
| | <i>Pimelea simplex</i> subsp. <i>continua</i> * |
| | <i>Pimelea simplex</i> subsp. <i>simplex</i> |
| Urticaceae | <i>Parietaria cardiostegia</i> * |
| Verbenaceae | <i>Verbena supina</i> ^ * |
| Zygophyllaceae | <i>Tribulus eichlerianus</i> |
| | <i>Tribulus minutus</i> * |
| | <i>Zygophyllum ammophilum</i> |
| | <i>Zygophyllum aurantiacum</i> subsp. <i>verticillatum</i> |
| | <i>Zygophyllum emarginatum</i> |
| | <i>Zygophyllum howittii</i> |
| | <i>Zygophyllum iodocarpum</i> * |
| | <i>Zygophyllum kochii</i> |
| | <i>Zygophyllum prismatothecum</i> |
| | <i>Zygophyllum simile</i> |



Rough Burr-daisy (*Calotis scabiosifolia* var. *scabiosifolia*) near Minagoona and South Well Paddocks, P. Lang © Department of Environment, Water and Natural Resources

| Conifers | |
|--------------|-------------------------------|
| Family | Species |
| Cupressaceae | <i>Callitris glaucophylla</i> |

| Fungi | |
|-------------|------------------------------|
| Family | Species |
| Agaricaceae | <i>Podaxis pistillaris</i> * |

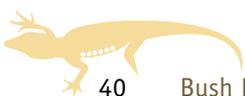
| Ferns | |
|--------------|---|
| Family | Species |
| Marsileaceae | <i>Marsilea costulifera</i> * |
| | <i>Marsilea drummondii</i> |
| | <i>Marsilea hirsuta</i> |
| Pteridaceae | <i>Cheilanthes lasiophylla</i> |
| | <i>Cheilanthes sieberi</i> subsp. <i>pseudovellea</i> * |
| | <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> |

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Appendix B: Threatened Species

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at March 2013



Andy Young collecting insects, K. Gillespie

Fauna

| Birds | | | |
|-------------------|---------------------------------|-----------------------------|------------------|
| Family | Species | Common name | Status |
| Acanthizidae | <i>Aphelocephala pectoralis</i> | Chestnut-breasted Whiteface | NPW — Rare |
| Accipitridae | <i>Hamirostra melanosternon</i> | Black-breasted Buzzard | NPW — Rare |
| Anatidae | <i>Anas rhynchotis</i> | Australasian Shoveler | NPW — Rare |
| | <i>Biziura lobata</i> | Musk Duck | NPW — Rare |
| | <i>Oxyura australis</i> | Blue-billed Duck | NPW — Rare |
| Estrildidae | <i>Emblema pictum</i> | Painted Finch | NPW — Rare |
| Falconidae | <i>Falco hypoleucos</i> | Grey Falcon | NPW — Rare |
| Monarchidae | <i>Myiagra inquieta</i> | Restless Flycatcher | NPW — Rare |
| Otididae | <i>Ardeotis australis</i> | Australian Bustard | NPW — Vulnerable |
| Psittacidae | <i>Neophema chrysostoma</i> | Blue-winged Parrot | NPW — Vulnerable |
| Scolopacidae | <i>Actitis hypoleucos</i> | Common Sandpiper | NPW — Rare |
| Threskiornithidae | <i>Plegadis falcinellus</i> | Glossy Ibis | NPW — Rare |
| Turnicidae | <i>Turnix pyrrhothorax</i> | Red-chested Button-quail | NPW — Rare |

NPW = Refers to the *National Parks and Wildlife Act 1972* (South Australia)

Blue = Previously recorded on the reserve but not found on this survey





Flora

| Flowering Plants | | | |
|------------------|---|----------------------|------------------|
| Family | Species | Common name | Status |
| Chenopodiaceae | <i>Atriplex eichleri</i> * | Eichler's Saltbush | NPW — Rare |
| Fabaceae | <i>Swainsona leeana</i> * | Lee's Swainson-pea | NPW — Rare |
| Malvaceae | <i>Gilesia biniflora</i> * | Western Tar-vine | NPW — Rare |
| Orobanchaceae | <i>Orobanche cernua</i> var. <i>australiana</i> * | Australian Broomrape | NPW — Rare |
| Poaceae | <i>Austrostipa pilata</i> * | Prickly Spear-grass | NPW — Vulnerable |

NPW = Refers to the *National Parks and Wildlife Act 1972* (South Australia)

* = New record for this reserve



Nick Neagle recording plants on limestone hill, P. Lang © Department of Environment, Water and Natural Resources



Red-barred Dragon (*Ctenophorus vadrappa*), R. Kittel © University of Adelaide



Gould's Goanna (*Varanus gouldii*), R. Kittel © University of Adelaide





Appendix C: Exotic and Pest Species

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at March 2013



Fauna

| Mammals | | |
|-----------|--------------------------------|-----------------|
| Family | Species | Common name |
| Bovidae | <i>Capra hircus</i> * | Feral Goat |
| Leporidae | <i>Oryctolagus cuniculus</i> * | European Rabbit |
| Muridae | <i>Mus musculus</i> * | House Mouse |

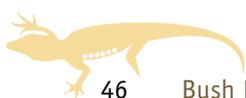
| Butterflies | | |
|-------------|---------------------|-------------------------|
| Family | Species | Common name |
| Pieridae | <i>Pieris rapae</i> | Cabbage White Butterfly |

| True Bugs — Terrestrial | | |
|-------------------------|----------------------------------|----------------------------------|
| Family | Species | Common name |
| Lygaeidae | <i>Nysius vinitor</i> * | Rutherglen Bug |
| Miridae | <i>Campylomma liebkechti</i> * | Apple Dimpling Bug, Dimpling Bug |
| | <i>Engytatus nicotiana</i> * | Tomato Mirid |
| Pentatomidae | <i>Oechalia schellenbergii</i> * | Predatory Shield Bug |

* = New record for this reserve



Banded rock formation, Minagoona Paddock, P. Lang © Department of Environment, Water and Natural Resources





Flora



Dry river bed, K. Gillespie

| Flowering Plants | | |
|------------------|--|---|
| Family | Species | Common name |
| Asteraceae | <i>Centaurea melitensis</i> * | Cockspur Thistle, Maltese Cockspur |
| | <i>Lactuca serriola</i> * | Compass Plant, Prickly Lettuce |
| | <i>Sonchus oleraceus</i> | Annual Sowthistle, Common Sowthistle |
| Boraginaceae | <i>Echium plantagineum</i> * | Paterson's Curse, Salvation Jane |
| Brassicaceae | <i>Brassica tournefortii</i> * | Wild Turnip, Mediterranean Turnip |
| | <i>Carrichtera annua</i> * | Ward's Weed |
| | <i>Sisymbrium erysimoides</i> | Smooth Mustard |
| | <i>Sisymbrium irio</i> * | London Rocket |
| Chenopodiaceae | <i>Chenopodium murale</i> * | Green Fat Hen, Nettle-leaf Goosefoot |
| Cucurbitaceae | <i>Citrullus</i> sp. * | Melon |
| | <i>Cucumis myriocarpus</i> | Gooseberry Cucumber, Paddy Melon |
| Gentianaceae | <i>Centaureum tenuiflorum</i> * | Branched Centaury, Slender Centaury |
| Geraniaceae | <i>Erodium aureum</i> * | Heron's Bill |
| | <i>Erodium cicutarium</i> * | Common Crowfoot, Common Heron's Bill, Common Storksbill |
| Malvaceae | <i>Malva parviflora</i> | Mallow |
| Papaveraceae | <i>Papaver somniferum</i> * | Opium Poppy |
| Poaceae | <i>Cynodon dactylon</i> var. <i>dactylon</i> * | Couch Grass, Bermuda Grass |
| | <i>Eragrostis barrelieri</i> | Pitted Lovegrass |
| | <i>Eragrostis minor</i> * | Small Stinkgrass |
| | <i>Rostraria pumila</i> | Tiny Bristle Tail, Roughtail |
| | <i>Schismus arabicus</i> * | Araby Grass |
| | <i>Schismus barbatus</i> | Arabian Grass |
| Polygonaceae | <i>Acetosa vesicaria</i> | Rosy Dock, Bladder Dock |
| Primulaceae | <i>Lysimachia arvensis</i> * | Scarlet Pimpernel |
| Solanaceae | <i>Datura leichhardtii</i> * | Native Thornapple |
| | <i>Nicotiana glauca</i> * | Tobacco Bush |
| | <i>Solanum lycopersicum</i> * | Tomato |
| | <i>Solanum nigrum</i> | Nightshade |
| Verbenaceae | <i>Verbena supina</i> * | Trailing Verbena |

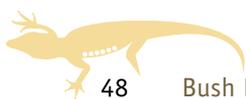
* = New record for this reserve



Notes



Several homesteads and ruins remain from Witchelina's 147 year history as a pastoral station. In 2010, livestock was removed from the property to reduce grazing pressure on vegetation, K. Gillespie





Glossary



C

Cryptospecies (cryptic species)

Species that are physically similar but reproductively isolated from each other.

M

Macrofungi

Fungi that produce large fruiting bodies, i.e. those visible to the naked eye and generally one centimetre or more in width or height.

Morphospecies

A group of individuals that are considered to belong to the same species on the grounds of morphology [physical features] alone.

N

National Reserve System

Australia's network of protected areas, which includes more than 9,700 protected areas covering 13.4% of the country—over 103 million hectares. It is made up of Commonwealth, State and Territory reserves, Indigenous lands and protected areas run by non-profit conservation organisations, through to ecosystems protected by farmers on their private working properties.

P

Putative new species

A species that has been recognised by an expert as never having been named or described in the scientific literature. Note specimens may already be in museum or herbarium collections.

T

Taxon (plural taxa)

A member of any particular taxonomic group, e.g. a particular species, genus, family.

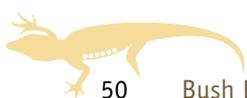
Taxonomy

The categorisation and naming of species. The science of identifying and naming species, as well as grouping them based on their relatedness.

U

Undescribed taxon

A taxon (for example, a species) that has not yet been formally described or named.



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FRONT COVER Twin-Leaf Pigface (*Gunniopsis papillata*), K. Gillespie





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Witchelina Reserve SA + 10-23 October 2010



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