



Tjiwarl (Leinster) Bush Blitz

Flora

28 August – 8 September 2023

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Nomenclature and taxonomy used in this report is consistent with:

The Australian Plant Name Index (APNI)

<http://www.anbg.gov.au/databases/apni-about/index.html>

The Australian Plant Census (APC)

<http://www.anbg.gov.au/chah/apc/about-APC.html>

Florabase (for conservation and exotic listing and common names)

<https://florabase.dbca.wa.gov.au/>

Mycobank

<https://www.mycobank.org/>

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Abstract

The Tjiwarl Country (Leinster) Bush Blitz was held from 28 August to 8 September 2023 in the eastern Murchison region of Western Australia. Ten (10) areas and two (2) standard survey sites were selected within the region, including the Wanjarri Nature Reserve, Kaluwiri NRS, Albion Downs, Yakabindie, Lake Miranda, and surrounding areas. Habitats included sand dunes and clay pans, salt lake, mulga and mallee shrublands. During the ten days of survey, 216 botanical voucher collections (223 items in total) were gathered comprising 205 unique vascular plant taxa and one fungal species. Two taxa with a conservation listing of Priority 3 in Western Australia were recorded, along with three exotic taxa. Most specimens, while not new records for the areas surveyed, filled a significant geographical gap in collections for the region. 34 new taxon records were vouchered for the Wanjarri Nature Reserve along with 31 new records for the Kaluwiri NRS, and nine (9) unnamed or not formalized taxa were recorded. Seven range extensions were recorded. Three BHP staff members were introduced to flora collecting during the expedition. As part of the outreach component of the Bush Blitz, the team participated in a successful school educational day held in Leinster.

1. Introduction

This Bush Blitz expedition was held in the Murchison region of Western Australia on Tjiwarl Country.

The specific land units that the expedition included:

- Wanjarri Nature Reserve, managed by Department of Biodiversity, Conservation and Attractions, Parks and Wildlife.
- Kaluwiri NRS, Albion Downs, and Yakabindie
- Lake Miranda, Leinster, and other natural areas (opportunistic collecting).

These areas have been reasonably well surveyed for flora (approx. 4,099 vouchered specimens comprising 918 taxa (AVH 2023, Figure 1)), with collections predominantly being made during the months of August and September.

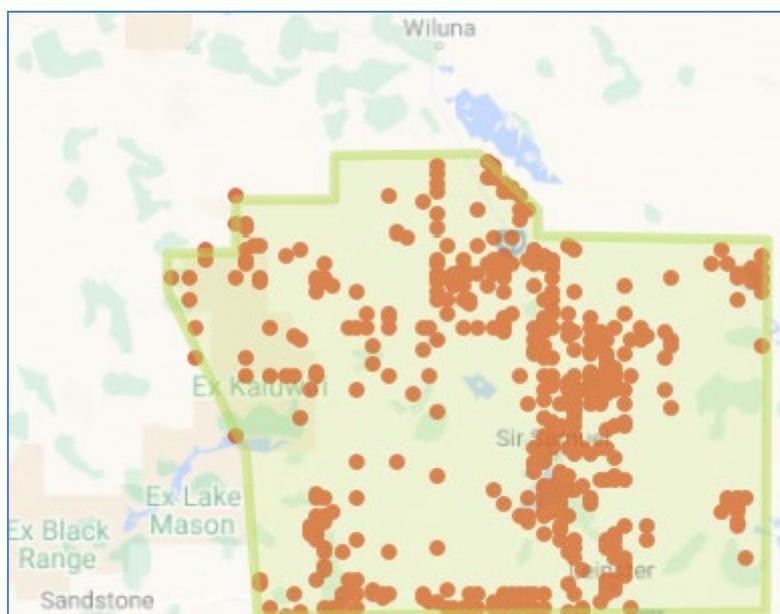


Figure 1: Records of botanical collections gathered from the Bush Blitz region made during the months of August-September. Source: Australasian Virtual Herbarium (AVH 2023).

2. Methods

2.1 Site selection

Sites were selected based on intensity of previous surveys (as documented by vouchered collections in Australian herbaria – Figure 1), availability/accessibility to fresh water, accessibility by car, permission to enter and collect in an area, and observation by Bush Blitz teams visiting locations during the expedition (Table 1, Figure 2). Areas were also selected by traversing regions by car or helicopter and selecting areas for voucher collection based on changes in vegetation type.

Table 1: Site descriptions for the Tjiwarl Bush Blitz.

Date	Location	Description	Survey type
29 th August 2023	Standard Survey Site 2, Buckley Well, 5.5 km west of Goldfields Highway, off Yakabindie Station track.	Plain, brown clay, seasonally moist. Open Acacia with herb layer.	Standard Survey methods
30 th August 2023	Standard Survey Site 1, Wanjarri Nature Reserve; approx. 12.5 km W Goldfields Highway, 2 km south of homestead sheds along pipeline track (and surrounding area).	Plain, red-brown clayey sand. Open Acacia over <i>Triodia</i> .	Standard Survey methods
31 st August 2023	Dingo Pool and surrounding area. Wanjarri Nature Reserve; 8.1 km SE homestead sheds, near central-south-east corner of reserve.	Flood plain/sandstone outcrops, brown clayey sand. Acacia scrub. Breakaway/sandstone outcrop.	Hand collection
1 st September 2023	Altona-Yeelirrie Road, Logan Spring. Albion Downs-Yeelirrie Road.	Sandstone outcrop, red sandy-clay. Open Acacia, <i>Eremophila</i> shrubland adjacent to herbfield. Roadside plain, red-brown clayey sand. Open Acacia/Eucalyptus over <i>Triodia</i> .	Hand collection
2 nd September 2023	Wanjarri Nature Reserve; sand dunes.	Sand dune, red-brown sand. Low <i>Acacia-Calytrix</i> scrub.	Hand collection
3 rd September 2023	Kaluwiri NRS (Site F5). Kaluwiri NRS (Site F6)	Breakaway/plain, brown clay. Mulga thicket. Creek bed and adjacent plain, brown clayey sand. Open <i>Acacia</i> scrub.	Hand collection
4 th September 2023	Wanjarri Nature Reserve; sand dunes & clay pan. Wanjarri Nature Reserve; northern boundary.	Sand dune & adjacent clay pan, red-brown sand. Acacia scrub. Hill, stony gritty sand. Open <i>Acacia</i> scrub.	Hand collection
6 th September 2023	Track towards McFarlanes Find Mine. Albion Downs Road and adjacent areas.	Breakaway, stoney brown clayey sand. Open <i>Acacia</i> scrub. Roadside plain, red-brown clayey sand. Open <i>Acacia/Eucalyptus</i> over <i>Triodia</i> .	Hand collection
7 th September 2023	Along Goldfields Hwy, approx. 25 km north from Leinster turnoff. Banks of Lake Miranda (M1).	Floodplain, clayey loam. Acacia scrub. Dune/salt pan, brown clayey loam. Scrub.	Hand collection
8 th September 2023	Agnew-Sandstone Road, sand dunes. Southern end of Booylgoo Range	Plain adjacent to road, brown sandy-clay. Open mulga. Rocky (dolerite), red clay. Open <i>Acacia</i> scrub.	Hand collection

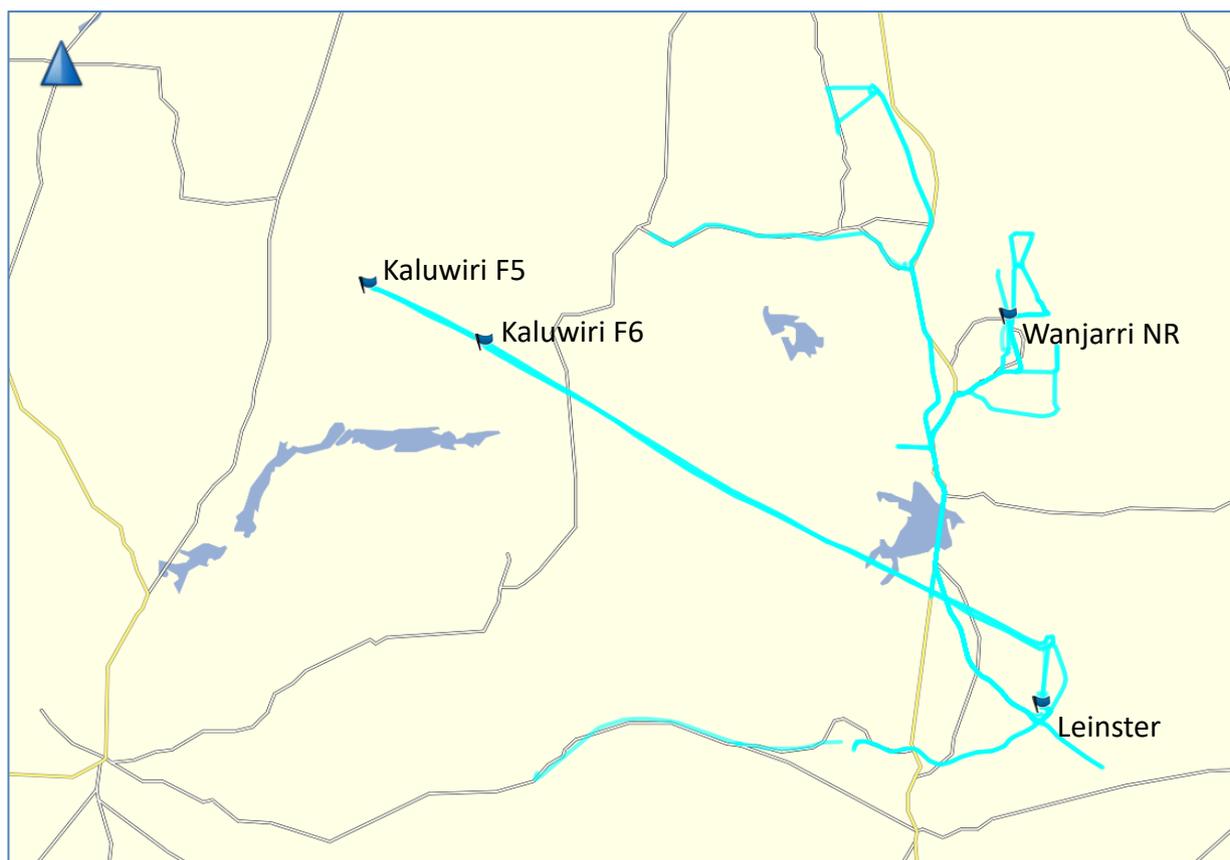


Figure 2. Map of the Bush Blitz survey region indicating areas surveyed by car, on foot, and by helicopter (pale blue).

2.2 Survey techniques

All flowering or fruiting taxa at each site were collected as a voucher specimen using standard herbarium collecting techniques (see https://herbarium.dbca.wa.gov.au/How_to_collect_herbarium_specimens.pdf) and lodged in the Western Australian Herbarium (PERTH).

Duplicate specimens, where available, will be lodged at the Australian National Herbarium (CANB). Along with a research-grade herbarium specimen, collection metadata and images of each collection and habitat were captured, and tissue for molecular analysis was gathered where possible (see Section 3.6).

2.2.1 Methods used at standard survey sites

A 20 m x 20 m quadrat was established at each standard survey site in a representative area not impacted by other survey activities. Single representatives of all taxa within the plot were collected as vouchers (as described in Section 2.2) and lodged with the Western Australian Herbarium (PERTH).

2.3 Identifying the collections

Many identifications were supported by or based on comparisons with existing specimens in the research collection at the Western Australian Herbarium (PERTH) and guided by species distribution data available through The Australasian Virtual Herbarium (<https://avh.chah.org.au>).

The following individuals assisted with the identification of specimens:

DBCA – Western Australian Herbarium

- Benjamin Anderson, Botanist (*Triodia*)
- Andrew Brown, Research Associate (*Eremophila*)
- Steve Dillon, Identification Botanist
- Malcolm French, Research Associate (*Eucalyptus*)
- Michael Hislop, Identification Botanist
- Terry Macfarlane, Botanist (*Thysanotus*, Poaceae)
- Frank Obbens, Research Associate (*Calandrinia*)
- Barbara Rye, Research Associate (*Myrtaceae*)
- Kelly Shepherd, Botanist (*Tecticornia*)
- Tony Start, Research Associate (mistletoes)
- Juliet Wege, Botanist (Stylidiaceae)

Australian National Herbarium - Alexander Schmidt-Lebuhn, Senior Research Scientist (Asteraceae)

State Herbarium of South Australia - Timothy Hammer, Research Associate (*Ptilotus*)

In addition, the following references and resources were used:

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3. Results and Discussion

During the ten days of survey, 205 unique vascular plant taxa and one fungal species were collected (Appendix 1), and 216 botanical voucher collections (223 items in total) were gathered (Appendix 2); these have been incorporated into the collections of the Western Australian Herbarium. Collections records are available via Florabase and the Australasian Virtual Herbarium. Images of specimens lodged within the Western Australian Herbarium are available online, following the URL [https://herbarium.dbca.wa.gov.au/\[PERTH number\]](https://herbarium.dbca.wa.gov.au/[PERTH number]) (e.g. https://herbarium.dbca.wa.gov.au/PERTH_09601260.jpg).

3.1 Un-named or not formalised taxa

Nine (9) collections were made of un-named or currently undescribed and unpublished taxa (Table 2). These taxa have been collected previously but require further taxonomic research and publication.

Table 2. Putatively un-named or not formalised taxa	
Taxon	Comment
<i>Eremophila platycalyx</i> subsp. Leonora (J. Morrisey 252)	Recognized taxonomic concept requiring further study.
<i>Halgania cyanea</i> var. Allambi Stn (B.W. Strong 676)	Recognized taxonomic concept requiring further study.
<i>Ptilotus</i> aff. <i>schwartzii</i>	Fits within the broad concept of <i>P. schwartzii</i> but requires revision of the group.
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	Recognized taxonomic concept requiring further study.
<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)	Recognized taxonomic concept requiring further study.
<i>Stylidium</i> sp.	Recognized taxonomic concept undergoing further study.
<i>Thysanotus</i> aff. <i>manglesianus</i>	Requires further study.
<i>Thysanotus</i> sp.	An unplaced twining species.
<i>Thysanotus</i> sp. Eremaean (S. van Leeuwen 1067)	Recognized taxonomic concept requiring further study.

3.2 Putative new species (new to science)

In this report, 'putative new species' means an unnamed species that, as far as can be ascertained, was identified as a new species as a direct result of this Bush Blitz. A single putative new flora species was identified during this expedition but requires further study.

Species	Comment
<i>Eremophila</i> aff. <i>glutinosa</i>	Potential new taxon, specialist unable to identify taxon.

3.3 Exotic and pest species

In general, sites surveyed were free from exotic and pest species with the exception of heavily human impacted and disturbed areas (e.g. roadsides). Three (3) exotic species were recorded (Table 4).

Exotic/pest species	Location sighted/observed	Indication of abundance	Comments
<i>Cuscuta epithymum</i> (L.) L.	Kaluwiri NRS (Site F6).	Locally frequent	A widely distributed introduced parasitic plant.
<i>Rumex vesicarius</i> L.	Kathleen Mine; along major roads	Common	Encroaching on Wanjarri Nature Reserve
<i>Sisymbrium orientale</i> L.	Floodway along Goldfields Hwy, approx. 25 km north from Leinster turnoff.	Locally frequent.	A widely distributed introduced herbaceous environmental weed.

3.4 Threatened species

While no threatened species were recorded, two (2) Western Australian Conservation-Listed taxa were reported during the Tjiwarl Country (Leinster) Bush Blitz (Table 5).

Species	Listing status and level (EBPC, State/Territory)	Location sighted/observed	Indication of abundance
<i>Euryomyrtus inflata</i> Trudgen	WA Priority 3	Albion Downs Road, approx. 5.5 km SW Goldfields Hwy	Locally frequent
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	WA Priority 3	Kaluwiri NRS, approx. 116 km NW (Site F5).	Occasional

***Euryomyrtus inflata*. Priority 3.** A small spreading shrub with white-pink flowers, restricted to the Murchison IBRA Region in *Triodia/Aluta* hummock grassland (Trudgen 2001), collected from 12 populations. This record is from the western-most range of the taxon.

***Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94). Priority 3.** This is a small viscous shrub primarily distributed in the Murchison on red sands. The collection made during this Bush Blitz, a new population record for the Kaluwiri NRS, was infertile. All *Sauropus* taxa in

Western Australia are now recognized as the genus *Synostemon*; however, this phrase name taxon has not yet been nomenclaturally updated. Barrett & Telford (2015) indicated that this phrase name taxon will “soon be described as a subspecies of *Synostemon ramosissimus*”.

3.5 Range extensions

Most specimens, while not new records for the areas surveyed, filled a significant geographical gap in collections for the region. 34 new taxon records were vouchered for the Wanjarri Nature Reserve along with 31 new records for the Kaluwiri NRS (see Appendix 2). Thirty-one (31) records of significant voucher collection gap fills (greater than 50 km), and significant range extensions were made (Table 6). A further 32 specimens fill a gap of more than 20 km (but less than 50 km).

Species	Location sighted/observed	Distance from nearest known record (km)	Comments
<i>Androcalva loxophylla</i> (F.Muell.) C.F.Wilkins & Whitlock	Wanjarri Nature Reserve	>50 km	New record for reserve
<i>Androcalva luteiflora</i> (E.Pritz.) C.F.Wilkins & Whitlock	Kaluwiri NRS (Site F6)	>100 km	New record for reserve
<i>Amyema fitzgeraldii</i> (Blakely) Danser	Leinster	>50 km	
<i>Calandrinia balonensis</i> Lindl.	Albion Downs Road	>150 km S	Range extension
<i>Centipeda pleiocephala</i> N.G.Walsh	Dingo Pool	>150 km	
<i>Chrysocephalum puteale</i> (S.Moore) Paul G.Wilson	Wanjarri Nature Reserve	>75 km	New record for reserve
<i>Dielitzia tysonii</i> P.S.Short	Wanjarri Nature Reserve	>100 km	New record for reserve
<i>Eremophila fraseri</i> F.Muell. subsp. <i>fraseri</i>	along Goldfields Hwy, approx. 23.7 km north of Leinster turn-off	35 km E	Range extension for Murchison
<i>Feldstonia nitens</i> P.S.Short	Wanjarri Nature Reserve	approx. 17 km W	Range extension and new record for reserve.
<i>Frankenia pauciflora</i> DC.	Lake Miranda	>50 km	
<i>Gonocarpus nodulosus</i> Nees	approx. 3.2 km N from Albion Downs Road south turn along northern track to Scottie Well/Nuendah	>60 km	
<i>Goodenia glandulosa</i> K.Krause	Albion Downs-Yeelirrie Road	455 km SE	New record for Murchison
<i>Goodenia havilandii</i> Maiden & Betche	Wanjarri Nature Reserve	>70 km	New record for reserve

<i>Goodenia nuda</i> E.Pritz.	Kaluwiri NRS (Site F5)	330 km N	New record for reserve and Murchison
<i>Muelleranthus stipulatus</i> (J.M.Black) A.T.Lee	Wanjarri Nature Reserve	approx. 90 km S	New record for reserve
<i>Neurachne minor</i> S.T.Blake	Wanjarri Nature Reserve	70 km	New record for reserve
<i>Pomax ammophila</i> Ngugi	Wanjarri Nature Reserve	approx. 100 km	New record for reserve
<i>Poranthera leiosperma</i> Halford & R.J.F.Hend.	Albion Downs Rd	approx. 35 km NW	Range extension for Murchison
<i>Rumex vesicarius</i> L.	Kathleen Mine	50 km	
<i>Scaevola restiacea</i> Benth. subsp. <i>restiacea</i>	Agnew-Sandstone Road	130 km	Range extension
<i>Schoenia cassiniana</i> (Gaudich.) Steetz	Wanjarri Nature Reserve	50 km	New record for reserve
<i>Sclerolaena convexula</i> (R.H.Anderson) A.J.Scott	Track towards McFarlanes Find Mine	>50 km	
<i>Senecio quadridentatus</i> Labill.	Kaluwiri NRS (Site F6)	320 km N	New record for reserve; range extension
<i>Sida cardiophylla</i> F.Muell.	Albion Downs Rd	>100 km	
<i>Sisymbrium orientale</i> L.	Goldfields Hwy, approx. 25 km north from Leinster turnoff	90 km	
<i>Marsilea drummondii</i> A.Braun	Kaluwiri NRS (Site F6)	>100 km	New record for reserve
<i>Pycnopus coccineus</i> (Fr.) Bondartsev & Singer	Henry's Well & Wanjarri Nature Reserve	>200 km	New record for reserve
<i>Solanum ashbyae</i> Symon	south of Wanjarri Nature Reserve boundary	80 km	
<i>Swainsona elegantoides</i> (A.T.Lee) Joy Thomps.	Kaluwiri NRS (Site F5)	>50 km	New record for reserve
<i>Tecticornia pterygosperma</i> (J.M.Black) K.A.Sheph. & Paul G.Wilson subsp. <i>pterygosperma</i>	Lake Miranda	70 km	

3.6 Genetic information

Samples of leaf tissues were taken from all vouchered collections. Fresh tissue (30–100 mg) was placed in an acid-free tea bag within silica gel for dehydration. Tissues have been lodged with the Western Australian Herbarium, linked to voucher specimens, and available for analysis upon request.

4. Information on species lists

A complete flora species list, consisting of the 205 vascular plant taxa, comprising 39 families, recorded during the Tjiwarl Bush Blitz is provided in Appendix 1. A further single species of fungi was documented. Due to the timing of rainfall in the region and the survey, many taxa had just completed flowering and were lacking good reproductive material. The timing of the expedition also resulted in limited collections of fungi.

5. Information for land managers

Ensuring the fencing of the Wanjarri Nature Reserve is intact to avoid damage to vegetation by ungulates is recommended, and the fencing and protection of waterways adjacent to Wanjarri Nature Reserve from ungulate access would benefit the flora of the region.

Ruby Dock (*Rumex vesicarius* L.) is an environmental weed invading large areas of arid Australia (Anthony & Dixon 2006). The proximity of populations of Ruby Dock along the Great Eastern Highway, and encroachment into the Wanjarri Nature Reserve is of concern. As a disturbance opportunist, with rapid spread, the rapid identification of infestations and control of the weed using chemical and manual removal and practicing good phytosanitary practices would be recommended for the management of Wanjarri Nature Reserve and surrounding areas.

Further assessment of *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) in Kaluwiri NRS (along with its nomenclatural status) should be undertaken. There was significant evidence of ungulate impact in Kaluwiri, particularly at Site F6.

Several locations along the Albion Downs Road showed indications of recent fires, and the floral diversity in these areas was significantly different to surrounding areas. Fire management regimes on Tjiwarl Country should be taken into account to maintain floristic and structural diversity of the region.

6. Other significant findings

An unusual all-white morph of *Goodenia rosea* (S.Moore) K.A.Sheph. was collected within Wanjarri Nature Reserve (Figure 3).



Figure 3. Normal (left) and white (right) morph of *Goodenia rosea* (S.Moore) K.A.Sheph.

Maireana planifolia (F.Muell.) Paul G.Wilson has previously been collected only twice on Tjiwarl County; the most recent collection more than 30 years of age.

7. Conclusions

The Tjiwarl Country Bush Blitz expedition has significantly added to botanical collections from the region and resulted in multiple range extensions, as well as new records for conservation listed taxa and weeds. The majority of collections have provided records to fill gaps within the already existing range of taxa.

As part of the outreach component of the Bush Blitz, the authors, along with other scientific participants, provided teachers from Wiluna, Leonora and Leinster and their students with some botanical experiences (microscopes, collecting tools, etc.) as part of a successful community day held at the Leinster Community School. Three BHP staff also contributed to the location, processing, and best practices of botanical specimen collecting in the field.

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Appendices

Appendix 1. List of flora recorded during the Tjiwarl (Leinster) Bush Blitz

See attached Excel spreadsheet (Appendix 1 Bush Blitz Species List Tjiwarl Flora.xls).

Appendix 2. List of specimens recorded during the Tjiwarl (Leinster) Bush Blitz

See attached Excel spreadsheet (Appendix 2 Bush Blitz Point Data Tjiwarl Flora.xls).