

Vascular Flora of Katjarra in the Birriliburu Indigenous Protected Area.

Report to the Birriliburu Native Title Claimants and Central Desert Native Title Services



N. Gibson, M.A. Langley, S. van Leeuwen & K. Brown

Western Australian Department of Parks and Wildlife
December 2014

© Crown copyright reserved

Contents

List of contributors	2
Abstract	3
1. Introduction	3
2. Methods	3
2.1 Site selection	3
2.2 Collection methods	6
2.3 Identifying the collections	6
2.4 Determining geographic extent	6
3. Results	13
3.1 Overview of collecting	13
3.2 Taxa newly recorded for Katjarra	13
3.3 Conservation listed taxa	13
3.4 Geographically restricted taxa	14
3.5 Un-named taxa	20
4. Discussion	22
Acknowledgements	23
References	24
Appendix 1.	
List of vascular flora occurring at Katjarra within the Birriliburu IPA.	25

List of contributors

Name	Institution	Qualifications/area of expertise	Level/form of contribution
Neil Gibson	Dept Parks & Wildlife	Botany	Principal author
Stephen van Leeuwen	Dept Parks & Wildlife	Botany	Principal author
Margaret Langley	Dept Parks & Wildlife	Botany	Principal author
Kate Brown	Dept Parks & Wildlife	Botany	Principal author / Photographer
Ben Anderson	University of Western Australia	Botany	Survey participant
Jennifer Jackson	Dept Parks & Wildlife	Conservation Officer	Survey participant
Julie Futter	Dept Parks & Wildlife	EIA Co-ordinator	Survey participant
Robyn Camozzato	Dept Parks & Wildlife	Conservation Employee	Survey participant
Kirsty Quinlan	Dept Parks & Wildlife	Invertebrates	Survey participant
Neville Hague	Dept Parks & Wildlife	Regional Ops. Manager	Survey participant
Megan Muir	Dept Parks & Wildlife	Conservation Officer	Survey participant

All photos: K. Brown.

Cover photo: View looking north from Katjarra.

Abstract

The three 2 week flora surveys of Katjarra (Carnarvon Range) within the Birriliburu Indigenous Protected Area more than doubled the known vascular flora from 269 to 647 indigenous taxa, and added 9 hybrids and four new weed records. No taxa listed as threatened were encountered but the number of taxa on the WA Department Parks and Wildlife Priority Flora list increased from nine to 21. Collections of a number of *Eremophila* spp., *Gunniopsis* spp. and a *Lawrencia* sp. and a *Mitrasacme* sp. could not be matched to any collections in WA Herbarium and appear to represent new taxa. Eight taxa appear to be endemic to the Katjarra area. Thirty taxa are only known by phrase names and a further six taxa require further study to clarify their taxonomic status. Six taxa have been added to the WA Census and have been listed on the WA Priority Flora list. Major range extensions (> 200 km) were recorded for 15 taxa, with smaller range extensions (> 100 km) being recorded for a further 14 taxa. A surprisingly large number of taxa (43) reach range limits at Katjarra representing both wide ranging eremaeian and tropical taxa, as well as a more restricted eremaeian element. Arid species of a few largely south western genera also reach as far north as Katjarra.

1. Introduction

The IUCN Category 6 Birriliburu Indigenous Protected Area (IPA) was declared on 23rd April 2013 over lands held by the Birriliburu native title holders. Within the Birriliburu IPA there are three IUCN Category 3 specially protected areas of which Katjarra is one (Dudley 2008). The Katjarra specially protected area is roughly rectangular, 50 km east-west and 40 km north-south, covers an area of some 1997.4 km² and is located approximately 160 km NNW of Wiluna (Figure 1). The southern and south western section of Katjarra falls within the Gascoyne bioregion with its lateritic surface and alluvial plains dominated by mulga woodlands and shrublands while extensive spinifex dominated sand dunes and sandplains and the sparsely vegetated ranges of the remaining area fall within the Little Sandy Desert bioregion (Figure 1). The Katjarra area captures the central and southern portion of the extensive Carnarvon Range, in particular the sandstone massifs associated with Mt Methwin.

Previous botanical collecting at Katjarra has been limited, with 466 collections of 269 taxa being lodged in the Western Australian Herbarium (PERTH). Of these collections 80% (372) were collected by D.J. Edinger and associates in 20 days spread over four years from 1998 to 2001. All of these collections were made in August or the first two days of September.

The current survey was conducted at the invitation of the Birriliburu native title holders over three 2 week periods from the 6 – 17th August 2012; the 13 – 24th May 2013 and the 12 – 23rd May 2014 by the Department of Parks and Wildlife (DPaW) Science Division and Regional Services staff. The area had come under the influence of a cyclonic system in early 2013 and average rains in 2014 allowing sampling of the grass flora that had previously been under sampled as collections had been concentrated in August and September.

2. Methods

2.1 Site selection

In order to sample all major habitat types (Figures 2–8) collection effort was stratified by geology, geomorphology, and topography across the study area as far as

practicable given location of access tracks. The survey used two base camps during each sampling period. In August 2012 these were located at Kanatukul West in the south and a mulga stand SW of Yamada in the north. In May 2013 and 2014 the same camp was used in the south while the northern camp was moved to beside the creek to the north of Yamada.

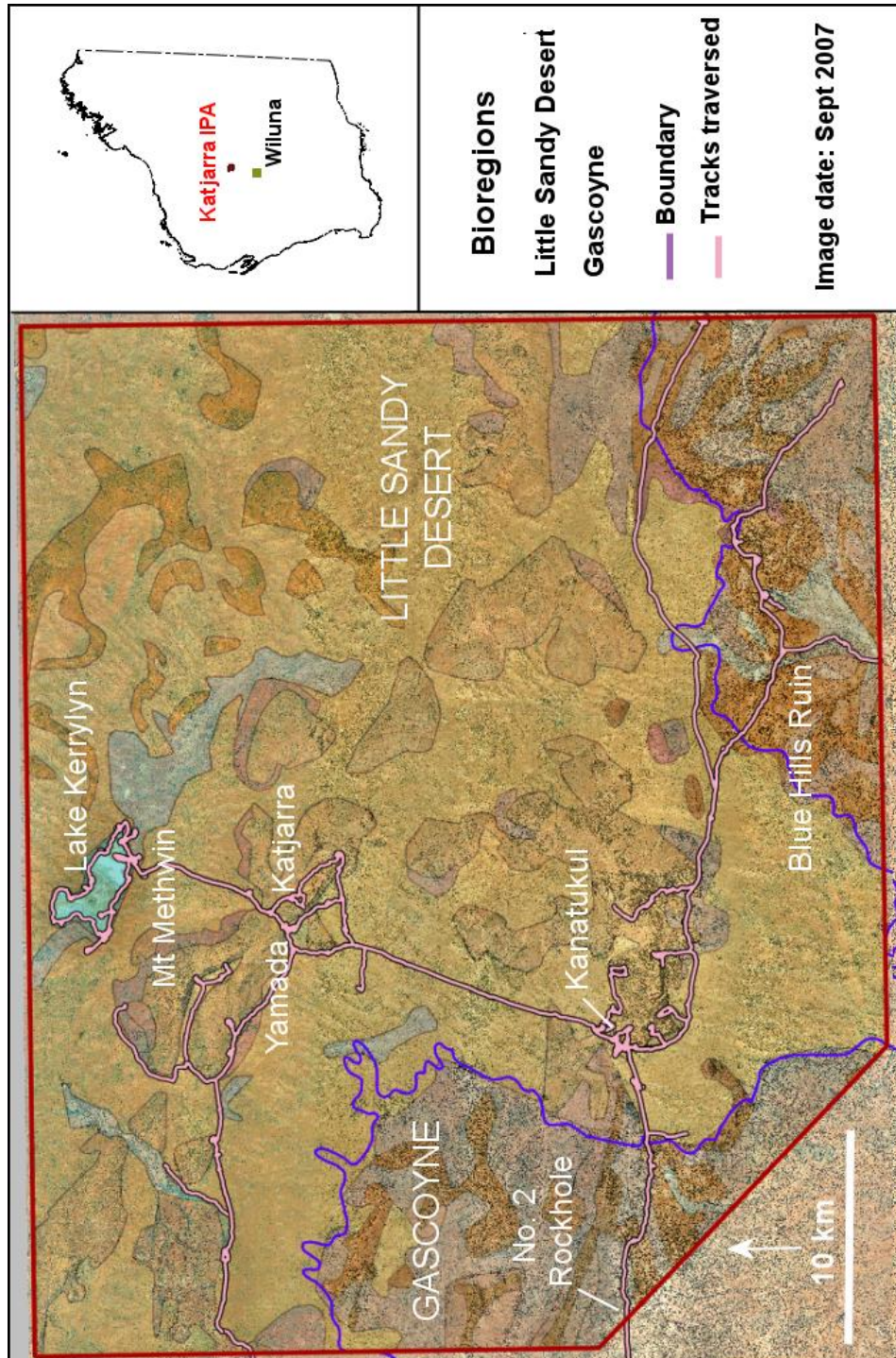


Figure 1. Map showing Katjarra , the locations mentioned in the text and the route traversed by the botany team over the course of the survey. Major habitat types shown as overlay, see Figure 2 for key.

The Gascoyne bioregion which occurs in the south and south west of the study area and is largely defined by the old erosional land surface (Figures 1 & 2). Five major habitats were sampled, mulga flats on sheet wash areas, breakaways and lateritic surfaces, rocky plains and alluvial creek lines (Figure 2). In addition a very unusual habitat of stony quartzite was found below a breakaway complex in the southeast near the abandoned Blue Hills homestead. This habitat had a number of endemic species restricted to it.

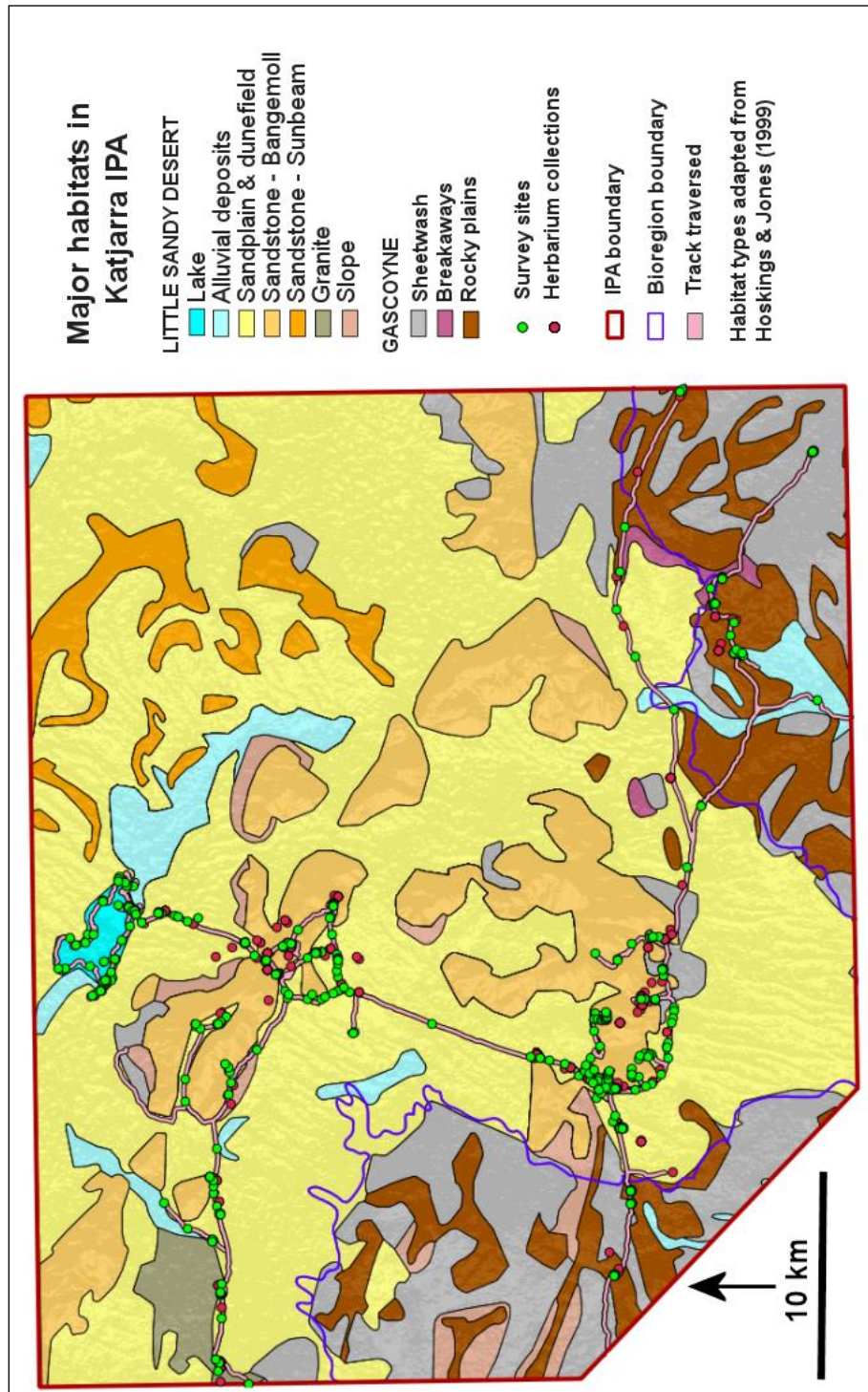


Figure 2. Map of Katjarra showing the major habitat types, the location of the current survey sites (green) and previous herbarium collections (red) and bioregional boundaries (DSEWPC (2013)).

Within the Little Sandy Desert bioregion the extensive sandplains and dunefields, the rocky sandstone tops, the colluvial slopes and gorge and creek systems were all sampled (Figure 2). The salt lake vegetation of Lake Kerrylyn was sampled as was the associated gypsum dunes, these systems occurring within the northern dunefields. In the north west of Katjarra, an area of decomposing granites was also sampled. These granites were undersampled and the sandstone ranges of the Sunbeam Group (Hocking & Jones 1999) in the north east could not be sampled due to access constraints (Figure 2).

Herbarium collections were made of the vascular flora with most effort directed to taxa not previously recorded from Katjarra.

2.2 Collection methods

Collecting followed standard methods with flowering and fruiting material being pressed after each days collecting, brief description were compiled for all sites and locations determined by handheld GPS. At 120 sites unbounded relevés of roughly 0.25 ha were searched for all vascular plants, generally 30 – 45 minutes were spent sampling a site. In 2014 permanent 50 x 50m quadrats were established at 19 of these sites. Opportunistic collections were made at a further 130 sites targeting individual taxa.

Where sufficient material was available efforts were made to collect duplicate material. At the completion of the surveys the plant presses were dried and frozen before processing. Nomenclature follows current usage at PERTH (Western Australian Herbarium 1998–).

2.3 Identifying the collections

Collections were identified using a diverse range of taxonomic literature given the breadth of families collected during the survey. Identifications were confirmed were necessary using the reference and main collections in PERTH.

The core resources used for identifications were the Flora of Australia series, the Flora of Central Australia (Jessop 1985) the *Eremophila* book (Chinnock 2007) and the electronic keys to the grasses (Sharp & Simon 2002), acacias (Maslin 2001), eucalypts (Slee *et al.* 2006), the peas (de Kok & Boffin 2007), Proteaceae (Hollister & Thiele 2011) and Goodeniaceae (Hollister 2011).

2.4 Determining geographic extent

Once the collections had been identified the geographical range of the species was determined from distribution maps available on FloraBase and the Atlas of Living Australia websites. Taxa were classed as local endemics if all records were restricted to Katjarra and Little Sandy Desert endemics if all records were restricted to the Little Sandy Desert bioregion (DSEWPC 2013). Range extensions were measured from the closest collection to the centre of the Katjarra and classed into groups >100 km, >200 km, and >300 km. Species at the boundary of their distribution within Katjarra were noted from these maps. The Atlas of Living Australia (ALA) mapping was particularly useful as it showed collections held in all major Australian herbaria, not just PERTH.

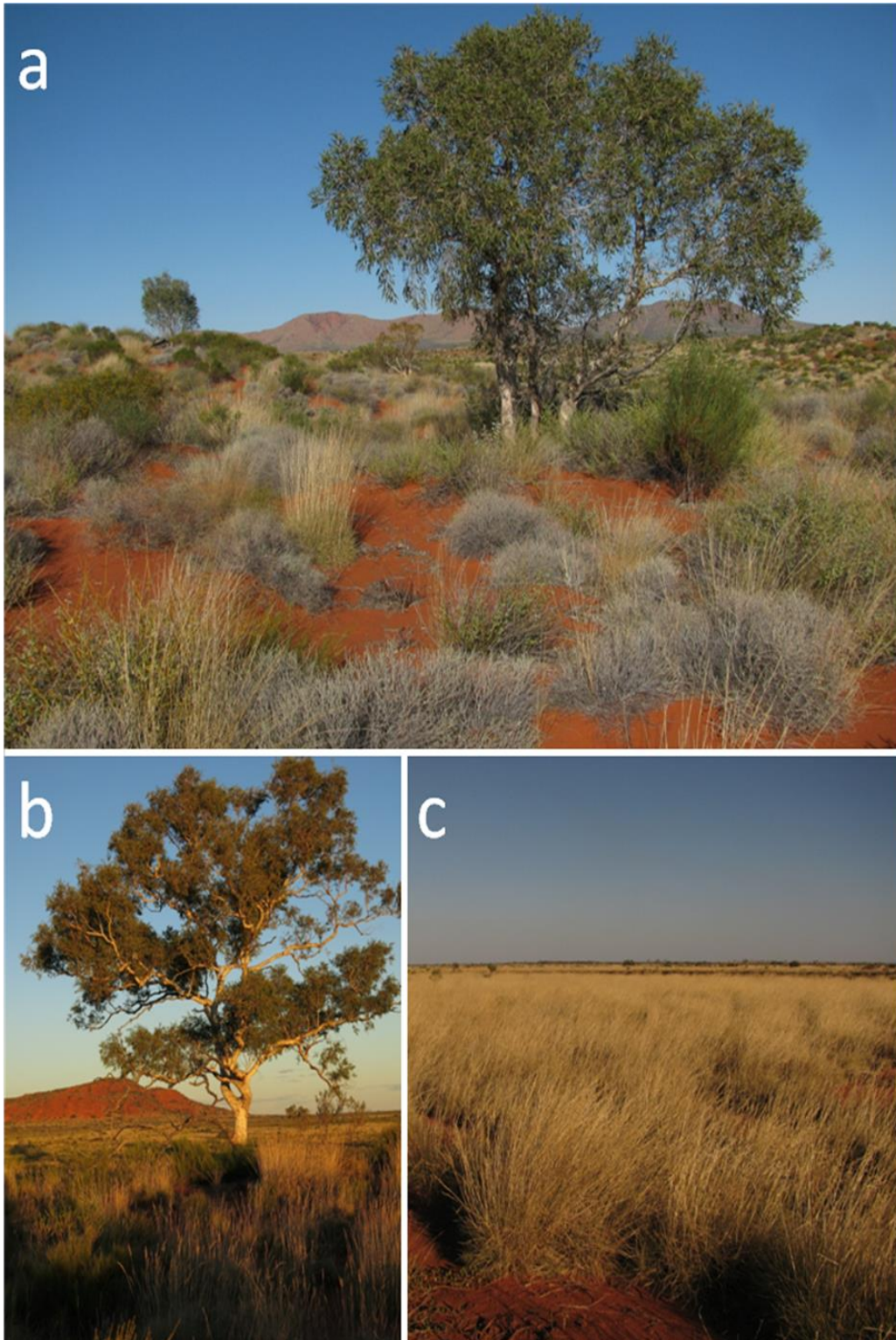


Figure 3. Two of the most extensive habitat types covered in the survey were the sandplains and dunefields. a) The dunefields comprised red dunes to 5 m tall separated by inter-dune swales that could be 1 km wide; b) The sandplains and dunes largely surround the sandstone ranges of Katjarra; c) However, on the south side of the range south of Kanatukul, sandplains covered with extensive *Triodia basedowii* hummock grasslands are more common than dunefields.

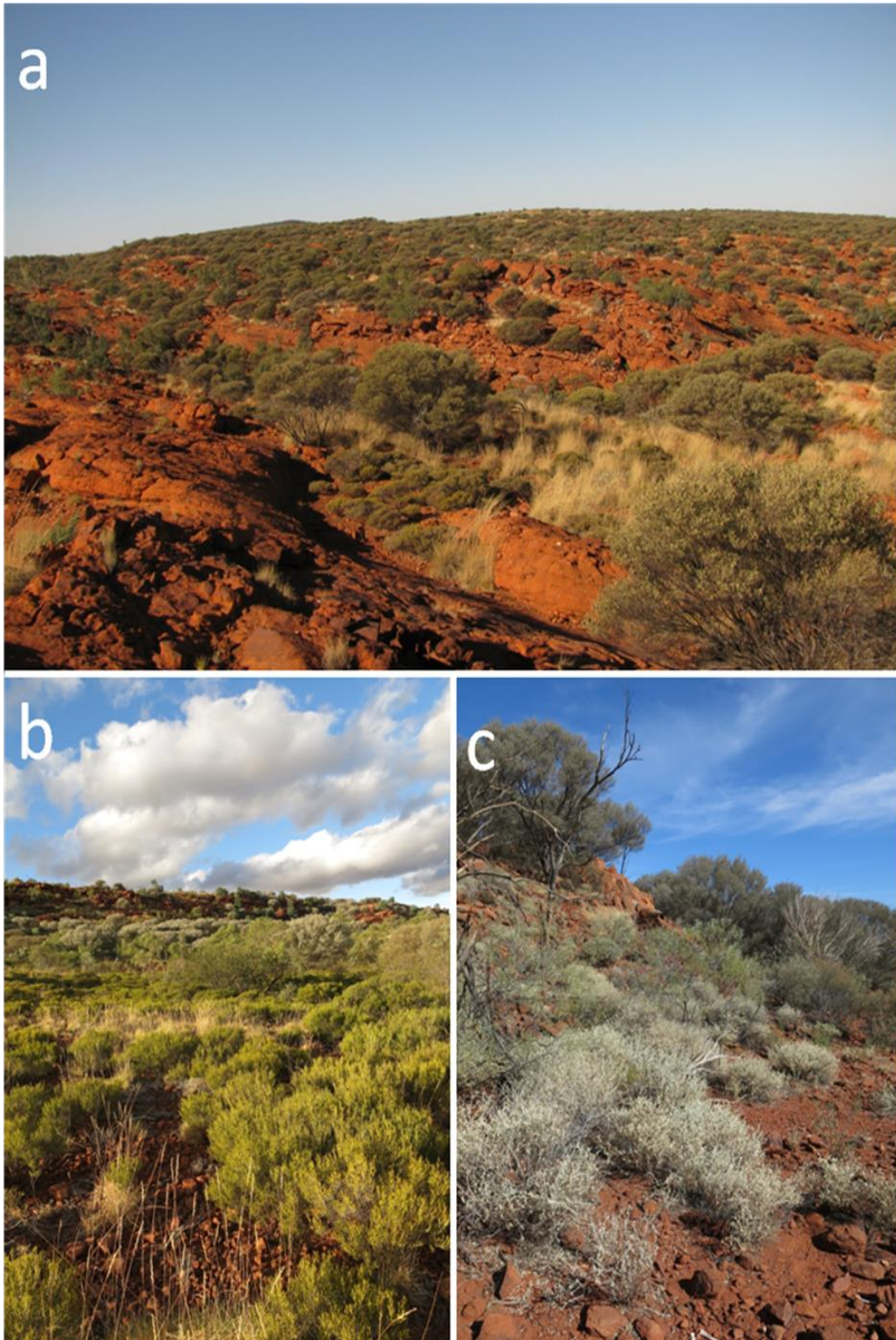


Figure 4. Other major habitat types are the sandstone ranges and their rocky side slopes. a) View across open *Acacia* and *Callitris* shrublands that dominate the tops of the sandstone ranges; b) Vegetation on rocky slopes can be dominated by *Aluta* and various *Acacia* species; c) On other slopes mulga and *Ptilotus* can be the dominant species.

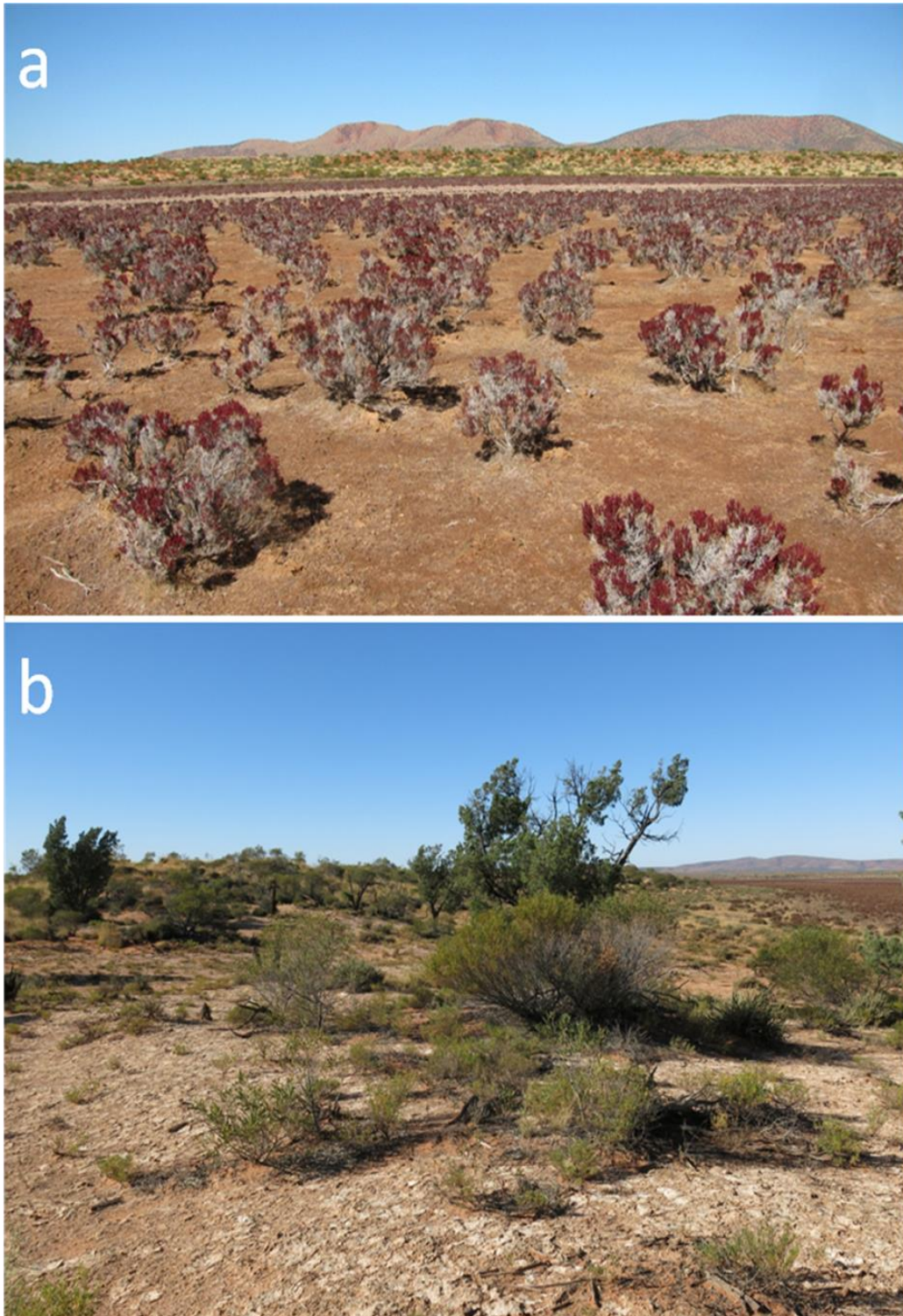


Figure 5. Salt lakes and gypsum dunes are other major habitat types found in the north of Katjarra. a) View across Lake Kerrylyn showing the typical *Tecticornia* shrubland toward the red sand dunes on the southern side; b) View of a large gypsum dune on the northern edge dominated by very open *Callitris* woodland over scattered *Acacia tetragonophylla*.

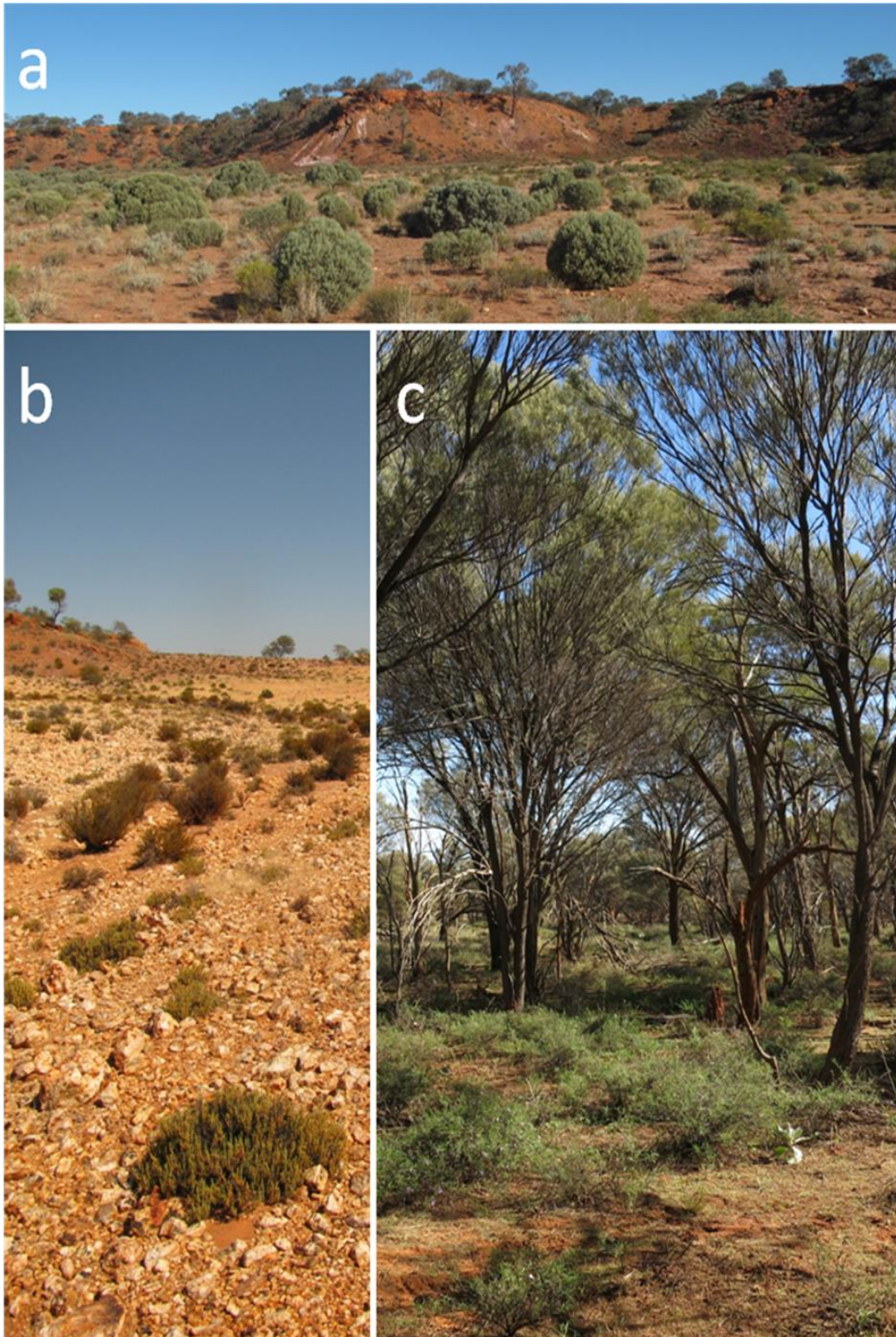


Figure 6. On the old erosional surfaces in the south and south west of Katjarra the major habitat types include: a) Breakaways and associated colluvial deposits; b) Stony plains generally ferruginous but east of the old Blue hills homestead quartzite plains are found; c) Mulga woodlands develop on the finer textured soils.

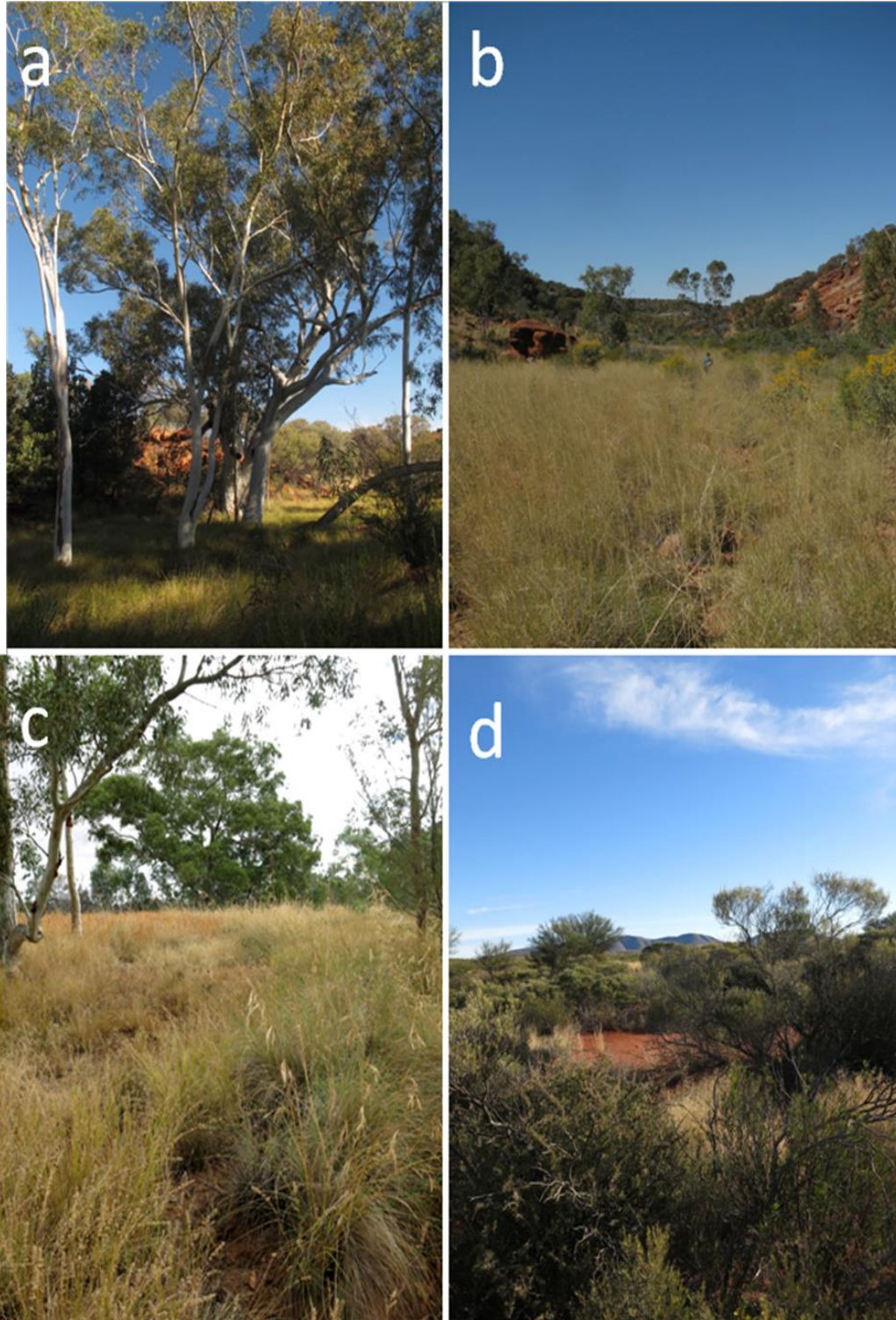


Figure 7 Alluvial habitats are generally small but widespread. They can develop in sandstone ranges, on the old erosional surfaces and in the broad valleys associated with salt lakes. a) Talbot Spring forms a permanent wetland in the ranges with an associated outflow stream; b) Other valleys systems in the ranges only flow seasonally; c) If sufficient fine textured soils accumulate they become dominated by mixed tussock grasslands; d) Mixed shrublands develop on the alluvial plains surrounding Lake Kerrylyn.

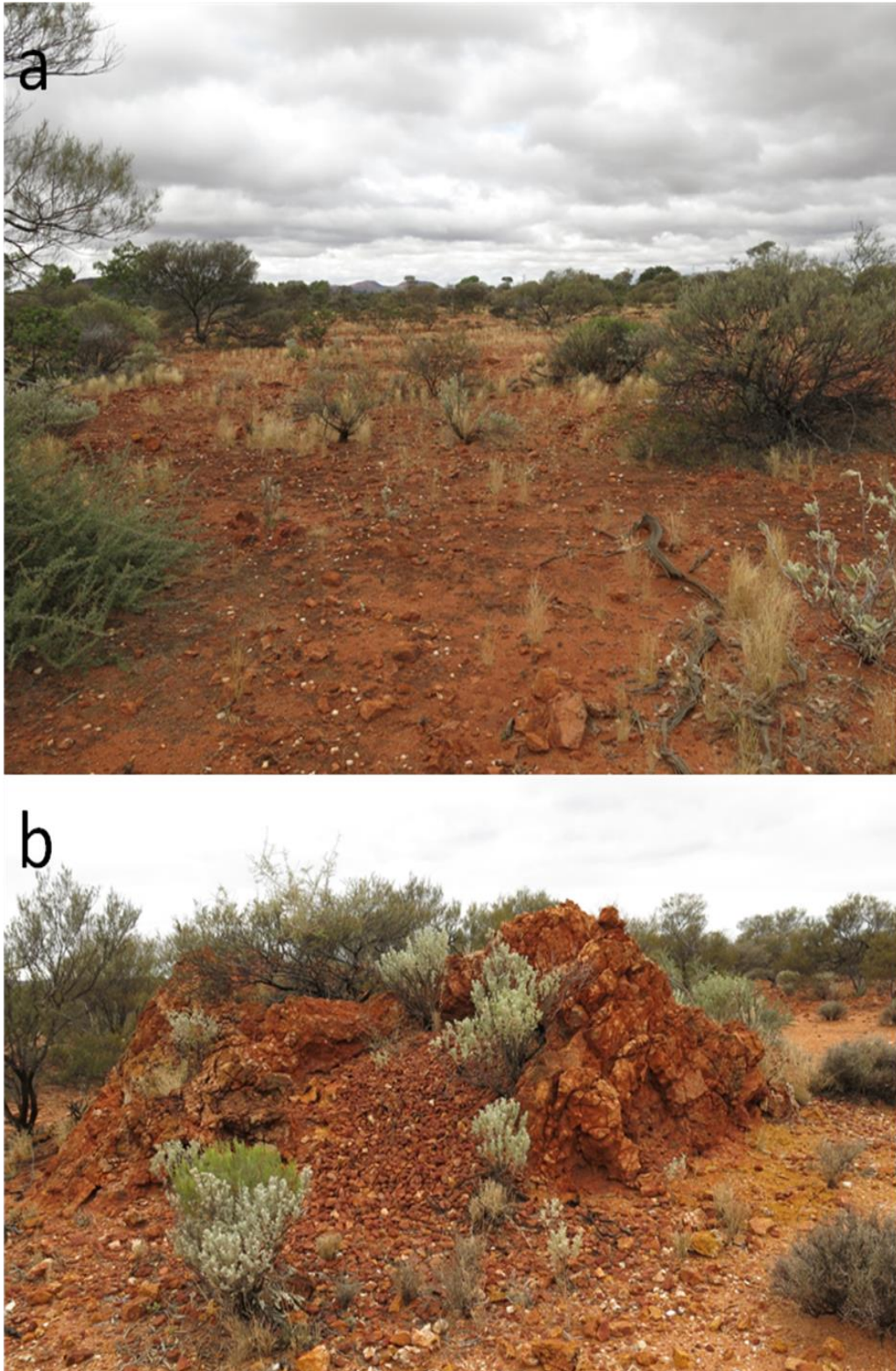


Figure 8. In the west of Katjarra decomposing granites are found, these surfaces while very open are floristically rich and are compositionally different from the sandstone and old erosional surfaces. a) Vegetation is often very open *Acacia* shrublands. b) Some areas retain some laterite on the surface although this has largely eroded away.

3. Results

3.1 Overview of collecting

Over the three field surveys 599 taxa (including hybrids and weed) were recorded and 955 herbarium collections were made of 515 of these taxa. The material available for the remaining taxa was not suitable for herbarium collections. Of the 599 taxa recorded 391 were not represented in earlier collections from Katjarra. The current flora of Katjarra now stands at 660 taxa (including hybrids and weeds) (Appendix 1).

3.2 Taxa newly recorded for Katjarra

Poaceae (53 taxa), Fabaceae (55), Malvaceae (38), Chenopodiaceae (32) and Asteraceae (28) contributed most of the taxa not previously recorded. The very high number of Poaceae and Fabaceae reflected the lack of previous collecting following good cyclonic rains. The survey also recorded four weed species not previously known from Katjarra (*Bidens bipinnata*, *Centaurium erythraea*, *Malvastrum americanum*, and *Sonchus oleraceus*).

3.3 Conservation listed taxa

No threatened taxa were encountered during the surveys. Ten taxa on DPaW's Priority Flora list (Smith 2010) had previously been recorded for the area, a further 11 were added by the current survey (Table 1). The Priority Flora List is a State based list of taxa under consideration for listing as Threatened Flora. Taxa that have not yet been adequately surveyed may be added to the Priority Flora List under Priorities 1, 2 or 3 (Smith 2010).

Table 1. Priority flora recorded from Katjarra in current and previous surveys including recent additions.

Family	Taxon	Priority Code	Current	Previous
Aizoaceae	<i>Gunniopsis</i> sp. Blue Hills (D.J. Edinger Nats 59)	1	+	
	<i>Gunniopsis</i> sp. Lake Kerrylyn (N. Gibson et al. NG 7028)	1	+	
Amaranthaceae	<i>Ptilotus chrysocomus</i>	1	+	+
	<i>Ptilotus daphne</i>	1	+	+
Asteraceae	<i>Minuria</i> sp. Little Sandy Desert (S. van Leeuwen 4919)	1	+	
Chenopodiaceae	<i>Tecticornia papillata</i>	1	+	+
	<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)	3	+	
Elaeocarpaceae	<i>Tetratheca chapmanii</i>	1	+	+
Fabaceae	<i>Daviesia arthropoda</i>	3	+	+
Goodeniaceae	<i>Dampiera atriplicina</i>	3	+	+
	<i>Goodenia modesta</i>	3	+	
Malvaceae	<i>Hibiscus</i> sp. Carnarvon (S. van Leeuwen 5110)	1	+	
	<i>Lawrenzia</i> sp. Blue Hills (N. Gibson et al. NG 6516)	1	+	
Myrtaceae	<i>Calytrix praecipua</i>	3	+	+
Oxalidaceae	<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	2	+	
Polygalaceae	<i>Comesperma pallidum</i>	3	+	
	<i>Comesperma viscidulum</i>	4	+	+
Scrophulariaceae	<i>Eremophila forrestii</i> subsp. Pingandy (M.E. Trudgen 2662)	2	+	
	<i>Eremophila shonae</i> subsp. <i>diffusa</i>	3	+	+
	<i>Eremophila</i> sp. Katjarra South (N. Gibson et al. NG 7149)	1	+	
	<i>Eremophila</i> sp. Mt Methwin (B. Backhouse et al. BEMJ 74)	1	+	+

The identification of the *Oxalis* species is provisional, while material from Katjarra closely resembles the collections for the Pilbara there is no published or unpublished diagnosis that details the difference of *Oxalis* sp. Pilbara (M.E. Trudgen 12725) from other species in this taxonomically complex genus. Detailed taxonomic study is required.

3.4 Geographically restricted taxa

Eight taxa appear to be endemic to Katjarra, three of these are located in small area of quartzite gravel east of the abandoned Blue Hills homestead (Table 2). The *Lawrencia* sp. Blue Hills, and *Gunniopsis* sp. Blue Hills (Figure 9c) and are known from only one and two collections respectively. *Tecticornia papillata* was only formally described in 2007. More detailed survey work in this area is clearly warranted. Another taxon (*Ptilotus daphne*) was originally only known from this area but has recently been found in a similar habitat on Lorna Glen.

A second unnamed *Gunniopsis* (*G.* sp. Lake Kerrylyn) was collected for the first time from the edge of Lake Kerrylyn.

Tetratheca chapmanii (Figure 9d) is restricted to the massive sandstone both in the north and south of Katjarra. It is a leafless purple-flowered shrub that grows out of cracks in the sandstone. In habit and growth form it resembles the five *Tetratheca* species restricted to the banded ironstone ranges of the Goldfields, all of which have similarly highly restricted distributions.

The *Goodenia* and *Hibiscus* (Figure 9a) appear to be widespread in Katjarra, the former on sandplains and the latter in rocky habitats. A new *Eremophila* species (*E.* sp Katjarra South) (Figure 9b) allied to *Eremophila hygrophana* was found in one creek line on the south side of the southern sandstone massive.

Table 2. Taxa endemic to the Katjarra study area.

Family	Taxon	Habitat
Aizoaceae	<i>Gunniopsis</i> sp. Blue Hills (D.J. Edinger Nats 59)	Blue Hills quartzite
	<i>Gunniopsis</i> sp. Lake Kerrylyn (N. Gibson et al. NG 7028)	edge of Lake Kerrylyn
Chenopodiaceae	<i>Tecticornia papillata</i>	Blue Hills quartzite
Elaeocarpaceae	<i>Tetratheca chapmanii</i>	massive sandstone
Goodeniaceae	<i>Goodenia</i> sp. Carnarvon Range (D.J. Edinger Nats 30)	sandplain
Malvaceae	<i>Hibiscus</i> sp. Carnarvon (S. van Leeuwen 5110)	rocky habitats
	<i>Lawrencia</i> sp. Blue Hills (N. Gibson et al. NG 6516)	Blue Hills quartzite
Scrophulariaceae	<i>Eremophila</i> sp. Katjarra South (N. Gibson et al. NG 7149)	creekline

A further five taxa appear to be endemic to the Little Sandy Desert bioregion (Table 3). With the *Minuria* and *Tecticornia* favouring the salt lakes and / or the surrounding dune while the *Eucalyptus rameliana* (Figure 10) and the *Triodia* (Figure 11c,d) are generally found on the red sand dunes but can also grow on more rocky substrates, while the *Eremophila* favours the rocky country.

Table 3. Taxa endemic to the Little Sandy Desert bioregion.

Family	Taxon	Comment
Asteraceae	<i>Minuria</i> sp. Little Sandy Desert (S. van Leeuwen 4919)	2nd collection
Chenopodiaceae	<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)	3rd collection
Myrtaceae	<i>Eucalyptus rameliana</i>	
Poaceae	<i>Triodia</i> sp. Little Sandy Desert (S. van Leeuwen 4935)	
Scrophulariaceae	<i>Eremophila</i> sp. Mt Methwin (B. Backhouse et al. BEMJ 74)	

Collections of undescribed *Stackhousia* (*S.* aff. *clementii* (SvL 2995), Figure 11 a,b) were originally thought to represent another Little Sandy Desert endemic, however Dr Bill Barker from the Adelaide Herbarium who is currently revising the group has seen

other collections of this taxon from dunes around salt lakes near the WA border so it is likely to be widespread across the arid zone, just poorly collected.

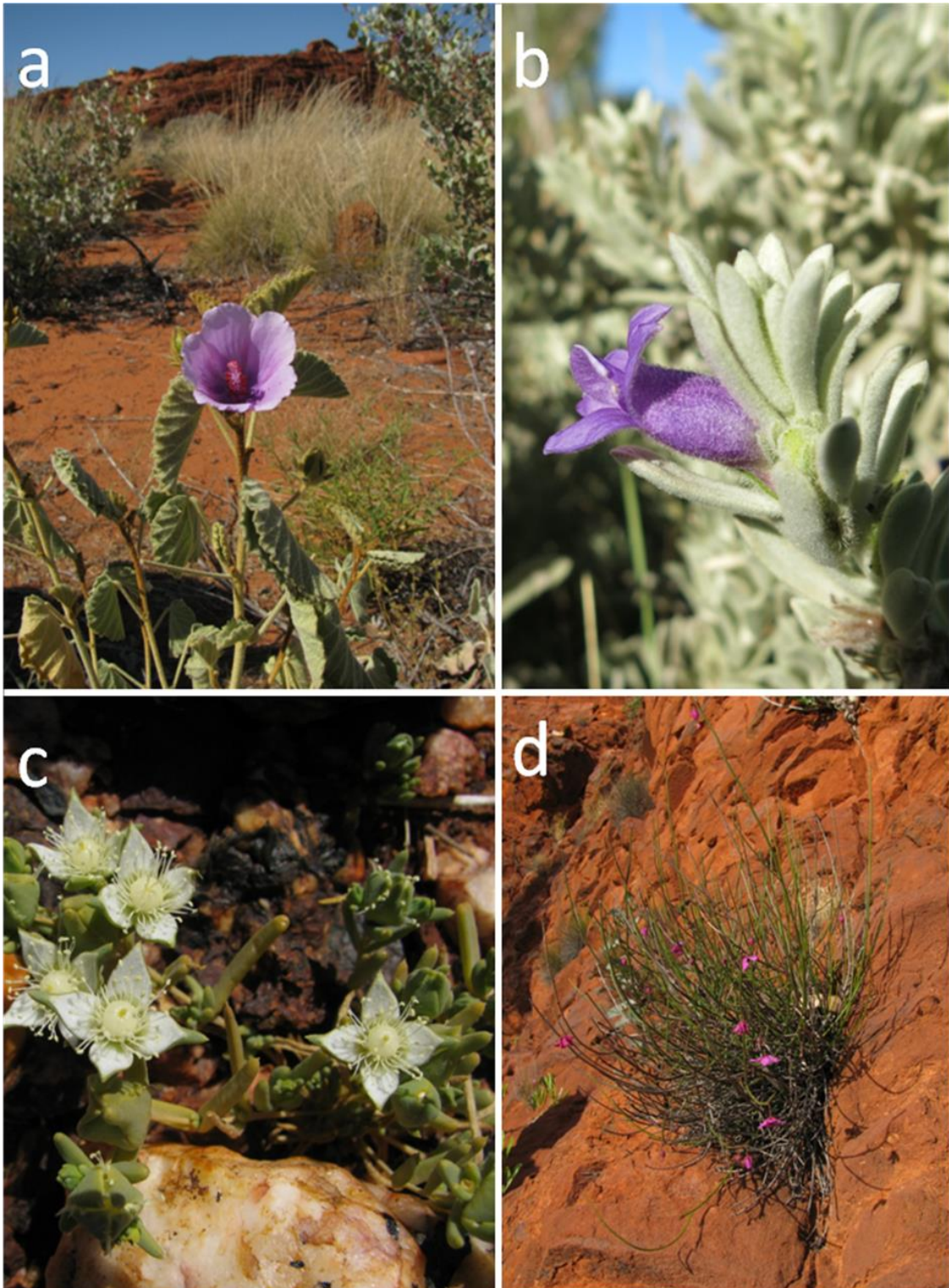


Figure 9. Some of the species apparently endemic to Katjarra. a) *Hibiscus* sp. Carnarvon (S. van Leeuwen 5110); b) *Eremophila* sp. Katjarra South (N. Gibson et al. NG 7149); c) *Gunniopsis* sp. Blue Hills (D.J. Edinger Nats 59); d) *Tetratheca chapmanii*.

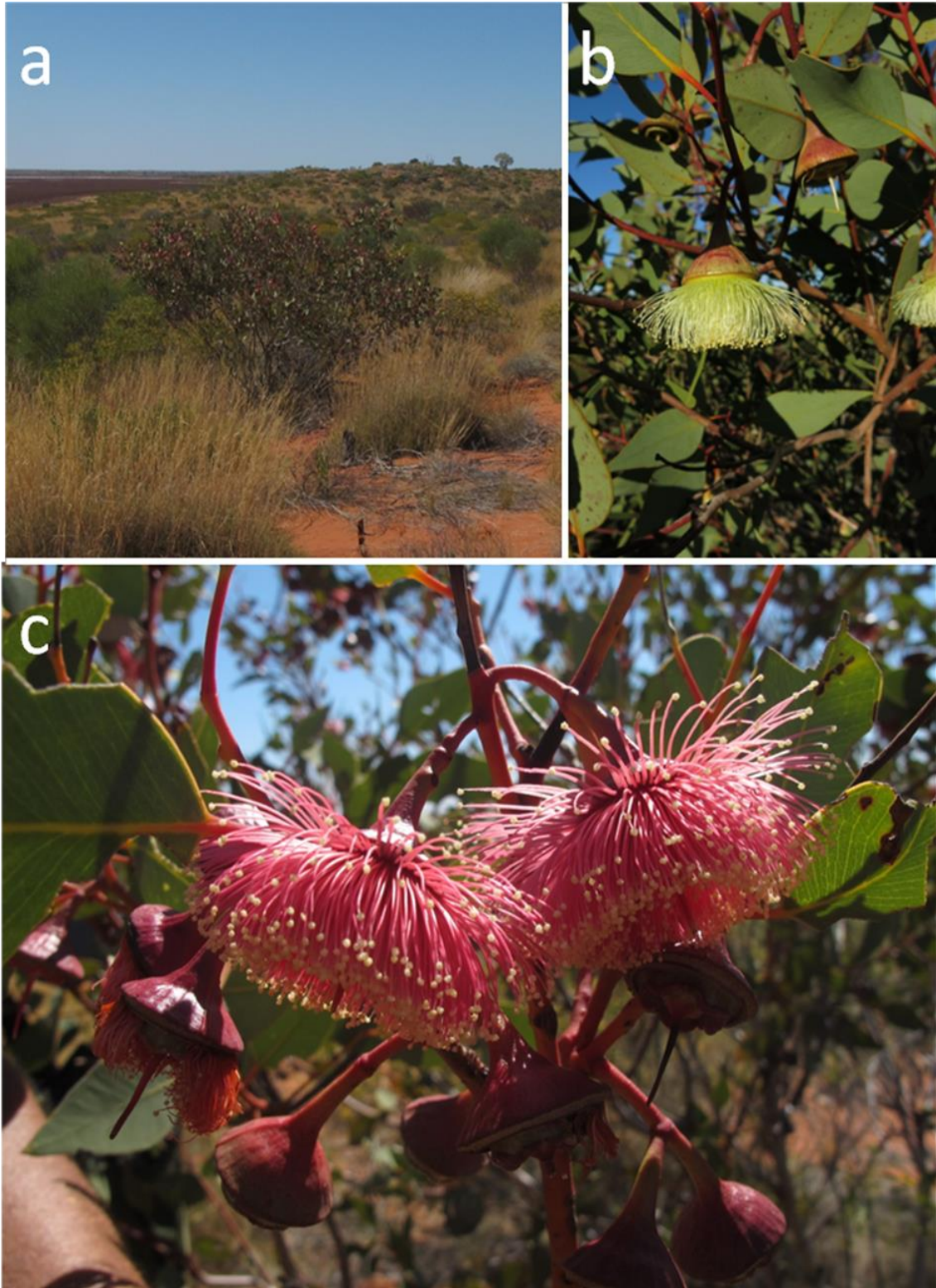


Figure 10. *Eucalyptus rameliana* is a spectacular mallee confined to the deep red sand dunes of the Little Sandy Desert, with different colour forms occurring in the same population. a) Mallee ca. 2.5m tall; b) Yellowish-white flowered form; c) Pink flowered form.

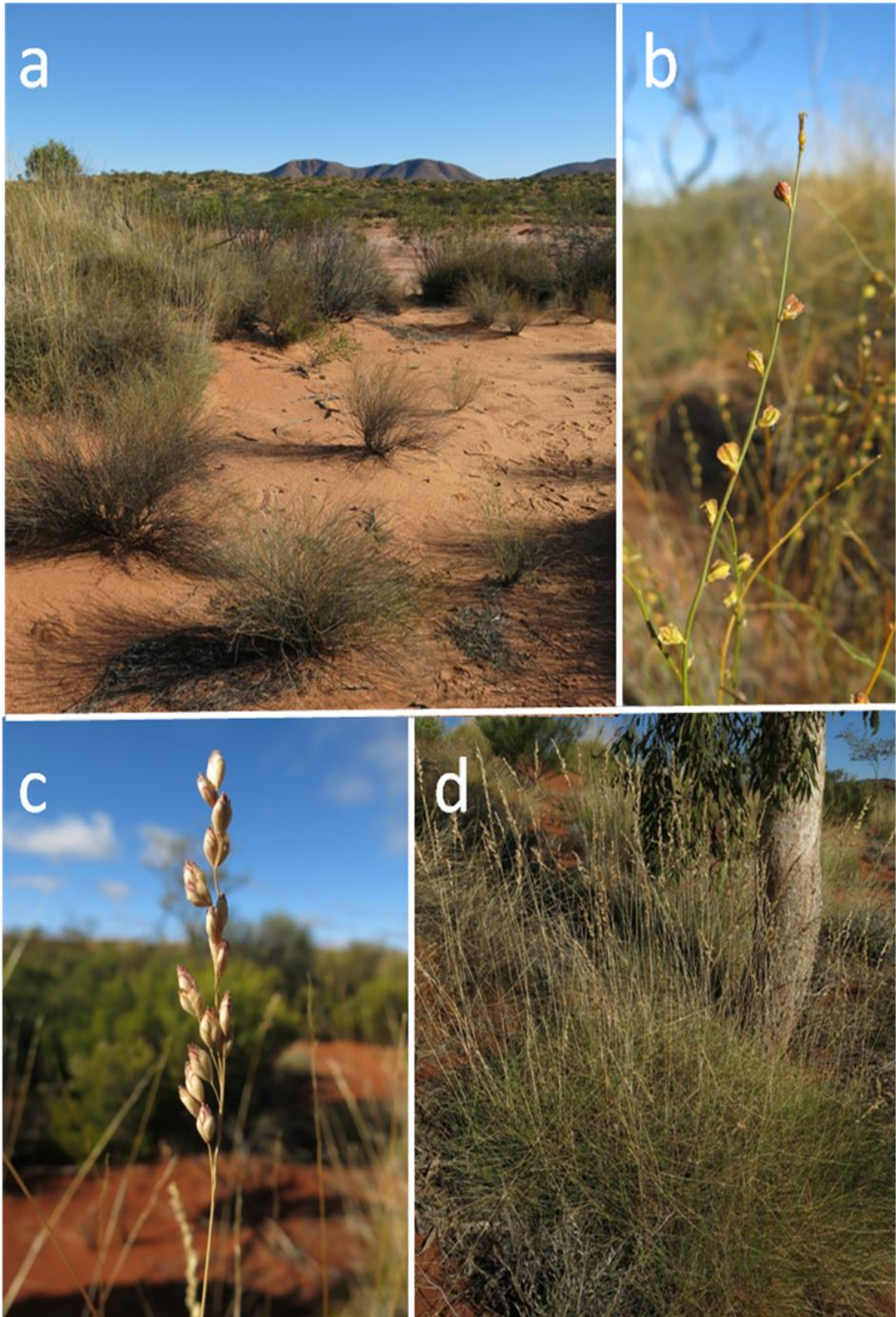


Figure 11. *Stackhousia* aff. *clementii* (SvL 2995) was initially thought to be a Little Sandy Desert endemic but is now known to be more widespread - a) habitat b) fruit; while *Triodia* sp. Little Sandy Desert (S. van Leeuwen 4935) is restricted to the Little Sandy Desert - c) flowering culm, d) habitat.

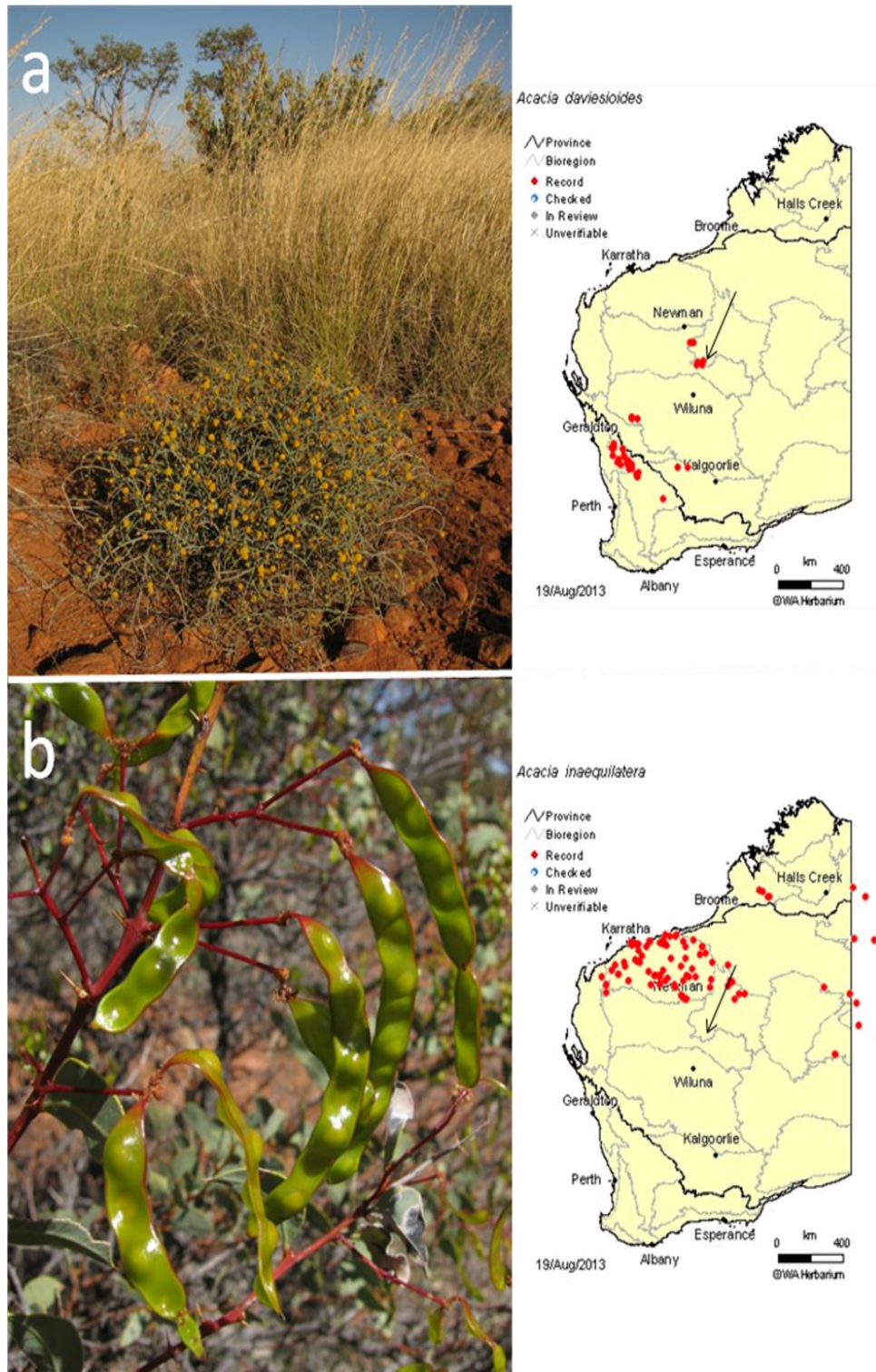


Figure 12. a) Taxa such as *Acacia daviesioides* occur in the Little Sandy Desert at considerable distances from the major species distribution (Katjarra shown with arrow); b) Range extensions of > 100 km were recorded for 25 taxa. *Acacia marramamba* was originally thought to be a Pilbara endemic.

Range extensions of more than 100 km were recorded in 27 taxa (Table 4, Figure 12b, Figure 13). The largest of these was > 300 km for *Ficus virens* a species previously recorded from the Kimberley and Pilbara. In addition to new range extensions populations of some taxa recorded from Katjarra represent outlying populations highly disjunct from the main distribution of the species (Figure 12a).

Table 4. Taxa recorded with > 100 km range extensions.

Family	Taxon	Range extension & direction
Amaranthaceae	<i>Ptilotus calostachyus</i>	> 100 km S
Asteraceae	<i>Centipeda minima</i>	> 100 km S
	<i>Olearia subspicata</i>	> 100 km N
	<i>Peripleura hispidula</i> var. <i>setosa</i>	> 200 km SE
	<i>Streptoglossa bubakii</i>	> 100 km S
	<i>Streptoglossa decurrens</i>	> 100 km S
Caryophyllaceae	<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>	> 200 km SE
Chenopodiaceae	<i>Sclerolaena fusiformis</i>	> 100 km N
Cyperaceae	<i>Fimbristylis eremophila</i>	> 200 km SW
Euphorbiaceae	<i>Euphorbia coghlanii</i>	> 100 km S
Fabaceae	<i>Acacia inaequilatera</i>	> 100 km S
	<i>Acacia sericophylla</i>	> 100 km S
Goodeniaceae	<i>Goodenia xanthosperma</i>	> 200 km NW
Juncaceae	<i>Juncus aridicola</i>	> 200 km N
Lythraceae	<i>Rotala mexicana</i>	> 200 km from Pilbara & Kimberley
Malvaceae	<i>Gossypium robinsonii</i>	> 200 km SE
Moraceae	<i>Ficus virens</i>	> 300 km from Pilbara
Myrtaceae	<i>Melaleuca bracteata</i>	> 200 km SE
Oxalidaceae	<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	> 200 km from Pilbara
Plantaginaceae	<i>Stemodia grossa</i>	> 200 km SE
Poaceae	<i>Aristida ingrata</i>	> 100 km from Pilbara
	<i>Brachyachne convergens</i>	> 200 km from Pilbara & Kimberley
	<i>Eragrostis speciosa</i>	> 100 km SE
	<i>Setaria surgens</i>	> 200 km S
Sapindaceae	<i>Dodonaea coriacea</i>	> 100 km S
Scrophulariaceae	<i>Eremophila canaliculata</i>	> 100 km E
	<i>Eremophila forrestii</i> subsp. <i>Pingandy</i> (M.E. Trudgen 2662)	> 200 km from Pilbara
Solanaceae	<i>Anthotroche pannosa</i>	> 100 km N



Figure 13. *Anthotroche pannosa* was found growing on dunes on north side of Lake Kerrylyn some 100 km further north than previously recorded.

3.5 Un-named taxa

There are 29 taxa recorded from the reserve that are identified by phrase names in PERTH, these taxa are likely to represent 'good' taxa though not yet formally described (Table 5, Figure 14). A further five phrase names and one recently named taxon have been added the WA census as a result of this survey (Table 6).

Table 5. Phrase named taxa recorded from Katjarra.

Family	Taxon
Asteraceae	<i>Calotis</i> sp. Carnarvon Range (D.J. Edinger & K.F. Kenneally D 2708 K 12243)
	<i>Minuria</i> sp. Little Sandy Desert (S. van Leeuwen 4919)
	<i>Podolepis</i> sp. Carnarvon Range (D.J. Edinger Nats 33)
	<i>Podolepis</i> sp. Great Victoria Desert (A.S. George 8219)
Celastraceae	<i>Stackhousia</i> sp. swollen gynophore (W.R. Barker 2041)
Chenopodiaceae	<i>Tecticornia</i> sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
	<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)
	<i>Tecticornia</i> sp. Yoothapina Station (A.A. Mitchell 883)
Fabaceae	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)
	<i>Tephrosia</i> sp. deserts (J.R. Maconochie 1403)
Goodeniaceae	<i>Goodenia</i> sp. Carnarvon Range (D.J. Edinger Nats 30)
Malvaceae	<i>Goodenia</i> sp. Sandy Creek (R.D. Royce 1653)
	<i>Hibiscus</i> sp. Carnarvon (S. van Leeuwen 5110)
	<i>Hibiscus</i> sp. Gardneri (A.L. Payne PRP 1435)
	<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)
	<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)
	<i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32)
	<i>Sida</i> sp. Golden calyces pubescent (G.J. Leach 1966)
	<i>Sida</i> sp. Rabbit Flat (B.J. Carter 626)
	<i>Sida</i> sp. sand dunes (A.A. Mitchell PRP1208)
	<i>Sida</i> sp. tiny glabrous fruit (A.A. Mitchell PRP1152)
	<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)
Myrtaceae	<i>Eucalyptus</i> sp. Little Sandy Desert (D. Nicolle & M. French DN 4304)
Oxalidaceae	<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)
Phrymaceae	<i>Peplidium</i> sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)
Poaceae	<i>Triodia</i> sp. Little Sandy Desert (S. van Leeuwen 4935)
Rubiaceae	<i>Pomax</i> sp. desert (A.S. George 11968)
Scrophulariaceae	<i>Eremophila forrestii</i> subsp. Pingandy (M.E. Trudgen 2662)
	<i>Eremophila</i> sp. Ostrina (M. Officer 164)



Figure 14. A collection from seasonal water course was provisionally identified as *Oxalis* sp. Pilbara (M.E. Trudgen12725) but requires further taxonomic study to confirm its identification.

Table 6. Taxa added to Western Australian Census as result of survey.

Family	Taxon	Distribution / Status
Aizoaceae	<i>Gunniopsis</i> sp. Blue Hills (D.J. Edinger Nats 59)	local endemic
	<i>Gunniopsis</i> sp. Lake Kerrylyn (N. Gibson et al. NG 7028)	local endemic
Fabaceae	<i>Acacia doreta</i>	regional endemic
Malvaceae	<i>Lawrencia</i> sp. Blue Hills (N. Gibson et al. NG 6516)	local endemic
Scrophulariaceae	<i>Eremophila</i> sp. Katjarra South (N. Gibson et al. NG 7149)	local endemic
	<i>Eremophila</i> sp. Mt Methwin (B. Backhouse et al. BEMJ 74)	local endemic

A further 18 taxa could not be identified to species level. For some this is due to lack of diagnostic characters and could be resolved with further collections; however at least seven require detailed taxonomic study. (Table 7)

Table 7. Taxa requiring taxonomic review

Family	Taxon	Distribution / Status
Celastraceae	<i>Stackhousia</i> aff. <i>clementii</i> (SvL 2995)	Widespread in arid zone
Chenopodiaceae	<i>Maireana</i> aff. <i>planifolia</i> (NG 7230)	Widespread in arid zone
	<i>Tecticornia</i> aff. <i>pruinosa</i> (NG 7128)	Taxonomically complex genus
Frankeniaceae	<i>Frankenia</i> aff. <i>cinerea</i> (NG 6562)	Taxonomically complex genus
	<i>Frankenia</i> aff. <i>georgei</i> (DJ Edinger 2675)	Taxonomically complex genus
Loganiaceae	<i>Mitrasacme</i> sp. (CP Campbell 3011)	Isolated collections from Katjarra & Gibson Desert
Myraceae	<i>Calytrix praecipua</i> (long leaf form – KFK 12208)	local endemic

The *Lawrencia* sp Blue Hills, the *Eremophila* sp. Katjarra South (Figure 9b) and the *Gunniopsis* sp. Lake Kerrylyn appear to have been collected for the first time on the current surveys. In addition an unusual long leafed form of *Calytrix praecipua* (Figure 15) was collected for the third time; it appears to be restricted to the massive sandstones. The *Mitrasacme* was recorded from one dune site north of Lake Kerrylyn and from one other site in dunes in the Gibson Desert. Taxonomic studies on *Stackhousia* are continuing (W. Barker pers. comm. – South Australian Herbarium).

Several other interesting taxonomic issues need to be resolved. Some material of the taxon referred to as *Eremophila petrophila* subsp. *petrophila* in this report is curated in PERTH under the name *Eremophila* sp. Carnarvon Range (D.J. Edinger Nats 24). After examining the collections under both names it remains unclear why they have been segregated and there is no published or unpublished diagnosis justifying this split. We consider *Eremophila* sp. Carnarvon Range a synonym of *Eremophila petrophila* subsp. *petrophila* in this report pending further taxonomic study.

One species has proved very difficult to relocate. *Eremophila* sp. Ostrina (M. Officer 164) is represented by one collection in PERTH, a duplicate from the State Herbarium of South Australia collected by Officer on the 8th July 1997. The description on the label describes this plant as a 2 m tall shrub with green flowers and a red calyx. The location is given as “N end of the Carnarvon Range above Virgin Springs, S of Mt Methwin”. Despite considerable efforts during the current survey trips and previous searches by other botanists this taxon has not been relocated. More material needs to be collected before its taxonomic status can be clarified.

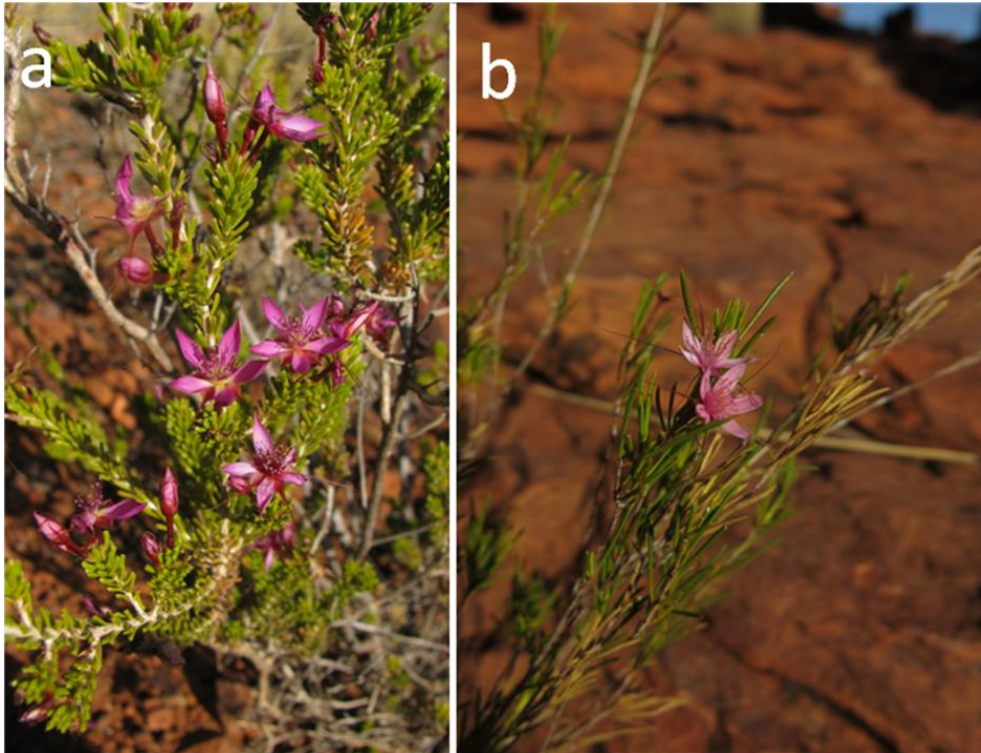


Figure 15. Two species of *Calytrix* were collected during the survey. a) *Calytrix carinata* was common on the ranges and sandplains, while b) a long leaved form of *Calytrix praecipua* appeared restricted to the massive sandstones of Katjarra.

4. Discussion

Most of the previous collections of vascular plants (80%) within Katjarra had been undertaken in August or early September. As a result graminoids that respond to cyclonic rains have been badly under sampled. In February 2013 a cyclone and associated tropical low tracked to the east of Katjarra, dumping significant rainfall across the area. As a result by May the grasses were flowering in profusion and the species list was increased from 14 to 60 grass species and further collections were made in May 2014 after an average season.

Records for other groups were also significantly increased, with the total indigenous flora now standing at 647 up from 269, an increase of 378 taxa. In addition there are nine new records of hybrids (mostly *Acacia* crosses) and four new weed records.

As a result of the survey program six taxa were added to the WA Census (Table 6) and it is recommended that two more taxa (*Calytrix praecipua* (long leaf form)(KFK 12208)) and *Mitrasacme* sp. (CP Campbell 3011)) should also be considered for adding to the WA Census. It is recommended these also be listed as Priority 1 taxa on DPaW's Priority Flora list.

Eight taxa appear to be endemic to Katjarra area, three of these are restricted to a small patch of stony quartzite below a breakaway system near the abandoned Blue Hills homestead. This is an area that clearly requires more survey effort following good seasons.

The granitic area on the western boundary of Katjarra, near No 2 Rockhole was very rich in taxa not seen elsewhere and would benefit from further collections as would the grassy creek lines in this area, a habitat type that is quite restricted.

A surprisingly large number of range limits were recorded in the survey, these appear to be a complicated mixture of restricted endemics, regional endemics and widespread tropical and eremaeian taxa. There is no clear congruent pattern. There are even a few arid members of genera more typical of the south west that extend as far north as Katjarra (e.g. *Laxmannia*, *Lomandra*, *Xanthorrhoea*).

In addition to species at their range limits, major range extensions were recorded for 27 taxa, again reflecting the limited previous collections from this area.

To date survey effort has been largely confined to the current access tracks, as a result the Sunbeam Group sandstones in the north east have not been surveyed at all and should be a priority for further work

Acknowledgements

The Birriliburu native title holders are thanked for the invitation to survey Katjarra within the Birriliburu IPA. Rob Thomas, Lindsey Langford and Hamish Morgan of Central Desert Native Title Services along with Gareth Catt from Kanyirrinpa Jukurrpa facilitated access to Katjarra and provided logistical support. DPaW regional staff assisted with logistics and the field survey campaigns.

Thanks also to Frank Obbens for his identifications of the *Calandrinia* collections, Bill Barker for his assistance with *Stackhousia* and *Lawrencia* taxonomy, and Bob Chinnock for his assistance with *Gunniopsis* taxonomy. Geoff Banks from DPaW's GIS Branch supplied the coloured orthophoto used in Figure 1.

This project was funded through a collaborative agreement between the Central Desert Native Title Services and DPaW's Goldfields Region and Science Division.

References

- Atlas of Living Australia (2013) *Atlas of Living Australia Website*.
<http://www.ala.org.au>. Accessed September 2013.
- Chinnock, R.J. (2007) *Eremophila and allied genera: a monograph of the plant family Myoporaceae*. Rosenberg Publishing, Dural, NSW.
- Cooke, J., Groves, R.H. & Ash, J. (2011) The distribution of *Carrichtera annua* in Australia: introduction, spread and probable limits. *The Rangeland Journal* 33: 23–35.
- Department of Sustainability, Environment, Water, Populations and Communities (2013) *Australia's bioregions (IBRA) website*.
www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/.
Accessed September 2013.
- Hocking, R.M. & Jones, J.A. (1999) *Methwin, W.A. Sheet 3047*. Western Australian Geological Survey. 1: 100 000 Geological Series.
- Hollister, C. (2011) *Keys to the Goodeniaceae of Western Australia*. Western Australian Herbarium, Perth.
- Hollister, C. & Thiele, K. (2011) *Keys to the Proteaceae of Western Australia*. Western Australian Herbarium, Perth.
- Dudley N. (Ed) (2008) *Guidelines for Applying Protected Area Management Categories*. IUCN, Gland, Switzerland.
- Keighery G. & Longman V. (2004) The naturalized vascular plants of Western Australia - 1: Checklist, environmental weeds and distribution in IBRA regions. *Plant Protection Quarterly* 19: 12–32.
- Jessop J (1985) *Flora of Central Australia*. Reed Books Pty Ltd, Sydney.
- de Kok, R. & Boffin, E. (2007) *The Pea Key: An interactive key for Australian pea-flowered legumes*. Available on line: <http://www.anbg.gov.au/cpbr/cd-keys/peakey/key/The%20Pea%20Key/Media/Html/index.html>
- Maslin, B.R. (2001) *Wattle: Acacias of Australia*. ABRS & CALM, Canberra.
- Sharp, D. & Simon, B.K. (2002) *AusGrass: Grasses of Australia*. CSIRO, Canberra
- Slee, A.V., Brooker, M.I.H., Duffy, S.M. & West, J.G. (2006) *EUCLID: Eucalypts of Australia* (Third Edition) Centre for Plant Biodiversity Research, Canberra.
- Smith, M.G. (2010) *Declared Rare and Priority Flora List for Western Australia, 16 September 2010*. Western Australian Department of Environment and Conservation, Como.
- Western Australian Herbarium (1998–) *FloraBase—the Western Australian Flora*. Department of Environment and Conservation.
<http://florabase.dec.wa.gov.au/>. Accessed September 2013.

Appendix 1: List of vascular flora occurring in the Katjarra survey area within the Birriliburu IPA, showing both current and previous surveys.

Number of taxa: 660.

Family	Name	Current	Previous	Conservation code	Weed
Acanthaceae	Harnieria kempeana subsp. muelleri	+	+		
Aizoaceae	Gunniopsis sp. Blue Hills (D.J. Edinger Nats 59)	+	+	1	
	Gunniopsis sp. Lake Kerrylyn (N. Gibson et al. NG 7028)	+		1	
	Trianthema triquetra	+			
Amaranthaceae	Alternanthera angustifolia	+			
	Alternanthera denticulata	+			
	Alternanthera nodiflora	+			
	Ptilotus aevroides	+			
	Ptilotus albidus	+			
	Ptilotus calostachyus	+			
	Ptilotus chrysocomus	+	+	1	
	Ptilotus clementii	+			
	Ptilotus daphne	+	+	1	
	Ptilotus gaudichaudii subsp. gaudichaudii	+			
	Ptilotus helipteroides	+			
	Ptilotus macrocephalus	+			
	Ptilotus nobilis subsp. nobilis	+			
	Ptilotus obovatus	+	+		
	Ptilotus polystachyus	+	+		
	Ptilotus roei	+	+		
	Ptilotus rotundifolius	+			
	Ptilotus schwartzii	+	+		
	Ptilotus aff. schwartzii (NG 7184)	+			
	Ptilotus stipitatus	+			
	Surreya diandra	+			
	Surreya aff. diandra (NG 7188)	+			
Apiaceae	Daucus glochidiatus	+			
Apocynaceae	Marsdenia australis	+			
	Rhyncharrhena linearis	+			
	Sarcostemma viminale subsp. australe	+	+		
Araliaceae	Trachymene bialata	+	+		
	Trachymene glaucifolia	+			
Asparagaceae	Laxmannia arida	+	+		
	Lomandra leucocephala subsp. robusta	+	+		
	Thysanotus exiliflorus	+			
	Thysanotus manglesianus	+	+		
Asteraceae	Angianthus tomentosus	+			
	Bidens bipinnata	+			weed
	Brachyscome ciliaris	+			
	Brachyscome ciliocarpa	+			
	Calocephalus multiflorus		+		
	Calocephalus ? beardii		+		
	Calotis erinacea	+			
	Calotis hispidula	+			
	Calotis sp. Carnarvon Range (D.J. Edinger & K.F. Kenneally D 2708 K 12243)		+		
Asteraceae	Centipeda minima	+			

Family	Name	Current	Previous	Conservation code	Weed	
Asteraceae	Centipeda pleiocephala	+				
	Chrysocephalum apiculatum	+				
	Chrysocephalum eremaeum	+				
	Chrysocephalum gilesii	+				
	Chrysocephalum puteale	+	+			
	Dielitzia tysonii		+			
	Erymophyllum ramosum subsp. ramosum		+			
	Gnephosis tenuissima	+	+			
	Helichrysum luteoalbum	+				
	Lawrencella davenportii			+		
	Leucochrysum fitzgibbonii			+		
	Leucochrysum stipitatum	+	+			
	Minuria leptophylla	+				
	Minuria multiseta	+				
	Minuria sp. Little Sandy Desert (S. van Leeuwen 4919)	+			1	
	Myriocephalus rudallii	+	+			
	Olearia stuartii	+	+			
	Olearia subspicata	+				
	Peripleura hispidula var. setosa	+				
	Pluchea dentex	+	+			
	Pluchea dunlopilii	+				
	Pluchea rubelliflora	+				
	Podolepis capillaris	+				
	Podolepis gardneri			+		
	Podolepis kendallii	+				
	Podolepis sp. Carnarvon Range (D.J. Edinger Nats 33)			+		
	Podolepis sp. Great Victoria Desert (A.S. George 8219)			+		
	Pterocaulon sphacelatum	+	+			
	Rhodanthe charsleyae			+		
	Rhodanthe propinqua	+	+			
	Rutidosis helichrysoides subsp. helichrysoides	+				
	Schoenia ayersii			+		
	Schoenia cassiniana	+				
	Senecio gregorii			+		
	Sonchus oleraceus	+				weed
	Streptoglossa bubakii	+				
	Streptoglossa decurrens	+				
	Streptoglossa liatroides	+	+			
	Taplinia saxatilis	+	+			
	Vittadinia aff. eremaea (DJE Nats 6A)	+	+			
	Vittadinia cervicularis	+				
	Vittadinia eremaea			+		
	Vittadinia sulcata	+				
Waitzia acuminata	+	+				
Boraginaceae	Halgalia cyanea var. Allambi Stn (B.W. Strong 676)	+				
	Halgalia erecta	+				
	Halgalia gustafsenii var. Mid West (G. Perry 370)	+	+			
	Halgalia solanacea var. Mt Doreen (G.M. Chippendale 4206)		+			
	Heliotropium cunninghamii	+				
	Heliotropium heteranthum	+				
	Trichodesma zeylanicum var. zeylanicum	+				

Family	Name	Current	Previous	Conservation code	Weed
Brassicaceae	Lepidium muelleri-ferdinandii	+			
	Lepidium oxytrichum		+		
	Lepidium phlebopetalum	+			
	Lepidium platypetalum	+	+		
	Menkea sphaerocarpa		+		
	Stenopetalum nutans	+			
Campanulaceae	Isotoma petraea	+			
	Wahlenbergia tumidifruca	+	+		
Caryophyllaceae	Polycarpaea corymbosa var. corymbosa	+			
	Polycarpaea holtzei		+		
	Polycarpaea involucrata	+	+		
Casuarinaceae	Casuarina obesa	+			
Celastraceae	Macgregoria racemigera	+	+		
	Stackhousia aff. clementii (S. van Leeuwen 2995)	+	+		
	Stackhousia intermedia	+	+		
	Stackhousia sp. swollen gynophore (W.R. Barker 2041)	+			
Centrolepidaceae	Centrolepis eremica	+	+		
	Atriplex bunburyana	+			
	Atriplex codonocarpa	+			
	Atriplex vesicaria	+	+		
Chenopodiaceae	Chenopodium gaudichaudianum		+		
	Dysphania glomulifera subsp. eremaea	+			
	Dysphania kalpari	+	+		
	Dysphania melanocarpa forma melanocarpa	+			
	Dysphania rhadinostachya subsp. inflata	+			
	Dysphania rhadinostachya subsp. rhadinostachya	+	+		
	Dysphania saxatilis		+		
	Dysphania simulans	+			
	Dysphania sphaerosperma	+			
	Enchylaena tomentosa var. tomentosa	+			
	Enchylaena tomentosa x Maireana pyramidata	+			
	Maireana aff. planifolia (NG 7230)	+	+		
	Maireana amoena	+			
	Maireana carnosae	+			
	Maireana convexa	+	+		
	Maireana eriosphaera	+	+		
	Maireana georgei	+	+		
	Maireana glomerifolia	+	+		
	Maireana luehmannii	+			
	Maireana melanocoma	+			
	Maireana pyramidata	+			
	Maireana thesioides	+	+		
	Maireana tomentosa subsp. tomentosa	+	+		
	Maireana triptera	+	+		
	Maireana villosa	+	+		
	Rhagodia eremaea	+	+		
	Salsola australis	+			
	Sclerolaena clelandii	+			
	Sclerolaena convexula	+			
	Sclerolaena cornishiana	+			
Sclerolaena cuneata	+				
Sclerolaena densiflora	+	+			

Family	Name	Current	Previous	Conservation code	Weed
Chenopodiaceae	<i>Sclerolaena deserticola</i>	+			
	<i>Sclerolaena diacantha</i>	+			
	<i>Sclerolaena eriacantha</i>	+	+		
	<i>Sclerolaena fimbriolata</i>	+			
	<i>Sclerolaena fusiformis</i>	+			
	<i>Sclerolaena lanicuspis</i>	+			
	<i>Sclerolaena parviflora</i>	+			
	<i>Tecticornia</i> aff. <i>pruinosa</i> / aff. <i>syncarpa</i> (NG 7128)	+			
	<i>Tecticornia</i> <i>disarticulata</i>	+	+		
	<i>Tecticornia indica</i> subsp. <i>bidens</i>	+			
	<i>Tecticornia indica</i> subsp. <i>leiostachya</i>	+			
	<i>Tecticornia laevigata</i>	+			
	<i>Tecticornia papillata</i>	+	+	1	
	<i>Tecticornia pruinosa</i>	+			
	<i>Tecticornia</i> sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	+			3
	<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)	+			
<i>Tecticornia</i> sp. Yoothapina Station (A.A. Mitchell 883)	+	+			
Cleomaceae	<i>Cleome viscosa</i>	+			
Colchicaceae	<i>Wurmbea deserticola</i>	+	+		
Convolvulaceae	<i>Bonamia erecta</i>	+			
	<i>Convolvulus clementii</i>	+			
	<i>Duperreya commixta</i>	+			
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+			
Cucurbitaceae	<i>Cucumis maderaspatanus</i>	+	+		
Cupressaceae	<i>Callitris columellaris</i>	+	+		
Cyperaceae	<i>Bulbostylis barbata</i>	+			
	<i>Cyperus</i> aff. <i>squarrosus</i> (NG 7178)	+			
	<i>Cyperus centralis</i>	+	+		
	<i>Cyperus iria</i>	+			
	<i>Cyperus squarrosus</i>	+	+		
	<i>Cyperus vaginatus</i>	+			
	<i>Fimbristylis dichotoma</i>	+			
	<i>Fimbristylis eremophila</i>	+			
	<i>Isolepis congrua</i>	+	+		
	<i>Lipocarpha microcephala</i>	+	+		
	<i>Schoenoplectus dissachanthus</i>	+			
	Ditrichaceae	<i>Ceratodon purpureus</i> subsp. <i>convolutus</i>		+	
Droseraceae	<i>Drosera burmanni</i>	+	+		
	<i>Drosera indica</i>	+	+		
Elaeocarpaceae	<i>Tetratheca chapmanii</i>	+	+	1	
Elatinaceae	<i>Elatine gratioloides</i>	+			
Euphorbiaceae	<i>Adriana tomentosa</i> var. <i>hookeri</i>	+			
	<i>Euphorbia australis</i>	+			
	<i>Euphorbia boophthona</i>	+	+		
	<i>Euphorbia coghlanii</i>	+			
	<i>Euphorbia drummondii</i>	+	+		
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	+		
	<i>Euphorbia wheeleri</i>	+			
	<i>Monotaxis luteiflora</i>		+		
Fabaceae	<i>Acacia abrupta</i>	+	+		
	<i>Acacia</i> aff. <i>adsurgens</i> (NG 6476)	+			

Family	Name	Current	Previous	Conservation code	Weed
Fabaceae	Acacia aff. ampliceps (NG 6689)	+			
	Acacia aff. incurvaneura (NG 7111)	+			
	Acacia aneura group	+	+		
	Acacia aptaneura	+	+		
	Acacia aff. aptaneura (BEMJ 99)		+		
	Acacia ayersiana	+	+		
	Acacia caesaneura	+			
	Acacia caesaneura x incurvaneura	+			
	Acacia citrinoviridis	+	+		
	Acacia craspedocarpa	+			
	Acacia craspedocarpa hybrid (NG 7117)	+			
	Acacia cuthbertsonii subsp. cuthbertsonii	+	+		
	Acacia daviesioides	+	+		
	Acacia dictyophleba	+	+		
	Acacia dictyophleba type 1 spear wattle form - narrow leaves (NG 6685)	+			
	Acacia dictyophleba type 2 spear wattle from - broad leaves (NG 6680)	+			
	Acacia doreta	+			
	Acacia doreta x rhodophloia	+			
	Acacia eriopoda	+			
	Acacia fuscaneura	+			
	Acacia hamersleyensis	+	+		
	Acacia inaequilatera	+			
	Acacia incurvaneura	+			
	Acacia incurvaneura x mulganeura	+			
	Acacia jamesiana			+	
	Acacia kempeana	+	+		
	Acacia ligulata	+	+		
	Acacia macraneura	+			
	Acacia maitlandii	+	+		
	Acacia marramamba	+			
	Acacia melleodora	+	+		
	Acacia minyura	+			
	Acacia mulganeura	+	+		
	Acacia oswaldii	+			
	Acacia pachyacra	+	+		
	Acacia prainii	+	+		
	Acacia pruinocarpa	+			
	Acacia pteraneura	+	+		
	Acacia pteraneura x fuscaneura	+			
	Acacia pyrifolia var. pyrifolia	+			
	Acacia ramulosa (hybrid) (D.J. Edinger 2235)			+	
	Acacia ramulosa var. linophylla	+			
	Acacia ramulosa var. ramulosa	+			
	Acacia rhodophloia	+			
	Acacia rhodophloia (non miniriche NG 6688)	+			
	Acacia sericophylla	+			
	Acacia sibirica	+	+		
Acacia subcontorta	+				
Acacia tetragonophylla	+				
Acacia thoma	+				

Family	Name	Current	Previous	Conservation code	Weed
Fabaceae	Acacia walkeri	+			
	Acacia wanyu	+			
	Crotalaria cunninghamii subsp. sturtii	+			
	Daviesia arthropoda	+	+	3	
	Daviesia grahamii	+	+		
	Gastrolobium grandiflorum		+		
	Gastrolobium simplicifolium		+		
	Glycine canescens	+	+		
	Gompholobium polyzygum	+	+		
	Gompholobium simplicifolium	+			
	Indigofera georgei	+	+		
	Indigofera linnaei	+			
	Indigofera monophylla	+	+		
	Indigofera sp. (NG 7247)	+			
	Isotropis atropurpurea	+	+		
	Isotropis forrestii	+	+		
	Kennedia prorepens	+	+		
	Leptosema chambersii	+			
	Mirbelia rhagodioides	+	+		
	Muelleranthus stipularis	+	+		
	Muelleranthus trifoliolatus	+			
	Petalostylis cassioides	+	+		
	Petalostylis labicheoides	+	+		
	Senna artemisioides subsp. filifolia	+			
	Senna artemisioides subsp. helmsii	+	+		
	Senna artemisioides subsp. oligophylla	+			
	Senna artemisioides subsp. petiolaris	+			
	Senna artemisioides subsp. x artemisioides	+	+		
	Senna artemisioides subsp. x sturtii	+	+		
	Senna glaucifolia	+			
	Senna glutinosa subsp. chatelainiana	+			
	Senna glutinosa subsp. glutinosa	+			
	Senna glutinosa subsp. pruinosa	+			
	Senna glutinosa subsp. x luerssenii	+			
	Senna notabilis	+			
	Senna pleurocarpa	+			
	Senna sp. Meekatharra (E. Bailey 1-26)	+			
	Senna stricta	+			
	Swainsona kingii	+	+		
	Swainsona microphylla	+	+		
Swainsona tenuis	+				
Swainsona ? paucifoliolata (NG 7214)	+				
Templetonia egena	+				
Tephrosia sp. deserts (J.R. Maconochie 1403)	+				
Frankeniaceae	Frankenia cinerea	+			
	Frankenia aff. cinerea (NG 6562)	+			
	Frankenia fecunda		+		
	Frankenia glomerata		+		
	Frankenia laxiflora	+	+		
	Frankenia punctata	+			
	Frankenia sessilis		+		
	Frankenia setosa	+			

Family	Name	Current	Previous	Conservation code	Weed
Frankeniaceae	Frankenia aff. georgei (DJ Edinger 2675)		+		
Gentianaceae	Centaurium erythraea	+			weed
Geraniaceae	Erodium crinitum	+			
	Erodium cygnorum	+			
Goodeniaceae	Brunonia australis	+			
	Brunonia suffruticosa		+		
	Dampiera atriplicina	+	+	3	
	Dampiera cinerea	+	+		
	Dampiera dentata	+	+		
	Dampiera ramosa	+	+		
	Dampiera roycei	+			
	Goodenia centralis	+	+		
	Goodenia aff. centralis (D.J. Edinger 2664)		+		
	Goodenia gypsicola	+			
	Goodenia havilandii	+	+		
	Goodenia heterochila	+			
	Goodenia macropectra	+	+		
	Goodenia maideniana	+			
	Goodenia modesta	+		3	
	Goodenia mueckeana	+	+		
	Goodenia aff. mueckeana (BEMJ 117)		+		
	Goodenia ramelii	+			
	Goodenia scaevolina	+			
	Goodenia schwerinensis	+	+		
	Goodenia sp. Carnarvon Range (D.J. Edinger Nats 30)	+	+		
	Goodenia sp. Sandy Creek (R.D. Royce 1653)	+	+		
	Goodenia stellata	+	+		
	Goodenia tenuiloba	+	+		
	Goodenia triodiophila	+	+		
	Goodenia xanthosperma	+			
	Goodenia quasilibera	+			
	Scaevola amblyanthera var. centralis	+			
	Scaevola basedowii	+	+		
	Scaevola browniana subsp. browniana	+	+		
	Scaevola collaris	+	+		
	Scaevola parvifolia	+	+		
	Scaevola sericophylla	+			
	Scaevola spinescens	+			
	Velleia connata	+	+		
	Velleia glabrata	+	+		
	Velleia hispida		+		
	Velleia panduriformis	+			
Gyrostemonaceae	Codonocarpus cotinifolius	+			
	Gyrostemon ramulosus	+	+		
	Gyrostemon tepperi		+		
Haloragaceae	Glischrocaryon angustifolium	+			
	Gonocarpus ephemerus	+	+		
	Gonocarpus eremophilus	+	+		
	Gonocarpus nodulosus		+		
	Haloragis gossei	+			
	Haloragis maierae	+			
	Haloragis odontocarpa forma pterocarpa	+			

Family	Name	Current	Previous	Conservation code	Weed
Haloragaceae	Haloragis odontocarpa forma rugosa	+	+		
	Haloragis trigonocarpa	+			
Hemerocallidaceae	Corynotheca micrantha var. divaricata	+	+		
Hypericaceae	Hypericum japonicum	+	+		
Isoetaceae	Isoetes ? muelleri (NG 7254)	+			
Juncaceae	Juncus aridicola	+			
Juncaginaceae	Triglochin nana	+	+		
Lamiaceae	Clerodendrum floribundum	+			
	Clerodendrum tomentosum	+			
	Dicrastylis cordifolia	+	+		
	Dicrastylis exsuccosa	+	+		
	Dicrastylis georgei	+			
	Dicrastylis kumarinensis	+	+		
	Microcorys macredieana	+	+		
	Newcastelia bracteosa		+		
	Newcastelia cephalantha	+			
	Newcastelia spodiotricha	+			
	Pityrodia loricata	+			
	Prostanthera althoferi	+			
	Prostanthera wilkieana	+			
	Quoya loxocarpa	+	+		
	Spartothamnella teucriffora	+			
	Loganiaceae	Logania centralis	+		
Mitrasacme sp. (C.P. Campbell 3011)		+			
Amyema bifurcata		+			
Loranthaceae	Amyema fitzgeraldii	+			
	Amyema gibberula var. gibberula	+	+		
	Amyema miquelii	+	+		
	Amyema preissii	+			
	Lysiana murrayi	+	+		
Lythraceae	Rotala mexicana	+			
Malvaceae	Abutilon cryptopetalum	+			
	Abutilon fraseri	+			
	Abutilon lepidum	+			
	Abutilon leucopetalum	+	+		
	Abutilon macrum	+			
	Abutilon otocarpum	+			
	Alyogyne pinoniana var. pinoniana	+	+		
	Androcalva loxophylla	+	+		
	Brachychiton gregorii	+			
	Corchorus sidoides subsp. sidoides	+			
	Gossypium robinsonii	+			
	Hibiscus brachychlaenus	+			
	Hibiscus burtonii	+			
	Hibiscus coatesii		+		
	Hibiscus gardneri	+	+		
	Hibiscus solanifolius	+			
	Hibiscus sp. (NG 6545)	+			
	Hibiscus sp. (NG 7309)	+			
	Hibiscus sp. Carnarvon (S. van Leeuwen 5110)	+			1
Hibiscus sp. Gardneri (A.L. Payne PRP 1435)	+				
Hibiscus sturtii var. grandiflorus	+				

Family	Name	Current	Previous	Conservation code	Weed
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>	+	+		
	<i>Keraudrenia velutina</i> subsp. <i>elliptica</i>	+	+		
	<i>Lawrenzia glomerata</i>	+			
	<i>Lawrenzia helmsii</i>	+			
	<i>Lawrenzia</i> sp. Blue Hills (N. Gibson et al. NG 6516)	+		1	
	<i>Lawrenzia squamata</i>		+		
	<i>Malvastrum americanum</i>	+			weed
	<i>Sida calyxhymenia</i>	+			
	<i>Sida cardiophylla</i>	+			
	<i>Sida ectogama</i>	+			
	<i>Sida excedentifolia</i>	+			
	<i>Sida fibulifera</i>	+			
	<i>Sida platycalyx</i>	+			
	<i>Sida</i> sp. (NG 7142)	+			
	<i>Sida</i> sp. (NG 7144)	+			
	<i>Sida</i> sp. (NG 7145)	+			
	<i>Sida</i> sp. (NG 7146)	+			
	<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	+			
	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	+	+		
	<i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32)	+			
	<i>Sida</i> sp. Golden calyces glabrous (pale variant) (H.N. Foote 32)	+			
	<i>Sida</i> sp. Golden calyces pubescent (G.J. Leach 1966)	+			
	<i>Sida</i> sp. Rabbit Flat (B.J. Carter 626)	+			
<i>Sida</i> sp. sand dunes (A.A. Mitchell PRP1208)	+				
<i>Sida</i> sp. tiny glabrous fruit (A.A. Mitchell PRP1152)	+				
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	+				
Marsileaceae	<i>Marsilea drummondii</i>		+		
	<i>Marsilea exarata</i>	+			
Moraceae	<i>Ficus brachypoda</i>	+			
	<i>Ficus virens</i>	+			
Myrtaceae	<i>Aluta maisonneuvei</i>	+	+		
	<i>Calothamnus aridus</i>		+		
	<i>Calytrix carinata</i>	+	+		
	<i>Calytrix praecipua</i>	+	+	3	
	<i>Corymbia chippendalei</i>	+	+		
	<i>Corymbia deserticola</i> subsp. <i>deserticola</i>	+	+		
	<i>Corymbia opaca</i>	+	+		
	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	+	+		
	<i>Eucalyptus eremicola</i> subsp. <i>peeneri</i>	+	+		
	<i>Eucalyptus gamophylla</i>	+	+		
	<i>Eucalyptus gypsophila</i>		+		
	<i>Eucalyptus kingsmillii</i> subsp. <i>kingsmillii</i>	+	+		
	<i>Eucalyptus lucasii</i>	+	+		
	<i>Eucalyptus mannensis</i> subsp. <i>mannensis</i>	+			
	<i>Eucalyptus oldfieldii</i>	+			
	<i>Eucalyptus rameliana</i>	+	+		
	<i>Eucalyptus socialis</i>	+			
	<i>Eucalyptus</i> sp. Little Sandy Desert (D. Nicolle & M. French DN 4304)		+		
	<i>Eucalyptus striatocalyx</i>	+			
<i>Eucalyptus trivalva</i>	+	+			

Family	Name	Current	Previous	Conservation code	Weed
Myrtaceae	Lamarchea sulcata	+			
	Melaleuca bracteata	+			
	Melaleuca glomerata	+			
	Melaleuca hamata		+		
	Melaleuca interioris	+			
	Melaleuca lasiandra	+	+		
	Micromyrtus flaviflora	+	+		
	Thryptomene decussata	+			
Nyctaginaceae	Boerhavia coccinea	+			
	Boerhavia repleta	+			
Oleaceae	Jasminum didymum subsp. lineare	+			
Ophioglossaceae	Ophioglossum lusitanicum	+			
Oxalidaceae	Oxalis sp. Pilbara (M.E. Trudgen 12725)	+		2	
Pedaliaceae	Josephinia eugeniae	+			
Phrymaceae	Glossostigma diandrum	+			
	Peplidium sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)	+	+		
	Phyllanthus aff. virgatus (NG 7208)	+			
	Phyllanthus erwinii	+	+		
	Poranthera microphylla		+		
Plantaginaceae	Stemodia grossa	+			
	Stemodia linophylla	+			
	Stemodia viscosa	+	+		
Poaceae	Amphipogon caricinus	+			
	Amphipogon sericeus	+			
	Aristida contorta	+			
	Aristida holathera	+			
	Aristida ingrata	+			
	Brachyachne convergens	+			
	Brachyachne prostrata	+			
	Cymbopogon ambiguus	+			
	Cymbopogon obtectus	+			
	Dactyloctenium radulans	+			
	Dichanthium sericeum subsp. humilium	+			
	Digitaria ammophila	+			
	Digitaria brownii	+			
	Elytrophorus spicatus	+			
	Enneapogon caerulescens	+			
	Enneapogon polyphyllus	+			
	Enteropogon ramosus	+			
	Eragrostis cumingii	+	+		
	Eragrostis desertorum		+		
	Eragrostis dielsii	+			
	Eragrostis elongata	+			
	Eragrostis eriopoda	+	+		
	Eragrostis exigua	+			
	Eragrostis falcata		+		
	Eragrostis kennedyae	+			
	Eragrostis lacunaria		+		
	Eragrostis leptocarpa		+		
	Eragrostis pergracilis	+			
	Eragrostis setifolia	+			

Family	Name	Current	Previous	Conservation code	Weed	
Poaceae	<i>Eragrostis speciosa</i>	+				
	<i>Eragrostis tenellula</i>	+				
	<i>Eragrostis xerophila</i>	+				
	<i>Eriachne aristidea</i>	+				
	<i>Eriachne benthamii</i>	+				
	<i>Eriachne helmsii</i>	+				
	<i>Eriachne mucronata</i>	+				
	<i>Eriachne pulchella</i>	+	+			
	<i>Eulalia aurea</i>	+	+			
	<i>Iseilema eremaeum</i>	+				
	<i>Iseilema membranaceum</i>	+				
	<i>Monachather paradoxus</i>	+				
	<i>Neurachne minor</i>	+	+			
	<i>Panicum decompositum</i>	+				
	<i>Paractaenum novae-hollandiae</i> subsp. <i>novae-hollandiae</i>			+		
	<i>Paractaenum novae-hollandiae</i> subsp. <i>reversum</i>	+				
	<i>Paractaenum refractum</i>	+	+			
	<i>Paraneurachne muelleri</i>	+				
	<i>Paspalidium clementii</i>	+				
	<i>Perotis rara</i>	+				
	<i>Setaria surgens</i>	+				
	<i>Sporobolus caroli</i>	+				
	<i>Themeda avenacea</i>	+				
	<i>Themeda triandra</i>	+				
	<i>Themeda</i> sp. (NG 6482)	+				
	<i>Thyridolepis mitchelliana</i>			+		
	<i>Thyridolepis multiculmis</i>	+				
	<i>Thyridolepis xerophila</i>	+				
	<i>Tragus australianus</i>	+				
	<i>Triodia basedowii</i>	+	+			
	<i>Triodia melvillei</i>	+				
	<i>Triodia pungens</i>	+				
	<i>Triodia schinzii</i>	+				
	<i>Triodia</i> sp. Little Sandy Desert (S. van Leeuwen 4935)	+				
	<i>Triodia</i> ? <i>lanigera</i>	+				
	<i>Tripogon loliiformis</i>	+	+			
	<i>Triraphis mollis</i>	+				
	<i>Yakirra australiensis</i> var. <i>australiensis</i>	+				
	Polygalaceae	<i>Comesperma pallidum</i>	+		3	
		<i>Comesperma viscidulum</i>	+	+	4	
<i>Polygala glaucifolia</i>		+				
<i>Polygala isingii</i>		+				
Portulacaceae	<i>Calandrinia balonensis</i>	+				
	<i>Calandrinia creethiae</i>	+	+			
	<i>Calandrinia eremaea</i>		+			
	<i>Calandrinia pleiopetala</i>	+				
	<i>Calandrinia polyandra</i>	+				
	<i>Calandrinia ptychosperma</i>	+	+			
	<i>Calandrinia pumila</i>	+				
	<i>Calandrinia reticulata</i>	+	+			
	<i>Calandrinia stagnensis</i>		+			
<i>Calandrinia</i> ? <i>creethiae</i> intergrade (NG 7213)	+					

Family	Name	Current	Previous	Conservation code	Weed
Portulacaceae	Calandrinia ? stagnensis intergrade (NG 7212)	+			
	Portulaca oleracea	+			
	Portulaca pilosa	+			
Proteaceae	Grevillea berryana	+			
	Grevillea deflexa	+			
	Grevillea eriostachya	+	+		
	Grevillea eriostachya x juncifolia	+			
	Grevillea eriostachya x spinosa	+			
	Grevillea juncifolia	+			
	Grevillea spinosa	+	+		
	Grevillea stenobotrya	+	+		
	Grevillea striata	+			
	Grevillea wickhamii subsp. hispidula	+	+		
	Hakea leucoptera subsp. sericipes	+			
	Hakea lorea subsp. lorea	+			
	Hakea preissii	+			
Hakea rhombales	+	+			
Pteridaceae	Cheilanthes brownii	+			
	Cheilanthes lasiophylla	+	+		
	Cheilanthes sieberi subsp. sieberi	+	+		
Rubiaceae	Oldenlandia galioides	+			
	Pomax rupestris	+	+		
	Pomax sp. desert (A.S. George 11968)	+	+		
	Psydrax attenuata	+			
	Psydrax latifolia	+			
	Psydrax suaveolens	+	+		
	Synaptantha tillaeacea var. hispidula	+			
Synaptantha tillaeacea var. tillaeacea	+	+			
Santalaceae	Anthobolus leptomerioides	+	+		
	Santalum acuminatum	+			
	Santalum lanceolatum	+			
	Santalum spicatum	+			
Sapindaceae	Diplopeltis stuartii var. stuartii	+			
	Dodonaea coriacea	+			
	Dodonaea petiolaris	+			
	Dodonaea viscosa subsp. angustissima	+			
	Dodonaea viscosa subsp. spatulata	+	+		
Scrophulariaceae	Eremophila aff. compacta (BEMJ 72)		+		
	Eremophila canaliculata	+			
	Eremophila citrina	+			
	Eremophila clarkei	+	+		
	Eremophila decipiens subsp. decipiens	+	+		
	Eremophila exilifolia	+	+		
	Eremophila falcata	+			
	Eremophila forrestii subsp. forrestii	+			
	Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	+		2	
	Eremophila galeata	+			
	Eremophila gilesii subsp. gilesii	+	+		
	Eremophila gilesii subsp. variabilis	+	+		
	Eremophila glabra subsp. glabra	+			
Eremophila hygrophana		+			
Eremophila latrobei subsp. filiformis	+	+			

Family	Name	Current	Previous	Conservation code	Weed
Scrophulariaceae	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	+		
	<i>Eremophila longifolia</i>	+			
	<i>Eremophila maculata</i> subsp. <i>brevifolia</i>	+	+		
	<i>Eremophila margarethae</i>	+			
	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	+	+		
	<i>Eremophila pendulina</i>	+			
	<i>Eremophila petrophila</i> subsp. <i>petrophila</i>	+	+		
	<i>Eremophila platycalyx</i>	+			
	<i>Eremophila platythamnos</i>		+		
	<i>Eremophila platythamnos</i> subsp. <i>platythamnos</i>	+	+		
	<i>Eremophila pterocarpa</i> subsp. <i>acicularis</i>	+			
	<i>Eremophila punctata</i>	+	+		
	<i>Eremophila shonae</i> subsp. <i>diffusa</i>	+	+	3	
	<i>Eremophila</i> sp. Katjarra South (N. Gibson et al. NG 7149)	+		1	
	<i>Eremophila</i> sp. Mt Methwin (B. Backhouse et al. BEMJ 74)	+	+	1	
	<i>Eremophila</i> sp. Ostrina (M. Officer 164)		+		
	<i>Eremophila youngii</i> subsp. <i>youngii</i>	+			
Solanaceae	<i>Anthotroche pannosa</i>	+			
	<i>Duboisia hopwoodii</i>	+			
	<i>Nicotiana benthamiana</i>	+	+		
	<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>	+			
	<i>Nicotiana rosulata</i>	+			
	<i>Nicotiana simulans</i>	+			
	<i>Solanum</i> aff. <i>sturtianum</i> (NG 6575)	+			
	<i>Solanum ashbyae</i>	+			
	<i>Solanum centrale</i>	+	+		
	<i>Solanum cleistogamum</i>		+		
	<i>Solanum ellipticum</i>	+			
	<i>Solanum lachnophyllum</i>	+			
	<i>Solanum lasiophyllum</i>	+			
	<i>Solanum orbiculatum</i> subsp. <i>macrophyllum</i>	+			
<i>Solanum sturtianum</i>		+			
Stylidiaceae	<i>Levenhookia chippendalei</i>	+	+		
	<i>Stylidium desertorum</i>	+			
	<i>Stylidium humphreysii</i>	+	+		
	<i>Stylidium inaequipetalum</i>	+	+		
Surianaceae	<i>Stylobasium spathulatum</i>	+			
Thymelaeaceae	<i>Pimelea ammocharis</i>	+			
	<i>Pimelea microcephala</i>	+			
Violaceae	<i>Hybanthus aurantiacus</i>	+	+		
Xanthorrhoeaceae	<i>Xanthorrhoea thorntonii</i>	+			
Zygophyllaceae	<i>Tribulus astrocarpus</i>	+			
	<i>Tribulus macrocarpus</i>	+			
	<i>Tribulus suberosus</i>	+	+		
	<i>Zygophyllum aurantiacum</i> subsp. <i>aurantiacum</i>	+	+		
	<i>Zygophyllum compressum</i>	+			
	<i>Zygophyllum eremaeum</i>	+			
	<i>Zygophyllum iodocarpum</i>	+			
<i>Zygophyllum simile</i>		+			