



TERN  
AusPlots

# Summary of Sites on Pine Hill Station March 2012



*Triodia schinzii* low open hummock grassland, Pine Hill Station



tern.org.au | tern@uq.edu.au | +61 (0)7 3365 9097



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## Acknowledgments

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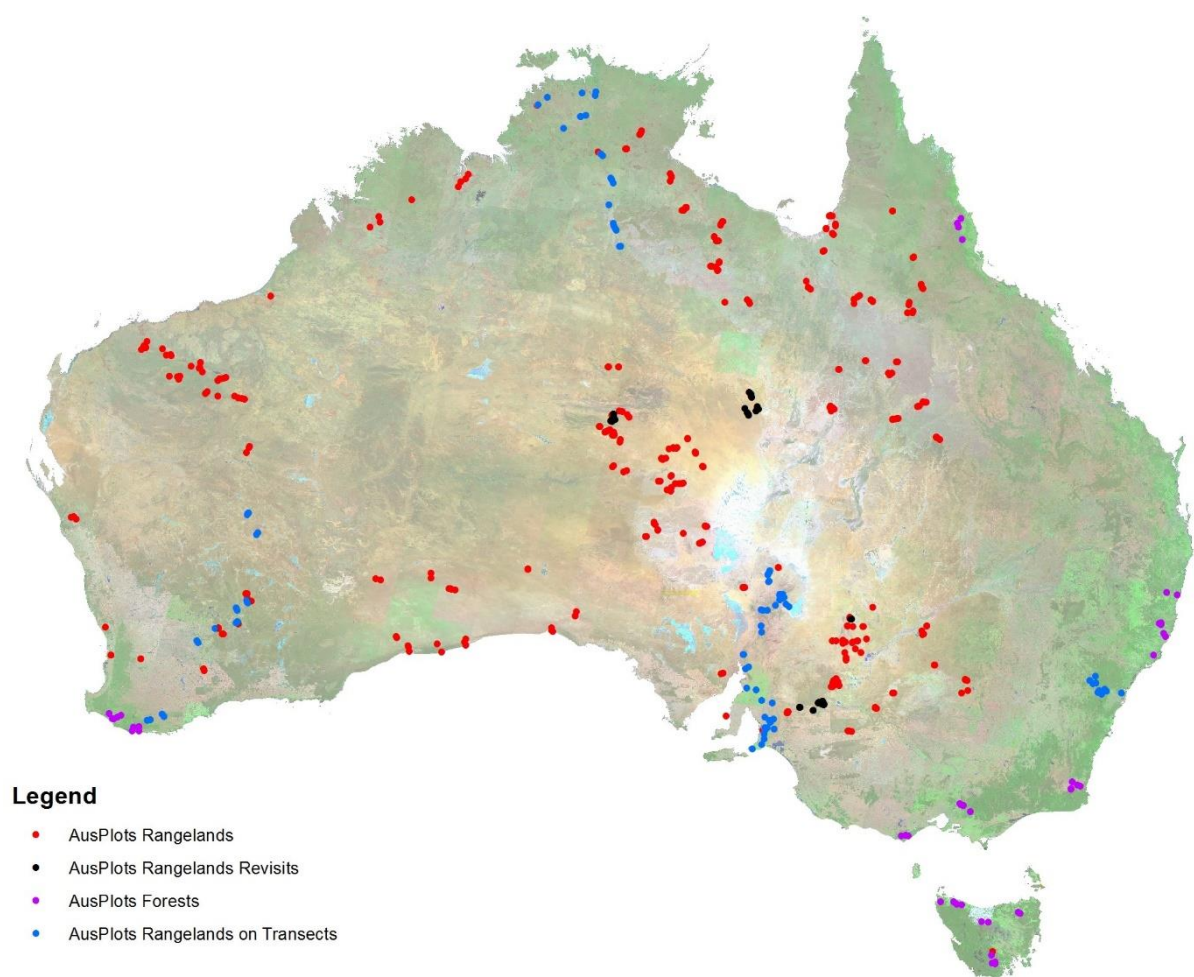
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## Introduction

In June 2012, AusPlots, part of the Terrestrial Ecosystems Research Network (TERN), undertook surveys Pine Hill Station, Northern Territory. The surveys involved vegetation and soils work following the AusPlots Rangelands methodology, with 6 plots completed. The plots are part of over 580 plots completed nationally. Figure 1 shows the national AusPlots plot network, and Figure 2 shows the locations of the plots Pine Hill Station.

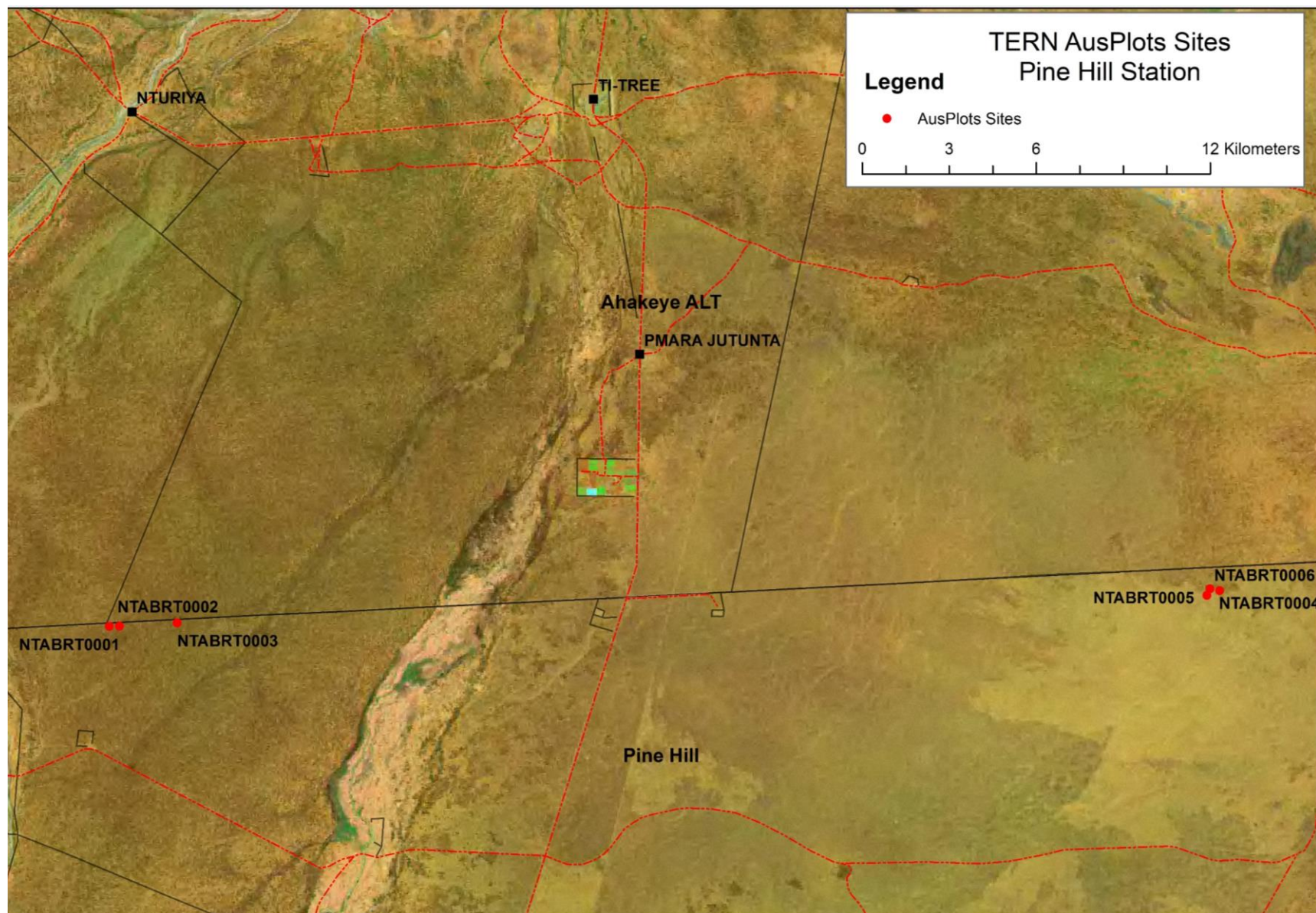
This report provides a snapshot of some of the data which was collected during the survey work. A more detailed description of the methods used can be found online in our *AusPlots Rangelands Survey Protocols Manual* (White *et al.* 2012), available from our website [www.ausplots.org](http://www.ausplots.org).



**Figure 1. AusPlots plot network**

*LandSat Image used courtesy of the Commonwealth Department of the Environment*





**Figure 2. AusPlots Rangelands plot locations Pine Hill Station**

*Topographic data copyright Geoscience Australia*

## Accessing the Data

All of the data the AusPlots collects is freely available online through the AEKOS data portal at [www.aekos.org.au](http://www.aekos.org.au). It can also be viewed on the Soils to Satellites website which contains a range of useful visualisations sourced from the Atlas of Living Australia. At <http://www.soils2satellites.org.au/>.

### Point intercept data

The point intercept method is a straightforward method that is readily repeatable and requires little instruction to produce reliable plot information. It provides accurate benchmark data at each plot including substrate type and cover; as well as species structural information such as growth form, height, cover and abundance and population vertical structure. The demographic information produced at each plot can be compared spatially to indicate plot differences, and temporally to indicate change over time. Additionally, the cover data collected at each plot can be used to validate cover data extrapolated through remote sensing techniques.

### Plant collections

Each species that is found within the plot has a herbarium grade sample taken. These have all been formally identified by the NT herbarium. Much of the material is then lodged at the NT herbarium or at the Ausplots facility in Adelaide.

### Leaf tissue samples

All of the above samples also have leaf tissue samples taken. This involves placing leaf samples from each species into a cloth bag and drying them on silica desiccant. All of the dominant species have an extra 4 samples collected. These samples are available for use on application to Ausplots facility in Adelaide. They are able to be used for genetic analysis, Isotopic composition and range of other uses.

### Site description information

Contextual information is also collected at each site. This includes measures of slope an aspect, surface strew and lithology, and information on the grazing and fire history of the site. The sites location is also recorded with a differential GPS and the plot corners and centres (with landholder permission) marked with a star picket.

### Structural summary

Detailed structural summary information is also collected at each site. When combined with the height and cover information from the point intercept data it enables the creation of structural description compatible with and NVIS level 5 description.

### Leaf Area Index

In plots where a mid and/or upper canopy is present a measure of Leaf Area is recorded. The tool used is an LAI-2200 and it captures LAI measurements in a range of canopies using one or two sensors attached to a single data logger (LI-COR 1990). The LAI data has a range of potential application such as studies of canopy growth, canopy productivity, woodland vigour, canopy fuel load, air pollution deposition, modelling insect defoliation, remote sensing, and the global carbon cycle.

### Basal area

Basal area measurements are collected across plots where woody biomass is taller than 2m. Basal area measurements provide information useful for calculating biomass and carbon levels and for structural studies. The wedge aperture, the length of string – 50 cm (and hence the distance from the eye and subsequent angle from the eye to the edges of the wedge aperture) and species count are all important in calculations. Algorithms developed for use with the basal wedge include the above data to calculate plant basal area on a per hectare basis even though species are counted outside the one hectare plot area. The method is plotless but used because it is based on the

concept of circles (trunks/basal area) within circles (circular plots) – the area of one varies proportionally to the change in the area of the other. Use of the basal wedge may be superseded by further improvement of the 3D photo point method and development of algorithms to provide information on vegetation community structure.

### **Soil classification**

Soils descriptions i.e. information recorded, number of recordings and coverage of locations, are generally poor across the rangelands region of Australia. The plot descriptions and soil characterisations collected will substantially alleviate this paucity of information. The data collected can also be used to increase the reliability of the rangelands component of the Soil and Landscape Grid of Australia, produced by the TERN facility consistent with the Global Soil Map specifications. Analyses of the collected samples will greatly enhance the level of knowledge (e.g. nutrient and carbon levels) and hence understanding of rangelands soils and how they will respond to climate change and management options. It is hoped to eventually be able to analyse all 9 of the soil pits from within the plot using a number of different methods e.g. wet chemistry, MIR or NIR (mid infrared spectrometry or near infrared spectroscopy) either individually to provide a measure of variation of the parameter being measured across a plot or bulked together and a sub-sample extracted and analysed to provide a mean value for that parameter across a plot.

### **Soil meta barcoding samples**

Metagenomics is the study of genetic material recovered directly from environmental samples. Soil metagenomics provides the opportunity to understand what organisms are present at survey plots and provides an indication on their abundance. The collection techniques result in a bias towards higher order organisms. All of the Ausplots Pine Hill Station have soil meta barcoding samples collected.

### **Soil bulk density**

The soil bulk density (BD), also known as dry bulk density, is the weight of dry soil divided by the total soil volume. The total soil volume is the combined volume of solids and pores which may contain air or water, or both. The average values of air, water and solid in soil are easily measured and are a useful indication of a soils physical condition. Soil test results are most often presented either as a percentage of soil (e.g. % organic carbon) or as a weight per unit of soil (e.g. nitrogen, mg/kg). As bulk density is a measure of soil weight in a given volume, it provides a useful conversion from these units to an area basis unit (e.g. t/ha). The resulting number gives an easily understandable idea of the carbon storage or nutritional status of the soil on an area basis.

### **3D Photo Panorama**

AusPlots uses a three-dimensional method for photographing the site. This involves taking three 360 degree panoramas in a triangular pattern. This allows the creation of a 3D model of the vegetation within the site which can be used to monitor change over time, track plot condition as well as providing a unique, fast measurement of basal area and biomass. A subset of these photo panoramas is shown below.





NTABRT0001



NTABRT0002



NTABRT0003



NTABRT0004



NTABRT0005



NTABRT0006



## Uses of AusPlots Data from Pine Hill Station

The AusPlots survey method was developed out of a dire need for consistent, national scale ecological data and surveillance monitoring. To date, we have completed over 530 survey plots across the continent. The data and samples collected from these surveys are being used in a range of ways to allow comparisons across the state and the continent. Some of the projects that have made use of the data and samples Pine Hill Station site are listed below.

### Opportunities for Integrated Ecological Analysis across Inland Australia with Standardised Data from Ausplots Rangelands (*Greg Guerin*)

How species abundance distributions (SADs) vary over climatic gradients is a key question for the influence of environmental change on ecosystem processes. He has found linear relationships between SAD shape and rainfall within grassland and shrubland communities, indicating more uneven abundance in deserts and suggesting relative abundance may shift as a consequence of climate change, resulting in altered diversity and ecosystem function.

### Floristic and structural assessment of Australian rangeland vegetation with standardized plot based surveys (*Zdravko Baruch*)

Vegetation classification at a continental scale has been lacking over the rangelands in Australia due to a lack of consistent data beyond state and regional levels. Zdravko undertook an integrated and comparative environmental, floristic and structural description of rangeland vegetation based on the AusPlots Surveys. His results offer a tentative classification scheme that is novel, ecologically sound and coherent in terms of floristic composition and structural attributes.

### The extent of forest in dryland biomes (*Jean-Francois Bastin*)

The vegetation cover data from Pine Hill was also part of a recent mapping project undertaken by the Food and Agriculture arm of the UN. They were able to show that in 2015, 1327 million hectares of drylands had more than 10% tree-cover, and 1079 million hectares comprised forest globally. Their estimate is 40 to 47% higher than previous estimates, corresponding to 467 million hectares of forest that have never been reported before. This increases current estimates of global forest cover by at least 9%.

### Herbarium Collections

The AusPlots program works very closely with state and national herbaria to help augment their collections to enable research and to better understand species distributions. Located in valuable areas of native vegetation, the plant collections made on Pine Hill have been eagerly accepted by the Northern Territory and National Herbarium. These specimens are currently being professionally mounted and preserved and will form a permanent part of their collection, which is available to botanical researchers globally to support ongoing research.

Some other applications that may be undertaken in the future are listed below.

- Assessing vegetation change using the AusPlots methodology as both a baseline and a continued surveillance monitoring tool.
- Detecting the impact of invasive species based on soil and vegetation data.
- Ground-truthing satellite derived vegetation and soil data
- Soil carbon analysis using the soil bulk density samples
- Mapping soil phosphorus, nitrogen and other nutrients using soil pit and subsite samples
- Assessing fuel loading using the basal area and leaf area data.
- Use of the leaf tissue samples for genetic and isotopic analysis.

## For more information

More information on the AusPlots facility can be found on our website [www.AusPlots.org](http://www.AusPlots.org)

For more information regarding the survey work on Pine Hill and assistance downloading and utilising the data from *AEKOS* and *Soils2Satellites* contact Emrys Leitch, AusPlots Field Survey Officer, [emrys.leitch@adelaide.edu.au](mailto:emrys.leitch@adelaide.edu.au)

For more information regarding the AusPlots facility, contact Ben Sparrow, AusPlots Director, [ben.sparrow@adelaide.edu.au](mailto:ben.sparrow@adelaide.edu.au)



## Appendices

### Appendix 1. Summary of AusPlots data and samples from Pine Hill Station

AusPlots Data and Samples	Count
<i>Total Collections</i>	272
<i>Total Leaf Tissue Samples</i>	415
<i>Total number of soil samples</i>	143
<i>Total weight of soil (kg)</i>	143
<i>Number of sites with Bulk Density data</i>	5
<i>Number of Sites with Basal wedge</i>	3
<i>Total metagenomic samples</i>	54
<i>Total metagenomic weight (kg)</i>	27
<i>Total Collections</i>	272

## Appendix 2. Plot locations

Plot Name	Date	Location	latitude	longitude
NTABRT0003	22-Mar-12	Pine Hill Station. 22km South West of Ti-Tree. Approximately 3km. East of Flux tower.	133.269857	-22.283579
NTABRT0004	03-Mar-12	Pine Hill Station. 25km South East of Ti-Tree. 20km East of Stuart Highway. South west corner of the site is 200m north west of proposed supersite flux tower	133.616421	-22.289809
NTABRT0005	24-Mar-12	Pine Hill Station. 25km South East of Ti-Tree. Approximately 200m. South of proposed Flux tower.	133.612075	-22.291079
NTABRT0006	24-Mar-12	Pine Hill Station. 25km South East of Ti-Tree. 200m north west of proposed flux tower.	133.613257	-22.289081
NTABRT0001	19-Mar-12	Pine Hill Station. 25km South West of Ti-Tree. Site is 130m from supersite flux tower.	133.247328	-22.2836
NTABRT0002	19-Mar-12	Pine Hill Station. 25km South West of Ti-Tree. 100m. West of Flux tower.	133.250631	-22.283668

## Appendix 3. Co-location with existing plots

AusPlots works on a mix of both new plots (where this is little existing monitoring infrastructure) and co-location with existing plots. The 6 plots on Pine Hill Station are co-located with existing two existing TERN Facilities sites. The table below provides the name of the AusPlots site and the corresponding site

AusPlot name	ACRIS Plot name
NTABRT0001	Flux Tower 1 footprint
NTABRT0002	Flux Tower 1 footprint
NTABRT0003	Flux Tower 1 footprint
NTABRT0004	Flux Tower 2 footprint
NTABRT0005	Flux Tower 2 footprint
NTABRT0006	Flux Tower 2 footprint



#### Appendix 4. Point intercept data

Plot name	Herbarium ID	Common name	Approx. % cover
NTABRT0006	Acacia aptaneura	Slender Mulga	30.40
NTABRT0006	Paraneurachne muelleri (dead)		7.23
NTABRT0006	Annual Forb		1.88
NTABRT0006	Aristida obscura (dead)	Rough-seed Wire-grass	1.58
NTABRT0006	Eremophila latrobei subsp. glabra		1.49
NTABRT0006	Triodia schinzii		1.49
NTABRT0005	Triodia schinzii		22.18
NTABRT0005	Paraneurachne muelleri		7.92
NTABRT0005	Eragrostis eriopoda subsp. Red earth (D.J. Nelson 1651)		3.27
NTABRT0005	Aristida holathera	Erect Kerosene Grass	2.97
NTABRT0005	Scaevola parvifolia		1.98
NTABRT0005	Annual Forb		1.68
NTABRT0005	Goodenia armitiana		1.68
NTABRT0005	Crotalaria eremaea	Bluebush Pea	1.19
NTABRT0004	Acacia aptaneura	Slender Mulga	29.53
NTABRT0004	Aristida holathera	Erect Kerosene Grass	12.69
NTABRT0004	Triodia schinzii		3.87
NTABRT0004	Eremophila latrobei subsp. glabra		1.09
NTABRT0003	Acacia aneura	Mulga	31.98
NTABRT0003	Triodia schinzii		18.61
NTABRT0003	Acacia aptaneura	Slender Mulga	3.37
NTABRT0003	Acacia kempeana	Granite Wattle	2.67
NTABRT0003	Thyridolepis mitchelliana	Mulga Grass	1.78
NTABRT0003	Acacia estrophiolata	Ironwood	1.49
NTABRT0002	Acacia aneura	Mulga	31.88
NTABRT0002	Acacia aptaneura	Slender Mulga	21.29
NTABRT0002	Thyridolepis mitchelliana	Mulga Grass	4.85
NTABRT0002	Eremophila latrobei subsp. glabra		3.56
NTABRT0002	Psyrax latifolia		2.48
NTABRT0002	Hibiscus sturtii var. grandiflorus		1.58
NTABRT0002	Eremophila gilesii subsp. gilesii	Charleville turkey bush (Qld)	1.49
NTABRT0002	Sida sp.		1.49
NTABRT0001	Acacia aneura	Mulga	22.57
NTABRT0001	Acacia aptaneura	Slender Mulga	15.15
NTABRT0001	Thyridolepis mitchelliana	Mulga Grass	9.01
NTABRT0001	Eragrostis eriopoda subsp. Red earth (D.J.Nelson 1651)		2.97
NTABRT0001	Eremophila latrobei subsp. glabra		2.97
NTABRT0001	Psyrax latifolia		1.09

## Appendix 5. Substrate and Cover data

Plot Name	Substrate	Approx. % Cover
NATBRT0001	Leaf litter	58.1
NATBRT0001	Bare	24.1
NATBRT0001	Lichen/Crust	17.4
NATBRT0001	Trunk	0.3

Plot Name	Substrate	Approx. % Cover
NTABRT0002	Leaf litter	73.2
NTABRT0002	Bare	14.2
NTABRT0002	Lichen/Crust	12.4
NTABRT0002	Termite mound	0.2
NTABRT0002	Trunk	0.1

Plot Name	Substrate	Approx. % Cover
NTABRT0003	Leaf litter	80.2
NTABRT0003	Bare	15.6
NTABRT0003	Lichen/Crust	4
NTABRT0003	Termite mound	0.1
Plot Name	Substrate	Approx. % Cover
NTABRT0004	Leaf litter	69.6
NTABRT0004	Bare	23
NTABRT0004	Lichen/Crust	7.3
NTABRT0004	trunk	0.1

Plot Name	Substrate	Approx. % Cover
NTABRT0005	Leaf litter	59.5
NTABRT0005	Bare	40.5

Plot Name	Growth form	Approx. % of Growth Forms
NATBRT0001	Shrub	69.7
NATBRT0001	Tussock grass (Oatgrass etc)	26.2
NATBRT0001	Vine	1.6
NATBRT0001	Hummock grass (Spinifex etc)	1.6
NATBRT0001	Chenopod	0.5
NATBRT0001	Forb (annual herbaceous plants)	0.3
NATBRT0001	Fern	0.2

Plot Name	Growth form	Approx. % of Growth Forms
NTABRT0002	Shrub	83.8
NTABRT0002	Tussock grass (Oatgrass etc.)	11.5
NTABRT0002	Forb (annual herbaceous plants)	2.5
NTABRT0002	Fern	0.9
NTABRT0002	Chenopod (saltbush, bluebush etc)	0.9
NTABRT0002	Sedge	0.3

Plot Name	Growth form	Approx. % of Growth Forms
NTABRT0003	Shrub	63.7
NTABRT0003	Hummock grass (Spinifex etc.)	28.8
NTABRT0003	Tussock grass (Oatgrass etc.)	7.2
NTABRT0003	Tree Mallee	0.3

Plot Name	Growth form	Approx. % of Growth Forms
NTABRT0004	Shrub	59.1
NTABRT0004	Tussock grass (Oatgrass etc.)	30.4
NTABRT0004	Hummock grass (Spinifex etc.)	7.4
NTABRT0004	Chenopod (saltbush, bluebush etc)	1.9
NTABRT0004	Forb (annual herbaceous plants)	1.3

Plot Name	Growth form	Approx. % of Growth Forms
NTABRT0005	Hummock grass (Spinifex etc.)	49.4
NTABRT0005	Tussock grass (Oatgrass etc.)	31.8
NTABRT0005	Shrub	11.5
NTABRT0005	Forb (annual herbaceous plants)	6.2
NTABRT0005	Tree/Palm	0.9
NTABRT0005	Tussock grass (Oatgrass etc.)	0.2



Plot Name	Substrate	Approx. % Cover
NTABRT0006	Leaf litter	67.4
NTABRT0006	Bare	19.6
NTABRT0006	Lichen/Crust	13.1

Plot Name	Growth form	Approx. % of Growth Forms
NTABRT0006	Shrub	69.2
NTABRT0006	Tussock grass (Oatgrass etc.)	23.1
NTABRT0006	Forb (annual herbaceous plants)	3.9
NTABRT0006	Hummock grass (Spinifex etc.)	2.8
NTABRT0006	Tree/Palm	1.1

## Appendix 6. Structural summary

Plot name	Structural description
NTABRT0001	Acacia aneura/ Acacia aptaneura tall shrubland with a ground stratum dominated by tussock grasses Thyridolepis mitchelliana, Eragrostis eriopoda subsp. red earth. Isolated Eremophila latrobei subsp. glabra and other shrubs in the mid-stratum.
NTABRT0002	Acacia aneura /Acacia aptaneura/ tall shrubland with scattered Eremophila latrobei subsp. glabra and Psydrax latifolia. Diverse Tussock grass understratum dominated by Thyridolepis mitchelliana.
NTABRT0003	Acacia aneura tall shrubland with Acacia aptaneura, Acacia kempeana and emergent Acacia estrophiolata. Acacia aneura getting denser on southern edge. ground stratum dominated by Triodia schinzii.
NTABRT0004	Acacia aptaneura tall shrubland with isolated emergent Corymbia opaca. Tussock grass/hummock grass ground stratum of Aristida holathera and Triodia schinzii.
NTABRT0005	Triodia schinzii low open hummock grassland with Paraneurachne muelleri, Eragrostis eriopoda subsp. red earth and Aristida holathera. Scattered emergent Corymbia opaca.
NTABRT0006	Acacia aptaneura tall shrubland with scattered emergent Corymbia opaca. A tussock grass understratum of Paraneurachne muelleri. Some scattered sparse clumps of Triodia schinzii in more open areas.

## Appendix 7. Soil Classification

Plot name	Upper depth	Lower depth	Horizon	Texture	Colour when wet	ph	effervescence
NTABRT0001	0	0.1	A1	Clayey sand	10R34	4.9	Non-calcareous
NTABRT0001	0.1	0.2	B1	Clayey sand	10R34	5.5	Non-calcareous
NTABRT0001	0.2	0.4	B21	Clayey sand	2.5YR36	5.5	Non-calcareous
NTABRT0001	0.4	1	B22	Clayey sand	2.5YR36	6.3	Non-calcareous
NTABRT0002	0	0.1	A1	Clayey sand	5YR43	5.5	Non-calcareous
NTABRT0002	0.1	0.85	B1	Sandy loam	5YR33	6.1	Non-calcareous
NTABRT0002	0.85	1	B2	Sandy loam	2.5YR36	6.4	Non-calcareous
NTABRT0003	0	0.03	A1	Sandy loam	2.5YR2.24	5.8	Non-calcareous
NTABRT0003	0.03	0.25	B11	Clayey sand	2.5YR33	5.4	Non-calcareous
NTABRT0003	0.25	1	B12	Clayey sand	2.5YR36	5.7	Non-calcareous
NTABRT0004	0	0.06	A1	Clayey sand	2.5YR32	5.7	Non-calcareous
NTABRT0004	0.06	0.4	A3	Clayey sand	2.5YR34	6.3	Non-calcareous
NTABRT0004	0.4	0.65	B1	Clayey sand	2.5YR36	6.4	Non-calcareous
NTABRT0004	0.65	1	B2	Sandy loam	2.5YR36	6.4	Non-calcareous
NTABRT0005	0	0.1	A1	Loamy sand	2.5YR44	6.5	Non-calcareous
NTABRT0005	0.1	0.17	A3	Clayey sand	10R34	6.7	Non-calcareous
NTABRT0005	0.17	0.7	B1	Clayey sand	10R36	6.8	Non-calcareous
NTABRT0005	0.7	1	B2	Sandy loam	10R36	6.9	Non-calcareous
NTABRT0006	0	0.12	A1	Clayey sand	2.5YR34	6.9	Non-calcareous
NTABRT0006	0.12	0.65	A3	Clayey sand	2.5YR34	6.9	Non-calcareous
NTABRT0006	0.65	1	B1	Loamy sand	10R34	6.9	Non-calcareous



## Appendix 8. Bulk density

Plot name	Sample depth	Fine earth weight	Fine earth bulk density
NTABRT0001	0.00 - 0.10	361.05	1.72
NTABRT0001	0.00 - 0.20	358.51	1.71
NTABRT0001	0.20 - 0.30	352.2	1.68
NTABRT0001	0.50 - 0.60	362.34	1.73
NTABRT0002	0.00 - 0.10	353.45	1.69
NTABRT0002	0.00 - 0.20	338.86	1.62
NTABRT0002	0.20 - 0.30	351.98	1.68
NTABRT0003	0.00 - 0.10	359.32	1.72
NTABRT0003	0.00 - 0.20	343.57	1.64
NTABRT0003	0.20 - 0.30	347.79	1.66
NTABRT0004	0.00 - 0.10	359	1.71
NTABRT0004	0.00 - 0.20	352.78	1.69
NTABRT0004	0.20 - 0.30	359.96	1.72
NTABRT0005	0.00 - 0.10	360.96	1.72
NTABRT0005	0.00 - 0.20	352.06	1.68
NTABRT0005	0.20 - 0.30	356.93	1.7
NTABRT0006	0.00 - 0.10	355.83	1.7
NTABRT0006	0.00 - 0.20	362.12	1.73
NTABRT0006	0.20 - 0.30	380	1.82

## Appendix 9. Plant collection

\* Denotes introduced species

Plot name	Herbarium determination	Common Name	NT Conservation Code
NTADAC0001	Acacia dimidiata		
NTABRT0001	Acacia aneura	Mulga	
NTABRT0001	Acacia aptaneura	Slender Mulga	
NTABRT0001	Aristida obscura	Rough-seed Wire-grass	
NTABRT0001	Aristida pruinosa	Gulf Feathertop Wiregrass	
NTABRT0001	Cheilanthes sieberi	Mulga Fern	
NTABRT0001	Cymbopogon ambiguus	Lemon Grass	
NTABRT0001	Cynanchum viminale		
NTABRT0001	Digitaria brownii	Cotton Grass	
NTABRT0001	Digitaria divaricatissima	Spider Grass	
NTABRT0001	Enchylaena tomentosa	Barrier Saltbush	
NTABRT0001	Eragrostis eriopoda subsp. Red earth (D.J. Nelson 1651)		
NTABRT0001	Eremophila gilesii subsp. gilesii		
NTABRT0001	Eremophila latrobei subsp. glabra		
NTABRT0001	Eriachne helmsii	Buck Wanderrie Grass	
NTABRT0001	Evolvulus alsinoides	Tropical Speedwell	
NTABRT0001	Hakea lorea	Bootlace Oak	
NTABRT0001	Hakea macrocarpa	Dogwood Hakea	
NTABRT0001	Hibiscus burtonii		
NTABRT0001	Hibiscus sturtii var. grandiflorus		
NTABRT0001	Maireana villosa	Silky Bluebush	
NTABRT0001	Monachather paradoxus	Bandicoot Grass	
NTABRT0001	Psydrax latifolia		
NTABRT0001	Senna artemisioides subsp. x artemisioides		
NTABRT0001	Sida platycalyx	Hemp Mallow	
NTABRT0001	Sida sp. Musselbrook (M.B. Thomas+ MRS437)		
NTABRT0001	Sida sp. Wakaya Desert (P.K. Latz 11894)		
NTABRT0001	Solanum ferocissimum		
NTABRT0001	Solanum quadriloculatum	Tomato Bush	
NTABRT0001	Thyridolepis mitchelliana	Mulga Grass	
NTABRT0001	Tribulus macrocarpus		
NTABRT0001	Triodia schinzii		
NTABRT0001	Tripogon loliiformis	Five Minute Grass	
NTABRT0002	Acacia aneura	Mulga	
NTABRT0002	Acacia aptaneura	Slender Mulga	
NTABRT0002	Aristida inaequiglumis	Feathertop Threeawn	
NTABRT0002	Aristida obscura	Rough-seed Wire-grass	
NTABRT0002	Cheilanthes sieberi	Mulga Fern	

Plot name	Herbarium determination	Common Name	NT Conservation Code
NTABRT0002	<i>Digitaria brownii</i>	Cotton Grass	
NTABRT0002	<i>Digitaria divaricatissima</i>	Spider Grass	
NTABRT0002	<i>Enchylaena tomentosa</i>	Barrier Saltbush	
NTABRT0002	<i>Eragrostis eriopoda</i> subsp. Red earth (D.J. Nelson 1651)		
NTABRT0002	<i>Eremophila gilesii</i> subsp. gilesii		
NTABRT0002	<i>Eremophila latrobei</i> subsp. glabra		
NTABRT0002	<i>Evolvulus alsinoides</i>	Tropical Speedwell	
NTABRT0002	<i>Hakea macrocarpa</i>	Dogwood Hakea	
NTABRT0002	<i>Hibiscus burtonii</i>		
NTABRT0002	<i>Hibiscus sturtii</i> var. grandiflorus		
NTABRT0002	<i>Maireana villosa</i>	Silky Bluebush	
NTABRT0002	<i>Marsdenia australis</i>	Doubah	
NTABRT0002	<i>Monachather paradoxus</i>	Bandicoot Grass	
NTABRT0002	<i>Psyrax latifolia</i>		
NTABRT0002	<i>Rhagodia eremaea</i>	Tall Saltbush	
NTABRT0002	<i>Rhyncharrhena linearis</i>	Purple Pentatroe	
NTABRT0002	<i>Senna artemisioides</i> subsp. x artemisioides		
NTABRT0002	<i>Sida</i> sp.		
NTABRT0002	<i>Solanum quadriloculatum</i>	Tomato Bush	
NTABRT0002	<i>Spartothamnella teucriflora</i>		
NTABRT0002	<i>Themeda triandra</i>	Kangaroo Grass	
NTABRT0002	<i>Thyridolepis mitchelliana</i>	Mulga Grass	
NTABRT0002	<i>Tinospora smilacina</i>	Snake Vine	
NTABRT0002	<i>Tripogon loliiformis</i>	Five Minute Grass	
NTABRT0003	<i>Abutilon otocarpum</i>	Desert Chinese Lantern	
NTABRT0003	<i>Acacia aneura</i>	Mulga	
NTABRT0003	<i>Acacia aptaneura</i>	Slender Mulga	
NTABRT0003	<i>Acacia estrophiolata</i>	Ironwood	
NTABRT0003	<i>Acacia kempeana</i>	Granite Wattle	
NTABRT0003	<i>Amyema preissii</i>	Long-leaf Mistletoe	
NTABRT0003	<i>Aristida holathera</i>	Erect Kerosene Grass	
NTABRT0003	<i>Aristida inaequiglumis</i>	Feathertop Threeawn	
NTABRT0003	<i>Aristida obscura</i>	Rough-seed Wire-grass	
NTABRT0003	<i>Calotis latiuscula</i>	Leafy Burr-daisy	
NTABRT0003	* <i>Cenchrus ciliaris</i>	Buffel Grass	
NTABRT0003	<i>Cheilanthes sieberi</i> subsp. sieberi		
NTABRT0003	<i>Corymbia opaca</i>		
NTABRT0003	<i>Digitaria brownii</i>	Cotton Grass	
NTABRT0003	<i>Digitaria divaricatissima</i>	Spider Grass	
NTABRT0003	<i>Einadia nutans</i> subsp. eremaea		
NTABRT0003	<i>Enchylaena tomentosa</i>	Barrier Saltbush	
NTABRT0003	<i>Eragrostis eriopoda</i> subsp. Red earth (D.J. Nelson 1651)		



Plot name	Herbarium determination	Common Name	NT Conservation Code
NTABRT0003	Eremophila gilesii	Charleville Turkey Bush	
NTABRT0003	Eremophila latrobei subsp. glabra		
NTABRT0003	Eriachne helmsii	Buck Wanderrie Grass	
NTABRT0003	Euphorbia ferdinandi		
NTABRT0003	Evolvulus alsinoides	Tropical Speedwell	
NTABRT0003	Hakea lorea	Bootlace Oak	
NTABRT0003	Hakea macrocarpa	Dogwood Hakea	
NTABRT0003	Hibiscus burtonii		
NTABRT0003	Hibiscus sturtii var. grandiflorus		
NTABRT0003	Maireana villosa	Silky Bluebush	
NTABRT0003	Monachather paradoxus	Bandicoot Grass	
NTABRT0003	Muelleranthus stipularis	Sand Pea	
NTABRT0003	Psyrax latifolia		
NTABRT0003	Rhagodia eremaea	Tall Saltbush	
NTABRT0003	Sclerolaena convexula	Tall Copperburr	
NTABRT0003	Senna artemisioides subsp. x artemisioides		
NTABRT0003	Sida platycalyx	Hemp Mallow	
NTABRT0003	Sida sp. Musselbrook (M.B. Thomas+ MRS437)		
NTABRT0003	Sida sp. Wakaya Desert (P.K. Latz 11894)		
NTABRT0003	Solanum centrale	Desert Raisin	
NTABRT0003	Solanum quadriloculatum	Tomato Bush	
NTABRT0003	Spartothamnella teucriflora		
NTABRT0003	Thyridolepis mitchelliana	Mulga Grass	
NTABRT0003	Triodia schinzii		
NTABRT0003	Tripogon loliiformis	Five Minute Grass	
NTABRT0003	Vittadinia pterochaeta	Rough Fuzzweed	Near Threatened
NTABRT0004	Abutilon fraseri	Dwarf Lantern Flower	
NTABRT0004	Acacia aneura	Mulga	
NTABRT0004	Acacia aptaneura	Slender Mulga	
NTABRT0004	Aristida contorta	Bunched Kerosene Grass	
NTABRT0004	Aristida holathera	Erect Kerosene Grass	
NTABRT0004	Aristida inaequiglumis	Feathertop Threeawn	
NTABRT0004	Boerhavia coccinea	Tarvine	
NTABRT0004	*Cenchrus ciliaris	Buffel Grass	
NTABRT0004	Corymbia opaca		
NTABRT0004	Cucumis argenteus		
NTABRT0004	Digitaria brownii	Cotton Grass	
NTABRT0004	Enneapogon avenaceus	Bottle Washers	
NTABRT0004	Enneapogon clelandii		
NTABRT0004	Eragrostis eriopoda subsp. Red earth (D.J. Nelson 1651)		
NTABRT0004	Eremophila latrobei subsp. glabra		
NTABRT0004	Eremophila longifolia	Berrigan	

Plot name	Herbarium determination	Common Name	NT Conservation Code
NTABRT0004	Eriachne helmsii	Buck Wanderrie Grass	
NTABRT0004	Euphorbia biconvexa		
NTABRT0004	Euphorbia ferdinandi		
NTABRT0004	Euphorbia tannensis		
NTABRT0004	Evolvulus alsinoides	Tropical Speedwell	
NTABRT0004	Fimbristylis dichotoma	Common Fringe-rush	
NTABRT0004	Hakea divaricata	Corkwood	
NTABRT0004	Hibiscus burtonii		
NTABRT0004	Ipomoea muelleri	Poison Morning Glory	
NTABRT0004	Isotropis wheeleri	Wheeler's Lamb-poison	
NTABRT0004	Maireana villosa	Silky Bluebush	
NTABRT0004	Panicum effusum	Branched Panic	
NTABRT0004	Ptilotus obovatus	Cotton Bush	
NTABRT0004	Rhagodia eremaea	Tall Saltbush	
NTABRT0004	Rutidosis helichrysoides	Grey Wrinklewort	
NTABRT0004	Sclerolaena cornishiana	Cartwheel Burr	
NTABRT0004	Sclerolaena costata		
NTABRT0004	Senna artemisioides subsp. filifolia		
NTABRT0004	Senna artemisioides subsp. x artemisioides		
NTABRT0004	Sida platycalyx	Hemp Mallow	
NTABRT0004	Sida sp. Wakaya Desert (P.K. Latz 11894)		
NTABRT0004	Solanum centrale	Desert Raisin	
NTABRT0004	Solanum ellipticum	Hillside Flannel Bush	
NTABRT0004	Spartothamnella teucriflora		
NTABRT0004	Tephrosia sp. Willowra (G.M. Chippendale 4809)		
NTABRT0004	Themeda triandra	Kangaroo Grass	
NTABRT0004	Tribulus eichlerianus	Bullhead	
NTABRT0004	Triodia schinzii		
NTABRT0004	Tripogon loliiformis	Five Minute Grass	
NTABRT0005	Acacia melleodora	Scented Wax Wattle	
NTABRT0005	Acacia murrayana	Colony Wattle	
NTABRT0005	Acacia sericophylla	Cork-bark Wattle	
NTABRT0005	Androcalva loxophylla		
NTABRT0005	Aristida holathera	Erect Kerosene Grass	
NTABRT0005	Aristida inaequiglumis	Feathertop Threeawn	
NTABRT0005	Boerhavia repleta	Tarvine	
NTABRT0005	Bonamia media		
NTABRT0005	Codonocarpus cotinifolius	Bell fruit Tree	
NTABRT0005	Corymbia opaca		
NTABRT0005	Crotalaria eremaea	Bluebush Pea	
NTABRT0005	Enneapogon avenaceus	Bottle Washers	
NTABRT0005	Eragrostis eriopoda subsp. Red earth (D.J. Nelson 1651)		

Plot name	Herbarium determination	Common Name	NT Conservation Code
NTABRT0005	Eulalia aurea	Silky Browntop	
NTABRT0005	Euphorbia ferdinandi		
NTABRT0005	Evolvulus alsinoides	Tropical Speedwell	
NTABRT0005	Goodenia armitiana		
NTABRT0005	Goodenia lunata	Hairy Goodenia	
NTABRT0005	Hakea divaricata	Corkwood	
NTABRT0005	Hakea lorea	Bootlace Oak	
NTABRT0005	Hakea macrocarpa	Dogwood Hakea	
NTABRT0005	Keraudrenia velutina		
NTABRT0005	Maireana villosa	Silky Bluebush	
NTABRT0005	Panicum effusum	Branched Panic	
NTABRT0005	Paraneurachne muelleri		
NTABRT0005	Ptilotus sessilifolius	Crimson Tails	
NTABRT0005	Rhagodia eremaea	Tall Saltbush	
NTABRT0005	Scaevola parvifolia		
NTABRT0005	Senna artemisioides subsp. filifolia		
NTABRT0005	Senna artemisioides subsp. x artemisioides		
NTABRT0005	Senna pleurocarpa	Firebush	
NTABRT0005	Sida sp. Supplejack Station (T.S. Henshall 2345)		
NTABRT0005	Sida sp. Wakaya Desert (P.K. Latz 11894)		
NTABRT0005	Solanum centrale	Desert Raisin	
NTABRT0005	Solanum ellipticum	Hillside Flannel Bush	
NTABRT0005	Themeda triandra	Kangaroo Grass	
NTABRT0005	Triodia schinzii		
NTABRT0005	Zornia albiflora		
NTABRT0006	Acacia aneura	Mulga	
NTABRT0006	Acacia aptaneura	Slender Mulga	
NTABRT0006	Acacia kempeana	Granite Wattle	
NTABRT0006	Aristida contorta	Bunched Kerosene Grass	
NTABRT0006	Aristida inaequiglumis	Feathertop Threeawn	
NTABRT0006	Aristida obscura	Rough-seed Wire-grass	
NTABRT0006	Austrobryonia centralis		
NTABRT0006	Boerhavia burbidgeana		
NTABRT0006	*Cenchrus ciliaris	Buffel Grass	
NTABRT0006	Cleome viscosa	Mustard Bush	
NTABRT0006	Corymbia opaca		
NTABRT0006	Cucumis argenteus		
NTABRT0006	Digitaria brownii	Cotton Grass	
NTABRT0006	Enneapogon avenaceus	Bottle Washers	
NTABRT0006	Enneapogon clelandii		
NTABRT0006	Eragrostis eriopoda subsp. Red earth (D.J. Nelson 1651)		
NTABRT0006	Eremophila latrobei subsp. glabra		



Plot name	Herbarium determination	Common Name	NT Conservation Code
NTABRT0006	Eremophila longifolia	Berrigan	
NTABRT0006	Euphorbia biconvexa		
NTABRT0006	Euphorbia ferdinandi		
NTABRT0006	Euphorbia tannensis		
NTABRT0006	Fimbristylis dichotoma	Common Fringe-rush	
NTABRT0006	Goodenia heterochila		
NTABRT0006	Hakea divaricata	Corkwood	
NTABRT0006	Hakea lorea	Bootlace Oak	
NTABRT0006	Hakea macrocarpa	Dogwood Hakea	
NTABRT0006	Hibiscus burtonii		
NTABRT0006	Indigofera linifolia		
NTABRT0006	Isotropis wheeleri	Wheeler's Lamb-poison	
NTABRT0006	Maireana villosa	Silky Bluebush	
NTABRT0006	No ID		
NTABRT0006	Panicum effusum	Branched Panic	
NTABRT0006	Paraneurachne muelleri		
NTABRT0006	Psyrax latifolia		
NTABRT0006	Ptilotus obovatus	Cotton Bush	
NTABRT0006	Rhagodia eremaea	Tall Saltbush	
NTABRT0006	Rhyncharrhena linearis	Purple Pentatropae	
NTABRT0006	Salsola tragus	Russian thistle	
NTABRT0006	Sclerolaena convexula	Tall Copperburr	
NTABRT0006	Sclerolaena cornishiana	Cartwheel Burr	
NTABRT0006	Senna artemisioides subsp. x artemisioides		
NTABRT0006	Sida platycalyx	Hemp Mallow	
NTABRT0006	Sida sp. Musselbrook (M.B. Thomas+ MRS437)		
NTABRT0006	Sida sp. Supplejack Station (T.S. Henshall 2345)		
NTABRT0006	Solanum quadriloculatum	Tomato Bush	
NTABRT0006	Spartothamnella teucriflora		
NTABRT0006	Tephrosia sp.		
NTABRT0006	Tinospora smilacina	Snake Vine	
NTABRT0006	Tribulus macrocarpus		
NTABRT0006	Triodia schinzii		
NTABRT0006	Tripogon loliiformis	Five Minute Grass	



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