

A  
FLORA  
AND  
VEGETATION SURVEY  
OF THE PROPOSED MINE AREAS  
AND ACCESS ROAD FOR THE PANORAMA  
PROJECT

prepared for

ASTRON ENVIROMENTAL

by

Malcolm Trudgen  
Consultant Botanist,

Brian Morgan  
Consultant Biologist

E.A. Griffin  
Consultant Botanist

M.E. Trudgen & Associates  
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## **Summary of the flora and vegetation of the three survey areas at Panorama and the access road to them from the Marble Bar road**

### **A: Vegetation of Panorama Project Survey Areas 1, 2 and 3 and the access tracks between them**

#### **Introduction**

There were three circular survey areas in the Gorge Ranges centred on ore bodies. The Sulphur Springs survey area is the largest, having a diameter of about 5 km, Kangaroo Caves survey area has a diameter of about 3 km and the Bernts survey area is the smallest with a diameter of about 2 km.

The three areas have similar physiography, each having fairly rugged low ranges with elevations of between 100 and 160 metres and moderately steep to steep slopes. Numerous flowlines occur, some in relatively deep, narrow gorges, others in small valleys up to 500 metres wide.

The geology of the three areas is similar as they have the same or similar series of geological units of varying widths. There are a relatively large number of geological units in each area, often with complex folding resulting in at times complex geology. For example, the North Shaw 1:100 000 sheet (Van Kranendonk, 2000) shows some thirteen geological units in the Sulphur Springs survey area. Kangaroo Caves and Bernts have some of these along with a few different units, having six to eight units each.

The vegetation of the three survey areas is complex, reflecting the interaction of the complex topography and complex geology. At least some of the geological units were noted to have an association with a particular set of vegetation units.

#### **Vegetation occurring in the three survey areas in the Gorge Ranges and connecting access tracks**

##### **a) Vegetation of the hill slopes and crests**

The vegetation of the hill slopes varies greatly from *Triodia* ('spinifex') hummock grasslands to scattered low trees and scattered tall shrubs over *Triodia* hummock grasslands to scattered low trees over high open shrublands and/or low open shrublands over *Triodia* hummock grasslands.

In all, five *Triodia* species occurred on the hill slopes and crests. Typically *T. brizoides* occurred on the mid to upper slopes, *T. wiseana* on the lower slopes (although it is very common on all slopes of the hills in the Kangaroo Caves Formation geological units. *Triodia melvillei* is largely restricted to small areas of rocky crests on high shale ridges and more extensive areas on high sandstone ridges (two small populations were found on the valley floor in the project survey area). The *Triodia melvillei* vegetation unit on the high shale ridge crests included a priority 2 species, *Ptilotus mollis*.

The common vegetation unit on the high sandstone ridges was a distinctive *Acacia tumida* high shrubland to open scrub over an *Acacia* low shrubland over *Triodia melvillei*. This unit also included a number of other tall and low shrub species. Another *Acacia tumida* high shrubland unit was closely associated with the crests and upper slopes of narrow chert ridges. In this unit, however, the *Acacia tumida* high shrubland grows over a *Triodia epactia* hummock grassland with relatively few other

shrub taxa. A fifth *Triodia* species noted only occasionally on hill slopes was *Triodia* sp. Panorama, which occurred occasionally along steep gully slopes and sometimes amongst rocky outcrops on lower slopes of Rhyolite ridges in the Kangaroo Caves area.

*Eucalyptus leucophloia* commonly occurred as a scattered low tree on the mid to upper slopes whereas *Corymbia hamersleyana* occurred in some lower slope units. Numerous *Acacia* species were typically amongst the low to tall dominant shrubs on the hill slopes. *Acacia ptychophylla*, *Acacia spondylophylla*, *Acacia hilliana* and *Acacia adoxa* var. *adoxo* were some of the more common low *Acacia* shrubs. *Acacia acradenia*, *A. inaequilatera* and *A. tumida* (chert and sandstone ridges) were some of the dominant tall *Acacias* on hill slopes.

*Tephrosia* and *Indigofera* species were also important low shrubland taxa on the hill slopes, particularly on the hill slopes of the Rhyolite and Andesite volcanic units.

#### **b) Vegetation of the valley floors**

The vegetation of the valley floors ranged from *Triodia* hummock grasslands of various species to scattered low trees and scattered tall shrubs over *Triodia* hummock grasslands. Four *Triodia* species commonly occurred on the valley floors, *Triodia wiseana* on the lower colluvial slopes and low ridges, *Triodia* sp. Panorama and *Triodia angusta* (Shaw River Form) on the calcrete swales and *Triodia epactia* adjacent to some of the flow lines.

#### **c) Vegetation of the creeks and gorges**

A wide variety of creek line vegetation units occurred in the valleys and gorges of the survey areas, with most creek lines having seasonal flows but a number of creeks fed by permanent springs and having some permanent pools with associated *Typha domingensis*. *Triodia* sp. Panorama and *Triodia epactia* were the common dominants in the creek lines. *Triodia wiseana* was commonly a dominant on the banks of the smaller creek lines. *Eucalyptus leucophloia* sometimes occurred along the banks of smaller, dryer flowlines, but scattered *Corymbia hamersleyana* low trees were the typical upper strata of small creek lines. *Acacia tumida* was a common dominant along creek lines, usually as a high shrubland along with *Acacia acradenia*, *Cajanus cinereus*, *Petalostylis labicheoides* and *Gossypium robinsonii*, but also maturing to low forest on alluvial flood banks of creeks. Along a few creek lines in the Kangaroo Caves and Sulphur Springs areas, *Acacia pyrifolia* (slender, white) formed a grey open scrub. Low trees of *Terminalia canescens* occurred in small pockets along some of the creek lines, notably in the Andesite and Rhyolite volcanic hills in the Kangaroo Caves and Sulphur Springs areas.

*Eucalyptus victrix* was the common upper strata of the larger creek lines, typically occurring over an open heath including *Melaleuca glomerata* and *Melaleuca linophylla*. A new *Themeda* species was found in one *E. victrix* vegetation unit that occurred in a creek along the access track between Sulphur Springs and Kangaroo Caves.

Two areas of a *Eucalyptus camaldulensis*, *Melaleuca argentea* open forest vegetation unit were found in the large creekline in the north eastern part of the Sulphur Springs area, where the access track leads to the Kangaroo Caves. *Schoenus falcatus*, a Priority species, occurred in this vegetation unit and in one small area occurred as an open sedgeland.

Extensive areas of *Eucalyptus camaldulensis* and *Melaleuca argentea* forest occurred along the banks and alluvial flood banks of the Shaw River and were in the study area at the foot of the Bernts hills.

A gorge unit was described for the narrow and high rocky gorges that occur in the sulphur Springs area. *Acacia tumida* over a *Triodia epactia* hummock grassland occurs along the upper slopes of the chert ridges associated with these units. *Acacia coriacea* and *Ficus platypoda* scattered low trees occur in this unit with *Atalaya*, *Flueggia virosa* var. *melanthesioides* and *Acacia pruinocarpa* on the rocky slopes.

## **B: Vegetation of the access road to Panorama from the Mt Magnet road**

### **Introduction**

Where it parallels the Shaw River, the access road traverses part of the Abydos Plain, which is underlain by granite and has orange-brown sandy soils derived from it. Near the abandoned airstrip, the road turns to the south-west, traversing a series of low rises as it parallels the base of the Gorge Ranges. The soils are more varied here, reflecting the variety of geology and the deposition of material from the ranges. Fifty km from the Marble Bar road the access road turns southwards again, entering an open gorge system, before reaching the northern end of the Sulphur Springs survey area.

#### **a) Vegetation of the granitic plain**

The two main vegetation types of the granitic plain are a range of units with low open shrubland to open heath of *Acacia stellaticeps* over *Triodia epactia* hummock grassland and areas of *Acacia tumida* high open shrubland to open scrub. There are numerous variants of these and smaller areas of other units.

The Shaw River has a number of different vegetation types in its bed, including areas dominated by the tall paperbark *Melaleuca argentea* and others dominated by either *Eucalyptus camaldulensis* var. *obtusata* (River Red Gum) or by *Eucalyptus victrix*. Along the lower slopes of the plain next to the river there are areas with *Triodia angusta* hummock grasslands. However, further south, there is a large sand dune adjacent to the river. This has *Triodia epactia* hummock grassland, but has been badly invaded by Buffel Grass (\**Cenchrus ciliaris*).

The small side creeks running off the edge of the plain into the Shaw river have a variety of vegetation units, the most notable being dense stands of one of the forms of *Cullen leucanthum* under scattered *Eucalyptus victrix*.

#### **b) Vegetation of the low rises near the base of the ranges and the creek lines between them**

This vegetation is more varied, with the variation apparently being related to different geological types. The most notable feature of this area was a large area (extending both sides of the abandoned Lallah Rook mine) where the vegetation was dominated by *Triodia* sp. Panorama.

Other areas were dominated by *Triodia wiseana*, *Triodia brizoides* (steeper areas on the slopes of the ranges) and *Triodia epactia*.

The vegetation of the creeks varied considerably depending on the size of the creek and soil development. The smaller creeks had shrublands or open scrub of *Acacia*

*acradenia* or *Acacia tumida*, somewhat larger creeks had more variable vegetation, some times with *Corymbia hamersleyana* (a bloodwood) present. The largest creeks had white gummed eucalypts; *Corymbia flavescens*, *Eucalyptus victrix* and *Eucalyptus camaldulensis*. These creeks had some species that were not common in the survey area, including *Themeda avenacea* and *Cullen* aff. *lachnostachys*. The latter species was seen a few times near and west of Lallah Rook.

### c) Vegetation of the gorge

The vegetation of the gorge consists of the vegetation of the gorge floor, which has a large creek, the vegetation of the steep gorge slopes and of the adjacent crests.

The vegetation of the slopes and crests was similar to that of the Sulphur Springs survey area (see above), with some units being common to the two areas. The most noticeable difference was the well developed rockpiles on the crest at the entrance to the gorge, which had *Terminalia canescens* as the dominant species.

The vegetation of the gorge floor has some similarities to the vegetation of the Shaw River, having areas dominated by a paperbark (*Melaleuca argentea*) as well as areas dominated by *Eucalyptus camaldulensis* and *Eucalyptus victrix*. However, the gorge offers a somewhat specialised habitat as it has semi-permanent water flow in places and presumably near surface underground flow. This has led to the development of denser vegetation than that generally found in the river systems. The more protected environment may also have some impact on the vegetation developed.

### C. Conservation significance of the vegetation

In many regards, such as the range of vegetation structures developed and most of the dominant and more common species, the vegetation of the study area has much in common with the vegetation of a large part of the Fortescue Botanical District. However, the survey area vegetation also has aspects that are more restricted. These include:

- the areas where the new species *Triodia* sp. Panorama is dominant. This vegetation is, on current knowledge, restricted to the survey area. However, it is likely that other stands occur in the Gorge Range area which is very poorly known botanically;
- the wetland areas on the track between Sulphur Springs and Kangaroo Caves. One of these has *Schoenus falcatus*, a species that is uncommon in the Pilbara as a significant component of the vegetation (another example of this vegetation was found during the second field trip). This vegetation has moderate significance. The other wetland has a population of the new *Themeda* species found during the survey work (see below). This vegetation is likely to be very restricted (although other stands may occur in the ranges) and is of high conservation significance;
- the vegetation of the gorge floor. While there are likely to be a few such places along the escarpment of the range, such vegetation will not be very common and is of moderate conservation significance;
- the PATN analysis carried out showed that in floristic composition and overall development (the analyses was based on floristics and abundance) some of the

- vegetation is similar to areas sampled to the west, but that much of the vegetation is more localised, with the level of dissimilarity being significant.
- the *Ptilotus mollis* (Priority 2) plant communities restricted to small areas of rocky crests of high shale ridges. A number of these communities occurred in both the Sulphur Springs and Kangaroo Caves survey areas.

The floristic distinctness of much of the vegetation shown by the PATN analysis, the large diversity of vegetation types present and the occurrence of areas of vegetation of particular value mean that the vegetation, overall, has significant conservation value. However, this value is likely to extend into the areas adjoining the survey area. It was also not evenly spread, with some types being of particular value, either due to the presence of less common species, or due to belonging to the less common or more restricted floristic types.

### **E. The flora recorded**

Three hundred and ninety six species were recorded during the survey. This fairly large number of species reflects the large area and large range of habitats surveyed, rather than unusually high species diversity. Overall, the flora recorded is typical of that of the Fortescue Botanical District. The most significant species recorded, in terms of conservation assessment are several new, ie. previously undiscovered species. These are:

#### ***Triodia* sp. Panorama.**

This taxon appears to be a new species related to *Triodia longiceps*, differing in the leaf sheaths and auricles being hairy (they are glabrous in *Triodia longiceps*) and the leaves having scattered droplets of resin. *Triodia* sp. Panorama is geographically restricted on current knowledge (there is no matching material at the Western Australian Herbarium), but it is not rare as the populations in the survey area are quite large.

#### ***Themeda* sp. Panorama**

This species was discovered between Sulphur Springs and Kangaroo Caves and appears to represent a new, distinctive species. On current knowledge, it is quite rare. However, it is likely to have other populations in the ranges but even so, it is unlikely that these are large.

#### ***Pityrodia* sp. Panorama**

This species was recorded from ridge tops in the Sulphur Springs area and appears to be a new and distinctive species. These populations have very high conservation value due to the restricted occurrence of the species on current knowledge.

Some other species in difficult genera including *Tephrosia* and *Corchorus* are also undescribed, however due to the uncertain state of the taxonomy of these groups it would be premature to consider them restricted. Some taxa in the *Indigofera monophylla* complex may be restricted, but this group needs further careful study before this can be authoritatively stated. Two taxa of *Corchorus* recorded appear to be previously uncollected, although they are relatively common in the survey area. This suggests that they are likely to be common in the adjoining ranges.

### Priority flora collected

*Eriachne tenuiculmis* (P3) and *Abutilon trudgenii* (ms) (P3). Recent surveys have shown that both these species are much more common than they were thought to be when they were placed on the CALM declared rare and priority flora list.

Another priority species collected, *Euphorbia clementii* (P2), was only collected twice. It is cited on the CALM list as occurring in the Port Hedland and Yarrarie areas. It was also collected in 2001 during the surveys for the Hope Downs rail line (M. Maier pers com.). This species was uncommon in the Panorama survey area and appears to be uncommon overall.

*Gonocarpus ephemerus* (P2) was only collected twice. Its distribution is given as Port Hedland and Dampier Peninsula on the CALM list.

*Gymnanthera cunninghamii* (P3), was only collected once, at the edge of the Shaw River near Bernts. This species is very widespread, occurring in the NT and Queensland as well as Western Australia.

*Olearia fluvialis* (P2) was collected from the Shaw River near the Mt Magnet road. This species is fairly uncommon, as it is restricted to the beds of large creeks.

*Ptilotis mollis* (P2) was collected from the Sulphur Springs and Kangaroo Caves ore body survey areas, restricted to small patches on the rocky crests of high shale ridges.

*Acacia glaucocaesia* (P3) was recorded at three releve sites and was prominent in the vegetation at three locations.

### F. Flora conservation assessment

The number of species recorded for the survey area, three hundred and ninety six, is fairly diverse for an area of this size in the Pilbara, but was not exceptional given the number of habitats in the survey area. This indicates that the conservation value for flora of the area is moderate, before taking into consideration species with particular conservation value.

Almost half of the species recorded in the survey area were only recorded once. This implies substantial variation in the distribution and density of individual flora species, which implies a significant conservation value for flora.

The conservation value of priority flora is low to moderate as it is considered that there are not many genuinely uncommon species involved, and the populations of these are not large. The value of 26 other species that are not currently on the priority flora list is considered to be moderate to high. Of particular importance are the newly discovered species *Themeda* sp. Panorama and *Pityrodia* sp. Panorama. The value for these two species is very high, because they are not known to occur anywhere else.

### Impact on vegetation and flora values by the proposed developments

The impact on vegetation and flora by the proposed development of a mine at Panorama will include widening and developing the existing track into an access road. This would mostly have a low impact on the vegetation and flora. However, if the road is re-routed to further away from the abandoned Lallah Rook mine, it would have to cross a medium sized creek twice at a point where there is a population of *Cullen* aff. *lachnostachys*, a quite uncommon species. It would also possibly impact



areas of cracking clay located on the other side of the creek. This habitat, which has edaphically restricted flora, is uncommon in the areas adjacent to the existing track. As the gorge where the track enters the escarpment is quite narrow, widening the track and constructing a road through the gorge would impact the dampland/wetland vegetation in this area and would need to be carried out with strict attention to minimising impact.

Developments associated with the proposed mine include a tailings dam, mill, vent and camp/service infrastructure in the Sulphur Springs survey area. Of these, the most significant direct impact on vegetation would be the construction of the tailings dam and mill. However, these are sited in areas with vegetation units that are fairly well represented in the survey area. Downstream from the tailings dam there is an occurrence of an uncommon wetland vegetation type in a creek line. Any changes to sub-surface water flow in this area could impact the stand, which has already been somewhat disturbed by the access track from Sulphur Springs to Kangaroo Caves.

## **1.0 INTRODUCTION**

### **1.1 Purpose of this report**

The study presented in this report has been written to enable assessment, under the Western Australian Environmental Protection Act, of the impact of development of the proposed Panorama mine on vegetation and flora.

### **1.2 Contents of the report**

To enable assessment of the impact of the proposed mine on the vegetation and flora, the report presents:

- a description and maps of the vegetation of areas surrounding the three potential mine sites and the access road;
- a floristic analysis of the vegetation, comparing it to vegetation of other areas in the Pilbara using the PATN computer package;
- a survey of the flora, with special attention paid to identifying the presence of flora of particular conservation value;
- assessments of the conservation value for flora and vegetation of the potential mine areas and access roads.

### **1.3 General location of the survey area**

The Panorama Project ore bodies are located in the Gorge Range, in the Pilbara region of Western Australia about 100 kilometres south-south-east of the coastal town of Port Hedland. It lies to the south-west of the Port Hedland - Marble Bar Road and immediately to the west of the Shaw River (Figure 1). The access road crosses the plain to the north of the Gorge Range and then runs along the foothills of the Gorge Range.

3333

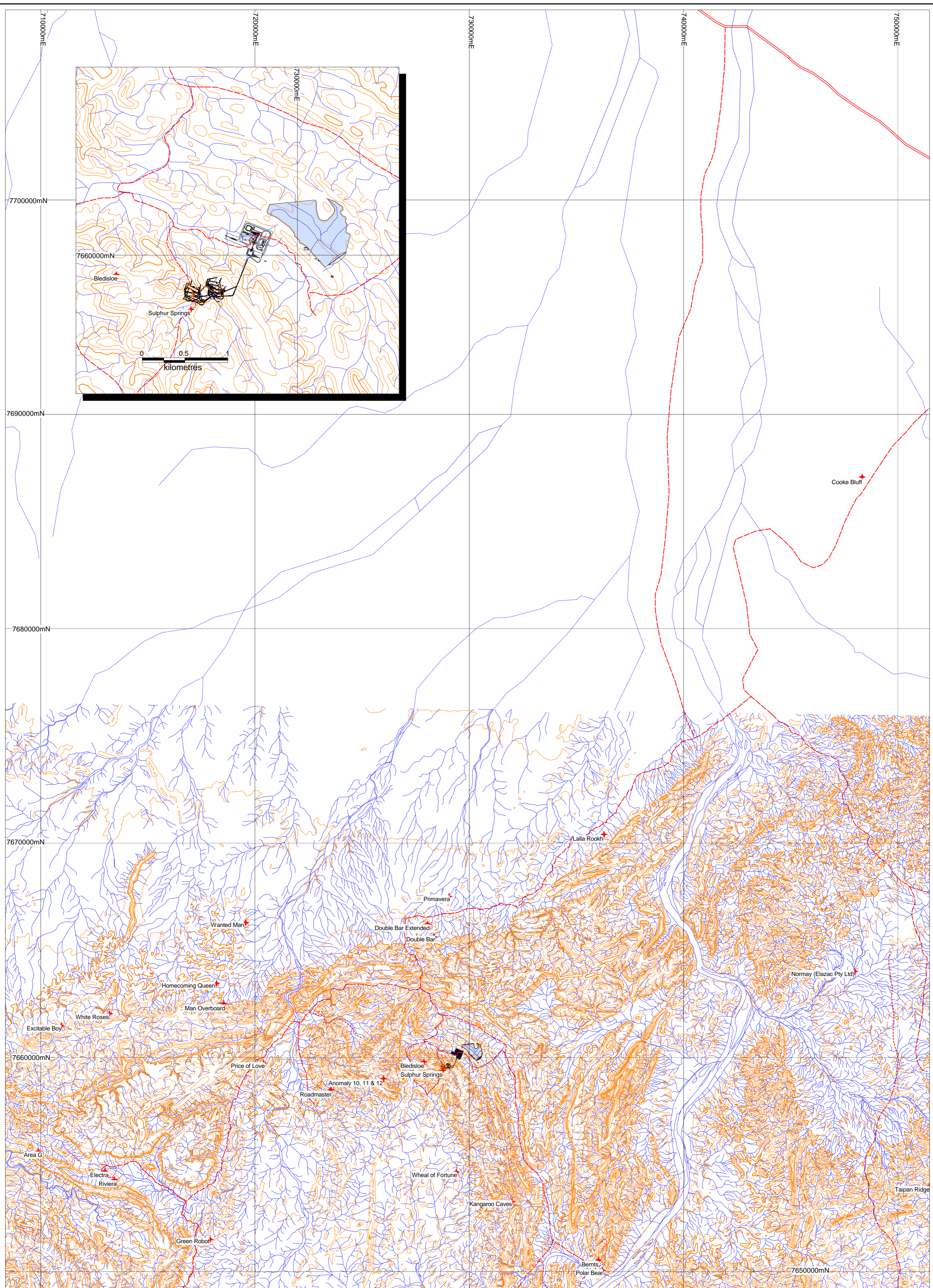
### **1.4 The survey area**

The survey area includes three potential mine sites, the Sulphur Springs, Kangaroo Caves and Bernts areas, the access tracks which link these potential mine areas and the road to link the project to the Port Hedland - Marble Bar Rd (Figure 1).

The proposed access road for the project is based on upgrading an existing track that runs south from the Port Hedland - Marble Bar road parallel to the Shaw River, until it reaches the foothills of the escarpment of the Gorge Ranges. It then turns to the south-west and then west, running along the foothills of the Gorge Ranges past the abandoned Lalla Rookh mine. A few kilometres west of Lalla-Rookh, the track heads south, winding its way to the Sulphur Springs area through a gorge that runs through the escarpment of the Gorge Range.

The Sulphur Springs area lies about seven kilometres south of the escarpment of the Gorge Range. The area surveyed here is a circle about five kilometres in diameter. The processing plant, tailings dam and other facilities for the project would also be located in this circle. The current access from the Sulphur Springs area to the Kangaroo Caves and Bernts areas is by a track, a significant length of which is placed in creek lines, but which in the south runs next to Honeyeater Creek and the Shaw River. Kangaroo Caves is about 14 kilometres south from the escarpment and Bernts about 18 kilometres from the escarpment.





<b>PANORAMA PROJECT</b>		
OUTOKUMPU MINING AUSTRALIA PTY. LIMITED		
Scale = 1:100,000		
Compiled:	Date:	DWG NO:
File Name:	Plot Date:	Revised:



### **1.5 Geology, topography and soils of the survey area**

The overall Panorama Project survey area (the access road and the three ore bodies) is located on two main geological/physiographic features. These are the Gorge Range and the plain adjoining its northern side. The plain is the Abydos Plain physiographic unit of Beard (1975), most of which is based on the granite of the Carlindi Dome. This granite plain includes alluvial plains, pediplains, low stony hills and dissected pediments, with low granite outcrops and tors. Hickman and Gibson (1982) described most of the area as riverine plains, with the surface consisting largely of flat expanses of sand. Granite rock generally lies within a few tens of meters of the present land surface.

The northern part of the project access road (about the first 33 kilometres southwards from the Port Hedland to Marble Bar road) passes through a very gently undulating section of the Abydos plain, gradually rising from an altitude of about 70 metres at the main road to about 120 metres near the foothills of the Gorge Range (Commonwealth of Australia, 1989a). It passes through Quaternary 'old alluvium', consisting of re-worked (siliceous) sand, silt and sandy clay, which forms the Yule surface which covers most of the plains (Hickman and Gibson, 1982).

The access road then travels south-west along the foot of the Gorge Range escarpment, passing mainly through colluvium deposits, largely sand, silt and gravel in outwash fans deposited from the sandstone, basalts and volcanogenic sedimentary rocks of the Coonterunah Group and Double Bar Formation (Kranendonk, 2000).

The Gorge Ranges consists of Archaean rocks in a layered succession. Their geology includes volcanic and sedimentary rocks of the Pilbara Supergroup and granitoid rocks (Kranendonk, 2000). Erosion has modified the landscape to produce a topography of strike-controlled ridges in dissected ranges, with the ridges often having steep slopes. The highest point in the project area is about 400 meters, in the Sulphur Springs area (Hickman and Gibson 1982). The range is traversed by a number of north-flowing rivers that rise in the Chichester Plateau, one of these, the Shaw River, lies to the east of the ore bodies and Bernts is immediately adjacent to this river.

The areas surveyed around the three ore bodies and the access tracks between them in the Gorge Ranges lie principally on Fe-shale (Paddy Market Formation), sandstones and mudstone (Corboy Formation) and basalt (Honeyeater Basalt) of the predominantly sedimentary George Creek Group of rocks. The older volcanic rocks of the Kangaroo Caves Formation (Sulphur Springs Group) lie immediately to the west and the younger conglomerate and sandstones of the Lalla Rookh Sandstone (De Grey Group) to the east and north-east of the access track and project areas (Kranendonk, 2000).

The soils of the Gorge Range area are shallow and stony with brown earthy loams the chief soils (Beard 1975).

### **1.6 Regional botanical context**

The Panorama Project survey area lies in the Fortescue Botanical District as defined by Beard (1975, 1980). Beard (1975) divides the Fortescue Botanical district into eight subdivisions (physiographic units), including the Abydos Plain and Gorge Range Physiographic units (see above and Figure 2, below).

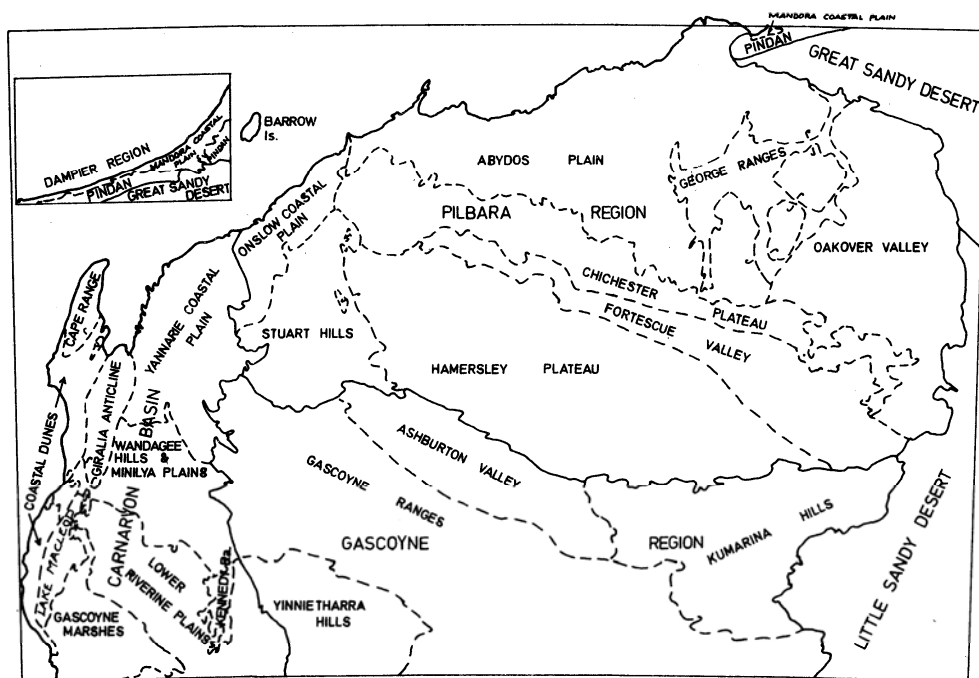


Fig. 3 Natural Regions and physiographic units of the Pilbara area

Fig. 2: Natural Regions and physiographic units of the Pilbara area (Beard 1975, fig. 3 p. 7)

Beard (1975) describes the vegetation of the Abydos Plain as:

"(i) *Shrub steppe*. The predominant community of the granite plain is shrub steppe of the *Acacia pyrifolia* - *Triodia pungens* association, in which there is a general cover of hummock grasses dotted with rather widely spaced shrubs.....

(ii) *Dwarf-shrub steppe*. On the seaward margin of the granite plain are extensive sandplains covered by dwarf-shrub steppe in which there is a general cover of the hummock-grass *Triodia pungens* interspersed by very numerous low spreading shrubs of *Acacia translucens*. ....

(iii) *The grass plains*. Where finer-grained alluvia have been deposited, particularly those derived from the weathering of basic rocks, there are open plains of [tussock] grass or mixed grass and spinifex. .... Nearer the coast, plains of [tussock] grass only occur.... These are clay plains.... On the Lower de Grey the soil material is more mixed so treeless plains are uncommon. Patches of *Acacia pyrifolia*-*Triodia pungens* shrub steppe occur mixed with patches of grass savanna, or the grass and spinifex occur mixed together.

(iv) *The coastal complex*. The Abydos Plain slopes so gently to the sea that there is a belt 5-10 km wide under the influence of the tides. .... and the land merges so gradually into the sea that it is frequently difficult to tell where one ends and the other begins, in a maze of tidal lagoons samphire flats and mangrove. ... " (Beard 1975, pp 50-56).

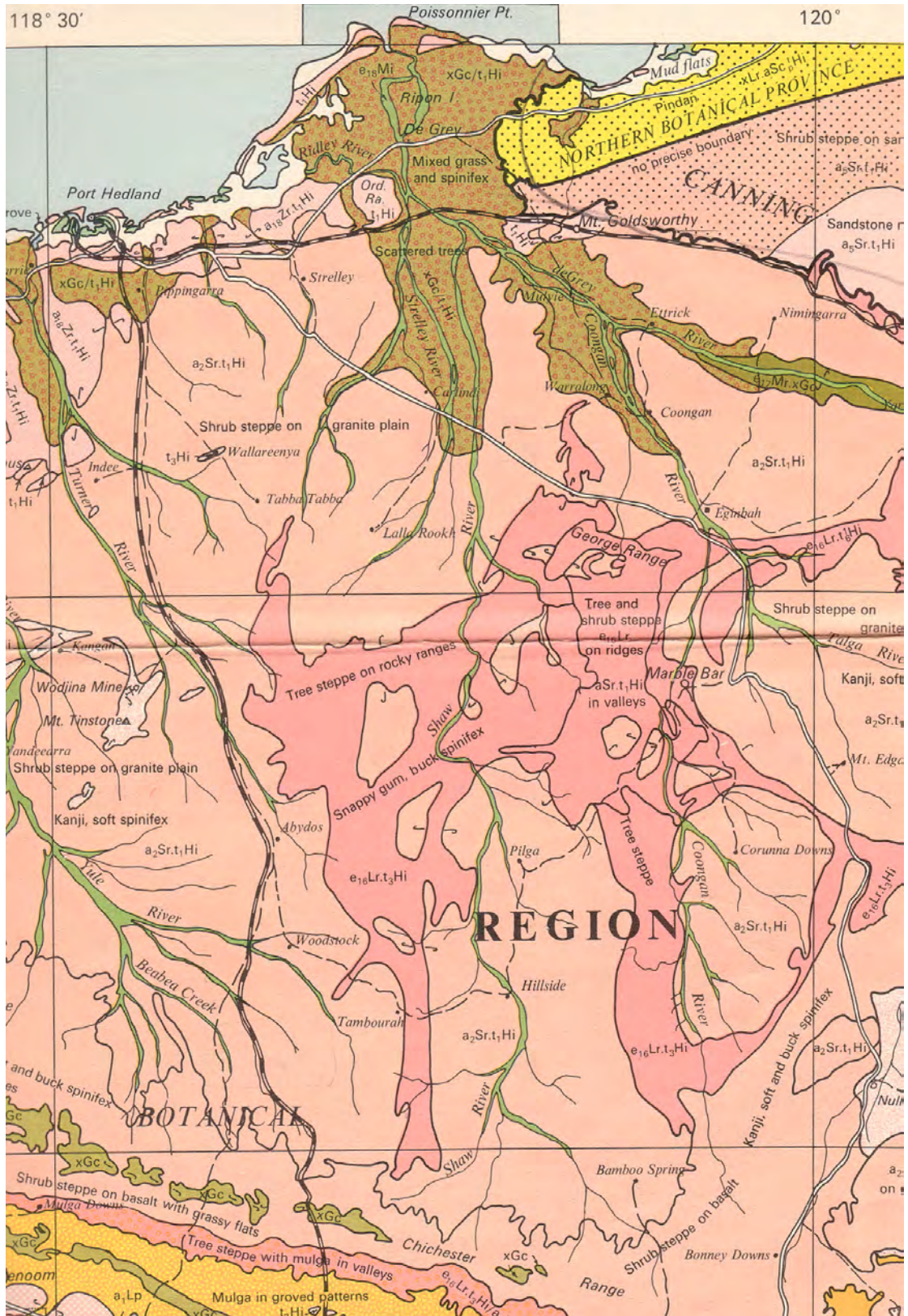


Figure 3: Part of Beard's (1975) 1: 1,000,000 vegetation map of the Pilbara. The dark pink is the Gorge Ranges, the paler pink to the north of them is the Abydos Plain. Note that the survey area contains only four of Beard's vegetation units.

Beard describes the vegetation of the Gorge Ranges as:

"The high steep parts of the Gorge Ranges on the most rocky ground are covered with tree steppe- often with the trees rather sparse- but this is replaced by shrub steppe in the valleys and lower slopes. In the tree steppe the occasional trees are *Eucalyptus brevifolia* (snappy gum) (low, only 6-8m or less), with white bark and glaucous [sic, slightly pruinose] foliage), and the hummock grasses a mixture of *Triodia pungens* and *T. brizoides*, at least in the north. Towards the south *T. brizoides* appears to be replaced by *T. wisea* var. *brevifolia*. On the lower slopes there is shrub steppe of *Acacia bivenosa* and *Triodia pungens*, while in the valleys *Acacia pyriformis* replaces *A. bivenosa*. On higher ground the eucalypts may be absent altogether, or elsewhere joined by *Ficus* and *Terminalia*. The flora of the shrub steppe appears to be the same as on the Abydos Plain in the *Acacia pyriformis-Triodia pungens* association." (Beard 1975, p. 57)

This level of description is extremely broad, and while useful for putting the project in a regional context, is inadequate for environmental impact assessment. In fact the level of description is so broad that the Panorama survey area contains only four of Beard's vegetation units.

### **1.7 State of knowledge of the vegetation and flora of the Fortescue Botanical District and assessment of the conservation status of the vegetation and flora found there**

The Fortescue Botanical District is a large area with few resident botanists and is difficult to access from Perth and other large cities where taxonomic research is usually carried out. It is not surprising then, that the state of knowledge of the flora and vegetation of this botanical district is neither very detailed nor very uniform.

The general lack of detailed knowledge of the vegetation and flora of the botanical district that the survey area lies in makes assessment of the conservation status of the flora and vegetation more difficult than if it were in an area where the existing knowledge base is better. Making good assessments then relies on making the best use of the information that is available in a context of carefully weighing this information.

For the flora, two principles should be used to make conservation status assessments in the absence of specific searches for particular species. These are firstly, that if a species is not well collected or otherwise well known, it should be presumed to be not common until known otherwise. The alternative is to risk impacting the populations of uncommon or rare species. Secondly, the best people to make judgements about the likely rarity of species and vegetation are experienced taxonomic and survey botanists, who can judge the issues on the available evidence (for species, the number of collections, habitat preference, plant form, known distribution, knowledge of where a particular species has and /or has not been found), utilising their experience of making such judgements.

For the vegetation, a somewhat different approach is needed. Description of the vegetation of a survey area allows comparison of the vegetation found there with the more general regional descriptions available. This allows judgements to be made on whether or not the vegetation in the survey area is within the scope of the variation generally found within the regional unit in which it lies. It follows that these judgments are based on the field work and report preparation and this has to be adequate if the judgments are to be soundly based, and seen to be adequate, if the assessments are to be accepted.

Fortunately, for the current survey it has been possible to compare the quadrat data from the Panorama survey to similar data collected for the Port Hedland to Hope Downs rail line survey (Maier and Trudgen in prep.) and releve data from the Chichester Ranges part of the

West Angelas ERMP survey (Trudgen and Casson 1998) using the PATN program. This type of analysis is a very useful addition to a conservation assessment for vegetation, as it can objectively deal with large data sets in a way that is impossible to manage intuitively. With a data set of the size of that used (more than 694 sites), this form of analysis allows a robust comparison that takes into account both the overall species composition and the relative contribution of the different species present.

A particular problem for making assessments of the rarity of species in the Fortescue Botanical District is that for this botanical district, the Department of Conservation and Land Management of Western Australia (CALM) Declared Rare and Priority Species list reflects the general knowledge of the flora of the botanical district. While many of the species that are on the list, either as Declared Rare Flora or Priority Flora, deserve to be there, others should be removed. There are also other species which are not present on the list and should be. It should be noted here that the priority flora section of the list is a working document that naturally changes as knowledge advances and for an area such as the Pilbara its current state is not unpredictable.

### **1.8 Climate of the survey area region**

The Bureau of Meteorology (1989) classified the climate (on the basis of median annual rainfall and seasonal rainfall incidence) of the Panorama project area as Arid (mainly summer rain) - sub-tropical.

The climate is hot and dry, with precipitation of about 300 mm per year (Beard 1975; Hickman and Gibson, 1982). Most of the rain comes from tropical cyclones and local thunderstorms occurring mainly between December and March (Hickman and Gibson, 1982). The cyclones normally form over the sea between northern Australia and the Indonesian Islands and generally adopt a south-westerly course parallel to the Australian coast as far as the Northwest Cape, and then travel southerly (Beard 1975). In two cases out of three the cyclone changes direction and heads south-east, crossing the coast and travelling inland, gradually weakening, but in most cases bringing heavy falls of rain to this arid inland region. During the period May to October northern Australia is influenced by mild, dry south-east trade winds and winter rains are infrequent (Bureau of Meteorology, 1989; Hickman and Gibson, 1982).

The temperature range is large and the maxima high. An absolute maximum of 49°C has been recorded at Marble Bar (Beard 1975). Average January daily maximum temperatures for the Panorama area are between 36°C and 39°C (Bureau of Meteorology, 1989). July is the coldest month (average daily maximum and minimum at Port Hedland of 27.0°C and 11.8°C respectively) (Hickman and Gibson, 1982).



## **2.0 METHODS AND LIMITATIONS OF THE VEGETATION AND FLORA SURVEYS**

### **2.1 Field visits**

Two visits were made to the survey area, the first was from the fifteenth to the twenty-fifth of April 2001 and the second from the seventeenth of October 2001 to November the fifth.

During the first visit general flora collections were made and 81 quadrats were established and recorded along the proposed access road and in the proposed mine and processing areas. During the second visit, the vegetation of the survey area was mapped (with releves recorded as necessary for this) and additional flora collections made.

### **2.2 Methods of the vegetation survey**

The vegetation survey has two components:

- mapping and description of the vegetation to define the variation in the vegetation present in the survey area; and
- definition of broad units within the vegetation using the PATN computer package to allow comparison of the study area vegetation to the vegetation of other areas in the Fortescue Botanical District.

The vegetation mapping was based on field observation of the vegetation and interpretation of aerial photographs (colour, 1:25,000, Panorama Project 1992). No photos were available for Kangaroo Caves and Bernts and a large part of the access road. Boundaries were marked directly onto aerial photographs, or where these were not available onto enlargements of topographic maps. The mapping of the three ore bodies was scaled up to 1:5,000 for presentation, as the vegetation was so varied that at a smaller scale the polygons would have been too small to place codes in.

The vegetation units were described using the descriptions of vegetation from the quadrats and from a large number of additional releves (sites recorded without installing a quadrat) recorded during the vegetation mapping field work. The units described vary from the plant community level to the vegetation association level and are based on the perennial species in the vegetation. The large number of releves was required because of the large numbers of plant communities found in relatively small areas of the survey area, especially in the ranges.

The geological survey map for the Gorge Range part of the survey area (Kranendonk, 2000) was found to be useful during the mapping to help understand the variation in the vegetation in the parts of the survey area in the Gorge Ranges.

The quadrats were located to give coverage of the range of variation in the vegetation occurring in the survey area, although not all the variation in structure and dominance could be sampled. The standard plot dimensions were 50 metres by 50 metres, but this was varied according to the boundaries of the particular vegetation stands being sampled. For example, the stands of vegetation along creek lines and in gullies can be quite narrow, frequently being less than ten metres across. In these situations, a strip about 100 metres long the width of the plant community was recorded. Sometimes a longer strip was recorded if the flora list was still increasing significantly after 100 m was recorded.

The quadrats were marked with steel fence droppers hammered into the ground at three of the four corners, except, where a narrow strip was recorded a fence dropper at each end was used. The locations of the quadrats were recorded as a grid reference using the WGS84 datum

(GDA94 compatible) with a hand held Global Positioning System (GPS) device and are shown on the vegetation maps.

At each plot the vegetation structure was described using the estimated height and cover of the dominant species and a complete list of flora species compiled with their cover and height. Vegetation condition was assessed using the scale of Trudgen (1988), which is reproduced in Appendix 2. Other data recorded included a brief description of the habitat and surface soil and the time since the site was last burnt was also estimated. Additional species found outside the plot were noted for addition to the flora list. In each plot (and later for the relevés), taxa that could not be identified using a field reference collection were collected, numbered and pressed. Common species well known to the recorders were not frequently collected, however they were collected occasionally for reference or when the material was very good and suitable for voucher specimens to be lodged with the Western Australian Herbarium.

The vegetation was described using Specht's classification of vegetation as modified by Aplin (1979), which is reproduced in Appendix 3. The modified version of Specht's table is used to describe all the strata in the vegetation rather than just the tallest stratum. This gives a more complete description of the vegetation at the site.

The data from the quadrats was entered into a Microsoft Access based database that is set up to enable the flora list and cover data to be transferred to the PATN computer package for analysis.

### **2.3 Limitations of the vegetation survey**

The main limitations of the vegetation survey are that:

- the quadrats sample most of, but not all of, the range of vegetation in the study area and only sample a part of the variation within the range of variation present; and
- while the data base the quadrat data from the current survey area was compared to is quite large, it does not contain other sites from the Gorge Ranges.

The only major vegetation units not sampled in the quadrats were the vegetation of cracking clay sites and high ridge tops with *Triodia melvillei*. The cracking clay vegetation were not observed on the first field visit, as no areas of this habitat are very close to the access road and none occur in the ore body areas. The *Triodia melvillei* unit was not sampled on the first visit due to time limitations.

The data sets the quadrats from the current survey were compared to is the best available appropriate data, however it does not have other data from the Gorge Ranges. The sites in the data set from the Port Hedland to Hope Downs rail line survey (Maier and Trudgen in prep.) are very comparable in quality, as they were sampled in the same year, using the same methodology (and some of the same recorders). The other data used is from an earlier study (Trudgen and Casson 1998), which used relevés rather than quadrats. This data was also collected in a good season and is reasonably comparable.

The aerial photography provided for mapping the vegetation was not a small enough scale for the variability present in the vegetation. For some units, particularly in the ranges this will have resulted in slightly inaccurate boundaries, as the aerial photography was photocopy enlarged after the field work to make the maps for the ranges practical for marking up. The same problem, fine scale variation in the vegetation patterns also meant that some areas had to be treated as complexes.

The mapping presented has not been corrected for spherical distortion in the aerial photographs or other distortion that may have been produced by the enlarging of the aerial photographs.

#### 2.4 Methods of classification of quadrat data for the floristic analysis

The quadrat data for the current survey and the Hope Downs rail line and West Angelas study were extracted from the Access database. However, because systematic differences do occur between data sets (surveys) due to for example different seasons and different degree of taxonomic distinction, apparently systematic variations were investigated.

Some uncertainties were recognised which, if retained in the data, might have created artificial differences. Amalgamating or omitting data can reduce this to an acceptable degree. Table 1 is a list of plant names and how they have been dealt with for this purpose. Most taxa identifiable only to generic level were also omitted.

**Table 1:** List of names amalgamated to reduce the influence of identification differences between surveys and thus avoid distorting the results of the analysis.

Database Name	Analysed as
Halosarcia indica subsp. ?	Halosarcia indica subsp. ?leiostachya
Themeda aff. triandra	Themeda aff. triandra (MET 16,046)
Hakea suberea	Hakea lorea ssp. lorea
Pterocaulon ?sphaeranthoides x sphacelatum	Pterocaulon sphaeranthoides x sphacelatum
Salsola kali	Salsola tragus
Keraudrenia sp.	Keraudrenia velutina subsp. elliptica (MS)
Acacia aneura var. ?	Acacia aneura var. ?aneura/intermedia
Acacia pyrifolia (green)	Acacia pyrifolia (bark not corky)
Acacia pyrifolia (slender form)	Acacia pyrifolia (bark not corky)
Acacia pyrifolia (slender, white)	Acacia pyrifolia (bark not corky)
Marsilea sp.	Marsilea hirsuta
Cenchrus setigerus	Cenchrus echinatus
Cymbopogon sp.	Cymbopogon ambiguus
Cymbopogon ?ambiguus	Cymbopogon ambiguus
Cymbopogon ?bombycinus	Cymbopogon ambiguus
Enteropogon ?acicularis	Enteropogon acicularis
Eriachne sp. aff. festucacea	Eriachne festucacea
Eriachne mucronata (typical form)	Eriachne mucronata
Tripogon loliiformis var. (2)	Tripogon loliiformis
Maireana planifolia x villosa	Maireana planifolia
Polycarpaea longiflora (red form)	Polycarpaea longiflora
Polycarpaea longiflora (pale form)	Polycarpaea longiflora
Polycarpaea longiflora (White form, M13-7)	Polycarpaea longiflora
Polycarpaea longiflora (Whim Creek form, WC147-7)	Polycarpaea longiflora
Acacia pyrifolia (stout form)	Acacia inaequilatera
Alysicarpus muelleri	Alysicarpus rugosus
Crotalaria medicaginea (Burrup form; B65-11)	Crotalaria medicaginea
Rhynchosia cf. minima	Rhynchosia minima
Euphorbia aff. boophthona (large seed form)	Euphorbia boophthona
Gossypium australe (Burrup Peninsula form)	Gossypium australe
Sida ?echinocarpa	Sida echinocarpa
Ammannia multiflora	Ammannia baccifera
Trachymene aff. oleracea (B61)	Trachymene oleracea
Polymeria calycina	Polymeria ambigua
Polymeria ambigua/calycina	Polymeria ambigua
Polymeria aff. calycina	Polymeria ambigua
Trichodesma zeylanicum var. latisepalum	Trichodesma zeylanicum

Database Name	Analysed as
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	<i>Trichodesma zeylanicum</i>
<i>Mukia</i> sp.	<i>Mukia maderaspatana</i>
<i>Mukia</i> aff. <i>maderaspatana</i> (2) (grey scabrid serrate)	<i>Mukia maderaspatana</i>
<i>Mukia</i> aff. <i>maderaspatana</i> (3) (green scabrid rounded)	<i>Mukia maderaspatana</i>
<i>Mukia</i> aff. <i>maderaspatana</i> (4) (green not scabrid)	<i>Mukia maderaspatana</i>
<i>Mukia</i> aff. <i>maderaspatana</i> (1) (grey scabrid rounded)	<i>Mukia maderaspatana</i>
<i>Scaevola spinescens</i> (broad form)	<i>Scaevola spinescens</i>
<i>Ptilotus exaltatus</i>	<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>
<i>Ptilotus gomphrenoides</i>	<i>Ptilotus gomphrenoides</i> var. <i>gomphrenoides</i>
<i>Ficus platypoda</i> var. <i>D</i>	<i>Ficus platypoda</i> var. <i>platypoda</i>
<i>Ficus platypoda</i> var. <i>minor</i>	<i>Ficus platypoda</i> var. <i>platypoda</i>
<i>Ficus brachypoda</i>	<i>Ficus platypoda</i> var. <i>platypoda</i>
<i>Vigna lanceolata</i>	<i>Vigna lanceolata</i> var. <i>lanceolata</i>
<i>Ptilotus calostachyus</i>	<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>
<i>Sida ?rohlena</i>	<i>Sida rohlena</i> var. <i>rohlena</i>
<i>Sida rohlena</i> subsp. <i>rohlena</i>	<i>Sida rohlena</i> var. <i>rohlena</i>
<i>Cucumis</i> sp.	<i>Cucumis melo</i> subsp. <i>agrestis</i>
<i>Enchylaena tomentosa</i>	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
<i>Cyperus cunninghamii</i>	<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>
<i>Triodia pungens</i>	<i>Triodia epactia</i>
<i>Clerodendrum tomentosum</i>	<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>
<i>Clerodendrum</i> sp.	<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>
<i>Leptopus decaisnei</i>	<i>Leptopus decaisnei</i> var. <i>decaisnei</i>
<i>Ehretia saligna</i>	<i>Ehretia saligna</i> var. <i>saligna</i>
<i>Indigastrum parviflorum</i> (Whim Creek form; W138-3)	<i>Indigastrum parviflorum</i>
<i>Acacia elachantha</i> golden hairy variant	<i>Acacia elachantha</i>
<i>Corymbia candida</i>	<i>Corymbia candida</i> subsp. <i>candida</i>
<i>Adriana tomentosa</i>	<i>Adriana tomentosa</i> var. <i>tomentosa</i>
<i>Polymeria ?lanata</i>	<i>Polymeria lanata</i>
<i>Corchorus lasiocarpus</i>	<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>

The data analysed was the cover for each species at each quadrat converted to a series of classes which were roughly a square root scale. This approach provides a weighting for those taxa which are more abundant, but reduces the influence of stochastic variations in cover particularly in the upper range of cover.

The core use of numerical floristic analysis techniques has been attempts to define "plant communities" or basic units of vegetation consisting of closely similar stands (or single occurrences). In the pursuit of more complete and robust circumscriptions of vegetation units, techniques were needed which were not only more sophisticated, but were capable of dealing with the large datasets involved. The development in recent years of computer based methods to cope with large data sets has seen the rise of numerical classification as an additional tool in the recognition of plant communities. These techniques are not a panacea for all the difficulties, but when well used are at least capable of addressing the scale of the problem in ways which otherwise would only be possible with enormous effort.

A computer package (PATN) (Belbin 1987) was used for the analysis. The PATN package is an integrated group of computer programs specifically designed for interrogating biological data sets such as the data set constructed for the current report.

Therefore, the analysis performed were principally directed towards producing a classification (grouping) of the quadrats which could be investigated for patterns. This involved the following PATN components:

- ASO (with the default values used for sites, and "Twostep" used for species);
- FUSE;
- DEND;
- GDF (10, 60 and 210-Groups for sites – after preliminary investigation).

The results from these components were imported into a Microsoft Access database, for combining with other data and generating interpretation.

The analyses were designed to compare the vegetation of the Panorama study area with vegetation, including a range of apparently similar and different types, from other parts of the surrounding region. They were not designed to generate a definitive classification of the vegetation of this part of the Pilbara, although a necessary product has been generation of an interim classification of this type.

### **2.5 Limitations of the classification of the quadrat data**

Errors related to the different identifications between the data included from the three surveys was minimised, but some may still exist. The efficiency of recording the plants potentially at a site in a "good" season is likely to be similar as seasonal conditions were both similar and relatively good.

The approach of aggregating taxa for which there appeared likely to be a different degree of distinction in the three studies will tend to make the differences between quadrats and classified groups slightly less than it really was.

The results and conclusions of the classification of the floristic composition of the quadrat data is limited by the relatively small number of quadrats compared to the apparently large number of floristic units. Also the quadrats did not sample the whole range of vegetation within any of the project areas. Therefore, the analysis must be considered indicative to some degree rather than entirely definitive.

### **2.6 Methods of the flora survey**

The flora survey was mostly based on the flora recorded in the 81 quadrats established in the survey area for the PATN analysis of the vegetation (see above), flora recorded during the recording of relevés for the vegetation mapping and flora collected during traverses for the vegetation mapping. However, additional records were made whenever a species was observed that had not been previously collected, including incidental collections of species observed while driving.

The specimens collected at the quadrats and relevés were pressed and dried (using a field dryer powered by a generator) and identified using reference collections, the collections at the Western Australian Herbarium and keys and reference books. Some specimens were identified by specialists in particular flora groups.

A significant number of the plant taxa (species, subspecies) recorded during this survey have not been described. This is particularly the case in some groups that are poorly studied, such as *Tephrosia* and *Euphorbia*. These taxa are referred to either by the collection number of one

collection of the taxon, a site number where a specimen of the taxon was collected or by the combination of a descriptive word or phrase and a collection or site number.

## **2.7 Limitations of the flora survey**

Any flora survey, such as the one that forms part of the survey reported here, only samples the flora in a survey area, as it would be prohibitively time consuming to visit every part of such survey areas repeatedly. However, because of the spread of quadrats and relevés through the survey area, the significant number of quadrats and relevés recorded and the extent of traverses walked through the survey area, the current survey area has been reasonably well examined with all major habitat types and most variants searched for flora.

As there was reasonable rainfall in the month before the first visit to the survey area, it is also likely that most of the annual species that occur in the survey area were available for collection, although some that require heavier rain would not have been available. Overall, it seems likely that the annual flora is somewhat less well sampled than the perennial flora, but that it has been reasonably well surveyed. Given the intensity of the field work carried out in the survey area, it is considered that probably between 85% and 90% of the vascular flora occurring in the survey area was recorded during the survey.

A significant limitation of the flora survey was that lichens, mosses, liverworts and fungi were not systematically collected or recorded. This is common practice in survey work carried out for environmental impact assessment in Western Australia because of the difficulty of working with these groups of organisms and their relatively small contribution to the biomass of most vegetation. During the survey, however, it was noted that species of these groups of organisms occur sporadically within the survey area.

The other possibly significant limitation relates to the difficulty of identification (and hence assessment of conservation status) of some species due to the poor state of knowledge of some flora groups. This is discussed in the next section.

### 3.0 TAXONOMIC PROBLEMS IN SOME PLANT GROUPS FOUND IN THE SURVEY AREA

The taxonomy of some plant groups that occur in the Fortescue Botanical District is still poorly resolved, even though some of these groups have been the subject of fairly recent studies. These groups include the genera *Corymbia* (formerly part of the genus *Eucalyptus*), *Senna* (formerly *Cassia* in Australia), *Tephrosia*, *Rhynchosia*, *Sida*, *Hibiscus* and that part of the genus *Acacia* (the wattles) that includes the Mulgas (*Acacia aneura* and related species), the latter group not occurring in the current survey area.

*Corymbia* includes both the *bloodwoods* (the group of eucalypts which have the typical 'gumnut' fruit) and the *paper fruited bloodwoods* (which have a much smaller and thinner fruit). Recent taxonomic publications have expressed significant differences of opinion as to the number of species of bloodwoods in the Fortescue Botanical District. It seems from the observations made during the field work for an earlier study (Trudgen and Casson 1998) for the West Angelas project and other surveys, that the situation is still unresolved. However, because of the difficulty of the situation, it has been necessary to follow the latest treatment, but to acknowledge that the name *Corymbia hamersleyana* as applied in this report may cover more than one taxon.

*Senna* presents a particular problem for two reasons. Firstly the taxonomy below the genus level proposed in the most recent revision (Randell 1989) does not fit at all well with the variation observed in the field, although some more recent changes have advanced the situation. This is partly (and possibly mostly) a problem of rank, with what appear to be good species being compressed into subspecific taxa making an unwieldy nomenclature of subspecies and varieties. However, there are also hybrids, and the nomenclature of these under Randell's treatment is particularly unwieldy. To deal with this problem, the older treatment of Symon (1966), which used the genus name *Cassia*, has been used as the best guide to specific rank (the species limits in this treatment agree well with observations made in the field), with species not having a published name in *Cassia* being referred to by their epithet published under *Senna* but in parentheses. For example, *Senna artemisioides* ssp. *stricta* will be referred to as *Cassia 'stricta'*.

*Rhynchosia* is very poorly known in Western Australia and the taxa are not easy to differentiate. The more obviously different taxa were given geographical names to enable them to be referred to when identifications were done for Trudgen and Casson (1998) and Trudgen and Griffin (2001), these have been used for this report also. The remainder have been referred to *Rhynchosia* cf. *minima* which may still include more than one taxon.

The genus *Tephrosia* (Papilionaceae) has many taxa in the Fortescue Botanical District. While some of these are very distinct, there are complexes of taxa related to *Tephrosia supina*, *Tephrosia clementii* and *Tephrosia rosea*. Fortunately, a revision of the genus is being carried out, but the results are not yet available.

The part of *Hibiscus* that includes *Hibiscus sturtii* and related taxa is very poorly studied, as is the *Hibiscus coatesii* complex. Both groups within the genus include a number of undescribed taxa (mostly good species), while it has been possible to refer to some of these taxa, it is very difficult to assess their conservation status.

## 4.0 FLORA SURVEY

### 4.1 Flora recorded during the survey

The total number of taxa recorded for the survey area was three hundred and ninety-six (396). Of these, five are weeds, one is the fern *Cheilanthes vellea* and one is the hybrid *Cassia oligophylla* x *helmsii*. The remainder are native flowering plants, one of which (*Acacia coriacea*) is represented in the survey area by two subspecies.

Of the native flowering plant species recorded, seventy-five (75) are monocotyledons and three hundred and thirteen (313) are dicotyledons. The monocotyledons are from three families: Typhaceae (bullrushes), Poaceae (the grasses) and Cyperaceae (the sedges). The dicotyledons belong to fifty (50) different families. The families represented by the most taxa are the

- Poaceae (grasses, 61 taxa, including the weeds \**Cenchrus ciliaris* and \**Cynodon dactylon*);
- Cyperaceae (sedge family, 15 taxa);
- Malvaceae (*Hibiscus* family, 32 taxa);
- Papilionaceae (pea family, 50 taxa);
- Mimosaceae (wattle family, 38 taxa - all but two are *Acacia* species);
- Amaranthaceae (Mulla-mullas, 17 taxa);
- Euphorbiaceae (*Euphorbia* family, 18 taxa, including the weed *Ricinus communis*);
- Caesalpiniaceae (*Cassia* family, 14 taxa - all but one were *Cassia* species);
- Tiliaceae (*Corchorus* family, 15 taxa);
- Myrtaceae (*Melaleuca* and gum family, 11 taxa);
- Convolvulaceae (morning glory family, 13 taxa);
- Boraginaceae (borage family, 11 taxa);
- Asteraceae (daisy family, 15 taxa)
- Goodeniaceae (fan flower family, 7 taxa).

All the other plant families on the flora list for this survey area are represented by five or less species. Seventeen native flowering plant families were only represented by one taxon and nine by two taxa.

### 4.2 No declared rare flora recorded in the survey area

Declared rare flora species are legally protected and cannot be "taken" without permission of the Minister for Conservation and the Environment.

No declared rare flora species were recorded during the survey reported here.

There are two Declared Rare Flora on the Pilbara region section of the *Declared Rare and Priority List* (Atkins 2001). These are *Lepidium catapycnon* and *Thryptomene wittweri*. The known distribution of *Lepidium catapycnon* is restricted to the Hamersley and Ophthalmia Ranges and this species is very unlikely to occur in the current survey area. *Thryptomene wittweri* has a wider distribution, extending out of Western Australia. However, in Western Australia its known occurrences are in the Hamersley Range and further south. Therefore, this species is also quite unlikely to occur in the current survey area, although as it prefers hilly areas it is not impossible that it occurs in the Gorge Ranges.

### 4.3 Priority flora species recorded during the survey

Priority flora species are plant species which due to being rare, uncommon, restricted in distribution, under some threat to their populations, or poorly known, are of conservation significance, but are not declared rare flora species as they have not been adequately surveyed.



Priority flora are ranked from one to four depending on their conservation status. A list of the criteria for the different ratings is given in Appendix four.

Eight priority flora species were collected during the survey, they are discussed individually below.

### ***Eriachne tenuiculmis***

*Eriachne tenuiculmis* is a Priority 3 species. It is a perennial tussock grass species and was recorded from six of the Quadrats recorded during the survey carried out for the Panorama project (see Appendix 4)

Until relatively recently, *Eriachne tenuiculmis* was only represented in the Western Australian Herbarium by three specimens. Since it was placed on the Priority list, many more records of its occurrence have been made. This is partly a result of surveys having been carried out in areas where it occurs more frequently and partly that attention has been focussed on it by the listing, probably resulting in more careful identification of specimens of *Eriachne* that might be this species. *Eriachne tenuiculmis* is somewhat similar to *Eriachne mucronata* and has probably often been mistaken for the latter species, especially when sterile. It is certainly the species recorded as *Eriachne* aff. *mucronata* for the Burrup Peninsula by Blackwell *et al* (1979).

The type of *Eriachne tenuiculmis* is from Nichol Bay and it is therefore not surprising that recent survey work on the Burrup Peninsula and Dolphin Island (Trudgen & Long in prep and CALM unpublished data) has recorded thirty-five occurrences of this species from the Burrup Peninsula and nearby Islands. *Eriachne tenuiculmis* was also recorded at seven of the quadrats recorded for the Hope Downs - Port Hedland rail line survey (Maier and Trudgen in prep.), thirty two of the relevés recorded in the Chichester Range for the West Angelas ERMP survey (Trudgen and Casson (1998) and two of the quadrats recorded for the Cape Preston survey (Maier and Trudgen 2000). The details of these records are given in Appendix 4.

*Eriachne tenuiculmis* is now known to be reasonably common in suitable habitat not only on the Burrup Peninsula, where it is quite common, but in at least parts of the Chichester Ranges and similar areas. It prefers small to medium sized creek lines, usually where the bed is fairly cobbly, or at least pebbly, in such habitat it is often quite common where it occurs. *Eriachne tenuiculmis* should be removed from the Priority list.

### ***Abutilon trudgenii* (ms)**

*Abutilon trudgenii* (ms) is a priority three species. This small shrub is a short lived pyrosere species, that also occasionally comes up in disturbed areas. It is poorly collected rather than rare, although it is not very common. It was recorded from six of the quadrats recorded at Cape Preston (Maier and Trudgen 2000), seven of the quadrats recorded for the Hope Downs - Port Hedland rail line survey (Maier and Trudgen in prep.), seven of the quadrats recorded for the current survey and also at several of the relevés recorded for the current survey and at nine of the relevés recorded in the Chichester Ranges for the West Angelas ERMP survey (Trudgen and Casson 1998) and another 14 relevés recorded for that survey in the Hamersley Ranges. The details of recent records of this species are given in Appendix 4.

In addition, there are specimens of *Abutilon trudgenii* (ms). lodged at the WA Herbarium from the Cane River, Hillside Station, Goldsworthy and Tom Price. However, according to the Priority Species List this species is known from other locations including Warralong, Woodstock, Point Sampson, Karratha and Pannawonica (Atkins, 2001).

*Abutilon trudgenii* should be considered to be poorly collected, rather than rare and should be removed from the priority list.

***Euphorbia clementii***

*Euphorbia clementii* is a priority two species. It is a small annual herb, with white sap.

*Euphorbia clementii* was only collected twice during the current survey and was very uncommon in the survey area. It only seems to occur in the north-eastern part of the Fortescue Botanical District, with the distribution given as "Port Hedland area, Yarrie" in the priority flora list (Atkins 2001), a collection in the Western Australian Herbarium from Talga Gap and another record made south of Port Hedland during the survey of the proposed route of the Hope Downs - Port Hedland railway (Maier and Trudgen in prep). The spread of collections suggests that this species is possibly uncommon rather than rare, noting that the area which it occurs in is quite poorly known botanically and it is not a large or showy species.

***Gonocarpus ephemerus***

*Gonocarpus ephemerus* is a priority 2 species and is a small spreading annual herb, with inconspicuous flowers.

This species was collected at two localities in the current survey area, where it was quite uncommon, being restricted to seasonally damp spots in creek habitats. There are specimens of this species in the Western Australian Herbarium from Mt Augustus, Rudall River, Jigalong and near Port Hedland in the Pilbara, another specimen from the Carnarvon Range in the Little Sandy Desert. *Gonocarpus ephemerus* was also recorded from three locations during the survey of the proposed route of the Hope Downs - Port Hedland railway. One of the sites was located on a floodplain and two opportunistic collections were associated with granite outcrops (Maier and Trudgen in prep). This species appears to be uncommon (or poorly collected) rather than rare.

***Gymnanthera cunninghamii***

*Gymnanthera cunninghamii* is a priority three species. It is a perennial species with erect stems to about 1-1.4 metres tall from underground bases or probably rhizomes, with clusters of a few to a moderate number (say ca. 20-30) stems in an occurrence. Thus what appear to be groups of individuals may be one individual.

*Gymnanthera cunninghamii* was only recorded once during the current survey, at the edge of the Shaw River near the Bernts ore body. It is very widespread, occurring in the NT and Queensland as well as Western Australia, but seems to occur very sporadically and be quite uncommon in the Fortescue Botanical District. Three records were made for the species from nearly 300 quadrats for the Port Hedland railway survey (Maier and Trudgen in prep.) and four from about 180 quadrats recorded on the Burrup Peninsula and adjoining islands by Trudgen and Long (in prep), but not at other plots recorded by them further inland. This species was not recorded in over four hundred relevés recorded in the Chichester Range by Trudgen and Casson (1998) and Trudgen (1999), indicating that it either does not occur there, or is extremely uncommon there.

***Olearia fluvialis***

*Olearia fluvialis* is a priority two species. It is a small perennial shrub, is quite uncommon and has a very restricted habitat range, only occurring in the beds of large creeks and rivers, usually in cobbly or pebbly/cobbly areas (sometimes with a sand cover).

*Olearia fluvialis* was only collected from the Shaw River bed near the Mt Magnet road during the current survey. It was collected at one of the nearly 300 quadrats recorded for the Port Hedland railway survey (Maier and Trudgen in prep.) and also by one incidental collection during that survey. It was not recorded from the ca. 220 quadrats recorded on the Burrup Peninsula, adjoining islands and further inland by Trudgen and Long (in prep).

#### ***Ptilotis mollis***

*Ptilotis mollis* is a priority two species. It is a small perennial shrub that favours ridge crests and scree slope. It is very uncommon in the Fortescue Botanical District (it has also been recorded from the Rudall River area).

*Ptilotis mollis* was recorded from the Sulphur Springs and Kangaroo Caves ore body survey areas during the current survey. It was only observed on the rocky crests of high shale ridges, with scattered small populations located on rocky areas. While some of the ridges were quite long (up to 2 to 3 km), their height and the extent of the shale rock outcropping varied such that where *Ptilotis mollis* occurred it was restricted to patches about 30 to 50 metres across. There were only about six or seven such occurrence of *Ptilotis mollis* in the Sulphur Springs survey area and two or three in the Kangaroo Caves survey area. None were observed in the Bernts survey area.

#### ***Acacia glaucocaesia***

*Acacia glaucocaesia* is a priority three species. It is a large perennial shrub that grows in creeks and on gentle slopes in the Panorama survey area.

*Acacia glaucocaesia* was recorded at three of the relevés recorded for the vegetation mapping during the October field trip along the access road. At M34 and M36 (where it replaced *Acacia tumida* in the tall shrub layer in places) it was listed in the associated species, while at M35 it occurred as scattered shrubs in the tall shrub layer. It was also observed to be prominent in the vegetation at another locality.

#### **4.4 Priority Flora species potentially in the survey area, but not recorded by the survey**

Although the survey area has been fairly well searched for flora, other priority species may occur there, as it would take very large amounts of time (and repeated visits in good seasons) to examine all parts of an area the size of the combined survey area intensively enough to find all occurrences of priority flora species.

Determining which other priority species would be most likely to occur within the survey area is problematic, as is indicated by the occurrence of *Ptilotis mollis* there. This species has a very sporadic distribution, with the other known locations being further inland. However, from the known distributions for the other Pilbara priority flora species and recent records for the Hope Downs - Port Hedland Rail survey (Maier and Trudgen in prep), a list can be prepared (see Table 2) that indicates which other priority flora species may occur in the survey area, noting that it would be likely that such species would have small populations in the survey area if they did occur there, given the searches already made.

Other species could be added to the list in Table 2, but this would quickly become nonsensical. What is appropriate, is to acknowledge that there may be some occurrences of priority species in the survey area that have not yet been recorded there.

Table 2: Priority species not recorded in the current survey area, but possibly there.

Species	Priority level and location or habitat details
<i>Ptilotus appendiculatus</i> var. <i>minor</i>	P1. Known from Boodarie
<i>Gomphrena pusilla</i>	P2. Known from Finucane Island
<i>Bulbostylis burbridgeae</i>	P3. Known from Gallery Hill Tors in the Abydos-Woodstock Reserve
<i>Goodenia pascua</i> ,	P3. Occurs on cracking clays
<i>Hibiscus brachysiphonius</i> ,	P3. Occurs on cracking clays
<i>Fimbristylis sieberiana</i> ,	P3. Occurs next to pools. Pilbara and Kimberley
<i>Phyllanthus aridus</i>	P3. Occurs next to or in creeks. Pilbara and Kimberley
<i>Hibiscus brachysiphonius</i>	P3. Occurs on cracking clays
<i>Goodenia nuda</i>	P3. Recorded by Hope Downs - Port Hedland rail survey

#### 4.5 Other species of conservation interest recorded

These are species which are neither declared rare flora nor priority flora, but which are of conservation interest for a number of reasons including:

- being uncommon or possibly rare, but not officially recognised as such;
- being newly discovered, in which case they may be rare or at least poorly collected or known, and indeed, may be rarer than some priority flora or declared rare flora;
- being newly recognised as distinct, although they have been collected previously (many of this group are uncommon or rare also);
- the population in the study area may be at the end of the range of the species and therefore of particular conservation significance;
- the population in the study area may be a significant extension of the known range of the species concerned.

The species considered in this section are grouped into:

- new species that are very distinct and were uncommon in the survey area, suggesting that they are rare species;
- locally more common new species; and
- widespread poorly collected and apparently uncommon species
- other species of conservation interest.

##### 4.5.1 Previously uncollected species that deserve priority status

The two species discussed here both appear to be not only previously unknown to science ("new"), but were also quite uncommon in the current survey area, suggesting that they are uncommon species overall. In contrast to this, some other taxa collected in the survey area thought to be new species were common there, suggesting that they are also likely to be common in the adjoining areas of the Gorge Ranges. For the purposes of this report, if a taxon is not represented at the Western Australian Herbarium it is considered to not have been collected before.

***Themeda* sp. Panorama**

This large tussock grass species was discovered in a small creek between the Sulphur Springs and Kangaroo Caves ore bodies. It is very different from the other *Themeda* (Kangaroo or Wallaby grass) species in the Pilbara and appears to represent a new, distinctive species that is restricted to the Gorge Ranges. On current knowledge, *Themeda* sp. Panorama is quite rare. However, there has been little or no previous botanical collecting in the Gorge Ranges and it is likely that there are other populations of this species in the ranges, but even so, it is unlikely that these are very large and the species deserves to be placed on the priority flora list.

***Pityrodia* sp. Panorama (BMor 151)**

This perennial shrub species was mostly recorded from ridge tops in the Sulphur Springs and Kangaroo Caves ore body survey areas (rarely from lower slopes) and appears to be a new and distinctive species. Like *Themeda* sp. Panorama, on current knowledge *Pityrodia* sp. Panorama is quite rare, but is likely to have other populations in the Gorge Range.

There were six populations in the Sulphur Spring ore body survey area, ranging from one to nineteen individuals, for a total of thirty-two plants. Three of the sites were on sandstone ridge tops and three from hilltops of volcanics of the Kangaroo Caves Formation. All the sites were in the southern half of the Sulphur Springs ore body survey area. There were also two populations in the Kangaroo Caves survey area, with one and eight individuals each respectively. One population was on the lower slopes of a shale ridge in vegetation of *Acacia inaequilatera* scattered shrubs over *Triodia wiseana* hummock grassland. The other was on the Kangaroo Caves formation on an upper slope, near quadrat PAN080.

**4.5.2 Locally more common previously uncollected species**

The species considered here have apparently not been collected before, but are relatively common in the Panorama survey area, suggesting that they are also likely to be common in the adjoining parts of the Gorge Range.

***Triodia* sp. Panorama.**

The taxon given this informal name appears to be a new species related to *Triodia longiceps*, differing in the leaf sheaths and auricles being hairy (they are glabrous in *Triodia longiceps*) and the leaves having scattered droplets of resin on them. While *Triodia* sp. Panorama is geographically restricted on current knowledge (there is no matching material at the Western Australian Herbarium) it is not rare as the populations in the survey area are quite large. The largest populations of this taxon were along the access road where it crossed the foothills of the escarpment of the Gorge Range. To the east of the gorge where the road enters the scarp, *Triodia* sp. Panorama is the dominant hummock grass over areas of low rises. in the Sulphur Springs ore body survey area, where it was the dominant over small areas in the valley the access road passes through and was present in some small creek lines.

***Corchorus* sp. Panorama**

The taxon given this name could not be matched at the Western Australian Herbarium. Seven collections were made, five from the Sulphur Springs ore body survey area and two from in and near the Kangaroo Caves survey area (see Table 3). *Corchorus* is a particularly difficult genus and although there have been some recent publications, more work would be required before the taxon could be positively said to be undescribed and restricted in distribution. However, it is likely given current information that the taxon is undescribed and restricted to the Gorge Ranges, but not uncommon there. At two of the relevés where it was recorded, *Corchorus* sp. Panorama was abundant enough to be included in the vegetation descriptions.

Table 3: Records of *Corchorus* sp. Panorama from the survey.

Location	Releve or specimen number
Sulphur Springs survey area	Releve B16
Sulphur Springs survey area	Collection B. Morgan C28
Track just north of Kangaroo Caves survey area	Releve B113
Sulphur Springs survey area	Releve B28
Sulphur Springs survey area	Releve B51
Kangaroo Caves survey area	Releve B90
Sulphur Springs survey area	Releve B50

***Corchorus aff laniflorus* (PAN 76)**

This taxon also seems to represent a new species. It was fairly common in the Gorge Ranges parts of the survey area (where seventeen collections of it were made, see Table 4), but was not collected on the access road across the granite plains, or in the foothills of the ranges. Similar comments apply to this taxon as were made for the one immediately above.

Table 4: Records of *Corchorus aff laniflorus* (PAN 76) from the survey.

Project	Location
Panorama survey	Quadrat P82
Panorama survey	Quadrat P80
Panorama survey	Quadrat P76
Panorama survey	Quadrat P62
Panorama survey	Quadrat P57
Panorama survey	Quadrat P49a
Panorama survey	Quadrat P49
Panorama survey	Quadrat P4
Panorama survey	Quadrat P42
Panorama survey	Near releve C45
Panorama survey	Releve B87
Panorama survey	Releve B75
Panorama survey	Releve B31
Panorama survey	Releve B30
Panorama survey	Releve B125
Panorama survey	Releve B119
Panorama survey	Releve B117

***Indigofera monophylla* (PAN57-9), *Indigofera monophylla* (PAN58-17), *Indigofera monophylla* (PAN65-14)**

It has been known for some time that *Indigofera monophylla*, as the name has been applied, is not one taxon, however identifications for several recent surveys have shown that there are more taxa involved than was previously realised. The three taxa considered here were not recorded during the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.), but were fairly common in the Panorama survey area, while some other taxa in the complex were recorded in both survey areas. This and their absence from flora lists for other recent surveys, suggests that they may be restricted in their distribution, although they may occur further to the east. Although it is not certain that they have not been collected at all before (it was not possible to exhaustively check all the collections referred to *Indigofera monophylla* at the Western Australian Herbarium, due to the time this would have taken), they certainly have not been recognised as distinct before. These taxa should be considered likely to be geographically restricted on current knowledge, but not rare.

### 4.5.3 Widespread poorly collected and apparently uncommon species

The species considered here are known from a few earlier collections, and on current knowledge are uncommon.

#### ***Corchorus* aff. *walcottii* (H251-3)**

This species was recorded at releve M19, where 12-15 plants were observed in the immediate locality of the releve (the population probably extended along the creek). *Corchorus* aff. *walcottii* (H251-3) is widespread in the Fortescue Botanical District, but is very sporadic in its distribution and should be considered uncommon. There are four specimens in the Western Australian Herbarium and the species was also collected four times during the survey for the Port Hedland to Hope Downs rail line (Maier and Trudgen in prep).

Table 5: Records of *Corchorus* aff. *walcottii* (H251-3) from the current survey and the Port Hedland to Hope Downs rail survey.

<b>Project</b>	<b>Site collected at</b>
Port Hedland to Hope Downs	H254
Port Hedland to Hope Downs	H253
Port Hedland to Hope Downs	H251
Port Hedland to Hope Downs	H246
Panorama survey	M19

#### ***Cullen* aff. *lachnostachys* (MET 15,154)**

This taxon was collected at several sites during the current survey (see Table 6 below) and was also recorded at releve M45. It is an apparently undescribed species fairly close to *Cullen lachnostachys*. There are a few specimens in the collections of the Western Australian Herbarium. It is fairly widespread, but poorly collected. It was only collected once during the West Angelas ERMP botanical survey (for which 1,200 sites were recorded) and was not collected during the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.). Some of the populations in the Panorama survey area were fairly large, but it was not possible to carry out population counts.

Table 6: Records of *Cullen* aff. *lachnostachys* (MET 15,154) from the current survey and the West Angelas ERMP Survey (Trudgen and Casson 1998)

<b>Project</b>	<b>Site recorded at and collections</b>
Panorama survey	Releve M37 (MET 21,322)
Panorama survey	Releve M39 (MET 21,332)
Panorama survey	Releve M42
Panorama survey	Releve M45 (recorded)
Panorama survey	60 metres upstream of releve B47, near the centre of the Sulphur Springs survey area (Collection BMor C34)
Panorama survey	Quadrat PAN26B-17
West Angelas ERMP survey	Site 0043 (near escarpment of Chichester Range)

#### ***Rhynchosia* sp. King Bay**

Most of the collections of *Rhynchosia* held at the Western Australian Herbarium are on loan and not available for comparison, however only two collections of *Rhynchosia* sp. King Bay have been made during several recent large surveys in the Pilbara (Cape Preston survey, Burrup survey, Port Hedland to Hope Downs rail survey and the current survey). This suggests that the taxon is very uncommon in the Pilbara, although it may also occur in the Kimberleys. One collection was made at quadrat PAN001 during the current survey and there is a record from quadrat B181 from near King Bay on the Burrup Peninsula.

### ***Vigna* sp. Harding Dam**

This taxon has been recorded from three collections (see Table 7, below), two from the Harding Dam area and one from the current survey. There are no matching specimens in the Western Australian Herbarium and it seems to represent a new, very uncommon species.

Table 7: Records of *Vigna* sp. Harding Dam

Project	Site recorded at
Burrup Peninsula survey, Harding Dam sub-area	Quadrat HD189
Burrup Peninsula survey, Harding Dam sub-area	Quadrat HD188
Panorama	Near quadrat PAN64

#### **4.5.4 Other species of conservation interest**

The species considered here are mostly of interest for reasons other than rarity, although some may be uncommon, but need more study and collections to confirm this.

#### ***Acacia* sp. (PAN M48)**

The specimen referred to here was collected at one of the releves (M48) recorded for the mapping of the access road. The taxon concerned was not observed elsewhere during the survey. It could not be finally determined without flowers or fruit, but is "unusual, possibly rare - certainly uncommon" (B. Maslin pers com.). While this taxon may be rare, it needs further study before it could be recommended that it be placed on the priority flora list.

#### ***Triodia melvillei***

The material referred to *Triodia melvillei* in this report matches some of the material in the Western Australian Herbarium under that name, which is from similar habitat (the crests and upper slopes of high ridges) to the material from the survey area. *Triodia melvillei* is usually found on plains, and the material from high ridges may represent another taxon, but this cannot be resolved without better material.

#### ***Acacia citriodora***

This species was collected near quadrat PAN 52. It was only collected once during the survey and was not common in the survey area. *Acacia citriodora* is "very uncommon in the Pilbara" (B. Maslin pers com.), but is more common in the Kimberleys. The Western Australian taxon may not be the same as that the name is applied to in the eastern states.

#### ***Mallotus ?dispersus***

One collection of *Mallotus* was made at quadrat PAN071, which was located in the creek in the gorge through the escarpment of the Gorge Ranges. *Mallotus* is uncommon in the Fortescue Botanical District, but more common in the Kimberleys. The material was sterile and could not be confidently identified.

#### ***Eriachne* sp. Port Hedland**

This small annual grass species seems to have not been collected before 2001. It was collected at one locality (quadrat PAN038) during the current survey, but at twenty-four localities during the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.). It seems to be fairly common in suitable habitat (parts of the granite plains where there are thin soils, especially near granite outcrops) south from Port Hedland. The frequency of collection during the Port Hedland to Hope Downs survey partly reflects the good conditions when the survey was carried out and partly the intensity of the survey.

#### ***Acacia* aff. *drepanocarpa* ssp. *drepanocarpa***

Only two individuals of this taxon were seen in the Sulphur Springs ore body survey area. They were several hundred metres apart on the lower colluvial slopes of the north side of a ridge forming the south side of the tailings dam valley. This taxon is possibly rare (B. Maslin



pers com.), but needs further study before it could be recommended that it be placed on the priority flora list. One individual was located about 150 metres west-north-west of PAN047 and the other about 500 metres west-north-west of PAN053.

***Triodia angusta* Panorama form & *Triodia angusta* Shaw River form**

*Triodia angusta* has been defined quite broadly in recent taxonomic treatments, but the existence of "forms" has been noted for some time. For example, N.T. Burbidge, who studied the genus in the mid 1900's and collected in the Pilbara noted different forms on some of her collection labels. The status of the two forms recognised in this study needs clarification through further study, although it is likely that they are separate species or subspecies. It is unlikely that they are rare, although they may have fairly limited distribution. They do have significance for vegetation conservation assessment, as to confuse them with the more widespread form would mean treating vegetation units as more widespread than they actually are.

***Tephrosia* aff. *supina* (HD88-4)**

The taxon referred to this informal name was recorded twice in the Panorama survey area (see Table 8, below) and is also known from one collection from the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep). Most of the collections of *Tephrosia* held by the Western Australian Herbarium are on loan for use for revision of the genus in Australia and therefore are not available for comparison. The name *Tephrosia supina* as currently applied has a number of forms that are probably good species or subspecies, however significant work is needed before assessments of their conservation status can be confidently made. In the interim, *Tephrosia* aff. *supina* (HD88-4) should be considered poorly collected and possibly uncommon.

Table 8: Records of *Tephrosia* aff. *supina* (HD88-4)

Project	Location
Port Hedland to Hope Downs	Quadrat H88
Panorama survey	Quadrat PAN 25
Panorama survey	Near quadrat PAN021

***Sida* aff. *fibulifera* (PAN10-6)**

Like *Tephrosia supina*, *Sida fibulifera* has a number of forms that are probably good species. While some of these are widespread, others are apparently more restricted. *Sida* is also being revised currently, making conservation assessments difficult for some species groups such as *Sida fibulifera*. Until better information is available, *Sida* aff. *fibulifera* (PAN10-6) should be considered poorly collected and possibly uncommon. Only one collection of *Sida* aff. *fibulifera* (PAN10-6) was made, at quadrat PAN10, during the survey. It was not recorded during the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.).

***Euphorbia* sp. (PAN5-15) and *Euphorbia* sp. (PAN1-14B)**

The genus *Euphorbia* urgently needs revision in the Pilbara. Seventeen taxa are currently recognised for the Pilbara biogeographic region (equivalent to the Fortescue Botanical District) based on Western Australian Herbarium records (Paczkowska and Chapman 2000), but the actual number of taxa present there is over forty. There are only forty-two taxa recognised for the state, many of which are weeds!!! Given this situation, it is extremely difficult to make conservation assessments for species in the region, except for very distinctive taxa such as *Euphorbia clementii*. Bearing this in mind, *Euphorbia* sp. (PAN5-15) and *Euphorbia* sp. (PAN1-14B) should be considered as likely to be poorly collected and very poorly collected respectively. *Euphorbia* sp. (PAN5-15) was collected once during the Panorama survey and four times during the Port Hedland to Hope Downs rail survey (Maier

and Trudgen in prep.), while *Euphorbia* sp. (PAN1-14B) was collected once during the Panorama survey and not collected during the Port Hedland to Hope Downs rail survey.

***Triumfetta* aff. *chaetocarpa* (Panorama form)**

While there is a recent revision of *Triumfetta*, there are still significant taxonomic problems in the genus in the Pilbara, with several "species" in fact being clusters of closely related species that have not been recognised as distinct. *Triumfetta chaetocarpa* is one such species and *Triumfetta* aff. *chaetocarpa* (Panorama form) and *Triumfetta* aff. *chaetocarpa* (PAN3/4) (see immediately below) another. The conservation status of these taxa is difficult to define, because of the difficulty of the genus. However, *Triumfetta* aff. *chaetocarpa* (Panorama form) seems to be fairly restricted in distribution (see Table 9, below), and possibly uncommon but not rare. It was not recorded during the Port Hedland to Hope Downs Rail survey (Maier and Trudgen in prep.).

Table 9: Records of *Triumfetta* aff. *chaetocarpa* (Panorama form) from the Panorama survey

Project	Location
Panorama survey	Quadrat PAN 25
Panorama survey	Quadrat P70-2
Panorama survey	Quadrat P60-2
Panorama survey	Quadrat P59-7
Panorama survey	3.5 km south of Marble Bar road (MET 21260)
Panorama survey	Releve M71

***Triumfetta* aff. *chaetocarpa* (PAN3/4)**

The comments about *Triumfetta* made under *Triumfetta* aff. *chaetocarpa* (Panorama form) (see immediately above) apply to this species as well. However, *Triumfetta* aff. *chaetocarpa* (PAN3/4) appears to be less common with only one collection made during the Panorama survey and none during the Port Hedland to Hope Downs Rail survey (Maier and Trudgen in prep.). The specimen was collected near quadrats PAN003 and PAN004 in the access road survey area near the Marble Bar road.

## 5.0 VEGETATION OF THE PANORAMA SURVEY AREA

### 5.1 Introduction

The vegetation of the Panorama project area is described (based on a combination of structure, dominance and floristics) using the modification by Aplin (1979) of Specht's classification table (see 5.2) and mapped (see map 1) as units that are considered to vary from the plant community level to the vegetation association level. This type of description allows comparison with other areas, but the number and variability of such units makes such comparison inherently difficult, although it is still a valuable part of understanding the conservation value of areas of vegetation. Some areas were mapped as mosaics of vegetation units, each mosaic area including a number of vegetation units. This was done in cases where the vegetation varied considerably in the area between the vegetation units shown.

The abbreviations used for species used in the codes for vegetation units on the vegetation maps (Maps 1 to 6) are shown in Table 10. They are derived from the first letter of the generic name and generally the first letter of the species name of the more abundant species in the different strata present in the unit. Where there is more than one species in the genus, or where two genera have the same initial, a lower case letter is used to distinguish which species is being referred to.

**Table 10:** Abbreviations for species names used in the codes for the vegetation units mapped for the survey area.

Aa	=	<i>Acacia ancistrocarpa</i>	Aa'	=	<i>Acacia acradenia</i>
Ab	=	<i>Acacia bivenosa</i>	Ac	=	<i>Acacia coriacea</i> subsp. <i>pendens</i>
Ad	=	<i>Acacia adoxa</i> var. <i>adoxo</i>	Ae	=	<i>Acacia elachantha</i>
Af	=	<i>Acacia farnesiana</i>	Ag	=	<i>Acacia glaucocoesia</i>
Ah	=	<i>Atalaya hemiglauca</i>	Ah'	=	<i>Acacia hilliana</i>
Ai	=	<i>Acacia inaequilatera</i>	Ao	=	<i>Acacia orthocarpa</i>
Ao'	=	<i>Acacia orthocarpa</i> (wispy form)	Ap	=	<i>Acacia pyrifolia</i> (slender, white)
Ap'	=	<i>Acacia ptychophylla</i>	Ap''	=	<i>Acacia pruinocarpa</i>
As	=	<i>Acacia stellaticeps</i>	As'	=	<i>Acacia spondylophylla</i>
At	=	<i>Acacia tumida</i>	At'	=	<i>Acacia trachycarpa</i>
*C	=	* <i>Cenchrus ciliaris</i>	C	=	<i>Corymbia hamersleyana</i> , <i>Corymbia zygophylla</i>
Ca	=	<i>Cymbopogon ambiguus</i>	Ca?	=	<i>Corymbia ?aspera</i>
Cc	=	<i>Cajanus cinereus</i>	Cf	=	<i>Chrysopogon fallax</i>
Cf'	=	<i>Corymbia ferriticola</i> ssp. <i>ferriticola</i>	Cg	=	<i>Cassia glutinosa</i>
Ch	=	<i>Corymbia hamersleyana</i>	Cl	=	<i>Cullen leucanthum</i>
Cl'	=	<i>Cullen lachnostachys</i>	Co	=	<i>Cassia oligophylla</i>
Cp	=	<i>Corchorus parviflorus</i>	Cp'	=	<i>Corchorus</i> sp. Panorama
Cpr	=	<i>Cassia pruinosa</i>	Cr	=	<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>
Cv	=	<i>Cyperus vaginatus</i>	Cy	=	<i>Corchorus</i> aff. <i>laniflorus</i> (PAN 76)
Cz	=	<i>Corymbia zygophylla</i>	Ds	=	<i>Dichanthium sericeum</i> var. <i>humilius</i>
Eb	=	<i>Eriachne benthamii</i>	Ec	=	<i>Eucalyptus camaldulensis</i> var. <i>obtusata</i>
El	=	<i>Eucalyptus leucophloia</i>	Es	=	<i>Ehretia saligna</i> var. <i>saligna</i>
Ev	=	<i>Eucalyptus victrix</i>	Ex	=	<i>Eragrostis xerophila</i>
Fo	=	<i>Ficus opposita</i> var. <i>indecora</i>	Fp	=	<i>Ficus platypoda</i> var. <i>D</i>
Fv	=	<i>Flueggea virosa</i> subsp. <i>melanthesioides</i>	G	=	<i>Grevillea pyramidalis</i>
Ga	=	<i>Gossypium australe</i> (Whim Creek form)	Gw	=	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>
H	=	<i>Hakea lorea</i> ssp. <i>lorea</i>	Hc	=	<i>Hakea chordophylla</i>
Im	=	<i>Indigofera monophylla</i>	Ir	=	<i>Indigofera rugosa</i>
Ma	=	<i>Melaleuca argentea</i>	Mg	=	<i>Melaleuca glomerata</i>
Ml	=	<i>Melaleuca linophylla</i>	P	=	<i>Petalostylis labicheoides</i>

Pf	=	<i>Pluchea muelleri-ferdinandii</i>	Pm	=	<i>Ptilotus mollis</i>
Rm	=	<i>Rhynchosia cf. minima</i>	Sb	=	<i>Streptoglossa bubackii</i>
T	=	<i>Tephrosia</i> sp. B (Kimberley Flora)	Ta		<i>Triodia angusta</i> (Shaw River form)
Tb		<i>Triodia brizoides</i>	Tc	=	<i>Terminalia canescens</i>
Te		<i>Triodia epactia</i>	Th	=	<i>Templetonia hookeri</i>
Tl		<i>Triodia lanigera</i>	Tm	=	<i>Triodia melvillei</i>
Tp	=	<i>Triodia</i> sp. Panorama	Tr	=	<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)
Ts		<i>Triodia schinzii</i>	Ts'	=	<i>Tephrosia spechtii</i>
Tw	=	<i>Triodia wiseana</i>			

## 5.2 Description of the vegetation units

The vegetation descriptions and maps are presented in two parts: one for the proposed access road from the Port Hedland-Marble Bar Road to the Sulphur Springs survey area (upgrading the existing track) and the other for the Sulphur Springs, Kangaroo Caves and Bernts mining tenement areas and the access track between them. The vegetation unit codes for the mining areas and track between them are indicated by a hash (#) sign.

The vegetation units in the survey areas are grouped into the major habitat types occurring in each survey area.

The major habitat types for the proposed access road to Sulphur Springs includes the Shaw River, sand plains, the eroded edge of the sand plains with habitats including low spurs and gullies, small areas of cracking clays, creeks between the lower hill slopes and the sand plain, the low rises and slopes below the escarpment of the Gorge Range, the escarpment and ranges and the large creek in the main gorge.

The major habitat types for the three potential mining areas in the Gorge Ranges are the hill crests and slopes, the valley floors, the creeks and waterways and finally the rockpiles. Within these habitat classes in the proposed mining areas, vegetation units were grouped for some distinctive geological unit, or simply grouped by the dominant *Triodia* species.

### 5.2.1 Vegetation of the proposed access road crossing the Abydos Plain, foothills of the Gorge Ranges and the gorge through the escarpment

#### Vegetation of the Shaw River

**At':** *Acacia trachycarpa* high open shrubland to high shrubland over *Corchorus* sp. (MET 21247) low shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

This unit was recorded at releve M1 on a drift of sand in the bed of the Shaw River, near the proposed Panorama access road.

**EcvAhp:** *Eucalyptus camaldulensis* var. *obtusa*, *Eucalyptus victrix* open woodland to high open woodlands over *Atalaya hemiglauca* scattered low trees over *Petalostylis labicheoides*, *Cullen leucanthum* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

This unit was recorded at releve M12, near the proposed Panorama access track. It occurred on brown sand in the bed of the Shaw River.

**EcAhMg:** *Eucalyptus camaldulensis* var. *obtus*a high open woodland to high woodland over scattered low trees of *Atalaya hemiglauca* over *Melaleuca glomerata* scattered tall shrubs over *Cyperus vaginatus*, \**Cenchrus ciliaris* scattered sedges and grasses.

This unit was occurred in a small channel in the bed of the Shaw River, near the proposed Panorama access road. It was recorded at releve M13.

**MaAt'Mg:** *Melaleuca argentea* low woodland to woodland over *Acacia trachycarpa*, *Melaleuca glomerata* scattered tall shrubs over \**Cenchrus ciliaris* tussock grassland.

This vegetation unit occurred on a large sandy bank or drift in the bed of the Shaw River. It was recorded at releve M14, near the proposed Panorama access track.

### Vegetation of the sand plains

**AsTle:** *Acacia stellaticeps* low shrubland to low open heath over *Triodia lanigera*, (*Triodia epactia*) hummock grassland.

This vegetation unit was recorded at quadrats PAN005, PAN006, PAN007 and PAN009 on low rises on a gently undulating sand plain. At PAN009, scattered *Corymbia zygophylla* occurred and *Triodia schinzii* was recorded, but no *Triodia epactia* was recorded. *Corchorus elachocarpus* formed a low open shrubland at PAN006. Only a few individuals of *Triodia epactia* were recorded in PAN007.

**Ta:** *Triodia angusta* (Shaw River form) hummock grassland.

This vegetation unit was recorded at releve M3 along the proposed Panorama access road near the Port Hedland-Marble Bar Road turnoff. It occurred on a gentle slope into a small creek.

**CzAe:** *Corymbia zygophylla* scattered low trees over *Acacia elachantha*, high open shrubland to open shrubland over *Triodia lanigera* (*Triodia epactia*) hummock grassland.

This unit was recorded at releves M4, M6 and M7, along the proposed Panorama access road near the Port Hedland-Marble Bar Road. It occurred on a gently undulating sand plain. As well as *Triodia lanigera*, *Triodia schinzii* was recorded at M7, but *Triodia epactia* was absent.

**AiAs:** *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* open shrubland over *Triodia lanigera* hummock grassland.

This vegetation was recorded at quadrat PAN014, about 26km south of the Port Hedland-Marble Bar Road. The unit occurred on a gently undulating sand plain.

**Aie:** *Acacia inaequilatera*, *Acacia elachantha* high open shrubland to high shrubland over *Acacia stellaticeps* low shrubland over *Triodia epactia*, *Triodia lanigera* hummock grassland.

This unit occurred in a slight depression in a gently undulating plain. It was recorded at releve M5, along the proposed access road about 1.6km south of the Port Hedland-Marble Bar Road.

**Cl':** *Cullen lachnostachys* high open shrubland over *Cullen martinii* low shrubland over *Triodia lanigera* hummock grassland.

This unit was based on the vegetation recorded at quadrat PAN008 and releve M8. Quadrat PAN008 vegetation included a *Cullen martinii* low shrubland, while releve M8 vegetation

included a *Cullen lachnostachys* high open shrubland over *Pluchea tetranthera* scattered low shrubs. Both units occurred on gently undulating sand plain. Quadrat PAN008 grades into M8, with PAN008 being at one end of a stand of *Cullen lachnostachys*. The southern part of the stand has a mixture of *Cullen lachnostachys* and *Cullen martinii* dominant.

**CAsTl:** *Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* high grassland.

Unit CAsTl occurred over a large area, about 7km along the proposed access track from the Port Hedland-Marble Bar Road. The unit was described from vegetation recorded at releves M9 and M10 and quadrat PAN010, on gently undulating sand plain.

**CTl:** *Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Triodia lanigera* hummock grassland.

This unit was recorded at releve M11 on a lower slope along the Panorama access road. It differed from unit CAsTl (releves M9 and M10 and quadrat PAN010) by having different associated species and by having no shrub or tall shrub layer.

**AiTl:** *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* hummock grassland.

This vegetation unit was recorded at releves M15 and M16. M16 differed in having scattered *Corymbia hamersleyana* low trees over *Acacia ancistrocarpa* scattered tall shrub layers. This vegetation occurred on gently undulating sand plain near a large river.

**ChAiGH:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea pyramidalis*, *Hakea lorea* ssp. *lorea*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* scattered low shrubs to low shrubland over *Triodia lanigera* hummock grassland.

This vegetation unit was recorded on loam soil on gently undulating plain at releve M17.

**GwAs:** *Grevillea wickhamii* ssp. *aprica* high open shrubland to high shrubland over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* hummock grassland.

This unit was described from vegetation recorded at releves M22 and quadrats PAN001, PAN002, PAN003, PAN004. *Grevillea wickhamii* ssp. *aprica* and *Triodia lanigera* occurred in all the plots while *Corymbia hamersleyana*, *Acacia inaequilatera*, *Acacia ancistrocarpa* and *Acacia stellaticeps* occurred in four of the five units. This unit occurred on gently sloping sand to loamy sand plains.

**AtTs:** *Acacia tumida* (*Acacia inaequilatera*) high open shrubland high shrubland over *Acacia ancistrocarpa* scattered tall shrubs over *Triodia schinzii* hummock grassland.

This vegetation unit was recorded at releve M23 and quadrats PAN011 and PAN012 on gently undulating sand plains. *Grevillea wickhamii* subsp. *aprica* was also typical of the area. While releve M23 has a *Corymbia hamersleyana* scattered low tree cover, *Corymbia zygophylla* formed the low tree strata at PAN011 and PAN012 sites.

**GwTs:** *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* high shrubland to high open shrub over *Triodia schinzii* hummock grassland.

This unit was recorded at releve M24 on a gently undulating sand plain.

**AtTI:** *Corymbia hamersleyana* scattered low trees over *Acacia tumida* tall shrubland to open scrub over *Triodia lanigera* hummock grassland.

This unit occurred in a small area not mapped. It was recorded at releve M24A.

**GwAaTI:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia ancistrocarpa* (*Acacia inaequilatera*) high shrubland to open shrub over *Triodia lanigera* hummock grassland.

This unit was recorded at quadrat PAN013 (about 21km along the proposed access road from the Port Hedland-Marble Bar Road) and releve M25. The sites where the unit was recorded were on gently undulating sand plain.

**ChAiaTe:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

This *Triodia epactia* unit was recorded at releve M31 on a sandy loam soil.

**AiaTw:** *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This unit was recorded at releve M32 on a slight rise on the plain.

### **Vegetation of the eroded edge of the sand plain**

**AabTI:** *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia lanigera* hummock grassland.

This unit was described from vegetation recorded at quadrats PAN015, PAN016, PAN018, PAN019, PAN020 and releves M26 and M30. Releve M26 was ecotonal - it occurred on lower slopes of a spur from the sand plain.

**AaPGw:** *Petalostylis labicheoides*, *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* closed shrubland to closed scrub over *Goodenia stobbsiana* scattered low shrubs over *Triodia brizoides* hummock grassland.

This vegetation unit occurred on a slight flow line at the head of a gully between two spurs descending from the edge of the plain towards the Shaw River. It was recorded at releve M27.

**AbTb:** (*Acacia inaequilatera* scattered tall shrubs over) *Acacia bivenosa* scattered tall shrubs over *Triodia brizoides* hummock grassland.

This unit was based on releve M29 and quadrat PAN017. Releve M29 occurred on the lower part of the crest of a low spur running from the plain towards east the river. Quadrat P17 occurred on a small low rise on the plain.

**Ta2:** *Triodia angusta* (Shaw River form) hummock grassland.

This unit was recorded on the gentle lower slopes of a very open small valley, between two low spurs, which leads down towards the river from the plain. The unit was recorded at M28 and differs floristically from the other *Triodia angusta* (Shaw River form) hummock grassland unit, Ta (releve M3).

### Vegetation of the creeks on the edges (near the river) of the sand plains

**ChAt':** Scattered low trees of *Corymbia hamersleyana* over *Acacia trachycarpa* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris*, *Chrysopogon fallax* tussock grassland.

This unit was recorded at releve M2, along a small creek passing through the edge of a gently undulating plain, near a large river.

**ChTa:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form), hummock grassland.

This unit was recorded at releve M18 on the loam slopes of a small creek line running west to east into the Shaw River.

**EvCl:** *Eucalyptus victrix* low woodland over *Cullen leucanthum* (Pan form) high shrubland to open scrub over *Stemodia grossa* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

EvCl vegetation unit was recorded at releve M20 in a small creek between some sand dunes. *Eragrostis tenellula* was common along the creek. There was less \**Cenchrus ciliaris* upstream of the releve site.

**EvAtCl:** *Eucalyptus victrix* low open woodland to low woodland over *Acacia tumida* scattered tall shrubs to open scrub over *Cullen leucanthum* scattered tall shrubs to open scrub over *Bothriochloa?*, *Triodia epactia*, *Chrysopogon fallax*, *Eriachne* sp. aff. *festucea* grassland.

This unit was described from releve M73 which was recorded on a medium sized creek line with a small channel (5m across) and small floodplains. It was not recorded below the escarpment, not at the edge of the sand plain. The releve site had a strip of *Triodia epactia* hummock grassland a few metres wide at the outer edge.

**EvAtP:** *Eucalyptus victrix* scattered trees over *Acacia tumida*, *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia*, (*Eriachne* sp. aff. *festucea*) hummock grassland/grassland.

This unit was recorded at quadrat PAN036 on a medium sized creek line and releve M79 on a small creek with narrow flowline. PAN036 varies from M79 in having *Sorghum plumosum* and *Tephrosia* aff. *rosea* (HD292-37) present.

**Ca?H\*C:** *Corymbia aspera* scattered trees to open woodland over *Hakea lorea* ssp. *lorea* scattered low trees over \**Cenchrus ciliaris*, *Triodia lanigera*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera* grassland.

This unit was recorded at releve M21, on sand-loam on a broad creek line more than 50m across, with no incised bed near Illyareena well. Grass cover was more than 70%.

### Vegetation of a sand dune adjacent to the Shaw River

**HTe(Tl):** *Hakea lorea* ssp. *lorea* scattered trees over \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera*, *Triodia epactia* grassland.



This vegetation unit occurred on siliceous sand. It was recorded at releve M19. The vegetation graded upslope to \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera*, *Triodia lanigera* grassland.

### **Vegetation of cracking clay areas**

**EbCf:** *Eriachne benthamii*, *Chrysopogon fallax* tussock grassland.

This unit was recorded at releve M33. It is not shown on the map, but occurs in the M31 map area west of the old airstrip. Small areas of the cracking clay vegetation were like M33 and some small areas of loose cracking clay occur within vegetation similar to M31. EbCf is a variant of the Eb unit (see below).

**Ex:** *Eragrostis xerophila* tussock grassland.

This unit was not recorded in detail. It occurs in small patches on cracking clay and formed part of the vegetation mosaic recorded at M44a.

**Ds:** *Dichanthum sericeum* ssp. *humilius* annual grassland.

This unit was not recorded in detail. It occurs in small patches on cracking clay and formed part of the vegetation mosaic recorded at M44A.

**Eb:** *Eriachne benthamii* tussock grassland.

This unit was recorded at releve M50 in a small area of about 40 x 10m in a cracking clay patch on a gentle slope.

**Sb:** *Streptoglossa bubakii* open annual hermland over *Ptilotus murrayi* var. *murrayi*, *Fimbristylis* sp. annual hermland/sedgeland.

This vegetation unit was recorded at releve M51, on a cracking clay patch.

### **Vegetation of the medium sized to large creeks in the foothills of the Gorge Ranges**

**AigTe:** *Acacia inaequilatera* scattered tall shrubs over *Acacia glaucocaesia* scattered shrubs over *Triodia epactia*, \**Cenchrus ciliaris* grassland.

This vegetation unit was recorded at releve M35 on a flat area of loamy sand between two branches of a creek.

**Ca?hAipa':** *Corymbia ?aspera* low open woodland over *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia pyrifolia* (slender, white), *Acacia acradenia* high open shrubland over \**Cenchrus ciliaris* *Triodia epactia* (*Chrysopogon fallax*, *Bothriochloa* sp.) grassland.

This unit was recorded at releve M36 on the clay loam of a broad flowline to medium sized creek, without an incised bed. In places this unit has narrow cracking clay soil 'gutters' <1m deep <1m wide. These have *Eriachne benthamii*, *Bothriochloa* sp. grassland along their edge. At the edges of the creek, there are stands of *Acacia acradenia* (in places). Where the site has not been burnt the *Acacia glaucocaesia* is 2.5-4m tall and the *Acacia trachycarpa* is more than 3m tall. The edges of the stand grade to *Corymbia hamersleyana* low open woodland with more *Triodia epactia* than \**Cenchrus*.

**ChAiTe:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Corchorus parviflorus* open heath (seral) over *Triodia epactia* hummock grassland.

ChAiTe was recorded at releve M37 on a gently sloping area, extending down towards releve M35.

**Aa'PfTe:** *Acacia acradenia* scattered tall shrubs over *Pluchea ferdinandi-muelleri* low shrubland with *Triodia epactia*, \**Cenchrus ciliaris* grassland.

Unit Aa'PfTe occurred on a sandy floodplain of a medium sized creek. It was recorded at releve M57.

**EvAtt':**

*Eucalyptus victrix* scattered low trees over *Acacia tumida*, *Acacia trachycarpa* scattered tall shrubs over *Cullen leucanthum* scattered tall shrubs to open scrub over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs to open heath over *Corchorus parviflorus* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

This vegetation unit was recorded at releve M63 on the flood plains (high flow areas) of a medium sized creek, next to the creek channel (8m across). The density of the *Corchorus parviflorus* and the *Tephrosia* aff. *rosea* (HD 292-37) probably relates to fire age (< 5 years). Releve M63 was located along the proposed Panorama access road about 1.5 km west of Lalla Rook Mine.

**ChAtpa':** *Corymbia hamersleyana* low open woodland over *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Acacia tumida* high open shrubland to high shrubland over *Corchorus parviflorus* low open heath (seral) over \**Cenchrus ciliaris*, *Triodia epactia* grassland.

This vegetation unit was recorded at releves M39 and M42. Releve M39 vegetation was on the broad sandy loam floodbanks of a creek line, with a small defined channel. Releve M42 was upstream of M39, with similar vegetation.

**EvAt'a':** *Eucalyptus victrix* scattered trees over *Corymbia hamersleyana* scattered low trees over *Acacia trachycarpa*, *Acacia acradenia* scattered tall shrubs over *Cullen leucanthum* tall shrubland to shrubland over \**Cenchrus ciliaris* grassland to closed grassland.

This unit was recorded at quadrat PAN032 on a medium sized creek. *Triodia epactia* was growing at the edges of the \**Cenchrus ciliaris* stand. *Sorghum plumosum* scattered large individuals.

**Vegetation of the low rises and slopes below the escarpment of the Gorge Range**

**(Ch)AiTw:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This unit was described from vegetation recorded at quadrats PAN021, PAN034 and releves M34, M40, M70 and M80. All these sites were located on the slopes of low rises. These recording sites were located between about 34 to 48 kilometres from the Port Hedland-Marble Bar Road along the proposed access road below the Gorge Range escarpment.

**AiTwp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana*, *Triodia* sp. Panorama hummock grassland.

This unit was recorded at quadrat PAN029 on a low rise, gently rounded, between escarpment and a low ridge.

**AoTe(b):** *Acacia orthocarpa* open shrubland over *Triodia epactia* hummock grassland.

This vegetation unit was recorded at M38 on loam soils on a north-facing steep slope. *Acacia inaequilatera* occurs on the very lower slopes. There were some patches of *Acacia ptychophylla* on the slopes and some areas where *Tephrosia* aff. *rosea* (HD 292-37) occurs as a fireweed (lower to mid slopes).

**AiTe:** *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

This vegetation unit typically occurred on slopes of low colluvial spurs and low rises. It was recorded in quadrats PAN022, PAN025, PAN030, PAN031, PAN037 and releves M59, M60, M66 and M81.

**Abt'Te:** *Acacia bivenosa*, *Acacia trachycarpa* scattered shrubs over *Triodia epactia* hummock grassland.

This unit was recorded at releve M75 on gentle slopes to south and south east.

**ElAisTe:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered shrubs over *Acacia stellaticeps* low scattered shrubs to low open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releve M77 on an upper slope of a colluvial spur below a ridge. In low areas *Acacia spondylophylla* replaces *Acacia stellaticeps*.

**ElAiTp:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

This vegetation unit was recorded at releve M76 on low rises and slopes on a ridge. *Acacia stellaticeps* varies from absent to low open shrubland.

**AiTp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

This unit was described from vegetation recorded at quadrats PAN026, PAN027 and PAN033 and releves M44, M45, M52, M53, M61, and M64. These sites were typically on the lower slopes of colluvial spurs and low rises.

**AiTpe:** *Acacia inaequilatera* occasional tall shrubs over *Triodia* sp. Panorama (*Triodia epactia*) hummock grassland.

This unit occurred on a gentle slope at releves M43 and M53. Releve M43 was beside a medium sized creek above a flood plain.

**TTe:** *Tephrosia* sp. B (Kimberley Flora) scattered shrubs to open shrubland over *Triodia epactia* hummock grassland.

This unit represents vegetation on low ridges with some rock outcrop. It was described from vegetation recorded at releves M46, M58, M74 and M78 and quadrat PAN035. At PAN035, *Triumfetta propinqua* also formed a low open shrubland. At releve M78, which was located on a gentle slope beside a creek, *Tephrosia* aff. *rosea* (HD 292-37) formed an open shrubland to shrubland and *Tephrosia* sp. B (Kimberley Flora) was present as scattered shrubs.

**AaTe:** *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

This unit was fairly extensive. It was recorded at releve M47 on a very gentle slope

**Ataa'Te:** *Acacia tumida* (*Acacia inaequilatera*) scattered tall shrubs to high open shrublands over *Acacia ancistrocarpa*, *Acacia acradenia* high open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releve M48 on gentle slopes. The *Acacia* species tend to be in small groups with small open areas of *Triodia* between them. This unit grades upslope (towards the base of the ridge) to *Triodia epactia* hummock grassland with the *Acacia* species (mainly *Acacia tumida*) on the slight flow lines.

**AgTe:** *Acacia glaucocaesia* scattered tall shrubs over *Triodia epactia* hummock grassland.

Not sampled, observed from a nearby low rise (see notes for releve M44A).

**AoTTb:** *Acacia orthocarpa* scattered shrubs over *Tephrosia* scattered shrubs over *Triodia angusta* (Panorama form), *Triodia* cf. *brizoides* open hummock grassland.

This vegetation unit was recorded at releve M65 on brown loam soil on the rocky crest of a low hill.

**AiTb:** *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* (*Triodia wiseana*) hummock grassland.

This unit was described from releve M87 on a steep slope below the rocky top of a low hill.

**Aih':** *Acacia inaequilatera* scattered tall shrubs over *Acacia hilliana* low open heath and *Triodia brizoides* hummock grassland.

This unit was recorded at releve M84. It occurred on a gentle slope facing the east, below the rocky crest. Occurs as small patches next to the crests.

**AiTbp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides*, *Triodia* sp. Panorama hummock grassland.

This vegetation unit occurred on a gentle slope facing east and was recorded at releve M85.

**ChAiaTe2:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* high open shrubland to open scrub over *Triodia epactia* hummock grassland.

This vegetation unit was recorded at releve M90 on a gently sloping area next to a large creek.

**Aia'bTwb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia*, *Acacia synchronicia*, *Acacia bivenosa* scattered shrubs to open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland.

This unit was recorded at releve M89 on moderate mid to lower slope.

**AibTb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* hummock grassland.

This unit was recorded at releve M95 on the upper part of a gently sloping colluvial spur. There were some small flowlines with *Acacia acradenia* high open scrub. *Corymbia hamersleyana* scattered low trees on the slopes.

**Aitba'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia tumida*, *Acacia bivenosa*, *Acacia acradenia* scattered shrubs (to small patches of open scrub) over *Triodia brizoides* hummock grassland.

This unit occurred on gentle slopes on an area of low rises. It was recorded at releve M91. The *Acacia* species tended to occur in small patches.

**AsPt:** *Acacia stellaticeps*, *Pluchea tetranthera* (low) open heath with *Triodia epactia* hummock grassland.

This vegetation unit was recorded at releve M69 on gentle slopes at the bottom of a small area between hills (on a slight rise between two small creeks).

### **Vegetation of small to medium creeks on slopes of the escarpment of the Gorge Range**

**ChAa':** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland to open scrub over *Indigofera monophylla* (PAN 65-14) (low) open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releves M41, M83 and quadrat PAN066. It occurred along small creek lines between low spurs and on lower gently sloping colluvial slopes at foot of hill range between hills to east and main watercourse to west.

**ChAitPte:** *Corymbia hamersleyana*, *Acacia inaequilatera* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp *aprica* high shrubland over *Petalostylis labicheoides* open scrub over *Corchorus parviflorus*, *Indigofera monophylla* (PAN20-2) shrubland over *Bonamia rosea* scattered low shrubs to low shrubland over *Triodia epactia* open hummock grassland.

This unit was recorded at quadrats PAN023 and PAN024, which were located on narrow creek lines about one kilometre apart, both positioned between colluvial spurs at the base of the Gorge Ranges escarpment.

**Aia'PTp:** *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp *aprica* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

This unit was recorded at releve M53A (on a small creek line). Releve M53A including typical creek taxa such as *Petalostylis labicheoides*, *Ficus opposita* var. *indecora* and *Clerodendrum floribundum* var. *angustifolium*.

**ChGwAa'Te:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp *aprica* high open shrubland over *Acacia acradenia* open scrub over *Tephrosia* sp. Bungaroo Creek (M.E. Trudgen 11601) low shrubland over *Polymeria* aff. *calycina* scattered low shrubs and *Triodia epactia* open hummock grassland.

This unit was recorded at quadrat PAN028 on an open flow line with no defined channel, between gently sloping colluvial spurs.

**ChAia'TTe:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* high shrubland to open scrub over *Tephrosia* sp. B (Kimberley Flora) shrubland to open heath [seral] over *Corchorus parviflorus* low shrubland [seral] over *Triodia epactia* open hummock grassland to hummock grassland.

This *Triodia epactia* vegetation unit was recorded at releve M56 along a small to medium sized flowline between slight rises.

**TrTe:** *Tephrosia* aff. *rosea* low shrubland over *Triodia epactia* hummock grassland. This unit was too small to map.

**ApCo:** *Acacia pyrifolia* (slender, white), (*Flueggia virosa* ssp. *melanthesoides*) scattered tall shrubs to high shrubland over *Cassia oligophylla*, (*Carissa lanceolata*) open shrubland over *Triodia epactia* open hummock grassland.

This unit, recorded at releve M82, was too small to map.

**Agf:** *Acacia glaucocaesia*, *Acacia farnesiana*, scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

This vegetation unit was recorded at releve M62. It occurred on loam soil on a broad creek. The vegetation was only like this for about 100-150 m and then turns into the vegetation recorded at M62A. Only one stand, related to deeper soil, was observed.

**Aia'Te:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* (high shrubland to) open scrub over *Triodia epactia* hummock grassland.

This vegetation was recorded at releve M62A on a broad creek.

**ChAa'tTr:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Acacia tumida* open scrub-scrub over *Tephrosia* aff. *rosea* (HD 292-37) open shrubland over *Corchorus parviflorus* low open shrubland over *Triodia epactia* open hummock grassland.

This unit was based on vegetation recorded at releve M68 on a small to medium sized creek bed between low rises.

**TcCh:** *Terminalia canescens*, *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia tumida*, *Acacia acradenia* scattered shrubs to high open shrubland over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs over *Triodia epactia* open hummock grassland.

This vegetation unit, recorded at releve M86, occurred on a small to medium creek. Sometimes there was no *Terminalia canescens*. The flat areas next to the creek had *Acacia acradenia* open scrub.

**ChTe:** *Corymbia hamersleyana* scattered low trees to low open woodland over *Triodia epactia* hummock grassland with various shrub layers: 1): Occasional *Acacia ancistrocarpa* high open shrubland to high shrubland. 2): Occasional *Acacia tumida* high open shrubland. 3): Occasional *Tephrosia* aff. *rosea* (HD 292-37) open heath. 4): (Mostly or no shrub layer) *Acacia acradenia* high shrubland to open scrub. 5): Occasional *Grevillea wickhamii* ssp. *aprica* high open shrubland.

This mosaic vegetation unit was recorded at releve M88 on a broad 'floodplain' next to a medium sized creek. The vegetation of the creek bed was similar to that at M86 except it had *Eucalyptus victrix* (rather than *Corymbia hamersleyana*) with the *Terminalia canescens*.

### **Vegetation of the escarpment and Gorge Ranges near the gorge**

**Cf'Aio:** *Corymbia ferriticola* ssp. *ferriticola*, *Ficus platypoda* var. D scattered low trees/tall shrubs over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over patches of *Acacia orthocarpa* shrubs over *Triodia epactia* (*Eriachne mucronata* (typical form)) open grassland to grassland.

This unit was described from vegetation recorded at releve M55, located on a steep rocky stabilised scree slope and cliff. The *Eriachne mucronata* was on the rocks only.

**AiGwTb:** *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Triodia brizoides* hummock grassland.

This vegetation unit was described at releve M54 on a lower to middle north facing slope of a ridge. Has *Indigofera* aff. *monophylla* (PAN 65-14) low shrubland layer in places.

**GwAoTe:** *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia orthocarpa* open shrubland to open heath over *Triodia epactia* hummock grassland.

This vegetation unit, recorded at releve M71, occurred on a moderate slope on a ridge complex, south facing.

**GwAtoTe:** *Grevillea wickhamii* ssp. *aprica*, *Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia epactia* hummock grassland.

This vegetation was recorded at releve M72, on a very steep rocky north facing upper ridge slope. *Triodia brizoides* occurs on the very rockiest parts of the outcrop.

**ElChAiTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Cassia glutinosa* scattered shrubs over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

This unit description was based on the vegetation recorded at quadrat PAN073 and releve M102 on steep upper to mid slopes of high ridges. Down slope of PAN073, *Triodia wiseana* dominates on the medium-lower slope. Upslope of PAN073, the vegetation changes to *Acacia tumida* low woodland with scattered *Eucalyptus leucophloia*. These sites were located on the slopes of ridges either side of the proposed access track, in the main gorge.

**ElAt:** *Acacia tumida* low woodland with scattered *Eucalyptus leucophloia*.

Not sampled, see notes PAN073. On a steep, south-facing, upper slope of a high ridge.

**AtTe:** *Acacia tumida* low open forest to open forest over *Triodia epactia* hummock grassland.

This unit was recorded at quadrat PAN070 on a steep upper slope, facing north.

**TcTe:** *Terminalia canescens* open woodland over *Flueggea virosa* subsp. *melanthesoides* scattered tall shrubs over *Eriachne tenuiculmis*, *Triodia epactia* open tussock, hummock grassland to grassland.

This vegetation was recorded at quadrat PAN069 on the edge of a wide creeks banks in a side gorge to the main gorge through which the proposed access track passes..

**Aio'GwTb:** *Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrub over *Indigofera monophylla* [seral] low shrubland to low open heath over *Triodia brizoides* hummock grassland.

This unit was defined from quadrats PAN067 and PAN074 and releve M92. These sites were recorded on the mid to lower slopes between the high ridges and the gorge creek.

**^AiTw:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This vegetation unit occurred on the slopes of low rises and hill slopes. It was recorded at quadrat PAN064 and relevés M67, M96 and M98. Typically the tall shrub layer included *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Acacia acradenia* or *Grevillia pyramidalis*. *Corchorus parviflorus* occurred as scattered shrubs at all four recording sites.

**Aip'Tb:** *Acacia inaequilatera* tall scattered shrubs over *Acacia bivenosa* scattered shrubs over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland.

This vegetation unit was recorded at releve M99 on a south-west facing, moderate to steep slope on a low hill in an open gorge complex.

**ChAip':** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs to high open shrubland over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releve M97 on a gently sloping colluvial spur from the hills towards the river, in an open gorge system.

**ChTp:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Acacia bivenosa* scattered shrubs over *Triodia* sp. Panorama hummock grassland.

The area of the unit was too small to map. The unit was recorded at releve M94 on a lower side slope of a low spur, west facing and gently sloping down to a creek.

**TcTb:** *Terminalia canescens* scattered low trees over *Triodia brizoides* scattered hummocks.

This vegetation was recorded at releve M93 on a rocky linear crest of an east-west trending ridgeline. The rock was chert-like (siliceous). The vegetation varied to areas with no *Terminalia canescens* and a few *Eucalyptus leucophloia* and *Grevillea wickhamii* ssp. *aprica*.

**ChApa'Tw:** *Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white), *Acacia acradenia* scattered tall shrubs over *Triodia wiseana* hummock grassland.



This unit was recorded at quadrat PAN063 on lower colluvial slopes, west facing.

**#Tw:** *Triodia wiseana* hummock grassland.

This unit was recorded at releve M101 on east-facing moderate lower slopes on a small hill and also at releve B30A (see below).

**#ChAa'CcTb:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded at releve M100 on a south easterly facing steep slope. It was also recorded at releve B130 (see below).

### **Vegetation of the large creek in the gorge through the escarpment**

**EcvAc:** *Eucalyptus camaldulensis* var. *obtusata*, *Eucalyptus victrix* open woodland over *Acacia coriacea* subsp. *pendens*, *Atalaya hemiglaucata* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla* high shrubland over *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Cymbopogon procerus*, *Triodia epactia*, \**Cenchrus ciliaris* tussock, hummock grassland.

This vegetation unit occurred on a drift of alluvial material between channels of a medium sized creek in the lower part of a gorge. It was recorded at a quadrat PAN065. Pools and damp edges were avoided, but there were stands of *Typha domingensis*, *Lobelia quadrangularis*, *Schoenus falcatus*, *Chara* sp.

**EvAc:** *Eucalyptus victrix* scattered trees over *Acacia coriacea* ssp *pendens* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggia virosa* ssp *melanthesioides* open to closed scrub over (*Triodia epactia*), *Cenchrus ciliaris*, *Cymbopogon procerus* open hummock, tussock grassland.

This unit was described from the vegetation recorded at quadrats PAN068 and PAN071 on the bed and the loamy drifts between channels of a medium sized creek flowing through an open gorge area with seasonal flow, but no permanent pools. Denser vegetation on banks (especially western) avoided as structurally different.

**EvMlg:** *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub.

This unit was recorded at quadrat PAN075 in a narrow strip along pools and flow area of a narrow channel of a medium sized creek in an open section of a gorge. The unit was described from vegetation occurring within the width of *Cyperus vaginatus*.

## **5.2.2 Vegetation in the Sulphur Springs, Kangaroo Caves and Bernt's tenement areas and along the proposed connecting access tracks**

### **5.2.2.1 Vegetation of hill slopes and crests**

#### **5.2.2.1.1 Vegetation of hill and ridge crests**

##### **Vegetation of shale ridge crests**

**#PmTm:** *Corchorus* aff. *lanifloris* (PAN 76), *Dampiera candidans*, *Ptilotus mollis* low shrubland over *Triodia melvillei*, *Eriachne mucronata* (typical form) very open to open hummock grassland/grassland

This vegetation type occurs on narrow, rocky crests of high shale ridges. It was recorded at releve B31 in the Sulphur Springs survey area and releve B75 in the Kangaroo Caves survey area. *Ptilotus mollis* and *Triodia melvillei* typically occur in this unit. *Triodia wiseana* is often present as an ecotonal species, being a dominant on the slopes just below the crest. Unit #PmTm is a relatively uncommon vegetation unit because of the very specific and limited habitat in which it occurs. However, it occurs at a number of locations in the Sulphur Springs area and on a high shale ridge in the Kangaroo Caves area. *Triodia melvillei* also occurred on the crest of sandstone ridges in the survey areas.

**#AioTm:** *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia melvillei* hummock grassland

This vegetation unit occurred on low shale ridge crests in the Sulphur Springs survey area and was based on the vegetation descriptions at releves B34 and B109. This unit is very similar to the distinctive rocky crest vegetation on high shale ridges described in unit #PmTm above, having a number of taxa in common, most notably *Triodia melvillei*. *Ptilotus mollis*, common in unit #PmTm, was not recorded in this unit. Conversely, while the lower slope elements of *Acacia orthocarpa*, *Acacia inaequilatera* and *Hakea chordophylla* were recorded in this unit, they were not recorded in unit #PmTm.

**#Aia'Tm:** *Acacia acradenia*, *Grevillea wickhamii ssp. aprica*, *Acacia inaequilatera*, *Acacia bivenosa* high open shrubland over *Triodia melvillei* hummock grassland

This was another shale ridge crest unit with a *Triodia melvillei* hummock grassland. The unit was recorded at releve B81, on the crest of a medium height, steep sloped shale ridge in the Kangaroo Caves survey area. However, this ridge was some 60 to 80 metres lower than the shale ridge crest about one kilometre to the north where releve B75 (unit #PmTm) was recorded. The vegetation is somewhat different from that recorded at releve B75, with no *Ptilotus mollis* or *Corchorus aff. laniflorus* (PAN076), but with a number of lower slope taxa (*Acacia acradenia*, *Grevillea wickhamii ssp. aprica*, *Acacia inaequilatera* and *Acacia bivenosa*) not recorded on the rocky shale crest at B75.

**#ElAa'ImTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii ssp. aprica* high open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland

This small vegetation unit was recorded at releve B76 on the edge of a rocky crest and on the adjoining, east-facing, upper slopes of a high shale ridge in the Kangaroo Caves survey area. It was somewhat different from other shale ridge crest units because of the presence of the *Acacia acradenia*, *Grevillea wickhamii ssp. aprica* high open shrubland. The presence of tall shrubs is more typical of lower shale ridges such as those where releves B81 and B124 were recorded. The *Triodia melvillei* shale ridge crest unit #PmTm (B31) was adjoining.

**#ElAiPmTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* hummock grassland

This shale ridge crest unit was recorded on one small ridge in the Sulphur Springs survey area at releve B124. It has some taxa that were exclusive to the high shale ridge crests in this survey area (*Ptilotus mollis*), but has a number of lower slope taxa which suggest it is an ecotonal unit (*Eucalyptus leucophloia*, *Acacia inaequilatera* and *Triodia brizoides*).

**#AiPPmTp:** *Acacia inaequilatera*, *Petalostylis labicheoides* high open shrubland to high shrubland over *Corchorus* aff. *laniflorus* (PAN 76), *Euphorbia* aff. *drummondii* (HD195-16) low open shrubland over *Triodia* sp. Panorama, *Triodia brizoides* hummock grassland

This vegetation unit, recorded at releve B119, occurred on the crest and upper slope of a very steep slope and high shale ridge. The vegetation on the shale crest included taxa common to other shale ridge crests, such as *Ptilotus mollis* and *Corchorus* aff. *laniflorus* (PAN 76). However, this shale ridge crest unit vegetation differed from others because of the presence of the *Petalostylis labicheoides* high open shrubland and the presence of taxa such as *Euphorbia* aff. *drummondii* (HD195-16) and *Triodia* sp. Panorama.

### Vegetation of sandstone ridge crests

**#Ath'ThTm:** *Acacia tumida* high shrubland to open scrub over *Templetonia hookeri*, *Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides* scattered tall shrubs over *Acacia hilliana*, *Goodenia stobbsiana* low open shrubland over *Triodia melvillei* hummock grassland.

This vegetation unit covers a large area of sandstone ridge crest in the Sulphur Springs area. It was recorded at releve B37. It was the largest occurrence of *Triodia melvillei* hummock grassland in the survey areas.

**#ElAa'Tm:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* (*Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides* high shrubland to open scrub over *Triodia melvillei* hummock grassland.

This vegetation unit was recorded at releve B38 and was recorded on the upper slopes of a high sandstone ridge, near unit #Ath'ThTm in the Sulphur Springs survey area. While being a *Triodia melvillei* hummock grassland and having a number of other taxa in common with unit #Ath'ThTm, it differed from that unit in that *Eucalyptus leucophloia* was present in the overstorey and *Acacia acradenia* formed a high shrubland to open scrub.

**#ElAdh'Tm:** *Eucalyptus leucophloia* scattered low trees over *Acacia adoxa* var. *adoxa*, *Acacia hilliana* low open heath over *Triodia melvillei* hummock grassland.

This unit was recorded at releve site B73, near the crest of a high sandstone ridge in the Sulphur Springs survey area. The dominance of *Acacia adoxa* var. *adoxa* and *Acacia hilliana* made this unit quite uncommon. The unit includes adjacent areas to B73 where the vegetation stand was very similar, but where *Acacia acradenia* formed a high shrubland.

**#ElAth'Tm:** *Eucalyptus leucophloia* scattered low trees over *Acacia tumida* scattered to high open shrubland over *Acacia hilliana* low shrubland over *Triodia melvillei* hummock grassland.

This was a sandstone ridge upper slope unit recorded at releve B17 in the Sulphur Springs area. It was a *Triodia melvillei* hummock grassland unit with similarities to unit #Ath'ThTm (B37).

**#ElAtTe:** *Eucalyptus leucophloia* scattered low trees over *Acacia tumida* high open shrubland over *Triodia epactia* hummock grassland.

This unit occurred on the steep upper slopes of a high sandstone ridge (just below and on the crest) in the Kangaroo Caves survey area. It was described from the vegetation recorded at releves B85.

**#ElAa'tTe:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, (*Acacia tumida*) high open shrubland over *Triodia epactia* hummock grassland.

This vegetation unit was recorded at releve B86 on the crest of a high sandstone ridge. It occurred in the north-west part of the Kangaroo Caves survey area.

#### **Vegetation of chert ridge crests**

While *Triodia melvillei* formed hummock grasslands on the rocky, high sandstone and shale ridge crests, *Triodia epactia* formed hummock grasslands on the chert ridges.

**#AtTe:** *Acacia tumida* open high shrubland to high shrubland over *Triodia epactia* hummock grassland.

This vegetation unit occurred on the steep chert ridges, forming distinctive bands of vegetation along the chert ridges. It was recorded at releve B5 in the Sulphur Springs survey area where it covered a sizeable area (corresponding to the area of chert). It also occurred to a lesser extent in the Kangaroo Caves survey area and in only a small area in the Bernts survey area.

**#GwTe:** *Grevillea wickhamii ssp. aprica* high shrubland over *Triodia epactia* hummock grassland

This unit was recorded at releve B99 on the high chert ridges on exposed chert in the Bernts survey area.

#### **5.2.2.1.2 Vegetation of the upper slopes of ridges and hills**

##### **Vegetation of the upper slopes of high shale ridges**

**#AtTm:** *Acacia tumida* open high shrubland to high shrubland over *Triodia melvillei* hummock grassland.

This unit was recorded at releve B128 on the steep rocky shale slopes just below the crest of a high shale ridge in the Kangaroo Caves survey area.

**#Aia'CyTm:** (*Corymbia hamersleyana*) scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii ssp. aprica* scattered tall shrubs to high open shrubland over *Corchorus* aff. *lanifloris* (PAN 76), (*Indigofera monophylla* (PAN 57-9)) scattered shrubs over *Triodia melvillei* (*Triodia wiseana*) hummock grassland

This unit occurred on the upper slopes of two different shale ridges in the northern part of the Sulphur Springs tenement area. It was recorded at releve B33 and B125. The two releve stands were similar, but scattered low *Corymbia hamersleyana* trees only occurred at site B33 and *Triodia melvillei* only occurred near the crest of the ridge. At releve B125 *Triodia melvillei* was the dominant much further down slope and *Indigofera monophylla* (PAN57-9) formed a low open shrubland. This vegetation unit is also very similar to unit #Aia'Tm found on the crest of a medium height shale ridge in the Kangaroo Caves area.

**#GwAs'Tb:** *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla*, *Waltheria virgata*, *Dampiera candicans*, *Goodenia cusackiana* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

This vegetation unit was recorded at releve B79 on a rocky upper slope of a high shale ridge in the Kangaroo Caves survey area. It was a small area with a distinctive flora which had some elements in common with the shale ridge crest units.

### **Vegetation of the upper slopes of high sandstone ridges**

**#EIAh'Tb:** *Eucalyptus leucophloia* scattered low trees over (*Acacia bivenosa* scattered shrubs over) *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia brizoides* (*Triodia epactia*) hummock grassland

This unit was recorded at releve B18, on the upper slopes of a high sandstone ridge in the Sulphur Springs survey area. A high slopes unit which occurred over *Triodia brizoides* and *Triodia epactia*.

**#AtoTb:** *Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland.

This vegetation unit was recorded at releve B39 on a steep, sandstone rock face about 300 metres east of B38.

**#EIAo'dTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia orthocarpa* (wispy form) open high shrubland over *Acacia adoxa* var. *adoxo* low open shrubland over *Triodia brizoides*, (*Triodia epactia*) hummock grassland

This unit only occurred in one small area on the top of a sandstone hill on the western side of the Sulphur Springs survey area. It was recorded at releve B54.

### **Vegetation of the rocky upper slopes of low dolerite/diorite sills**

**#ChAa'CcTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over (*Cajanus cinereus* scattered shrubs over) *Triodia wiseana* hummock grassland

This unit occurred on the crest and upper slopes of dolerite/diorite sills, adjacent to small rock outcrops (very small rock piles). It was recorded at releve B30 in the proposed tailings dam valley in the Sulphur Springs survey area.

### **Other upper slope vegetation units**

#### ***Triodia brizoides* vegetation on upper slopes**

**#EIAp'Tb:** *Eucalyptus leucophloia* scattered trees over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland

This vegetation occurred on the upper part of a south-west facing slope in the Sulphur Springs survey area. It was recorded at releve B6. A number of areas of this unit occurred in the western part of the Sulphur Springs survey area.

**#ElAa's'Tb:** *Eucalyptus leucophloia* scattered trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla* open shrubland over *Triodia brizoides* hummock grassland.

This unit covered a small area in the western part of the Sulphur Springs survey area. It was recorded at releve B11, mid to upper slope on a medium height ridge.

**#Aibs'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* shrubland over *Acacia spondylophylla* low open shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded at quadrat PAN052, on a steep south-facing upper slope of a medium ridge. The unit occurred on a number of upper slopes along the ridge, which formed the northern boundary of the main valley of the Sulphur Springs survey area. It is similar to unit #Aios'Tb (releve B23), but differs by not having an *Acacia orthocarpa* open shrubland strata.

**#EITb:** *Eucalyptus leucophloia* scattered low trees over *Triodia brizoides* hummock grassland

This unit was recorded at releve B40 on the upper slope of a high ridge near releve B38 in the Sulphur Springs survey area and at quadrat PAN060 in the Bernt's survey area. It occurred in a number of upper slope areas.

**#ElAiGwTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Triodia brizoides* hummock grassland.

This upper slope unit occurred on a high ridge just below the steep crest rock outcrop. It was recorded at releve B118 on a ridge in the south-east section of the Sulphur Springs survey area.

**#CgImAdTb:** (*Acacia inaequilatera* scattered tall shrubs over) *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland over *Triodia brizoides* hummock grassland.

This vegetation unit occurred in a few small areas on the upper slopes of a low hill in the high part of the ranges in the south-east part of the Sulphur Springs survey area. It was recorded at releve B42 on the Kangaroo Caves Formation geological unit. In some areas the *Acacia adoxa* var. *adoxo* cover was greater and it formed a low shrubland to low open heath.

**#ElAtGwTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* sp. low open shrubland to scattered low shrubs over *Triodia brizoides* open hummock grassland to hummock grassland.

This vegetation unit was recorded at releve B52 on a steep upper slope of a high ridge with craggy exposed rock outcrop. It occurred in a small unit in the western part of the Sulphur Springs survey area.

**#Aio'GaTb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* (wispy form) open high shrubland over *Gossypium australe* (Whim Creek form) open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland

This unit was recorded on the steep north-east facing upper slopes of a high hill in the south-western part of the Sulphur Springs survey area. It was only recorded in the one area (releve B58) on brown loam to clayey loam in the Kangaroo Caves Formation geological unit.

**#Ao'Tb:** *Acacia orthocarpa* (wispy form) over *Triodia brizoides* hummock grassland.

This unit was recorded at releve B65 on the southern perimeter of the Sulphur Springs survey area.

**#Ais'ImTb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla*, *Indigofera monophylla* (PAN57-9) low shrubland over *Triodia brizoides* hummock grassland.

This vegetation unit occurred on the middle and upper slopes of two ridges. It was recorded at releve B77 and quadrat PAN056 on the eastern most ridge in the Kangaroo Caves.

**#ElCgImTb:** *Eucalyptus leucophloia* scattered low trees over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland.

This vegetation unit was recorded at releve B84. It occurred just below a crest on a steep south-facing slope of a high ridge in the central part of the Kangaroo Caves survey area.

**#ChAa'Tb:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland over *Triodia brizoides* hummock grassland.

This vegetation was recorded at releve B102 in a very large gully, just below a high ridge in the Bernts area. The unit occurred mid to upper slope on the gully walls.

#### ***Triodia epactia* vegetation on upper slopes**

*Triodia epactia* occurred less commonly on the upper slopes. It also occurred on parts of the valley floors and along some flowlines.

**#Cf'CaTe:** *Corymbia ferritcola*, *Eucalyptus leucophloia* low open woodland over *Triodia epactia*, (*Triodia brizoides*), *Cymbopogon ambiguus* grassland/hummock grassland

This was a unique vegetation unit in which *Corymbia ferritcola* formed a low open woodland over a *Triodia epactia*, (*Triodia brizoides*), *Cymbopogon ambiguus* grassland/hummock grassland along the breakaway of a high sandstone ridge. It was recorded at releve B55 in the Sulphur Springs survey area.

**#ElAa'GwTe:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releve B97 and in the Bernts survey area on the crest of a medium ridge. Several areas of the unit occurred in the Bernts hills and a similar unit occurred on the east-facing upper slope of a ridge on the south-eastern edge of the Sulphur Springs survey area.

**#ElAa'Te:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at quadrat PAN059 near the top of a large ridge in the Bernts survey area. It was similar vegetation structure to releve B97, but occurred upslope and was floristically different.

**#ElTe:** *Eucalyptus leucophloia* scattered low trees over *Triodia epactia* hummock grassland.

This unit was recorded at releve B100 in the Bernts survey area. It occurred on the upper slopes of a high ridge, just down slope of the chert unit that formed the eastern edge of the ridge crest.

**#ElGwAp'Te:** *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland

A small area of this unit was recorded at releve B101 in the Bernts survey area. It occurred on a broad ridge crest adjacent to and slightly lower than the exposed chert unit that formed the eastern edge of the ridge crest.

### ***Triodia wiseana* vegetation on upper slopes**

**#Aio'Ts'Tw:** *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), (*Gossypium australe* (Whim Creek form)) scattered tall shrubs over *Tephrosia spechtii*, *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland

This unit was described at releve B59 in the south-west corner of the Sulphur Springs survey area. It occurred as small units in a number of places in the southern part of the Sulphur Springs survey area. The unit has been described broadly to allow for some variation in the shrub layer. *Tephrosia spechtii* formed a low shrubland in most cases but was sometimes absent. *Gossypium australe* (Whim Creek form) occurred in a number of the areas as scattered shrubs. *Cullen leucochaites* was sometimes present.

**#Aio'ImTw:** *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) scattered shrubs over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana*.

This unit was recorded at releve B143, 100 metres west of B59. The unit occurred on the upper slopes of a high hill in the Kangaroo Caves Formation geological unit in the south-west part of the Sulphur Springs survey area. This unit is similar to B59 but does not have the *Tephrosia spechtii* and *Gossypium australe* elements..

**#Cl'ImTw:** Scattered *Cullen leucochaites* shrubs to open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland

This unit was recorded at releve 61, a small area on a ridge crest in the Sulphur Springs area south of the chert ridges in the volcanics (Rhyolite?).

**#ElGwAs'Tw:** *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana*, (*Triodia brizoides*) hummock grassland.

This unit was recorded at releve B83 and covered a small area on the upper slopes of the southern end of a ridge in the Kangaroo Caves survey area.



### 5.2.2.1.3 Vegetation of the mid-slopes of hills and ridges

#### Vegetation units on the mid-slopes of shale ridges

**#AioTw:** *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releves B110 and B36 on the lower and mid slopes respectively of medium to low height shale ridges in the northern part of the Sulphur Springs survey area. The mid to lower slope unit B36 included some of the taxa found on the higher shale slopes such as *Corchorus* aff. *lanifloris* (PAN 76) and *Solanum phlomoides*. Releve B110 was located on a low ridge.

**#GwAis'Tb:** *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low shrubland over *Triodia brizoides* hummock grassland

This unit was recorded at releve B127 in the south-eastern part of the Sulphur Springs survey area.

**#AiImTb:** *Acacia inaequilatera* high open shrubland over *Indigofera monophylla* (PAN 57-9) low shrubland to low open shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland

This unit was recorded at releve B32 on the mid-slope on the north side of a medium height shale ridge. It was located as part of a mosaic along the north-facing slopes of a long east-west orientated shale ridge in the northern part of the Sulphur Springs survey area.

#### Vegetation units on the mid-slopes of hills and ridges (geology uncertain)

##### *Triodia brizoides* vegetation on mid-slopes

**#AibTb:** Scattered *Acacia inaequilatera* over scattered *Acacia bivenosa* over *Triodia brizoides* hummock grassland.

This unit occurred in a number of small areas, mainly in the western part of the Sulphur Springs survey area. It was recorded at releve B3.

**#AiTb:** (*Acacia inaequilatera*) scattered tall shrub over *Triodia brizoides* hummock grassland

This vegetation unit was recorded at releve B8 in the western part of the main valley in the Sulphur Springs survey area. It occurred as a mid slope unit on high ridges in six areas in that part of the survey area. It was also mapped in one area of the Kangaroo Caves survey area.

**#EIAa'Tb:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia brizoides* hummock grassland

This vegetation unit was recorded at releve B16. It was a common unit on the mid to upper slopes of the high ridges in the Sulphur Springs survey area. It is very similar to the vegetation stand recorded in unit #Aa'bTb (quadrat PAN045 and releve B7), but the latter unit included *Acacia bivenosa* in the tall shrub strata and occurred on the lower slopes. In places *Eucalyptus leucophloia* formed a low woodland in this vegetation unit.

**#ElAa'CgTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* shrubland to open shrubland over *Triodia brizoides* hummock grassland

This unit occurred in several areas in the central southern part of the Sulphur Springs survey area. It was recorded at releve B46 on the slopes of low rises and hills in the upper ranges in the Kangaroo Caves Formation geological unit. While having a similar vegetation structure and dominants to unit #ElAa'Tb (releve B16), the units differed floristically, probably reflecting the different geological units on which they occurred.

**#Aios'Tb:** *Acacia inaequilatera* (*Acacia bivenosa*) scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Acacia spondylophylla* open low shrubland to shrubland over *Triodia brizoides* hummock grassland

This unit was recorded at releve B23, mid-slope of medium height ridges in several areas in the north-west part of Sulphur Springs survey area. It also occurred mid slope on a high shale ridge in the Kangaroo Caves survey area. This unit is similar to that represented by releve B26, but they area floristically different and have some different dominant taxa.

**#ChAioTb:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland

This unit occurred in several areas in the central-eastern and northern parts of Sulphur Springs survey area on the slopes of medium height shale ridges. It was recorded at releve B26. With *Acacia orthocarpa* as a dominant shrub, it has some similarities, although floristically different, with unit #Aios'Tb (releve B23).

**#ChAoImTb:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* high shrubland to open scrub over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded at releve B56, where it covered a small area on a lower slope in the western part of the Sulphur Springs survey area. There were several other occurrences of the unit, mid slope, also in the hill ranges in the Kangaroo Caves Formation geological unit.

**#Aih's'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia hilliana* (*Acacia spondylophylla*) low shrubland over *Triodia brizoides* hummock grassland

This small unit occurred lower to upper slope on a medium height ridge on the north side of the main valley in the Sulphur Springs survey area. It was recorded at releve B24.

**#Aa'h'As'Tb:** *Acacia inaequilatera* scattered low trees over *Acacia acradenia* high open shrubland over *Acacia bivenosa* open shrubland over *Acacia hilliana*, *Acacia spondylophylla* scattered low shrublands over *Triodia brizoides* hummock grassland.

This unit was recorded at releve B29, mid-slope on an east-facing slope of a medium ridge near the centre of the Sulphur Springs survey area. It was similar to unit #Aih's'Tb (releve B24), but had an *Acacia acradenia* and *Acacia bivenosa* high open shrubland layer.

**#ElAiCgTb:** *Eucalyptus leucophloia* (*Corymbia hamersleyana*) scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded on the mid-slopes at releve B45 high in the hills in the central-south area of the Sulphur Springs survey area. It occurred in the Kangaroo Caves Formation geological unit. There were several areas of this vegetation in the same general location.

**#Abp''CgTb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa*, *Cassia glutinosa* open shrubland to shrubland over *Corchorus* sp. Panorama scattered low shrubs over *Triodia brizoides* hummock grassland.

This was an uncommon unit near the centre of the Sulphur Springs survey area. It was recorded at releve B50 on the west facing slope of a high rocky ridge. It included rocky slope taxa such *Acacia pruinocarpa*. It is a similar habitat to releve B47 with some taxa in common.

**#Aio'Tb:** *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) high open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded at releve B57 in the mid to upper slopes of Kangaroo Caves Formation hills in the south-west of the Sulphur Springs survey area. Key elements of this unit are *Acacia orthocarpa* (wispy form) as a dominant in the tall shrub layer over a *Triodia brizoides* hummock grassland with *Tephrosia* aff. *rosea* (HD 292-37) in the low shrub layer, sometimes as a dominant.

**#Aio'Ts'Tb:** *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Indigofera monophylla* (PAN 58-17), *Tephrosia spechtii* low shrubland over *Triodia brizoides* hummock grassland.

This unit is similar to unit #Ao'AdTb (releve B57) above. It was recorded at releve B134 in the same hill range as releve B57. It was distinguished by the presence of *Tephrosia spechtii*, rather than *Tephrosia* aff. *rosea* (HD 292-37) in the flora, with *Tephrosia spechtii* often forming a low shrubland.

**#Ao'AdTb:** *Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* open high shrubland over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland to low open shrubland over *Triodia brizoides* hummock grassland.

This unit occurred in the same Kangaroo Caves Formation hill range habitat of unit #Ao'AdTb (releve B57) and #Aio'Ts'Tb (releve B134) in the Sulphur Springs survey area. It was very similar to those units, but differed in the presence of an *Acacia adoxa* var. *adoxo* low shrubland and the absence of *Tephrosia spechtii* and *Tephrosia* aff. *rosea* (HD 292-37). It was recorded at releve B135.

**#GaTs'Tb:** *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Gossypium australe* (Whim Creek form) scattered shrubs over *Corchorus* aff. *laniflorus* (PAN 76), *Tephrosia spechtii*, *Euphorbia* aff. *drummondii* (MET 15,030) over *Triodia brizoides*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii* hummock grassland/grassland/sedgeland.

This mid-slope unit occurred on steep mid slopes on a high ridge in the central-western part of the Kangaroo Caves survey area. The unit was recorded at quadrat PAN080. It was an unusual unit although with similarities with other Kangaroo Cave Formation units such as unit #Aio'GaTb (releve B58) in the Sulphur Springs survey area.

**#AhdTb:** (*Corymbia hamersleyana* scattered low trees) over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia hilliana*, *Acacia adoxa* var. *adoxo*, (*Indigofera monophylla* (PAN 58-17)) low open shrubland over *Triodia brizoides* hummock grassland

This unit was recorded at releves B117, B122 and B126 on lower to mid slopes of a ridge in the south-eastern part of Sulphur Springs survey area.

***Triodia epactia* vegetation on mid-slopes**

**#Ap'Te:** *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* closed hummock grassland

Only one area of this unit was observed. It was recorded at releve B51, mid-slope on an east facing slope in the Sulphur Springs survey area.

**#ElAp'Te:** *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia epactia* (*Triodia brizoides*) hummock grassland

This was a small unit recorded at releve B91 on the gully slopes and crest of a medium ridge in the Kangaroo Caves Formation in the Kangaroo Caves survey area.

**#Ts'ImTe:** (*Eucalyptus leucophloia* scattered low trees over) *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Tephrosia spechtii*, *Indigofera monophylla* (PAN 58-17) low open heath over *Triodia epactia*, *Triodia brizoides* hummock grassland.

This unit was recorded at releves B44 and B87 in the Sulphur Springs and Kangaroo Caves survey areas respectively. Releves of both units were occurred on the Kangaroo Caves Formation geological unit.

***Triodia wiseana* vegetation on mid-slopes**

**#GwTw:** *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia wiseana* hummock grassland

This unit was unusual for the survey areas in that *Grevillea wickhamii* ssp. *aprica* formed a high open shrubland. The unit was recorded at releve B67 in the northern part of Sulphur Springs survey area and covered a small area only.

**#ChGwTw:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland

This unit, recorded at releve B69 on mid and upper slopes of a high ridge, covered a large area on the northern most ridge in the Sulphur Springs survey area.

**#Aia'Tw:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B70. It covered a small area of low to upper slope on a medium height ridge in the northern part of the Sulphur Springs survey area.

**#AiImTw:** *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 57-9) low open shrubland over *Triodia wiseana* hummock grassland

This unit was recorded at releve B35 and was common in the vicinity of the tailings dam valley in the Sulphur Springs survey area as well as in the Kangaroo Caves survey area. The unit is similar to that recorded at releve B49 in the Kangaroo Caves Formation geological area several kilometres to the south. However, the form of the *Indigofera monophylla* was different and the associated flora was different.

**#AiTw:** *Acacia inaequilatera* scattered tall shrubs to open high shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B131 in the proposed tailings dam valley in the Sulphur Springs survey area and at quadrat PAN054 in the lower slopes of the Kangaroo Caves survey area. It differed from unit #AiImTw (releve B35) in not having *Indigofera monophylla* as a dominant in the low shrubland strata. It was a common unit near the shale ridges and dolerite sills in the Sulphur Springs and Kangaroo Caves survey areas.

**#AiImRmTw:** *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 65-14) shrubland to open heath over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B49 mid slope of a high hill in the Kangaroo Caves Formation geological unit in the southern part of the Sulphur Springs survey area. The unit is similar to that recorded at releve B35 in or near the proposed tailings dam valley in the central part of the Sulphur Springs survey area. However, the form of the *Indigofera monophylla* was different and the associated flora was different. It was a common unit in the Kangaroo Caves Formation geological unit in the Sulphur Springs survey area and in the Kangaroo Caves survey area.

**#ImTw:** *Indigofera monophylla* (PAN 65-14) scattered low shrubs to low open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B132, near the south-west perimeter of the Sulphur Springs survey area. It was 100 to 200 metres south of releve B59. It was a common unit in the Kangaroo Caves Formation geological unit.

**#AiTs'Tw:** *Acacia inaequilatera* scattered tall shrub over *Tephrosia spechtii* scattered shrubs to open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B74 in the Kangaroo Caves Formation geological unit of the Sulphur Springs releve area. It occurred middle to high slopes on the high hills.

**#EITw:** *Eucalyptus leucophloia* scattered low trees over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B98 on the upper to lower slopes of the Bernt's survey area hills. The unit covered a large area along the eastern side of the Bernts survey area.

**#GCpTw:** *Grevillea pyramidalis* scattered tall shrubs over *Corchorus parviflorus* low open shrubland over *Triodia wiseana* hummock grassland.

This plot was recorded at quadrat PAN058 mid slope at the south end of the Bernts hill range. It occurred on a steep south-facing slope.

**#ElAbTw:** *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia wiseana* hummock grassland.

This unit was described at releve B92 on the southern side of the Kangaroo Caves survey area.

#### **5.2.2.1.4 Vegetation of the lower to mid- slopes of hills and ridges**

##### **Vegetation units of lower to mid-slopes of shale ridges**

**#Aos'Tw:** *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Acacia spondylophylla* low open shrubland to shrubland over *Triodia wiseana* hummock grassland.

This unit was described from vegetation recorded at releves B72 and B13. At B13 *Acacia spondylophylla* occurred as scattered low shrubs rather than as a dominant. This vegetation occurred lower slopes of low to medium ridges on the north-west side of the central valley in the Sulphur Springs area.

**#ChAos'Tw:** *Corymbia hamersleyana* scattered low trees over *Acacia orthocarpa* high open shrubland over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland

This unit is very similar to unit #Aos'Tw (releves B72 and B13) but had scattered *Corymbia hamersleyana* low trees rather than *Acacia inaequilatera*. It was recorded at releve B112 on lower slopes adjacent to the access track just north of the Kangaroo Caves survey area.

**#Ais'Tw:** *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland.

This unit was described from vegetation recorded at releves B71 and B12 and quadrat PAN048 on the lower slopes of low to medium ridges on the north-west side of the central valley in the Sulphur Springs area. This vegetation was similar to that of unit #ChAos'Tw (see above) with the main difference being the absence of *Acacia orthocarpa* in this unit.

##### ***Triodia longiceps* vegetation on lower to mid-slopes of Kangaroo Caves Formation**

**#Cp'TTI:** *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* sp. Panorama, *Tephrosia* sp. B (Kimberley Flora), *Tephrosia spechtii* open shrubland to scattered shrubs over *Triodia longiceps*, (*Triodia epactia*) open hummock grassland

This unit was recorded at releve B90 in the Kangaroo Caves survey area. It was representative of rocky headland and outcrops on the lower to mid-slopes of the Kangaroo Caves geological formation in the Kangaroo Caves survey area.

##### ***Triodia brizoides* vegetation on lower slopes**

**#Aa'bTb:** *Acacia acradenia*, *Acacia bivenosa*, *Acacia inaequilatera* scattered shrubs to high open shrubland over *Triodia brizoides* hummock grassland.

This unit was recorded at quadrat PAN045 and releve B7 on a lower slope in the central and south-western part of Sulphur Springs survey area. It occurred on the lower slopes of high ridges typically with unit #ElAa'Tb (releve B16) upslope.

**#Ap'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia brizoides* closed hummock grassland.

This unit was recorded at quadrat PAN053 and releve B22 on the north-facing mid-slopes of the ridge along the northern side of the main valley in the Sulphur Springs survey area. It was also recorded at releve B4 (on the mid slopes of a medium height ridge). Most areas of the unit occurred on the ridge slopes on the south side of the main valley in the Sulphur Springs survey area.

**#GwAdTb:** *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* subsp. *aprica*, *Acacia acradenia* high shrubland over *Acacia adoxa* var. *adoxo* scattered low shrubs to low open shrubland over *Triodia brizoides* hummock grassland

This small unit was recorded at releve B120, on the lower slopes of a ridge in the south-east part of the Sulphur Springs survey area.

**#Aa'AdTb:** *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia adoxa* var. *adoxo* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland

This was a small unit recorded on lower to upper slopes on a medium height shale ridge in the southern part of the Kangaroo Caves survey area. It was recorded at releve B82 and is very similar to the unit described by releve B120.

**#ChAhTb:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* tall shrubs over *Acacia hilliana* low open shrubland to low shrubland over *Triodia brizoides* hummock grassland

This unit, recorded at releve B121, is similar to unit #GwAdTb (releve B120). However, while *Acacia adoxa* var. *adoxo* scattered low shrubs were recorded at B120, *Acacia hilliana* formed a low open scrub at releve B121. Other elements of the taxa differed so that the two units were floristically different.

**#As'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla* low open shrubland to low shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland

This unit was recorded at releve B123 in the south-eastern part of the Sulphur Springs survey area. It has a very similar vegetation structure description as recorded at releve B77. Unfortunately, the releve description at B77 did not include a list of associated flora and so the units have been left separate. This unit was recorded on the lower slopes of a medium height ridge.

**#Ah'Tb:** *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *aprica*, *Acacia bivenosa* scattered high shrubs over *Acacia hilliana* shrubland over *Triodia brizoides* hummock grassland

This unit, recorded at releve B115, occurred on the lower slopes of a high ridge immediately upslope of unit #Ah'Te (releve B114). It occurred in the south-east part of the Sulphur Springs survey area.

**#ImAp'Tb:** *Acacia inaequilatera* scattered tall shrub over *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN57-9) *Acacia ptychophylla* low open shrubland to scattered low shrubs over *Triodia brizoides* hummock grassland

This unit occurred on the lower slopes of a high ridge in the Kangaroo Caves Formation geological unit in the Kangaroo Caves survey area. It was recorded at releve B88 and is similar to the unit #ElAiCgTb (releve B45).

***Triodia epactia* vegetation on lower slopes**

**#ElAbTe:** *Eucalyptus leucophloia* low scattered trees over *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland

Only a small area of this mapping unit was recorded. It occurred at the base of lower slopes in the Sulphur Springs survey area and was described from releve B15.

**#Aip'Te:** *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland

A small area of this unit occurred at the base of the south facing slopes of the medium height ridge on the north side of the central valley in the Sulphur Springs survey area. The unit was recorded on the lower slopes of the colluvial spurs at releve B25.

**#Ah'Te:** *Acacia inaequilatera*, *Acacia bivenosa* scattered tall shrubs over *Acacia hilliana* low shrubland to open heath over *Triodia epactia* hummock grassland.

This unit was recorded at releve site B114 on the lower slopes of colluvial spurs below medium to high ridges in the eastern part of the Sulphur Springs survey area. This vegetation unit covered a small area on the edges of a narrow valley floor.

***Triodia wiseana* vegetation on lower slopes**

**#AibTw:** Scattered *Acacia inaequilatera* over *Acacia bivenosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B2 in the main valley in the Sulphur Springs survey area. It occurred on a low to mid-slope of a medium height ridge. It was a common unit along the base of the north-facing hills along the lower slopes of the ridge on the south side of that valley.

**#ChAa'bTw:** *Corymbia hamersleyana* low scattered trees over scattered *Acacia inaequilatera*, *Acacia acradenia* over *Acacia bivenosa* open shrubland to shrubland over *Triodia wiseana* (*Triodia brizoides*) hummock grassland.

This unit was recorded at releve B14 on the lower to mid slopes of a low ridge on the north-west perimeter of the Sulphur Springs survey area. It was similar to unit #AibTw (releve B2), but had a *Corymbia hamersleyana* scattered low trees upper strata and *Acacia acradenia* in the tall shrub layer.

**#ChHcGTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla*, *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B9 on the lower slopes and edge of the valley floor at the base of the ridge on the northern side of the main valley in the Sulphur Springs survey area. It covered a large area on the western end of this valley floor.



**#Ap'As'Tw:** *Acacia inaequilatera*, scattered tall shrubs over *Acacia ptychophylla*, (*Acacia spondylophylla*) low shrubland to low open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland

This unit was recorded at releve B10 and quadrats PAN041 and PAN044. It was only recorded in one small area and may have been ecotonal.

**#Tw:** *Triodia wiseana* hummock grassland.

This unit covered large areas in the tailings dam and adjacent valleys in the central and eastern part of the Sulphur Springs survey area and a small area in the Kangaroo Caves survey area. It was common along the lower slopes of the dolerite/diorite sills in these areas. It was recorded at releve B130

**#CgImTw:** Scattered *Cassia pruinosa*, *Cassia glutinosa* shrubs over *Indigofera monophylla* (PAN 58-17) low open heath over *Triodia wiseana* hummock grassland.

This unit covered a small area on a small valley floor (swale) high in the ranges in the central southern part of the Sulphur Springs survey area. It was recorded at releve B41.

**#IrTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Indigofera rugosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

This occurred along the lower slopes of Honeyeater Basalt in the Sulphur Springs and Kangaroo Caves survey area. It was recorded at releve B68. It covered fairly small areas. The unit was quite different to other units in the survey areas due to the presence of an *Indigofera rugosa* open shrubland.

**#AiGwAoTw:** *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B113 beside the proposed access track just north of the Kangaroo Caves survey area. It was very similar to unit #AioTw above (releves B110 and B36). It has floristic differences and so is mapped separately.

**#ChAiTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*) scattered tall shrubs to high open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B80 and quadrat PAN078 in the Kangaroo Caves survey area on lower to mid-slopes of a steep slopes shale ridge. It is similar to the unit #ChGwTw (releve B69), but has different floristics. It occurs on lower slopes in the Kangaroo Caves survey area and on the lower ridge slopes in the western part of the Bernts survey area.

**#ChAiImTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B142 in the southern part of the Kangaroo Caves survey area. It occurred on the west facing slopes of the ridges whereas the similar unit #ChAiTw (releve B80) occurred on the east-facing slopes.

**#ElAiTw:** *Eucalyptus leucophloia* scattered low trees over (*Acacia inaequilatera* scattered tall shrubs over) *Triodia wiseana* hummock grassland.

This unit, recorded at releve B48, occurred on a low gentle slope high in the ranges in the central southern part of the Sulphur Springs survey area. It covered small areas in what was a mosaic of units.

**#ChImTw:** *Corymbia hamersleyana* scattered low trees over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland

This unit was recorded at releve B60 on the valley floor near the southern perimeter of the Sulphur Springs survey area. It occurred on the lower slopes of the colluvial spurs of Kangaroo Caves Formation hills and the adjacent valley floor.

**#AbImTw:** *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.

This unit occurred adjacent to the creekline on the valley floor near the southern perimeter of Sulphur Springs survey area. It was recorded at releve B136. It occurred along with another vegetation unit as part of a mosaic of units.

**#Aa'ImTw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland to shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland.

This vegetation unit occurred on the lower slopes of a high ridge in the Kangaroo Caves Formation geological units. It was recorded at releve B138 in the southern part of the Sulphur Springs survey area.

#### **5.2.2.2 Vegetation of the valley floors**

A number of broad valley floors occurred in the three major survey areas. Vegetation within each valley floor was very variable, forming mosaics as the units repeated themselves across the many swales, low ridges and creek banks. While the vegetation units were similar between some of the valley floors, some of the valley floors occur on different geological units and so had differences. For this reason the valley floor vegetation in each valley is mapped as a mosaic of units, with the basic units described for each valley.

*Triodia* sp Panorama and *Triodia angusta* (Shaw River Form) tended to occur on lower slopes, *Triodia epactia* generally occurred along flowlines and *Triodia wiseana* on the low ridges.

#### ***Triodia* sp. Panorama vegetation on the valley floors**

**#AbTp:** *Acacia bivenosa* scattered shrubs over *Triodia* sp. Panorama hummock grassland.

This vegetation unit was recorded at releve B1 on the lower slopes of a small ridge. It occurred on a number of similar habitats in the western end of the central valley in the Sulphur Springs survey area. The *Acacia bivenosa* was up 1 metre tall.

**#Tp:** *Triodia* sp. Panorama (*Triodia epactia*) open hummock grassland.

This unit was recorded at quadrat PAN043 in the eastern part of the main valley in the Sulphur Springs survey area. It was recorded on the upper slopes of a low rise on the valley floor.

***Triodia angusta* (Shaw River form) vegetation on the valley floors**

**#ChAiTa:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland

This unit was recorded at releve B19, at the eastern end of the central valley in the Sulphur Springs survey area, near the camp site. It occurred in a drainage area crossed by a number of creeks flowing to the east end of the valley from the ranges to the south. Calcrete gravel was abundant in the area. *Acacia bivenosa* occurred nearer the creek line.

**#AiTa:** *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland

This vegetation unit was recorded at releve B21 and was common on the lower colluvial slopes, down slope of the lower slope *Triodia wiseana* hummock grasslands. It had low species diversity.

**#Ta:** *Triodia angusta* (Shaw River form) hummock grassland.

This vegetation was recorded at releve B105 on the broad valley floor to the east or south-east of Bernt's hill range and between the hill range and the Shaw River. It occurred on the swales between the low ridges.

***Triodia wiseana* vegetation on the valley floors**

**#AiCpTw:** *Acacia inaequilatera* scattered tall shrubs over *Corchorus parviflorus* scattered low shrubs to low open shrubland and *Triodia wiseana* hummock grassland.

This unit was recorded at quadrat PAN038 on the colluvial slopes above a creek on the floor of the main valley in the Sulphur Springs survey area.

**#ChAa'Tw:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* high open shrubland (in parts) over *Triodia wiseana* hummock grassland.

This unit was recorded at quadrats PAN051 and PAN047 in the proposed Tailings Dam area north of the main valley in the Sulphur Springs survey area at PAN055 on the upper slopes of a low spur in the main valley in the Kangaroo Caves survey area.

**#Aa'GwTw:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This unit was recorded at quadrat PAN050 at the base of a gently sloping colluvial spur immediately above a creekline. It was several hundred metres north west of PAN047 in the Tailings Dam valley in the Sulphur Springs survey area.

**#GHcTw:** *Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland

This valley floor unit was recorded at releve B66 in the north-east part of the Sulphur Springs survey area in its northern most valley. *Acacia bivenosa* occurred in the lower lying areas, particularly adjacent to flowlines.

**#Aa'TwTm:** *Acacia acradenia*, (*Acacia inaequilatera*, *Hakea chordophylla*) high shrubland to high open shrubland over *Triodia wiseana* (*Triodia melvillei*) hummock grassland

This unit was recorded at releve B137, along the narrow valley flats adjacent to the banks of a creek followed by the access track between Sulphur Springs and Kangaroo Caves survey areas. It was one of only two valley floor areas where *Triodia melvillei* hummock grassland was observed. It also differed from other valley floor units in having an *Acacia acradenia* high shrubland.

**#ChAbTw:** *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia bivenosa* scattered tall shrubs over *Triodia wiseana* hummock grassland.

This unit was recorded in the main valley in the Kangaroo Caves survey area on the valley floor adjacent to the main *Eucalyptus victrix* creekline. It was recorded at releve B78.

**#GCgTw:** *Grevillea pyramidalis*, *Cassia glutinosa* scattered tall shrubs over *Triodia wiseana* hummock grassland to closed hummock grassland.

This unit was recorded at quadrat PAN061 on the lower slopes of the southern end of the Bernts hill range, down slope of the quadrat PAN058 unit.

**#ChGTw:** *Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland

This vegetation unit was recorded at releve B103. It occurred on low calcrete ridges on the valley floor on the eastern side of the hill range in the Bernts survey area.

**#ChAp'Tw:** *Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland over *Triodia wiseana* hummock grassland.

This unit was recorded at releve B94 on the lower slopes of a low ridge in the eastern part of the Bernts survey area.

**#ChTw:** *Corymbia hamersleyana* scattered low trees over *Triodia wiseana* hummock grassland.

This unit occurred on the crest of a low ridge in the western part of the Bernts survey area. It was recorded at releve B96, upslope of B94.

**#ChGwHcTw:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Acacia acradenia* tall shrubs over *Triodia wiseana* hummock grassland

This unit occurred on the upper slopes of a low ridge in the eastern part of the Bernts survey area. It was a common unit in the area and was recorded at releve B108, several hundred metres north of releves B94 and B96.

**#CIAa'Tw:** *Acacia inaequilatera* scattered tall shrubs over *Cullen leucanthum*, (*Grevillea wickhamii* ssp. *aprica*) high open shrubland over *Acacia acradenia* open heath to closed

heath over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland

This vegetation was common in the valley on the southern boundary of the Sulphur Springs survey area. It was recorded at releve B53. Some areas of this unit had little *Acacia inaequilatera*, but included *Corymbia hamersleyana* scattered low trees.

### ***Triodia epactia* vegetation on the valley floors**

**#ChAp'Te:** *Corymbia hamersleyana*, *Eucalyptus leucophloia* scattered low trees over *Acacia ptychophylla* low shrubland to low open heath over *Triodia epactia* hummock grassland.

This unit was recorded on the slope of a low ridge in the western part of the main valley in the Sulphur Springs survey area. It was recorded at quadrat PAN040.

**#Aa'HcTe:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Hakea chordophylla*, *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded at releve B116. It occurred along a narrow valley floor in the south-east part of the Sulphur Springs survey area, adjacent to a flowline.

**#ChAa'Te:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

This vegetation unit was recorded at releve B95, on a very low ridge on a very gently undulating valley floor. The valley floor was a large area at the south of Bernts survey area, between the hill range and the Shaw river-Honeysuckle Creek.

**#GwAp'Te:** *Grevillea wickhamii ssp. aprica* scattered tall shrub to high open shrubland over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland.

This unit was recorded on a large gently undulating valley floor along the eastern base of the Bernts hill range. It was recorded at releve B104 and was one of a number of units forming a mosaic of vegetation types on the valley floor.

### ***Triodia melvillei* vegetation on the valley floors**

**#ChAp'Tm:** *Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia melvillei* hummock grassland

This vegetation unit was recorded at releve B93 on the valley floor between the Kangaroo Caves and Bernts survey area. It occurred on low rises and swales on the valley floor and was one of only two valley floor vegetation units observed in the survey areas that included *Triodia melvillei*.

## **5.2.2.3 Vegetation of creeks, rivers and gorges**

### **5.2.2.3.1 Vegetation of small flowlines and creeks**

#### ***Acacia tumida* high shrubland to low open forest small creek banks**

**#EIAAtPte:** *Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides*, *Acacia bivenosa* high open shrubland to high shrubland over *Acacia ptychophylla*, *Acacia spondylophylla* scattered low shrubs over *Triodia epactia*, (*Triodia angusta* (Shaw River form)) closed hummock grassland.

This unit was recorded at releve B20 on the banks of a small creek near the base of the ridge slopes in the main valley in Sulphur Springs survey area. It differs from larger creek vegetation in having an overstorey of *Eucalyptus leucophloia*.

**#AtPGrTe:** *Acacia tumida* low woodland to low open forest (pre-fire) to high shrubland over *Corymbia hamersleyana* scattered low trees over *Petalostylis labicheoides*, *Gossypium robinsonii* high shrubland over *Cajanus cinereus*, *Tephrosia* aff. *rosea* (HD292-37) shrubland over *Triodia epactia*, *Triodia wiseana* very open hummock grassland.

This unit was based on plant communities on sandy loam creek banks recorded at quadrats PAN039 and PAN049. It occurred on the banks of a number of creek lines in the Sulphur Springs survey area, particularly in the main central valley. At quadrat PAN039 (main valley) which was at the base of a high ridge on the north side *Triodia epactia* formed a hummock grassland while at quadrat PAN049 (tailings dam valley) *Triodia wiseana* formed a hummock grassland. Similar units of *Acacia tumida* low open forest were recorded along the creek banks at releve B133 in the southern part of Sulphur Springs survey area and on a broad sandy loam bank at quadrat PAN042 in the main valley of the Sulphur Springs survey area.

**#AtCcTw:** *Acacia tumida* low open forest over *Acacia acradenia*, *Cajanus cinereus*, *Acacia pyrifolia* (slender, white), *Cassia glutinosa* closed scrub over *Indigofera monophylla* (PAN 65-14) low shrubland over *Triodia wiseana* hummock grassland.

This creek bank vegetation unit was recorded at releve B133. *Acacia acradenia* was a dominant in the tall shrub strata. *Acacia colei* also occurred in this creek bank vegetation in the Kangaroo Caves Formation area.

**#AtPte:** *Acacia tumida* low open forest to open forest over *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia* hummock grassland.

This unit occurred in a small area in the main valley in the Sulphur Springs survey area. It was recorded at quadrat PAN042 on loamy sand on a small creek floodbank.

**#ApCn:** *Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white) open scrub over *Carissa lanceolata*, *Cajanus cinereus*, *Cassia oligophylla*, *Cassia glutinosa* closed scrub.

This vegetation unit was recorded at releve B63 in the Sulphur Springs survey area. A major difference from other *Acacia pyrifolia* open scrub stands was the occurrence of *Carissa lanceolata* as a dominant tall shrub.

**#ApCpTw:** *Acacia pyrifolia* (slender, white) high open shrubland to high shrubland over *Indigofera monophylla* (PAN57-9), *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Corchorus parviflorus* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

This vegetation unit was recorded at quadrat PAN079 in the Kangaroo Caves survey area. Downstream to the east, where the valley was more open and the creek broader, the *Acacia pyrifolia* (slender, white) high shrubland occurred under *Eucalyptus victrix* scattered trees and

with *Melaleuca linophylla* and *Melaleuca glomerata* in the high shrubland strata. These are vegetation elements of the larger creeks (see below).

### Other small creek vegetation units

**#Aa'Pte:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, (*Grevillea wickhamii* ssp. *aprica*) open scrub over *Petalostylis labicheoides* high open shrubland over *Triodia epactia*, *Triodia wiseana* hummock grassland

This vegetation unit is very similar to that recorded at quadrat PAN039 (see above). However, *Acacia tumida* either is not present in this unit or is not the dominant of the tall shrub layer, whereas *Acacia acradenia* is a dominant in the tall shrub layer. This unit occurred on creek banks in all three survey areas and was recorded at releve B140 and quadrats PAN046 and PAN057.

**#Aa'CcTa:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Cajanus cinereus*, *Grevillea wickhamii* subsp. *aprica*, *Acacia pyrifolia* (slender, white) *Petalostylis labicheoides* open shrub over *Triodia angusta* (Shaw River form) hummock grassland.

This vegetation, recorded at releve B106 in the Bernts survey area, was similar to unit #Aa'Pte (releve B140 and quadrats PAN046 and PAN057) above, but included a *Triodia angusta* (Shaw River form) hummock grassland rather than a *Triodia epactia* and *Triodia wiseana* hummock grassland.

### 5.2.2.3.2 Vegetation of medium sized Creeks

**#EvMlgTe:** *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub over, *Petalostylis labicheoides*, *Cajanus cinereus* (*Acacia tumida*) high shrubland over *Triodia epactia*, (*Triodia* sp. Panorama, *Triodia wiseana*).

This is a broad unit based on the vegetation recorded at releve B129 on a large creekline in the central-eastern part of the Sulphur Springs survey area. In the creekline on the western side of the Sulphur Springs survey area, *Triodia epactia* was the common hummock grassland recorded. In the main valley on the eastern side of the Kangaroo Caves survey area, similar vegetation was observed growing over *Triodia wiseana*. On a creekline on the southern boundary of the Sulphur Springs survey area, the *Eucalyptus victrix* woodland was over vegetation similar to releve B133 vegetation with a major difference being the absence of *Acacia tumida*.

**#EvAtPte:** *Eucalyptus victrix* scattered trees to open woodland over *Acacia tumida*, *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Gossypium robinsonii* high shrubland over *Petalostylis labicheoides*, *Cajanus cinereus*, *Cassia glutinosa*, *Tephrosia* aff. *rosea* (HD 292-37) open shrubland to shrubland over *Triodia epactia* hummock grassland.

This vegetation unit was recorded at releve B27 in the Sulphur Springs survey area east of the tailings dam valley. It occurred on the banks of a creek that was smaller than the creek where unit #EvMlgTe (releve B129) was recorded.

**#EvTp'Tw:** *Eucalyptus victrix* scattered low trees to trees over *Acacia acradenia*, *Acacia pyrifolia* (slender, white) high open shrubland over *Cajanus cinereus* scattered shrubs to open shrubland over *Themeda* sp. Panorama, *Triodia wiseana*, *Cyperus vaginatus* tussock, hummock grassland/sedgeland and *Stemodia grossa* herbland.

This vegetation unit is based on the vegetation stands recorded along the access track between Sulphur Springs and Kangaroo Caves survey areas, at quadrat PAN076 and at a releve a few hundred metres downstream, B111. The new taxa *Themeda* sp. Panorama, grew along this part of the creek line. *Melaleuca linophylla* and *Melaleuca glomerata*, which were recorded in releve B111 but not in quadrat PAN076, occurred discontinuously along the creekline. *Stemodia grossa* and *Lobelia quadrangularis* formed herblands in places along the creekline.

#### 5.2.2.3.3 Vegetation of creeks with permanent or semi-permanent water

**#EvcTl:** *Eucalyptus victrix*, *Eucalyptus camaldulensis*, *Melaleuca argentea* open forest over *Acacia ampliceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia longiceps* sedgeland, hummock grassland.

This vegetation unit is uncommon in the survey area, with only two sites occurring in the Sulphur Springs survey area (PAN077 and B141). The sites had an overstorey of *Eucalyptus victrix*, *Eucalyptus camaldulensis* and *Melaleuca argentea* and a number of other Kimberley flora elements. B141 had areas of *Schoenus falcatus* sedgeland. *Schoenus falcatus* also occurred in PAN077 while *Themeda* sp. Panorama occurred just beyond the immediate creek bank vegetation at the base of a rockpile (rockpile site PAN082).

#### 5.2.2.3.4 River vegetation

**#EcMgCv:** *Eucalyptus camaldulensis* open forest over *Melaleuca glomerata*, *Atalaya hemiglauca* low forest over *Cyperus vaginatus* open sedgeland to sedgeland over \**Cynodon dactylon*, \**Cenchrus ciliaris* grassland.

This unit occurred on the banks of the Shaw River, just south of the Bernts hill range. It was recorded at quadrat PAN062.

**#EcMaCv:** *Eucalyptus camaldulensis* var. *obtusa*, *Melaleuca argentea* open to closed forest over *Acacia ampliceps*, *Acacia coriacea* var. *pendens*, *Atalaya hemiglauca* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggia virosa* ssp. *melanthesioides* scattered tall shrubs over *Cyperus vaginatus*. \**Cenchrus ciliaris*, *Cynodon dactylon*, \**Argemone ochroleuca* very open sedgeland and herbland, grassland.

This unit was recorded at releve B107 (on a sand drift nearer the middle of the broad river channel) on the Shaw River on the southern boundary of the Bernts survey area. This part of the river vegetation was on the edge of the open part of the river bed (which had sporadic sand drifts that were vegetated). *Melaleuca argentea* tended to occur more towards the main river bed, rather than on the edge of the banks.

#### 5.2.2.3.5 Vegetation of gorge walls, steep gully slopes and rocky creek lines

##### Vegetation of rocky gorge walls

**#AhEsFp:** *Atalaya hemiglauca*, *Acacia pruinocarpa*, *Ehretia saligna* var. *saligna*, *Acacia tumida*, *Ficus platypoda* high open shrubland over *Cassia glutinosa*, *Cassia venusta* scattered shrubs over *Triodia epactia* (*Cymbopogon ambiguus*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Eriachne mucronata* (typical form)) open hummock grassland/grassland/sedgeland.



This vegetation unit was recorded at releve B43, near Sulphur Spring in a narrow rocky gorge with very steep to vertical rocky walls more about 50 meters high. Similar vegetation, including *Acacia coriacea* ssp. *pendens*, was recorded in similar habit near B43.

### Vegetation of steep gully slopes

**#ElAtTe:** *Eucalyptus leucophloia* (*Corymbia hamersleyana*) scattered low trees over *Acacia tumida* low open forest over *Acacia orthocarpa*, *Petalostylis labicheoides*, *Cassia glutinosa* high open shrubland over (*Tephrosia spechti*), *Corchorus parviflorus* scattered low shrubs to shrubland over *Triodia epactia* hummock grassland

This vegetation unit was recorded at releve B47. It was several hundred metres upstream of releve B43 where the gorge turned direction and widened and where the gorge walls were not as high. Releve B47 was recorded on a steep soil slope (lower to mid slope) below very steep to vertical, rocky walls. Releve B43 taxa, such as *Acacia pruinocarpa* and *Atalaya hemiglauca*, occurred on the rocky gorge walls adjacent to B47.

**#CcImTw:** *Cajanus cinereus* open to closed heath over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia wiseana* hummock grassland

This vegetation unit was quite small but distinctive, occurring on gully slopes in the upper reaches of a valley in the Kangaroo Caves formation immediately north east of the Strelley Granite. It was recorded at releve B62.

### Vegetation of rocky creeks

**#TcAhSg:** *Terminalia canescens* low woodland over *Atalaya hemiglauca*, *Acacia colei*, *Acacia acradenia*, *Cajanus cinereus* open shrubland over *Stemodia grossa*.

This unit is based on releve B139 which occurred in a rocky creek bed and banks at the southern extent of Sulphur Spring survey area. Similar vegetation was observed in a occasional small pockets in rocky steep sections of creek lines (mainly on slopes) in the southern part of Sulphur Spring survey area in the Rhyolite and Andesitic volcanic geological formations.

**#TcMglTp:** *Terminalia canescens* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggea virosa* subsp. *melanthesoides*, *Acacia pyrifolia* (slender, white) open scrub over *Triodia* sp. Panorama, *Cyperus vaginatus* sedgeland/grassland and *Flaveria australasica*, *Stemodia grossa* herbland

This vegetation unit occurred in a wide cobbly creek flowing east between high volcanic ridges and recorded at releve B89. It was an uncommon creek unit with *Terminalia canescens* occurring only very occasionally in the area.

#### 5.2.2.4 Rockpile vegetation

**#CrFvFo:** *Acacia coriacea* subsp. *pendens* scattered low trees over *Clerodendrum floribundum* var. *angustifolium*, *Clerodendrum tomentosum*, *Cajanus cinereus*, *Flueggia virosa* subsp. *melanthesoides*, *Ficus opposita* scattered tall shrubs over *Triodia wiseana*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii* very open hummock/tussock grassland/sedgeland.

There were not large areas of rockpiles in the survey areas, but numerous small rockpiles occurred in the metamorphosed gabbro, dolerite and diorite geological unit, particularly in the Sulphur Springs survey area. The rockpile vegetation unit was recorded at quadrats PAN081 and PAN082.

## **6.0 FLORISTIC ANALYSIS OF THE VEGETATION OF THE STUDY AREA**

### **6.1 Analyses carried out**

Three levels of groups of sites are defined from the analysis of the site (quadrata and releve) data used in the floristic analysis. These three levels of groups divide the 700+ sites in the dataset into respectively 10, 60 and 210 groups of sites. The groups of sites in each level are roughly equivalent to each other. The aims of defining such groups is identifying patterns of distribution of groupings of flora species in the vegetation that would be of conservation significance and trying to identify what cause or controls the patterns identified.

The analysis includes data from three studies, the present study, and two others to provide a regional context for the data from the present study. As noted above, the other two studies are the Port Hedland to Hope Downs rail study (Maier and Trudgen in prep.) and the West Angelas ERMP study (Trudgen and Casson 1998), with only the data from the Chichester Ranges and Abydos Plain used from the latter study.

While three sets of groups have been defined, inspection of the dendrogram suggests that divisions could be defined below the 210 group level, however, the number of sites available in most groups is inadequate to do so with confidence.

The analysis at the sixty group level was carried out to define some of the broad patterns in the data. At this level there appeared to be relative consistency in the composition of the vegetation dominated by the more commonly dominant species. As the groups are further joined into a smaller number of groups, the groups become more heterogeneous and those joining are "forced" to join.

The results from the analysis are summarised in a number of ways to demonstrate some of the major controlling factors probably at play in influencing the floristic composition of the vegetation represented by the quadrats. Using the summaries, the results are discussed at regional (section 6.3) and subregional (section 6.4) levels.

A summary of the characteristics of the groups from the 60 Group level groups and the 210 group level groups present in the Panorama survey area is given in Appendix 7. They are arranged there so the at the groups from the 210 group level are given below the group at the 60 group level that they belong to.

### **6.2 Large number of the groups defined and their level**

Some thought was put into the number of groups defined, with a two level classification of sixty higher order groups and two hundred and ten groups decided on and a ten group level added later to see if higher level patterns were present in the data. Factors taken into account in deciding on the 60 group and 210 group levels included:

- the large range of vegetation structural types sampled;
- the large diversity of habitats sampled;
- the observation during the first field visit of substantial variation in the structure and dominance of the vegetation;
- the recognition of fifty groups in the dataset of an earlier study, which accorded well with the previous broad level classification of the vegetation of the study area by intuitive sorting;

- a desire to make the groups defined similar in level to those defined in another study (Trudgen and Griffin 2001) that incorporated some of the same data.

In fact, the dendrogram for the classification of sites using flora cover data shows that there is very significant variation in the dataset. Thus, the large number of groups in the classifications of the sites produced, while somewhat arbitrary, reflects and is appropriate for the diversity of the data being analysed.

The values on the horizontal scale of the dendrogram at which the 210-Group level groups are defined roughly correspond to the values for the definition of the Floristic Community sub-type of Gibson *et al* (1994). That study was based on a somewhat similar sized data set (504 sites), but which sampled a much smaller range of geology and geomorphology. This suggests that the 210 group level units of this study are defined at approximately the same level as the floristic community sub-types of Gibson *et al* (1994). The much greater number of units defined in the current study reflecting the greater range of geology, soils and geomorphology sampled. However, there are difficulties making such comparisons between different data sets, especially ones from such different regions as the Swan Coastal Plain and the Fortescue Botanical District and the 210 group level units of this study may be a little higher than the floristic community types of Gibson *et al*.

The classification of sites using the cover data suggested that there were many very different plant communities in the data set. This is best shown in Figure 4, a truncated dendrogram showing the way the 60-Groups join together. From the way the groupings represented by the dendrogram occur, especially the values at which they join, it should be inferred that many of the 60-Groups have very different composition.

When considering the number of floristic groups defined for the Panorama survey area, it should be appreciated that the eighty-two quadrats used in the analysis are insufficient in number to sample the range of vegetation structural types found to be present in the study area during the vegetation mapping. However, it is likely that the quadrats do sample most of the range of floristic variation present in the survey area at the 210 group level, although possibly not all of it. It is possible that the upper parts and tops of ridges in the Gorge Ranges parts of the survey area, which are poorly represented in the dataset, would have other units not sampled in the study.

### 6.3 Regional level results

Seventeen of the 60 groups defined in the 60 group level of the analysis were present in the Panorama survey area, while 38 and 34 were present in the Port Hedland to Hope Downs rail survey data and the West Angelas (Chichester part only) ERMP survey data respectively (see Figure 4). The smaller number of groups at this level in the Panorama data would largely be a result of the smaller area surveyed, with consequently a smaller range of geomorphology and geology sampled.

Of these seventeen groups from the 60 group level of the analysis present in the Panorama data set, seven are present in both the other survey areas, while three were also present in the West Angelas ERMP survey data and five were also present in the Port Hedland to Hope Downs rail survey data. That the Panorama survey area has more in common with the Port Hedland to Hope Downs rail survey area (11 shared groups) than the West Angelas ERMP survey (9 shared groups) could be reasonably expected as it is much closer to the Hope Downs survey area and both data sets include significant numbers of sites from the Abydos Plain. However, the difference (two groups) is not very great.

What is possibly more important from the point of view of conservation assessment is the number of groups that are not shared with the Port Hedland to Hope Downs rail survey area, or the West Angelas ERMP survey. The Port Hedland to Hope Downs rail survey area is an extremely long survey area, running from the coast near Port Hedland to into the Fortescue Valley, passing about 30 kilometres west of the Panorama survey area and sampled a very large range of vegetation, with some three times as many quadrats as recorded for the Panorama survey. The West Angelas (Chichester part only) ERMP survey area was also very large and was also sampled by a large number of sites. That there is not more overlap between the three areas at the sixty group level indicates a very high level of variation in the distribution of the floristic makeup of the vegetation of the region surrounding the Panorama survey area (noting, of course that the data set does not include any data from east of the Panorama survey area) as well as a high level of variation. When it is also noted that seventeen of the sixty group level groups were only recorded from the West Angelas ERMP survey area, nineteen were only recorded from the Port Hedland to Hope Downs rail survey area and seven in these two areas and not in the Panorama survey area it can readily be seen that there is very significant regional variation in the distribution of floristic variation in the vegetation at the sixty group level.

The analysis at the 210 group level shows further regional variation in the floristic composition of the vegetation. At this level of variation in the vegetation, only 13 of the 36 groups recorded in the Panorama survey area were shared (Table 20) with the other two survey areas. Of these, nine were also recorded from the Port Hedland to Hope Downs rail survey area and five from the West Angelas (Chichester part only) ERMP survey area. Particularly illuminating, was that at this level of variation only one group was recorded from all three survey areas.

Thus, the floristic analysis shows that at a very broad level the vegetation of the Panorama survey area has moderate overlap with the vegetation of the surrounding region, while at a lower, but still broad, level it has a quite low level of overlap with the vegetation of the surrounding region.

#### **6.4 Subregional level results**

There is also a strong geographic basis to the distribution of the floristic groups within the Panorama survey area, with the patterns being clearly related to the three major geomorphological units present in the survey area. The three major geomorphological units in the study area are:

- the Abydos Plain which forms the northern part of the survey area;
- the foot slopes of the Gorge Range, which form a strip in the centre of the survey area; and
- the Gorge Ranges which form the southern part of the survey area.

Figure 5 shows this geographic/geomorphological pattern diagrammatically, with the sites from the Abydos Plain going north-south in the upper part of the figure, the sites from the foothills of the Gorge Range (symbols in circles) running WSW-ENE across the figure and the sites from the Gorge Ranges running NW-SE down the bottom part of the figure.

Close inspection of Figure 5 shows that three of the seventeen groups recorded for the Panorama survey area from the 60 group level of the analysis are confined to the Abydos Plain (groups 54 – 56), three are confined or nearly so to the foot slopes of the Gorge Ranges

(groups 4, 16 and 37) and eight are confined or nearly so to the Gorge Ranges (groups 1, 6, 10, 23, 36, 39, 41 and 43). This is a strong relationship to the geomorphology.

At the 210 group level of the analysis, the geographic basis of the distribution of floristic composition in the vegetation of the study area is also apparent. Only three of the thirty six groups from the 210 group level of the analysis present in the Panorama survey area were not confined to one of the three major geomorphic units present in the study area. These three units (see Table 21) were units 60 (in the foothills and the ranges), 127 (on the plain and in the foothills) and 144 (in the foothills and the ranges).

### **6.5 Relationship of floristic units to land units and habitat**

The land systems in which each quadrat occurred was obtained by a GIS query undertaken by the Department of Agriculture of the co-ordinates of the quadrats against their draft mapping for the Pilbara survey. Some sites in the West Angelas study fell outside that study and have not been assigned a land system. The land systems present in this study are shown in Table 12.

Of the seven land systems present in the Panorama survey data set, Satirist and Platform were not sampled in the data from the other projects used in the analysis, Uaroo was also sampled in the Port Hedland to Hope Downs rail survey and the others in all three surveys, although Capricorn had only a minor presence in the Port Hedland to Hope Downs rail survey (see Table 14). Thus, the groups from the 210 group level recorded in the Panorama survey area are mostly based on sites recorded on the Capricorn land system, with others from the Rocklea, Uaroo, Macroy, Platform and Satirist land systems.

A number of summary tables were prepared to investigate the major influences on the floristic composition of the units defined in the analysis. These show that the classification is strongly related to survey area, that is, to the geographical distribution of the quadrats (see Figure 4). In fact, thirty-one of the thirty-nine groups from the 60 group level which have 5 or more sites are predominantly in one of the three study areas. This suggests that there are significant differences between the floras of the parts of the Pilbara sampled by the three study areas.

It should be noted in assessing these differences, that the land systems are regional scale units, yet, the floristic classification represented by the 60-group level groups are not strongly related to the land systems (see Table 13).

In fact, land systems themselves are only moderately related to the different survey areas (see Table 14). Tables 13 and 14 suggest that the vegetation in the land systems in each study area might have a different floristic composition. This was investigated by summarizing the combination of study and land systems (Table 15).

The relationship of 60-group level to habitat appeared poorer (Table 16) with only some of the groups appearing related to habitat. Habitats are widespread across projects with most being in all three projects (Table 17). When these are combined with project and simplified in Table 18, it shows that many of the groups are principally geographical with habitat only a modifying influence. Habitats and land systems appear only broadly related (Table 19), however, this is to be expected because land systems are units that are heterogeneous in terms of the habitat types used in this report. Also, the sites for this report are not necessarily representative of the land systems. A close examination shows that most of the habitats at sites are consistent with the land system description.

At the 10 group-level there appears to be a relationship with broad habitat types. For example slopes, slopes and narrow drainage lines, broader drainage lines, rockpiles and plains.

It is concluded that habitat in a broad sense, and geographic distribution strongly influence the floristic patterns. Land systems appear important, but their influence is not easy to separate from the others (possibly, differences in geology below that taken into account for the definition of the land systems, or climatic variables have an influence here that has not been detected).

## **6.6 SUMMARY**

### **6.6.1 Regional variation**

The analysis of the floristic patterns shows that there is strong geographic influences at play in the Pilbara. Earlier studies (eg. Trudgen and Griffin 2001) have shown similar results. Broad habitat (landscape position) appears to be important also. Land systems were not a strong predictor of floristic patterns on their own. However, when taken in context of geographic position and habitat, their predictive ability is greatly improved.

Panorama shared floristic units with the other surveys at different levels. At the 60-group level, it shares units of the Abydos Plain with the Port Hedland to Hope Downs rail route study and units of the range with the West Angelas study. However, at the 210-group level (roughly at the Floristic Community sub-type level of Gibson et al, 1994) most floristic units appear distinct. The area of greatest distinctness appears to be the ranges

### **6.6.2 Panorama study area**

A major control on the floristic patterns is the broad geomorphological or physiographic units. The plains, foot slopes and ranges each have more or less distinct suites of floristic units. It is probable that the different geologies of these areas is a major contributor to these differences. It is likely that closer examination would show that much of the variation within these geomorphic units would be explainable in terms of geological substrate and soil type. The data available in terms of number of sites and the quality of geology and soil descriptions is currently inadequate for this purpose.

The land systems mapping also appears to closely reflect these geomorphological units. On the basis of the sites in the Panorama survey, Uaroo, Macroy and River were confined to the plain, Satirist was confined to the foot slopes, Capricorn confined to the ranges and Platform and Rocklea straddled the foot slopes and ranges.

**Table 11:** The list of habitat types that each of the quadrats was assigned according to the site descriptions

<b>HAB_CODE</b>	<b>decode</b>
rp	rockpile
rpg	rockpile - granite
rpv	rockpile - volcanic
p	plain
ps	plain - stony
pg	plain - gilgai and clayey
py	plain - sandy
s	slope
sc	slope - crest & upper
scr	slope - crest & upper, rocky
scs	slope - crest & upper, stony
ss	slope - stony
sm	slope - mid
smr	slope - mid, rocky
sms	slope - mid, stony
sl	slope - lower
slr	slope - lower, rocky
sls	slope - lower, stony
d	drainage line
ds	drainage line - stony
dap	drainage line - alluvial plain
daps	drainage line - alluvial plain, stony
dn	drainage line - narrow
dnr	drainage line - narrow, rocky
dns	drainage line - narrow, stony
du	dune
li	littoral and salt flats



**Table 12:** Land Systems present in quadrats of the present study (Draft descriptions from Department of Agriculture)

<b>Code</b>	<b>Land System</b>	<b>Description</b>
ADR	Adrian	Stony plains and low silcrete hills supporting hard spinifex grasslands
BGD	Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands
BOO	Boolaloo	Granite hills, domes and tor fields and restricted sandy plains supporting soft spinifex grasslands
CHR	Christmas	Stony alluvial plains supporting snakewood and mulga shrublands with sparse tussock grasses
COB	Coolibah	Flood plains with weakly gilgaied clay soils supporting coolibah woodlands with tussock grass understorey
CPN	Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands
CWA	Cowra	Plains fringing the Marsh and supporting snakewood and mulga shrublands with some halophytic undershrubs
DIV	Divide	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands
GRC	Granitic	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands
HOF	Horseflat	Gilgaied clay plains supporting tussock grasslands and minor grassy snakewood shrublands
JAM	Jamindie	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey
LIT	Littoral	Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches
MAC	Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands
MAL	Mallina	Sandy-surfaced alluvial plains supporting soft spinifex (and occasionally hard spinifex) grasslands
MCK	McKay	Hills, ridges, plateaux remnants and breakaways of metasedimentary and sedimentary rocks supporting hard spinifex grasslands
NEW	Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands
PLA	Platform	Dissected slopes and raised plains supporting hard spinifex grasslands
PYR	Pyramid	Stony gilgai plains supporting hard spinifex grasslands and minor tussock grasslands
RIV	River	Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands
ROB	Robe	Low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands
ROC	Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands
RUT	Ruth	Hills and ridges of volcanic and other rocks supporting hard spinifex (and occasionally soft spinifex) grasslands
SAT	Satirist	Stony plains and low rises supporting hard spinifex grasslands, and gilgai plains supporting tussock grasslands
SRK	Sherlock	Stony alluvial plains supporting snakewood shrublands with patchy tussock grasses and spinifex grasslands
TLG	Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands
UAR	Uaroo	Broad sandy plains supporting shrubby hard and soft spinifex grasslands
WHS	White Springs	Stony gilgai plains supporting tussock grasslands and hard spinifex grasslands
WON	Wona	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands

**Figure 4:** Dendrogram showing joining of the 60-group level groups and their occurrence in the studies and land systems and habitats present in the clusters.

GP10	GP60	PAN **	HDRAIL **	WANGEL **	Land Systems // Habitats***
1	1	15	8	26	Capricorn-17 Boolgeeda-9 Rocklea-8 Macroy-4 Pyramid-3 // sls-12 scs-12 sms-10 smr-3
1	2			41	Rocklea-23 Capricorn-8 Ruth-3 Boolgeeda-3 Wona-2 // scs-9 smr-8 scr-7 dns-5 sls-4 sm-
1	3			5	Rocklea-5 // scr-2 ps-1 scs-1 sls-1
1	4	2	7	1	Rocklea-4 Macroy-3 Talga-2 Wona-1 // sms-3 scs-2 sm-1 sl-1 p-1 ps-1 smr-1
1	5		3		White Springs-2 Macroy-1 // dap-1 ps-1 scs-1
1	6	5			Capricorn-5 // dns-2 rp-1 sls-1 daps-1
1	7		3	46	Boolgeeda-14 Rocklea-12 Ruth-5 Capricorn-4 River-3 // sls-15 scs-8 dn-6 sl-5 ps-2 smr-2
1	8			7	Rocklea-4 Capricorn-3 // dns-3 dn-2 d-1 ds-1
1	9			15	Capricorn-14 unknown-1 // dns-7 scs-4 sms-1 ss-1 slr-1 dnr-1
2	10	6	2	8	Capricorn-7 Rocklea-6 McKay-1 Newman-1 River-1 // dns-4 dap-3 smr-2 sms-2 scr-2 dn-
2	11	5	13	7	Rocklea-6 Capricorn-3 Uaroo-3 Ruth-2 White Springs-2 // scs-7 sls-3 dap-3 sms-3 scr-2 :
2	12		1	3	Boolgeeda-1 Macroy-1 Rocklea-1 unknown-1 // dn-1 dnr-1 scr-1 scs-1
2	13		4		Uaroo-3 Mallina-1 // p-4
2	14		3		Uaroo-3 // dn-2 dns-1
2	15		2	18	River-7 Boolgeeda-5 Rocklea-3 Pyramid-2 Littoral-1 // dap-10 daps-5 dn-2 d-1 ds-1 dns-
2	16	1	7	1	McKay-3 Rocklea-2 Macroy-2 Boolgeeda-1 unknown-1 // smr-2 scr-2 sl-1 rpv-1 dn-1 dap
2	17		4		Macroy-2 Boolaloo-2 // scr-3 rpg-1
2	18		4	2	River-4 Jamindie-1 unknown-1 // dap-3 daps-2 dnr-1
2	19		7		Boolgeeda-6 River-1 // dap-4 daps-2 dn-1
3	20			8	Boolgeeda-3 Sherlock-1 Capricorn-1 Horseflat-1 River-1 // sls-2 sms-1 scs-1 sc-1 dns-1 c
3	21			3	Boolgeeda-2 Sherlock-1 // scs-2 sls-1
3	22		1	1	Macroy-1 Rocklea-1 // ps-1 sls-1
3	23	2		6	Rocklea-3 Boolgeeda-2 Capricorn-2 unknown-1 // scs-2 sm-1 ds-1 sc-1 sl-1 ss-1 sls-1
3	24			1	Sherlock-1 // d-1
3	25			1	Boolgeeda-1 // dap-1
3	26			2	Capricorn-2 // dn-1 s-1
3	27		2	2	Rocklea-3 White Springs-1 // dap-1 dns-1 d-1 ds-1
3	28		3		Rocklea-2 Wona-1 // d-2 dns-1
3	29		5		Macroy-3 White Springs-2 // dn-4 dap-1
3	30		6	1	Coolibah-2 Macroy-1 River-1 Robe-1 Rocklea-1 // pg-2 sms-1 sl-1 scs-1 ps-1 py-1
3	31			1	Rocklea-1 // pg-1
3	32			1	Pyramid-1 // pg-1
3	33		2		Christmas-1 Coolibah-1 // pg-2
3	34		2		Littoral-1 Uaroo-1 // li-2
4	35		6		Macroy-3 Boolgeeda-2 Mallina-1 // scs-2 sc-1 sl-1 sms-1 ss-1
4	36	7	2		Capricorn-7 Macroy-2 // smr-3 ps-2 sms-2 slr-1 scs-1
4	37	4	5		Macroy-4 Platform-2 Satirist-1 Granitic-1 Uaroo-1 // dn-3 dns-2 d-1 dap-1 p-1 py-1
4	38	8			Macroy-2 Rocklea-2 Satirist-2 Capricorn-1 unknown-1 // scs-8
5	39	1		6	Rocklea-6 Boolgeeda-1 Capricorn-1 // rp-3 smr-3 scr-1
6	40	2	8	11	Boolgeeda-6 River-6 Macroy-4 Rocklea-2 Talga-1 // dap-9 ds-5 daps-2 d-2 dns-2 dn-1
6	41	6	4	7	River-7 Capricorn-5 Rocklea-3 Granitic-1 Platform-1 // daps-12 dap-4 dnr-1
6	42			1	River-1 // dap-1
6	43	1		13	Rocklea-8 Capricorn-5 Pyramid-1 // daps-10 dnr-2 ds-1 dns-1
6	44			5	Capricorn-3 Rocklea-2 // dnr-2 dns-2 smr-1
6	45			2	Rocklea-2 // dn-2
7	46			6	Pyramid-2 Boolgeeda-1 Horseflat-1 Rocklea-1 Ruth-1 // sl-3 pg-2 sc-1
7	47			1	Horseflat-1 // sl-1
7	48			7	Wona-6 unknown-1 // scs-5 pg-2

					<b>Land Systems // Habitats***</b>
<b>GP10</b>	<b>GP60</b>	<b>PAN **</b>	<b>HDRAIL **</b>	<b>WANGEL **</b>	
7	49		8		White Springs-5 Wona-3 // pg-7 dap-1
8	50		13		Christmas-4 Cowra-4 Adrian-3 Rocklea-1 Wona-1 // pg-11 scr-1 p-1
8	51		12		Jamindie-7 Adrian-2 Newman-2 Boolgeeda-1 // sl-2 pg-2 ps-2 py-2 sls-1 sc-1 d-1 p-1
9	52		6		Uaroo-4 Macroy-2 // scs-3 slr-1 sc-1 sl-1
9	53		34		Uaroo-16 Macroy-11 Boolaloo-3 Mallina-2 River-1 // p-15 dap-7 dn-5 sl-3 sm-1 pg-1 dnr-
9	54	1	8		Uaroo-9 // p-6 py-3
9	55	10	24		Macroy-22 Uaroo-8 Boolaloo-2 Boolgeeda-1 Mallina-1 // p-14 ps-7 sc-4 py-2 sls-1 sm-1 s
9	56	5	28		Uaroo-26 Macroy-6 River-1 // p-23 py-3 dn-2 sc-2 dap-1 s-1 sms-1
9	57		5		Macroy-3 Mallina-1 River-1 // dap-4 p-1
9	58		3		Newman-2 McKay-1 // sm-2 smr-1
10	59		26		Boolgeeda-23 Jamindie-2 Divide-1 // py-6 dap-4 sl-4 dn-2 p-2 s-2 sls-2 sms-2 ps-1
10	60		2		River-1 Boolgeeda-1 // du-2

\* GP10, group number for the 10 group level and GP60, group number for the 60 group level

\*\* Number of sites in PAN (Panorama), HDRAIL (Hope Downs Rail) and WANGEL (West Angelas)

\*\*\* See Table 11 and Table 12 for the descriptions of Land Systems and Habitats

\*\*\*\* The bottom portion of dendrogram has been truncated.

Figure 5: Geographic distribution of the 210 group level groups in the Panorama study area, showing the relationship to geomorphology. (The units with large circles around their symbols) are from the foot slopes of the Gorge Ranges.)

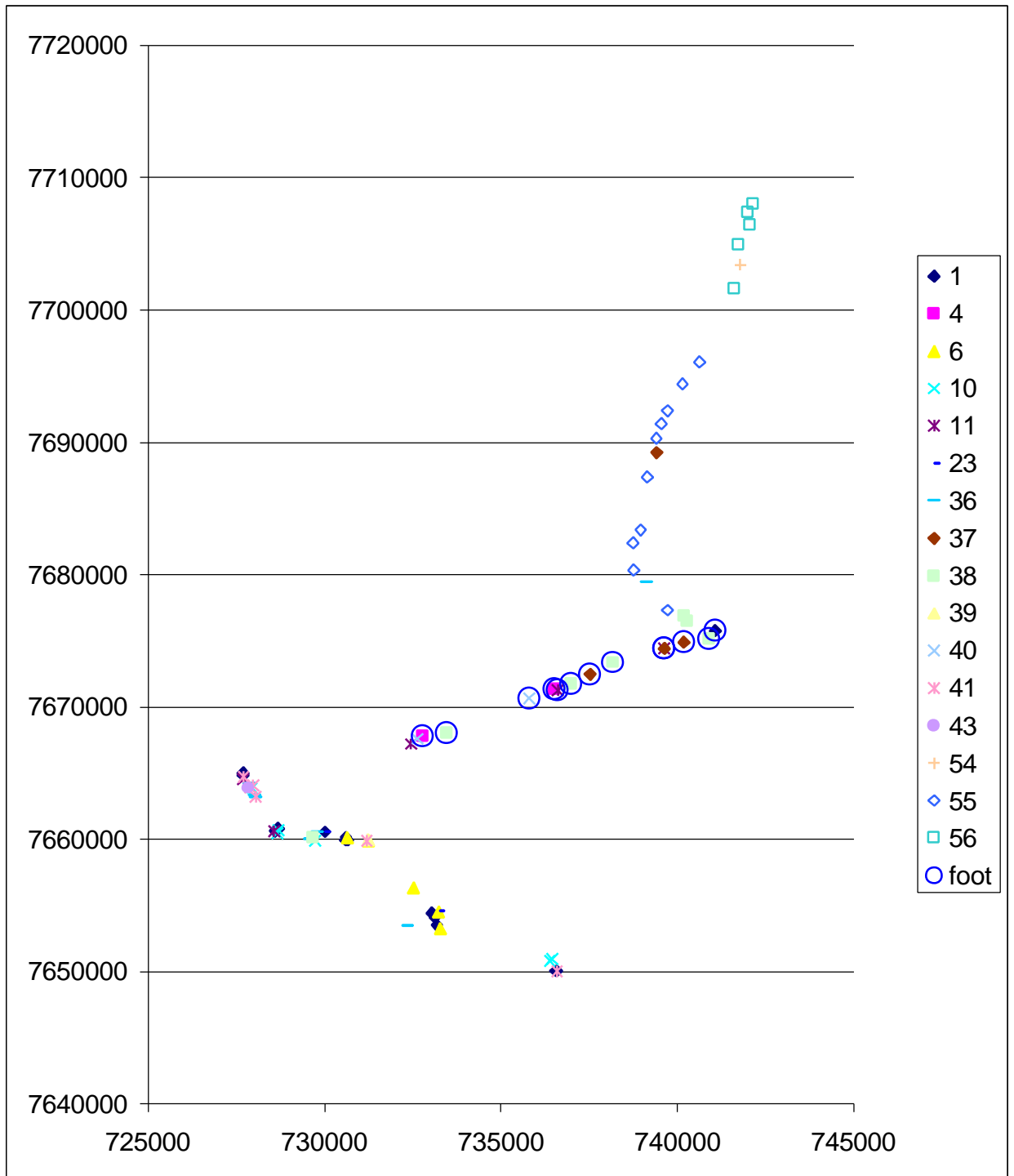


Table 13: Land Systems by 60-group level groups (See Table 12 for land system names)

GP10	GP60	#	LIT	UAR	MAL	RUT	ROB	TLG	BOO	MAC	RIV	WHS	WON	GRC	JAM	MCK	NEW	ROC	SAT	PLA	CPN	CHR	ADR	COB	CWA	BGD	DIV	HOF	PYR	SRK	^		
1	1	49		1						4	2	2						8	1	2	17					9			3				
1	2	41				3							2					23			8					3					2		
1	3	5																5															
1	4	10						2		3			1					4															
1	5	3								1		2																					
1	6	5																				5											
1	7	49				5	2				3	1						12				4				14		2	2		4		
1	8	7																4															
1	9	15																				14										1	
2	10	16									1					1	1	6				7											
2	11	25		3		2				2	1	2				2		6		1	3					2				1			
2	12	4								1								1								1					1		
2	13	4		3	1																												
2	14	3		3																													
2	15	20	1								7							3								5		2	1	1			
2	16	9								2						3		2								1					1		
2	17	4						2	2																								
2	18	6									4				1																	1	
2	19	7									1																6						
3	20	8									1											1				3		1		1	1		
3	21	3																								2					1		
3	22	2								1								1															
3	23	8																3			2					2					1		
3	24	1																														1	
3	25	1																								1							
3	26	2																				2											
3	27	4										1							3														
3	28	3											1						2														
3	29	5								3		2																					
3	30	7		1			1			1	1								1						2								
3	31	1																	1														
3	32	1																														1	
3	33	2																					1		1								
3	34	2	1	1																													
4	35	6			1					3																	2						
4	36	9								2												7											
4	37	9		1						4				1						1	2												
4	38	8								2									2	2		1											1
5	39	7																	6			1					1						
6	40	21			1			1		4	6								2			1					6						
6	41	17									7			1					3		1	5											
6	42	1									1																						
6	43	14																															1
6	44	5																				5											
6	45	2																				3											
7	46	6				1																					1		1	2			
7	47	1																															
7	48	7																															1
7	49	8										5	3																				
8	50	13																					4	3		4							
8	51	12																						2			1						
9	52	6		4						2																							
9	53	34		16	2		1		3	11	1																						
9	54	9		9																													
9	55	34		8	1				2	22																1							
9	56	33		26						6	1																						
9	57	5			1					3	1																						
9	58	3															1	2															
10	59	26																									23	1					
10	60	2									1																1						

**Table 14: Land Systems within each study area as represented by the number of quadrats**

<b>Land System</b>	<b>HDRAIL</b>	<b>PAN</b>	<b>WANGEL</b>
(not described)		2	13
Adrian Land System	5		
Boolaloo Land System	7		
Boolgeeda Land System	35		50
Capricorn Land System	1	41	47
Christmas Land System	5		
Coolibah Land System	3		
Cowra Land System	4		
Divide Land System	1		
Granitic Land System	2		
Horseflat Land System			5
Jamindie Land System	10		
Littoral Land System	2		
Macroy Land System	71	6	2
Mallina Land System	7		
McKay Land System	7		
Newman Land System	5		
Platform Land System		6	
Pyramid Land System			11
River Land System	13	1	25
Robe Land System	4		
Rocklea Land System	12	8	92
Ruth Land System	2		9
Satirist Land System		4	
Sherlock Land System			5
Talga Land System	3		
Uaroo Land System	63	13	
White Springs Land System	15		
Wona Land System	6		8

Table 15: Study area by Land Systems by 60-group level groups (See Table 12 for Land System name)

GP10	GP60	sites	PAN							HDRAIL																				
			UAR	MAC	RIV	PLA	CPN	ROC	SAT	LIT	UAR	MAL	RUT	ROB	TLG	BOO	MAC	RIV	WHS	WON	GRC	JAM	MCK	NEW	ROC	CPN				
1	1	49					2	12			1							4	1	2										
1	2	41																												
1	3	5																												
1	4	10									2						2													2
1	5	3																1				2								
1	6	5								5													2							
1	7	49																												
1	8	7																												
1	9	15																												
2	10	16								6																			1	1
2	11	25						1	2	2								2											2	
2	12	4																												
2	13	4																												
2	14	3																												
2	15	20																												
2	16	9																												
2	17	4																												
2	18	6																												
2	19	7																												
2	20	8																												
3	21	3																												
3	22	2																												
3	23	8								2																				
3	24	1																												
3	25	1																												
3	26	2																												
3	27	4																												
3	28	3																												
3	29	5																												
3	30	7																												
3	31	1																												
3	32	1																												
3	33	2																												
3	34	2																												
4	35	6																												
4	36	9								1																				
4	37	9								6																				
4	38	8																												
5	39	7																												
6	40	21																												
6	41	17									2																			
6	42	1																												
6	43	14																												
6	44	5																												
6	45	2																												
7	46	6																												
7	47	1																												
7	48	7																												
7	49	8																												
8	50	13																												
8	51	12																												
9	52	6																												
9	53	34																												
9	54	9																												
9	55	34																												
9	56	33																												
9	57	5																												
9	58	3																												
10	59	26																												
10	60	2																												

Table 16: Habitat by 60-group level groups (See Table 17 for habitat description)

GP10	GP60	sites	li	du	d	dap	daps	ds	dn	dnr	dns	rp	rpg	rpv	sm	smr	sms	sc	scr	scs	s	sl	slr	sls	ss	p	pg	ps	py
1	1	49				1				1					1	3	10		1	12		3	1	12	1	1		2	
1	2	41					2			1	5					8	3		7	9				4	1			1	
1	3	5																	2	1			1					1	
1	4	10													1	1	3			2		1				1		1	
1	5	3				1														1								1	
1	6	5					1				2	1												1					
1	7	49			1	1			6	2	2					2	2		1	8	1	5		15	1			2	
1	8	7			1			1	2		3																		
1	9	15								1	7						1			4			1		1				
2	10	16				3	1		1		4					2	2		2				1						
2	11	25				3					1					1	3	1	2	7		1	1	3	1	1			
2	12	4							1	1									1	1									
2	13	4																								4			
2	14	3								2		1																	
2	15	20			1	10	5	1	2		1																		
2	16	9				1			1					1						2			1						
2	17	4												1						3									
2	18	6				3	2			1																			
2	19	7				4	2		1																				
3	20	8					1		1		1						1	1		1				2					
3	21	3																		2				1					
3	22	2																										1	
3	23	8						1							1			1		2		1	1	1					
3	24	1			1																								
3	25	1				1																							
3	26	2							1													1							
3	27	4			1	1		1			1																		
3	28	3			2						1																		
3	29	5				1			4																				
3	30	7															1			1		1				2	1	1	
3	31	1																										1	
3	32	1																										1	
3	33	2																										2	
3	34	2	2																										
4	35	6															1	1		2		1		1					
4	36	9														3	2		1				1					2	
4	37	9			1	1			3		2															1		1	
4	38	8																		8									
5	39	7										3				3			1										
6	40	21			2	9	2	5	1		2																		
6	41	17				4	12			1																			
6	42	1				1																							
6	43	14					10	1		2	1																		
6	44	5								2	2					1													
6	45	2							2																				
7	46	6																1				3						2	
7	47	1																				1							
7	48	7																			5							2	
7	49	8				1																						7	
8	50	13																	1							1	11		
8	51	12			1													1				2		1		1	2	2	2
9	52	6																1		3		1	1						
9	53	34			1	7			5	1					1							3				15	1		
9	54	9																								6		3	
9	55	34			1				1						1			4		1	1	1		1		14	7	2	
9	56	33				1			2								1	2			1					23		3	
9	57	5				4																				1			
9	58	3													2	1													
10	59	26				4			2								2				2	4		2	1	2		1	6
10	60	2		2																									



Table 17: Study areas by Habitats

<b>land form</b>	<b>decode</b>	<b>HDRAIL</b>	<b>PAN</b>	<b>WANGEL</b>
li	littoral and salt flats	2		
du	dune	2		
d	drainage line	7		6
dap	drainage line - alluvial plain	42	4	15
daps	drainage line - alluvial plain, stony	4	8	27
ds	drainage line - stony			10
dn	drainage line - narrow	21	2	15
dnr	drainage line - narrow, rocky	3		9
dns	drainage line - narrow, stony	4	4	29
rp	rockpile		2	3
rpg	rockpile - granite	1		
rpv	rockpile - volcanic		1	
sm	slope - mid	5	1	1
smr	slope - mid, rocky	5	5	17
sms	slope - mid, stony	9	14	10
sc	slope - crest & upper	9	1	3
scr	slope - crest & upper, rocky	8		15
scs	slope - crest & upper, stony	16	13	42
s	slope	4		2
sl	slope - lower	16	1	12
slr	slope - lower, rocky	1	3	1
sls	slope - lower, stony	5	5	36
ss	slope - stony	4		3
p	plain	59	12	1
pg	plain - gilgai and clayey	25		6
ps	plain - stony	13	5	4
py	plain - sandy	18		

Table 18: Study by Habitat by 60-group level groups (See Table 17 for Habitat description)

GP10	GP60	sites	PAN							HDBRAIL							WANGEL							
			d	dn	r	sc	sm	s	p	l	du	d	dn	r	sc	sm	s	p	d	dn	r	sc	sm	s
1	1	49				1	10	4				1		4		1	2	1			8	4	12	1
1	2	41															2	6			16	11	5	1
1	3	5																		3		1	1	
1	4	10				1	1							4	1	2				1				
1	5	3									1			1		1								
1	6	5	1	2	1			1																
1	7	49												2		1	2	10		7	4	21	2	
1	8	7															2	5						
1	9	15																8		4	1	2		
2	10	16	2	1			3				1	1					1	3		2	1	1		
2	11	25				1	1	3			1			6	2	3	1	2	1	3	1			
2	12	4										1							1	2				
2	13	4															4							
2	14	3										3												
2	15	20									2						15	3						
2	16	9			1						1	1		2	2	1					1			
2	17	4											1	3										
2	18	6									3	1					2							
2	19	7									6	1												
3	20	8															1	2		2	1	2		
3	21	3																		2		1		
3	22	2														1						1		
3	23	8				1	1										1			2		3		
3	24	1															1							
3	25	1															1							
3	26	2																1				1		
3	27	4									2						1	1						
3	28	3									2	1												
3	29	5									1	4												
3	30	7													1	1	4			1				
3	31	1																					1	
3	32	1																					1	
3	33	2															2							
3	34	2								2														
4	35	6												3	1	2								
4	36	9				1	4	1	1						1		1							
4	37	9		3					1		2	2					1							
4	38	8				8																		
5	39	7			1														2	1	3			
6	40	21	2								8						8	3						
6	41	17	6								3	1					7							
6	42	1															1							
6	43	14	1														10	3						
6	44	5															4			1				
6	45	2															2							
7	46	6																		1		3	2	
7	47	1																				1		
7	48	7																		5			2	
7	49	8										1												
8	50	13												1										
8	51	12										1		1		3	7							
9	52	6												4		2								
9	53	34									8	6			1	3	16							
9	54	9															8							
9	55	34							1		1	1		5	1	3	13							
9	56	33				1			4		1	2		1	1	1	22							
9	57	5									4						1							
9	58	3													3									
10	59	26										4	2		2	9	9							
10	60	2									2													

Table 19: Land Systems by habitats. Emphasise the relationship with habitats.

land form	decode	BGD	CPN	ROC	< >	LIT	DIV	SRK	RIV	GRC
		Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands								
		Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands								
		Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands								
		Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches								
		Sandplains and occasional dunes supporting shrubby hard spinifex grasslands								
		Stony alluvial plains supporting snakewood shrublands with patchy tussock grasses and spinifex grasslands								
		Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands								
		Rugged granitic hills supporting shrubby hard and soft spinifex grasslands								
li	littoral and salt flats					1				
du	dune	1							1	
d	drainage line	2		2				1	2	
dap	drainage line - alluvial plain	6	2	7	1	1	1	1	13	1
daps	drainage line - alluvial plain, stony	6	12	8	1				9	
ds	drainage line - stony	3	1	3				1	2	
dn	drainage line - narrow	11	2	4					2	
dnr	drainage line - narrow, rocky	1	3	4					1	
dns	drainage line - narrow, stony	6	12	12					1	
rp	rockpile	1	2	2						
rpg	rockpile - granite									
rpv	rockpile - volcanic				1					
sm	slope - mid		1	1						
smr	slope - mid, rocky	1	7	14	1					
sms	slope - mid, stony	3	14	7					1	
sc	slope - crest & upper	3			1					
scr	slope - crest & upper, rocky	1	1	13					1	
scs	slope - crest & upper, stony	4	16	15	4			2		
s	slope	2	1		1					
sl	slope - lower	10	2	2						
slr	slope - lower, rocky		4							
sls	slope - lower, stony	13	8	11	4				3	
ss	slope - stony	1	1	2	1				1	
p	plain	3							2	
pg	plain - gilgai and clayey			1						
ps	plain - stony	1		4						
py	plain - sandy	6								1

Table 20: 210-group level groups present in the Panorama study area

GP10	GP60	GP210	PAN *	HDRAI	WANG	Summary of Land Systems
1	1	5	1	2		
1	1	6	10			Capricorn slopes
1	1	7	4			Platform & Capricorn slopes
1	4	20	2			Rocklea slopes
1	6	23	3			Capricorn
1	6	24	2			Capricorn
2	10	48	2			Capricorn slopes
2	10	50	1		2	Rocklea & Capricorn narrow
2	10	51	3			Capricorn narrow alluvial plain
2	11	55	1	4		Capricorn & Rocklea slopes
2	11	56	2	1	3	Rocklea slopes
2	11	60	2			
2	16	75	1		1	
3	23	96	1		1	slopes
3	23	97	1			Capricorn slopes
4	36	119	1	1		Macroy stony plain
4	36	121	1			Capricorn slopes
4	36	122	5			Capricorn slopes
4	37	123	1	4		Macroy drainage lines
4	37	125	1			Uaroo plain
4	37	126	2			Platform narrow drainage lines
4	38	127	2			Macroy & Satirist slopes
4	38	128	1			Macroy slopes
4	38	129	1			slopes
4	38	130	3			Rocklea & Satirist slopes
4	38	131	1			Capricorn slopes
5	39	135	1			Capricorn rockpile
6	40	144	2			Rocklea alluvial plain
6	41	148	1	3		alluvial plain
6	41	149	4			Capricorn alluvial plain
6	41	150	1			Capricorn alluvial plain
6	43	152	1		3	Capricorn alluvial plain
9	54	192	1	4		Uaroo plain
9	55	193	2	2		Uaroo & Macroy plain
9	55	194	8	5		Uaroo & Macroy plain
9	56	200	5			Uaroo plain

\* number of sites in each study area.

**Table 21:** Relationship of the major geomorphological units to the floristic units recorded from the study area, with the number of sites recorded for the geomorphological units in the 210 group units.

<b>GP10 units</b>	<b>GP60 units</b>	<b>GP210 units</b>	<b>Abydos Plain (no. of sites)</b>	<b>Foot hills of Gorge Ranges</b>	<b>Gorge Range (no. of sites)</b>
1	1	5		1	
1	1	6			10
1	1	7			4
1	4	20		2	
1	6	23			3
1	6	24			2
2	10	48			2
2	10	50			1
2	10	51			3
2	11	55		1	
2	11	56			2
2	11	60		1	1
2	16	75		1	
3	23	96			1
3	23	97			1
4	36	119	1		
4	36	121			1
4	36	122			5
4	37	123		1	
4	37	125	1		
4	37	126		2	
4	38	127	1	1	
4	38	128	1		
4	38	129		1	
4	38	130		3	
4	38	131			1
5	39	135			1
6	40	144		1	1
6	41	148			1
6	41	149			4
6	41	150			1
6	43	152			1
9	54	192	1		
9	55	193	2		
9	55	194	8		
9	56	200	5		

## **7.0 CONSERVATION CONTEXT**

### **7.1 Regional context**

The assessment of the conservation value of an area for vegetation and flora needs to be carried out within an appropriate framework. The regional level context for the Panorama survey area is quite readily apparent, the survey area falls within the Fortescue Botanical District of Beard (1975), which is the same area as the Pilbara biogeographic region of Creswell and Thackway (1995), and this is the appropriate boundary for the regional level analysis.

The Fortescue Botanical District covers a portion of the Eremaean Botanical Province of Beard (1975). The boundary starts on the coast near the town of Onslow, includes the Hamersley and Ophthalmia Ranges, passing just east of the town of Newman and rejoins the coast east of Port Hedland..

### **7.2 Subregional context**

At the sub-regional level, it is appropriate to assess the vegetation and flora conservation value of the current survey area in the context of the Gorge Range and the Abydos Plain, as:

- the Gorge Range has been described as a physiographic unit, with distinct vegetation in a regional study (Beard 1975) and has different geology from surrounding areas;
- the Abydos Plain has been described as a physiographic unit, with distinct vegetation in a regional study (Beard 1975) and has different geology from the surrounding areas
- the two sub regions have quite different vegetation and fairly different floras; although there is a lot of overlap in the flora;

Beard's (1975) descriptions of the vegetation of the Gorge Ranges and Abydos Plain physiographic units are reproduced in section 1.6 (see above). However, these descriptions are so general that they are of very limited use for conservation assessment.

## 8.0 FLORA CONSERVATION ASSESSMENT

### 8.1 Assessment approach

The general value of the site for flora will be discussed first. This is the value relating to the overall populations of flora present, it will be addressed at two levels, the regional level and the subregional level. The value of the survey area for species of particular conservation significance or interest will then be discussed.

The concept of conservation value applied is obviously of some significance for interpretation of this section. The general value for flora of an area can be understood as the sum of the value of the populations of all the individual species in it. This is a value that all areas with native flora have, even if they do not have any species of particular interest, ie. it recognises the intrinsic value of areas of native vegetation for flora. This value will obviously vary depending on the size of the area, the flora habitat diversity, the commonness of the particular flora habitats present and the overall flora present. While a description of this value can be made, such as low, moderate, high or very high, it would be difficult to quantify. This value for a particular size of area increases as the number of flora species increases, which generally increases with habitat diversity. The general conservation value for flora of an area will be similar to that of adjoining areas of similar size that have similar ranges of habitat.

The conservation value for species of particular conservation significance will vary for areas that have a similar general value because the number of species (or taxa) of conservation significance can vary fairly widely in areas of similar size and flora habitat diversity. It is a special value rather than a general value. As noted above, the current state of the taxonomy of some genera, such as *Tephrosia*, *Euphorbia*, *Triumfetta* and *Corchorus* does not enable confident assessment of some species of these genera which may be of conservation significance.

### 8.2 General conservation value for flora of the survey area: regional level

While the Fortescue Botanical District is very variable in the distribution of the flora species found there, the survey area does not have any habitat that is extremely restricted in distribution in the district or habitat that is an outlying occurrence that is important for this reason. For example, it does not have any areas of coastal sand dunes, which are of limited occurrence in the district. Thus, it does not have any habitats present as a large part of the survey area that would significantly increase the general conservation value for flora through the presence of a suite of species of restricted area of occurrence (ie., overall low populations compared to species found in more extensive habitat types). The closest it would have to this is the small areas of the larger creeks or rivers and cracking clays present in the survey area. While generally not abundant in the Fortescue Botanical, cracking clays are extensive in the Chichester Ranges and the parts of the Abydos Plain (eg. near Karratha) not based on granite. Although they are not a large part of the Fortescue Botanical District, larger creeks or rivers are widespread in it and not sufficiently restricted in area as to be considered a restricted habitat. They are however, often very degraded by the invasion of Buffel Grass (\**Cenchrus ciliaris*) so that examples with low invasion of this weed are uncommon.

The number of native flora species recorded for the survey area was three hundred and ninety-six, which is fairly diverse for an area of this size in the Pilbara, but not exceptional for an area with the range of habitat present in the survey area, its elongate shape and its range of geology. The very variable structure of the vegetation, reflected in the large number of mapping units, does not seem to have had any significant effect on flora diversity.

This suggests a general conservation value for flora for the survey area, given the size of the area and its elongate nature, at the regional level based simply on the number of species (ie., ignoring species of particular conservation value) would be moderate. That is, there is a significant value, but it is not exceptional or extraordinary. Rather, it is the "base" value that would be expected of an area the size and shape of the survey area containing the two physiographic units included in the survey area. The value would then be modified by the particular species of conservation value found in such an area.

A comparison of the flora recorded during the current survey with that recorded during the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.) illustrates some of the value of the overall Panorama survey area for conservation of flora. Noting that the Port Hedland to Hope Downs survey (287 quadrats overall) had more sites on the Abydos Plain than the current survey (82 quadrats overall), but did not sample the Gorge Ranges (it did however, sample ranges further inland), the following figures give some indication of the "general" conservation value for flora of the study area:

- 291 of the species recorded during the current survey were also recorded during the Hope Downs survey;
- 145 of the species recorded in the Panorama survey had only one occurrence in the dataset;
- 82 of the species with only one occurrence in the Panorama dataset were collected during the Port Hedland to Hope Downs survey;
- the remaining 63 of the species with only one occurrence in the Panorama dataset were not collected during the Port Hedland to Hope Downs survey;
- 57 of the species in the Panorama data set had only two occurrences in the data set;
- :
- 24 of the species in the Panorama data set had only three occurrences in the data set;
- 38 of the species in the Panorama data set had 15 or more occurrences in the dataset.

Such figures give an insight into the "general" conservation value for flora of the Panorama survey area. Firstly, they show that a fairly small proportion of the flora is very common and that most of the other species are much less common. Secondly, they show that the less common species, while not so uncommon as to be considered rare on current criteria, are uncommon enough that a significant proportion are only recorded once in the quadrats in a survey of the size of the Panorama survey and of these almost half are uncommon enough not to be recorded in a larger survey carried out in the same subregion. They also show that of the total list of species recorded, some 25% were not recorded in the latter survey. The implication for the assessment of the "general" conservation value for flora is obvious, it is not insubstantial. To elaborate, the implication is that there is substantial variation in the distribution and density of individual flora species in the landscape with many species being uncommon, which in turn means that means that large areas are required to contain viable



populations of many species (the less common ones). This then implies significant conservation value for flora, which here is turned a general value to differentiate it from the value for those species thought to be so uncommon that they deserve special protection.

### 8.3 General conservation value for flora of the survey area, sub-regional level

The general conservation value for flora of the survey area at the sub-regional level relates to how representative the flora recorded for the sections of the survey area in different subregions are of those subregions as a whole. Unfortunately, the detailed data that would be required to answer this question (overall flora lists for the subregions and measures of population sizes in them) is simply not available. Therefore this section will have to be indicative, rather than being able to define the value under consideration in detail.

As noted above, the survey area includes parts of two of the physiographic subregions of the Fortescue Botanical District defined by Beard (1975). These are the Abydos Plain (particularly that part with soils developed from granite) and the Gorge Ranges. However, this section will consider not only the Abydos Plain and the Gorge Range, but also the foothills of the Gorge range. This has been done, as at the scale of the survey area, the foothills are a significant physiographic unit.

The variation in the flora species recorded for the three physiographic units in the Panorama study area is quite significant, with the number only recorded in one of them (see Table 22 and for more detail, Appendix 5) varying from 48 to 67, the number only recorded in two of them varying from 21 to 58 and only 74 of the 396 species recorded for the survey area recorded in all three. Given the significant numbers of sites recorded (and other collections included in Appendix 5 as well) the difference in the floras recorded for the three subsets of the survey area is quite significant and the "general" value of each of the three areas is significant. The value should be rated as moderate, meaning that while it is significant, it would be shared to a large degree with the other parts of the three physiographic units being considered.

Table 22: Number of species only recorded from one of the physiographic units in the study area or from particular combinations of them

Physiographic area or combination of areas	Number of species only in or only in the combination
Abydos Plain	67 species
foothills	59 species
Gorge Ranges	48 species
Abydos Plains and foothills	27 species
Abydos Plains and Gorge Ranges	21 species
Gorge Ranges and foothills	58 species
Plain, Ranges and foothills	74 species

While the value for flora at the subregional level has been considered for the three major physiographic or geomorphic units in the study area, it should be recognised that these units are not uniform and that the occurrence of flora species in them is not uniform either. For example, where the Abydos Plain slopes down to the river there is a minor geomorphic unit that varies from a gentle slope to small, broad open gullies separated by low spurs. Some species recorded for the plain were only recorded in these open gullies, including *Sclerolaena hostilis*.

Also of note is that between the edge of the Plain and the Shaw River, there was a sand dune that does not really fit into the three geomorphic units. Only a small part of this sand dune was in the edge of the survey area and it was not searched intensively for flora. However, it did provide habitat for one of the rarer species (see below), but only along its edge where it abutted a creek. *Pityrodia* sp. Panorama.

#### 8.4 Conservation value for priority flora and other species of particular conservation value

The survey area as a whole, has eight priority species recorded from it, however, two of these (*Eriachne tenuiculmis* and *Abutilon trudgenii*) have been found to be fairly common since they were placed on the list. Of the others:

- *Olearia fluvialis* was only recorded in the Shaw River at the edge of the survey area;
- *Euphorbia clementii*, *Gonocarpus ephemerus* and *Acacia glaucocaesia* were uncommon in the access road survey area;
- *Gymnanthera cunninghamii* was observed once at the edge of the Shaw River adjacent to Bernts; and
- *Ptilotis mollis* was uncommon in the Kangaroo Caves survey area and more abundant, but still uncommon, in the Sulphur Springs survey area. In both places occurring on the crests of shale ridges.

The conservation value of the survey area as a whole for priority flora is therefore low to moderate. There are not many genuinely uncommon species involved (see Table 22) and the populations of these are not large. However, the value is not insignificant.

The value for other species of conservation significance is much higher, simply because there are more of them that are (on current knowledge) uncommon or even rare. Undoubtedly some will be found to be more common than current information suggests, but this will leave a number that are significant. The value for this group of species should be rated as moderate to high. Of particular importance are the newly discovered species *Themeda* sp. Panorama and *Pityrodia* sp. Panorama, both of which are likely to be quite restricted and very uncommon, if not rare. The value for these two species is obviously very high, quite simply they are not known to occur anywhere else.

**Table 23:** Summary of the species recorded in the flora survey with particular conservation value (see 4.3 and 4.5 above).

Species	Priority level	Range	Common/rare
<b>Priority taxa</b>			
<i>Eriachne tenuiculmis</i>	Priority 3	Widespread	Not uncommon
<i>Abutilon trudgenii</i> (ms)	Priority 3	Widespread	Not uncommon
<i>Euphorbia clementii</i>	Priority 2	Fairly restricted	Not common, possibly rare
<i>Gonocarpus ephemerus</i>	Priority 2	Widespread	Not common
<i>Gymnanthera cunninghamii</i>	Priority 3	Very widespread	Quite uncommon, possibly rare
<i>Olearia fluvialis</i>	Priority 2	Fairly widespread	Uncommon
<i>Ptilotis mollis</i>	Priority 2	Widespread	Rare in the Fortescue Botanical District
<i>Acacia glaucocaesia</i>	Priority 3	Fairly restricted	Not common, possibly quite uncommon
<b>Not priority taxa</b>			
<i>Themeda</i> sp. Panorama		Very restricted	Apparently quite rare

<i>Pityrodia</i> sp. Panorama		Very restricted	Apparently quite rare
<i>Triodia</i> sp. Panorama		Quite restricted	Locally very common
<i>Corchorus</i> sp. Panorama		Quite restricted	Locally common
<i>Corchorus</i> aff. <i>laniflorus</i> (PAN 76)		Quite restricted	Locally common
<i>Indigofera monophylla</i> (PAN57-9.)		Quite restricted	Locally common
<i>Indigofera monophylla</i> (PAN58-17)		Quite restricted	Locally common
<i>Indigofera monophylla</i> (PAN65-14)		Quite restricted	Locally common
<i>Corchorus</i> aff. <i>walcottii</i> (H251-3)		Fairly widespread	Uncommon, possibly rare
<i>Cullen</i> aff. <i>lachnostachys</i> (MET 15,154)		Fairly widespread	Quite Uncommon
<i>Rhynchosia</i> sp. King Bay		Moderately widespread?	Very uncommon in the Pilbara (at least)
<i>Vigna</i> sp. Harding Dam		Moderately widespread	Very uncommon
<i>Acacia</i> sp. (PAN M48)		Very restricted	Very uncommon, possibly rare
<i>Triodia melvillei</i> (? aff. <i>melvillei</i> )		Moderately widespread?	Locally very common
<i>Acacia citriodora</i>		Quite widespread	Uncommon in Pilbara, more common in Kimberleys
<i>Mallotus</i> ? <i>dispersus</i>		Quite widespread	"
<i>Eriachne</i> sp. Port Hedland		Fairly widespread	Not very common
<i>Acacia</i> aff. <i>drepanocarpa</i> ssp. <i>drepanocarpa</i>		Fairly widespread	Not very common
<i>Triodia angusta</i> Shaw River form		Fairly widespread	Not very common?
<i>Triodia angusta</i> Panorama form		Fairly widespread	Not very common?
<i>Tephrosia</i> aff. <i>supina</i> (HD88-4)		Fairly widespread	Possibly uncommon, poorly collected
<i>Sida</i> aff. <i>fibulifera</i> (PAN10-6)		Apparently quite restricted	Poorly collected, possibly uncommon.
<i>Euphorbia</i> sp. (PAN5-15)		Apparently quite restricted	Poorly collected, possibly uncommon.
<i>Euphorbia</i> sp. (PAN1-14B)		Apparently quite restricted	Very poorly collected, possibly uncommon.
<i>Triumfetta</i> aff. <i>chaetocarpa</i> (Panorama form)		Apparently quite restricted	Poorly collected, possibly uncommon.
<i>Triumfetta</i> aff. <i>chaetocarpa</i> (PAN3/4)		Apparently quite restricted	Very poorly collected, possibly uncommon.

## 9.0 VEGETATION CONSERVATION ASSESSMENT

### 9.1 Assessment approach

The assessment of the conservation value of the vegetation of the survey area will be carried out in the following ways:

- a regional level assessment;
- a subregional level assessment;
- assessment of vegetation structural diversity;
- comment on individual potential impact areas.

### 9.2 Regional level assessment of conservation value for vegetation of the survey area

#### 9.2.1 Regional assessment using Beard's (1975) mapping

Reference to Beard's (1975) vegetation map (see Figure 3 above) shows that the survey area has representation of four of his vegetation units. They are:

- **xGc/t3Hi**, which is "Grass savanna mixed with spinifex" which is mapped as a broad zone around the near coastal parts of rivers;
- **a2Sr.t1Hi**, which is "Kanji and spinifex" which is mapped as covering large areas of the Abydos plain;
- **eMi**, which is "Sclerophyll woodland riverain" which is mapped on the rivers and large creeks; and
- **e16Lr.t3Hi**, which is "Snappy gum and spinifex" (Beard 1975, map key) which is mapped on the Gorge Ranges in the study area, as well as large parts of the Hamersley Range and other ranges.

In Beard's descriptions: x = heterogenous, c = *Cassia* spp., t3 = *Triodia wiseana*, Kanji = *Acacia inaequilatera*, e = *Eucalyptus*, e16 = *Eucalyptus ferritcola* (formerly referred to *Eucalyptus brevifolia*).

Clearly while such units convey a certain amount of information about the vegetation, in effect they are "vegetation" units that distinguish little more than broad geomorphic units, or sometimes large geological units, unless the vegetation is extremely different.

So at the level of Beard's (1975) mapping, the vegetation of the study area could be assessed as being typical of that which occurs in the Fortescue Botanical District on the major geomorphic types (lower parts of plains near rivers, plains, rivers or large creeks and ranges) that occur in the study area.

However, the limitations of this should be clearly understood. A useful comparison is with the description and mapping of the geology Shaw 1:100, 000 sheet (Kranendonk 2000), which includes most of the study area (not covering the northern part). This publication describes a hierarchy of units, with three at the upper level (Quaternary, Cainozoic, Archaean), 6 at the next level ("group") for the Archaean, 38 at the next level ("Association") for the Archaean and 146 for the lowest level ("rock type") for the Archaean and 164 overall for this level. This puts the units of Beard's map in perspective (and to be fair, it is a 1:

1,000,000 map) they are so broad that they can be only considered to be somewhere above the formation level.

To further address the latter point, there are thirty-one vegetation units on Beard's (1975, map key) for the entire 1: 1,000,000 map(excluding mosaic units) and one would expect more examples of formations than this in the area the map covers. It would have to be concluded therefore that the units are so broad that they are of very little use by themselves for assessment of conservation value.

### **9.2.2 Regional assessment using the floristic analysis**

The 60 group level of the floristic analysis carried out for this survey is an appropriate level to make regional assessments with, as the groups defined (see Appendices 7 and 8), or at least some of them have distributions across significant parts of the region.

At the 60 group level, the survey area had seventeen groups, or nearly a third of those defined at this level, while the Port Hedland to Hope Downs survey and the part of the West Angelas data set used had thirty-eight and thirty-four respectively. While the overall data set obviously does not contain all such groups found in the region, it seems reasonable to say that the current survey area (with approximately a third of the number of sites and a third of the geographic range of the other data sets and yet half the number of units) has somewhat higher than average richness of these regional level groups. The very diverse geology of the foot slopes and ranges in the current survey area would explain it having higher than average diversity at this level.

Of the seventeen 60 group level units recorded during the current survey, four were not recorded in the other two data sets (see Figure 4), seven were in both the other data sets, while an additional three were also present in the West Angelas ERMP survey data and five were also present in the Port Hedland to Hope Downs rail survey data. These figures indicate that a part of the variation at the 60 group level present in the Panorama survey is not very common elsewhere in the region (with the reverse also being true). Therefore, the Panorama survey area has high value at the regional level for units 6, 23, 38 and 39 of the 60 group level. The Panorama survey also has moderate to high value for group 36, which was recorded by seven quadrats in the Panorama survey area and only two others in the overall data set, both in the Port Hedland to Hope Downs rail survey area. These values are placed assuming the dataset provide a reasonable sampling of the actual abundance of the different groups at the sixty group level. While the survey area can be considered to have such values for these floristic groups, it would be fairly obvious that it would probably share such values with adjacent areas of similar habitat in the Gorge Range and on the Abydos Plain.

The floristic analysis carried out at the 210 group level showed another level of importance for the regional level of assessment of conservation value for vegetation for the Panorama survey area. At this level of division of the data set, 23 of the groups defined were not represented in either the Port Hedland to Hope Downs rail survey or the part of the West Angelas ERMP data set from the Chichester Ranges used in the analysis. This means that the Panorama survey area has high conservation value for these groups (210 group level groups 6, 7, 20, 23, 48, 51, 60, 97, 121, 122, 125, 126, 127, 128, 129, 130, 131, 135, 144, 149, 150 and 200). Again, however, such values are likely to be shared with adjacent areas of similar habitat and geology in the Gorge Range and on the Abydos Plain. However, note that most of the restricted units are from the Gorge Range and its foothills.

The application of values such as those just made can be better understood, when it is seen that the floristic analysis carried out shows that at a very broad level (60 group) of floristic analysis the vegetation of the Panorama survey area has just a moderate overlap with the

vegetation of the surrounding region, while at a lower (210 group), but still broad, level it has a quite low level of overlap with the vegetation of the surrounding region (or at least that in the data set - but this is not small).

### **9.3 Subregional level assessment using the floristic analysis**

A subregional level assessment for the Panorama survey area is inherently difficult, because of the lack of comparative data or vegetation maps for the Gorge Ranges and their foothills. This is a particular problem, because these geomorphological divisions of the survey area are the parts in which the quadrats referred to the more restricted floristic units were mostly located. Consequently, this section will have to largely rely on indirect ways of assessing the likely value of these areas.

#### **Abydos Plain**

Three of the seventeen groups at the sixty group level recorded at Panorama were restricted to the Abydos plain, these are groups 54, 55 and 56 (see Figure 5). These groups were recorded from 1, 10 and 5 quadrats respectively in the Panorama survey area and 8, 24 and 28 quadrats in the Port Hedland to Hope Downs survey area. The other units at the sixty group level recorded on the Abydos Plain in the Panorama survey area were units 36, 37 and 38, with one, one and two records respectively on the Plain. Unit 36 was also recorded six times in the Gorge Ranges, unit 37 was also recorded three times in the foothills of the Gorge Ranges and unit 38 was also recorded five times in the foothills and once in the Ranges. Unit 36 was recorded twice in the Port Hedland to Hope Downs survey area, Unit 37 was recorded five times in the same survey and unit 38 was not recorded outside the Panorama survey area (see Table 21 and Figure 4).

From this it is apparent that the Abydos Plain part of the Panorama survey area has some vegetation that is well represented elsewhere on the Abydos Plain and other vegetation that is apparently not represented elsewhere. It is likely that the latter variation is represented outside the Panorama survey area in areas closer than the Port Hedland to Hope Downs survey area, but is relatively restricted compared to the units also recorded in the Port Hedland to Hope Downs survey area. From this, it is apparent that the area of the Abydos Plain in the Panorama survey area has high value for the sixty group level unit 38, which is localised to this area and the nearby foot hills and ranges. However, it also has significant value for unit 36, which was only recorded twice in the Port Hedland to Hope Downs survey area, this value could be assessed as moderate, given the occurrences in the Ranges.

Parts of this variation, 210 level groups 119, 128, 125 and 119 was not represented in the foothills or ranges, the value for these units would be higher.

#### **Gorge Ranges**

A high proportion of the floristic variation in the Gorge Ranges seems to be localised to that part of the Panorama survey area, with eighteen of the twenty 210 group level units recorded for the survey in the ranges not recorded outside the ranges (Table 21). Table 20 shows that of the twenty 210 group level units recorded in the Gorge Ranges, five were recorded outside the survey area, interestingly with more sites in the West Angelas survey data set than in the Port Hedland to Hope Downs rail data set. Of most relevance to this section is that there was little overlap between the floristic groups at the 210 group level found in the Ranges and elsewhere at the subregional level (ie., either other parts of the survey area or the closer parts of the Port Hedland to Hope Downs rail survey area). This suggest a high value for the vegetation of the Gorge Ranges part of the survey area at the subregional level. However, it is very likely that the groups concerned are also present in other parts of the Gorge range with similar habitats and geology. The latter point is very significant, as the Gorge Ranges are

very diverse geologically and the quadrats do not sample much of that variation. Taking this into account the value may tend towards very high.

### **Foothills of the Gorge Ranges**

Eight of the eleven units at the 210 group level recorded for the foot hills of the Gorge Ranges were not recorded elsewhere in the Panorama survey area. Three of the eight units not recorded elsewhere in the Panorama survey area were also recorded in the Port Hedland to Hope Downs rail survey area and another was recorded also recorded in the West Angelas survey data set. Given the large number of sites recorded for the Port Hedland to Hope Downs rail survey area and the West Angelas survey, this suggests that much of the variation at the 210 group level found on the foot hills of the Gorge Ranges in the current survey is not found (or is not common in) the nearby region. However, this variation is likely to be found on areas of the foothills of the Gorge Range not sampled in this survey. Given the fairly narrow, although also fairly long, nature of the foot hills, the variation not recorded outside the foot hills in the current survey has high conservation value at the subregional level.

### **9.4 Assessment of the structural diversity of the vegetation**

During the mapping of the vegetation, it was found that parts of the survey area, particularly the Sulphur Springs area, but also other parts of the Ranges and some parts of the foot hills of the Ranges, had vegetation that was very varied over quite small distances. While this not extraordinary, it is unusual for areas of the size of the Sulphur Springs area in the Pilbara to have vegetation that is as varied as that area. However, the diversity of vegetation structure/dominance types in the Sulphur Springs area can be explained by a combination of the thirteen different geological types in the area, their complex history of folding and the topography of the area, which has a large number of ridges for the size of the area.

As noted above (see 9.1) 164 geological units have been described for the Shaw 1:100,000 geological map (Kranendonk 2000), which includes most of the study area. Considering that the interaction of such a large number of geological units (although, obviously, not all were in the current survey area) with topography and water relations would produce a large range of different habitats for vegetation, the number of units mapped can be explained by a combination of geological, topographic and edaphic factors. On the other hand, the large number of units mapped for the access road can be explained by the fact that it intersects three major geomorphological types over its length of some 60 kilometres.

Even though explainable, the diversity of units found in the Sulphur Springs area is high for the size of the area and this must add to the vegetation conservation value of the area. Similar reasoning applies to the other areas, taking their sizes into account.

## **10.0 Impact of the proposed Panorama project on the vegetation of the survey areas**

### **10.1 Types of and locations of impact of the Panorama project**

The mines in the three Panorama tenement areas would be underground rather than open pit mines, which will reduce the direct impact of mining on the vegetation and flora by avoiding construction of an open pit and large waste dumps.

The impacts will be construction of access and other roads, construction of processing and other developments and disposal of waste material (tailings). The location of mining activities has not been indicated for the Kangaroo Caves and Bernts survey areas, as they are longer terms proposals. Consequently, the assessment of the impact of mining on vegetation and flora conservation values in these areas can only be considered in general terms.

### **10.2 Impact on vegetation in the Sulphur Springs survey area**

In the Sulphur Springs survey area, potential impacts on vegetation and flora from mining would be a tailings dam (proposed for the valley immediately to the north-east of the central valley), a processing mill (proposed for the central valley), ventilation shafts for the underground mine, administration, accommodation and servicing centre (probably in the main valley) and proposed access roads.

#### **10.2.1 Proposed tailings dam**

A tailings dam (see Figure 1) is proposed for the valley to the north-east of the central Sulphur Springs valley (ie., north of the current exploration camp which is located in the central valley). The tailings dam valley floor slopes gently to the north-east. On the north side are a series of low rises and dolerite sills. A medium height ridge borders the south-west side of the dam. The valley floor drains to the east into a medium sized creek.

The tailings dam valley floor vegetation is mapped as a complex of units #ChAa'Tw and Aa'GwTw and creek vegetation #AtPGrTe. The vegetation is largely scattered tall shrubs including *Acacia inaequilatera*, *Acacia acradenia* and *Hakea chordophylla* over *Triodia wiseana* hummock grassland. This vegetation unit is typical of vegetation on a number of valley floors in the project area. The creek vegetation in the valley is typical of the *Acacia tumida* small creeks unit (#AtPGrTe), which is a widespread creek unit in the project area. The vegetation of the low rises and dolerite sills on the north side of the proposed dam is unit #ChAa'CcTw on the upper rocky slopes and #Tw (releve B130) on the lower slopes. Unit #ChAa'CcTw has scattered low trees of *Corymbia chordophylla* over shrubs of *Acacia acradenia* and *Cajanus cinereus*, with *Triodia wiseana* forming a layer of hummock grassland beneath them. Unit #Tw is a hummock grassland of *Triodia wiseana* with very few shrubs. The vegetation unit on the slopes on the south-western side of the proposed tailings dam is mainly #Aibs'Tb which has shrubs of *Acacia inaequilatera*, *Acacia bivenosa* and *Acacia spondylophylla* over *Triodia brizoides*.

None of these vegetation units would be considered uncommon in the Panorama project area. However, two individuals of a possibly rare taxa, *Acacia* aff. *drepanocarpa* subsp. *drepanocarpa*, were recorded along the base of this ridge in the tailings dam valley. The material collected of this species was sterile and so identification was difficult. Further searches and collections of this taxa would be needed to better evaluate its conservation status.

Downstream of the tailings dam is a north-east flowing medium sized creek which mostly had *Eucalyptus victrix* creek vegetation of unit #EvMlgTe, which has *Melaleuca linophylla* and *Melaleuca glomerata* shrubs under the Eucalypt. Of more significance is the occurrence in a part of the creek of vegetation unit #EvcTl (recorded at quadrat PAN077 and releve B141) in two small areas of this creek, downstream and to the north-east of the tailings dam. Unit #EvcTl has *Eucalyptus victrix* and *Eucalyptus camaldulensis* ssp. *obtusata* over *Melaleuca*



shrubs and *Triodia longiceps*. It is of significance, because it also had a large population of *Schoenus falcatus*, a medium sized perennial sedge which is very uncommon in the Pilbara and which was forming an open sedge layer in the vegetation. This vegetation unit is rare in the creeks in the project area (although it may prove to occur infrequently over a larger area in the Gorge Ranges) and is also important for the population of the *Schoenus*. Also important at this locality is a population of *Themeda* sp. Panorama on the banks of the creek at the base of the adjacent rock pile. *Themeda* sp. Panorama is a new taxa known only from this locality and along the track to Kangaroo Caves (a few patches on a rock pile and larger populations in a creek bed).

### 10.2.2 Proposed Mill

The location for the proposed mill (see Figure 1) is on the north side of the central valley and approximately central in relation to the valley's length. The central valley is the next valley system to the south-west from the proposed tailings dam valley. The proposed mill and the proposed tailings dam would be separated by a medium height ridge. There is a break in the ridge near the proposed mill location which would enable easy connection between the mill and the tailings dam. The vegetation occurring on the valley floor at the proposed location of the mill has been mapped as a mosaic of *Triodia angusta* (Shaw River form) and *Triodia* sp. Panorama hummock grassland (units #AiTa, #AbTp and #Tp) with areas of *Triodia epactia* extending away from creek lines and mixing with *Triodia angusta* (Shaw River form). *Triodia* sp. Panorama is a new species currently only know from the Panorama survey area, where it is moderately common. The distribution of *Triodia angusta* (Shaw River form) and its status is less clear, due to the existence of several forms within *Triodia angusta*, it has a wide if sparse distribution in the project area. The south-eastern part of the mill would be located where there is a mosaic of mainly lower slope *Triodia wiseana* hummock grassland units (#AibTw). Creek line vegetation in this area was *Acacia tumida* unit #AtPGrTe, which is widespread in the Panorama project area. The vegetation units along the lower slopes of the ridge on the north side of the mill are mapped as unit #Aip"Te (low shrubland of *Acacia ptychophylla* over *Triodia epactia*) and a lower colluvial spur mosaic of #Tp on low spur crests and *Acacia inaequilatera* over *Acacia ptychophylla* and *Acacia hilliana* over *Triodia epactia*. Vegetation on the slopes of the ridge between the tailings dam and the proposed mill included *Acacia ptychophylla* and *Acacia spondylophylla* low shrubland units #Aibs" Tb, #Ap" Tb and #Ap" Tb.

Of the vegetation units that occur at the location of the proposed mill, the *Triodia* sp. Panorama and *Triodia angusta* (Shaw River form) units are of most importance. It should be noted that there are extensive areas of *Triodia* sp. Panorama on the foothills along the Gorge Range escarpment.

### 10.2.3 Proposed mine vent

The indicated location of the proposed mine vent for the Sulphur Springs mine is just to the west of Sulphur Springs in the Sulphur Springs survey area. It is an area of steep high sandstone and chert ridges with steep rocky walls either side of narrow creek lines. Vegetation units in this area are creek unit #AtPGrTe (*Acacia tumida* dominant, with *Petalostylis labicheoides* and *Grevillea wickhamii* over *Triodia epactia*) and the rocky gorge wall and gully units #AhEsFp (*Atalaya hemiglauca*, *Ehretia saligna* var. *saligna*, *Ficus* "platypoda") and #ElAtoTe (scattered *Eucalyptus leucophloia* over *Acacia tumida*, *Acacia orthocarpa* over *Triodia epactia*). On the upper slopes of the ridges a unit (#AtTe) with *Acacia tumida* over *Triodia epactia* was dominant. The gorge wall vegetation occurs in a number of places (but with only small areas) in the Sulphur Springs and Kangaroo Caves survey areas, but the Sulphur Springs area is the most developed and extensive. The *Acacia tumida* upper slopes unit #AtTe is extensive in the Panorama project area.

If the vent installation is carried out carefully, the impact should be able to be minimised on the less abundant vegetation units.

#### **10.2.4 Other developments in the central valley**

There may be the need for other developments in the central valley such as accommodation or administration buildings. The vegetation values of other parts of the floor of this valley are generally similar to those outlined for the proposed mill area. While the vegetation in the western end of the valley differs somewhat from that in the central and eastern end, the vegetation units are fairly similar and the vegetation values are therefore similar.

#### **10.3 Impact on vegetation in the Kangaroo Caves and Bernts survey areas**

The valley floor vegetation likely to be impacted by future development in the Kangaroo Caves area is similar to that of the tailings dam location in the Sulphur Springs area. The vegetation is very similar to that area and a valley in the northern most part of the Sulphur Springs area. *Triodia wiseana* dominates the hummock grassland in this valley. The valley on the eastern side of the Bernts hills had areas of *Triodia angusta* (Shaw River form) (relevé B105) in a mosaic of vegetation units.

The shale ridge vegetation units in which *Ptilotus mollis* grows also occurred on the high shale ridge tops in the Kangaroo Caves survey area, but was not observed in the Bernts hill range, any impact on this vegetation would be significant. *Triodia melvillei* units were also recorded on the sandstone ridges in the Kangaroo Caves survey area, but not in the Bernts area. The conservation value of the *Triodia* in these vegetation units needs further investigation, however as they were quite extensive if any impact was small and was kept to a minimum it would not be significant. Other units with this *Triodia* (on shale) were less extensive).

#### **10.4 Impact on vegetation along the proposed access tracks linking the Sulphur Springs survey area and the Kangaroo Caves and Bernts survey areas**

The access track between Sulphur Springs survey area and Kangaroo Caves survey area runs along creek beds for a significant distance. It passes along the creek bed through a unit of #EvcTl, whose vegetation values were outlined in the section on the tailings dam above. The importance of this vegetation stand is supported by the fact that in the floristic analysis the quadrat (PAN077) recorded in it formed a separate group. That is, it is significantly different from not only any other stand sampled at Panorama, but also from any recorded for the other surveys in the data set used. Another small stand of vegetation unit #EvcTl occurred further downstream (north-east) on the northern extent of the Sulphur Springs survey area. Other stands of this vegetation unit may occur further along that creek line, but this would need confirmation.

Several kilometres along the access track towards Kangaroo Caves, south-east from unit #EvcTl, the proposed track runs along a section of the creek line where the new and restricted taxa *Themeda* sp. Panorama is a dominant in the grass/lower shrub layer (unit #EvTp'Tw, quadrat PAN076 and relevé B111). This vegetation unit is of very high conservation value and impact on it should be avoided.

#### **10.5 Impact of the access track from the Port Hedland-Marble Bar road to the escarpment**

The access road to the proposed mine at Sulphur Springs from the Port Hedland-Marble Bar road would be based on widening and developing the existing track into an access road. This would mostly have a low impact on the vegetation and flora, as although many different vegetation types would be impacted, only a small area of each would be disturbed. However, if the road is re-routed to further away from the abandoned Lallah Rook mine, it would have

to cross a medium sized creek twice at a point where there is a population of *Cullen aff. lachnostachys*, a quite uncommon species. It would also possibly impact areas of cracking clay located on the other side of the creek. This habitat, which has edaphically restricted flora, is uncommon in the areas adjacent to the existing track. Moving part of the road to a new alignment would also involve much more area of vegetation being disturbed than maintaining the current alignment.

#### **10.6 Impact of the access track from the Port Hedland-Marble Bar road in the gorge through the escarpment**

As the gorge where the track enters the escarpment is quite narrow, widening the track and constructing a road through the gorge would impact the dampland/wetland vegetation in this area and would need to be carried out with strict attention to minimising impact.

The Panorama access road reached the Sulphur Springs survey area from the foothills of the Gorge Range escarpment by passing through about 6 kilometres of an open gorge. A medium to large creek flowed along the floor of the gorge and the access road traversed along the sides of the creek and at times through it. Four vegetation survey quadrats were located along the creekline. The 210-group floristic analysis of the Panorama sites (see analysis section above) grouped the four gorge creek sites together in one group at the 210 group level, with no other sites from elsewhere in the Panorama project area, the West Angelas survey or the Hope Downs survey.

This means that the Panorama gorge creek vegetation, in the context of the seven hundred sites in the floristic analysis database, is restricted in distribution to that gorge. It should also be noted that the Panorama gorge creek vegetation was separated floristically by the floristic analysis from the Shaw River vegetation (PAN062) and vegetation of three medium sized creeks in the Sulphur Springs survey area (PAN076, PAN077) and Kangaroo Caves survey area (PAN079). Further information is required to determine to what extent the Panorama gorge creek vegetation is restricted within the larger Gorge Ranges area, however, on the currently available information this vegetation belong to a distinct vegetation group that has only been recorded in the "Panorama" gorge. It is likely that similar vegetation would occur in similar habitat, ie, other gorges in the escarpment of the Gorge Ranges that have semi-permanent flow. However, this surmise has not been tested.

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## 12.0 REFERENCES

- Aplin, T. E. H. (1979). The Flora. Chapter three of "Environment and Science". Brian J. O'brien (Editor). University of Western Australia Press.
- Atkins, K.J. (2001). Declared rare and priority flora list. The Department of Conservation and Land Management. Como, Perth.
- Beard, J. S. (1975). Vegetation survey of Western Australia. Pilbara. The vegetation of the Pilbara area. University of Western Australia Press, Nedlands, Western Australia.
- Belbin, L. (1987). PATN Reference Manual (313p), Users Guide (79p), Command Manual (47p), and Example Manual (108p). CSIRO Division of Wildlife and Ecology, Lynham, ACT
- Biota Environmental Sciences and M.E. Trudgen & Associates (2000). Austeel Biological Survey Phase 1. Prepared for Austeel Pty Ltd as sub-consultants to Halpern Glick Maunsell Pty Ltd.
- Blackwell, M., Trudgen, M.E. & Weston A.S. (1979). Vegetation and floristics of the Burrup Peninsula. Unpublished report prepared for Woodside Petroleum Development Pty. Ltd. by Blackwell and Cala, Perth
- Bureau of Meteorology (1989). Climate of Australia. Commonwealth of Aust., Canberra.
- Commonwealth of Australia (1989a). Carlindie Map, Australia 1:100,100 Topographic Survey. Royal Australian Survey Corps, Canberra.
- Commonwealth of Australia (1989b). North Shaw Map, Australia 1:100,000 Topographic Survey. Royal Australian Survey Corps, Canberra.
- Hickman, A. H. and Gibson, D. L. (1982). Port Hedland-Bedout Island, 2nd Edtn. 1:250,000 Geological Series Explanatory Notes. Australian Government Publishing Service, Canberra.
- Kranendonk, M. J. (2000). Geology of the North Shaw 1:100 000 sheet: Geological Survey, 1:100 000 Geological Series Explanatory Notes, 86p.
- Maier, M. & Trudgen (2000). See Biota Environmental Sciences and M.E. Trudgen & Associates (2000).
- Maier, M. & Trudgen, M.E. (in prep for 2002). Port Hedland to Hope Downs rail - vegetation and flora survey. Unpublished report.
- Morgan, B.R. & Trudgen, M.E. (2001). A flora and vegetation survey of a site on the Burrup Peninsula for a proposed DiMethyl Ether project. An unpublished report prepared for PPK Environment and Infrastructure by M.E. Trudgen and Associates.
- Paczkowska , G and Chapman, A.R. (2000). The Western Australian flora, a descriptive catalogue. Wildflower Society of Western Australia (Inc), Western Australian Herbarium, CALM and Botanic Gardens and Parks Authority. Perth, W.A.

- Trudgen, M.E. (1988). *A Report on the Flora and Vegetation of the Port Kennedy Area*.  
Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Trudgen, M.E. & N. Casson (1998). Flora and vegetation surveys of Orebody A and Orebody B in the West Angela Hill area, an area surrounding them, and of rail route options considered to link them to the existing Robe River Iron Associates rail line. Unpublished report for Robe River Iron Associates.
- Trudgen, M.E. and Casson, N. (1999). A flora and vegetation survey of the Millstream section of a rail route to link the West Angelas project to the existing Robe River Iron Associates rail line. Report for Robe River Iron Associates.
- Trudgen, M. E. and Griffin, E. A. (2001). A flora, vegetation and floristic survey of the Burrup Peninsula, some adjoining areas and part of the Dampier Archipelago, with comparisons to the floristics of areas on the adjoining mainland. Vol 2. Unpublished report prepared for the Department of Mineral and Petroleum Resources.
- Trudgen, M.E. & Long, V.L. (in prep.). Botanical survey of the Burrup Peninsula. Vol 1

## **APPENDIX 1: Criteria for the priority rankings applied by CALM to species on The Department of Conservation and Land Management Declared Rare and Priority Flora List for Western Australia**

### **Declared Rare Flora - Extant Taxa**

Taxa which have been adequately searched for and are deemed to be, in the wild, either rare, in danger of extinction, or otherwise in need of special protection.

### **Declared Rare Flora - Presumed Extinct Flora**

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

### **Priority One**

Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat.

### **Priority Two**

Poorly Known Taxa. Taxa which are known from one or a few (generally < 5) populations, at least some of which are not believed to be under immediate threat.

### **Priority Three**

Poorly Known Taxa. Taxa which are known from several populations, at least some of which are not believed to be under immediate threat.

### **Priority Four**

Rare Taxa. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.

**APPENDIX 2: Vegetation condition scale**

This is a general purpose condition scale for assessment of native vegetation, reproduced from Trudgen (1988).

**E = Excellent.** Pristine or nearly so, no obvious signs of damage caused by the activities of European man.

**VG = Very good.** Some relatively slight signs of damage caused by the activities of European man. E.g. some signs of damage to tree trunks caused by repeated fire and the presence of some relatively non-aggressive weeds such as Ursinia anthemoides or Briza spp., or occasional vehicle tracks.

**G = Good.** More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones.

**P = Poor.** Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man such as grazing or partial clearing (chaining) or very frequent fires. Weeds as above, probably plus some more aggressive ones such as *Ehrharta* spp.

**VP = Very poor.** Severely impacted by grazing, fire, clearing or a combination of these activities. Scope for some regeneration but, not to a state approaching good condition without intensive management. Usually with a number of weed species including aggressive species.

**D = Completely degraded.** Areas that are completely or almost completely without native species in the structure of their vegetation. I.e. areas that are cleared or "parkland cleared" with their flora comprising weed or crop species with isolated native trees or shrubs.



### APPENDIX 3: Modified vegetation classification system of Specht

The modification of the vegetation classification of Specht (1970) used by Trudgen (1991 etc) for the description of sites and vegetation units involves describing all the strata in the vegetation to enable comparison between stands on all strata rather than just on the tallest strata. The logic of this is that the tallest stratum often has less cover or biomass than either one lower stratum or the combined lower strata and that vegetation stands with the same or very similar upper strata often have very different lower strata. Another modification is that an additional division (the "scattered" category) has been added to allow for the low cover of many strata in the vegetation of more arid areas such as the Fortescue Botanical District. For example, the cover of *Eucalyptus leucophloia* is often less than 2% and it is desirable to be able to distinguish between stands where this species has say 9% cover and stands with less than 2% cover. The table below also includes some minor modifications by Aplin (1979), from where it is sourced.

An example of the modified use is: *Eucalyptus leucophloia* scattered trees over scattered *Cassia pruinosa* shrubs over *Triodia wiseana* open hummock grassland. Where a vegetation unit is described rather than a site, one of the layers may be a range. For example, *Eucalyptus leucophloia* low open woodland to low woodland.

The classification is given in the following table:

Life form and height	Projective foliage cover of tallest stratum as %	Description of tallest stratum
Trees over 30 metres	70 -100	High closed forest
	30 -70	High open forest
	10 - 30	High woodland
	2 -10	High open woodland
	under 2	Scattered tall trees
Trees 10 - 30 metres	70 -100	Closed forest
	30 -70	Open forest
	10 - 30	Woodland
	2 -10	Open woodland
	under 2	Scattered trees
Trees under 10 metres	70 -100	Low closed forest
	30 - 70	Low open forest
	10 - 30	Low woodland
	2 -10	Low open woodland
	under 2	Scattered low trees
Shrubs over 2 metres	70 - 100	Closed scrub
	30 - 70	Open scrub
	10 - 30	High shrubland
	2 -10	High open shrubland
	under 2	Scattered tall shrubs

Shrubs 1 - 2 metres	70 - 100	Closed heath
	30 - 70	Open heath
	10 - 30	Shrubland
	2 -10	Open shrubland
	under 2	Scattered shrubs
Shrubs under 1 metre	70 - 100	Low closed heath
	30 - 70	Low open heath
	10 - 30	Low shrubland
	2 -10	Low open shrubland
	under 2	Low scattered shrubs
Herbs/Sedges/Grasses	70 - 100	Closed herb, sedge, grassland
	30 - 70	Herb, sedge, grassland
	10 - 30	Open herb, sedge, grassland
	2 -10	Very open herb, sedge, g'land
	under 2	Scattered herbs sedges, grasses

Grasslands are then divided into:

Tussock grasslands (perennial tussock species, e.g. Eragrostis species);

Hummock grasslands (Triodia and Plectrachne species that form hummocks)

Curly spinifex grassland (Plectrachne pungens, which does not form hummocks)

Annual tussock grassland (e.g. annual Sorghum species).

The "curly spinifex grassland " division follows J.S. Beard.

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**APPENDIX 4. Records from some recent surveys of occurrences of *Eriachne tenuiculmis* and *Abutilon trudgenii***

Key: ANGRIV = Angelo River; BURPEN = Burrup Peninsula survey; CALM = CALM Burrup Peninsula survey ; CAPRE = Cape Preston; PAN = Panorama; HDRAIL = Port Hedland to Hope Downs railway survey; WANGEL = West Angelas ERMP survey; BMGC = Survey of proposed DiMethyl Ether site on the Burup Peninsula.

**Records of *Eriachne tenuiculmis* from recent surveys**

Survey area	Site number	Species
ANGRIV	ANGRIV010	<i>Eriachne tenuiculmis</i>
ANGRIV	ANGRIV005	<i>Eriachne tenuiculmis</i>
BMGC	BMGC008	<i>Eriachne tenuiculmis</i>
BMGC	BMGCy	<i>Eriachne tenuiculmis</i>
BURPEN	B081	<i>Eriachne tenuiculmis</i>
BURPEN	B181	<i>Eriachne tenuiculmis</i>
BURPEN	B237	<i>Eriachne tenuiculmis</i>
BURPEN	B193	<i>Eriachne tenuiculmis</i>
BURPEN	B167	<i>Eriachne tenuiculmis</i>
BURPEN	B230	<i>Eriachne tenuiculmis</i>
BURPEN	B152	<i>Eriachne tenuiculmis</i>
BURPEN	B004	<i>Eriachne tenuiculmis</i>
BURPEN	B060	<i>Eriachne tenuiculmis</i>
BURPEN	B058	<i>Eriachne tenuiculmis</i>
BURPEN	B015	<i>Eriachne tenuiculmis</i>
BURPEN	B051	<i>Eriachne tenuiculmis</i>
BURPEN	B042	<i>Eriachne tenuiculmis</i>
BURPEN	B039	<i>Eriachne tenuiculmis</i>
BURPEN	B036	<i>Eriachne tenuiculmis</i>
BURPEN	B007	<i>Eriachne tenuiculmis</i>
BURPEN	B029	<i>Eriachne tenuiculmis</i>
BURPEN	B021	<i>Eriachne tenuiculmis</i>
BURPEN	B020	<i>Eriachne tenuiculmis</i>
BURPEN	B083	<i>Eriachne tenuiculmis</i>
BURPEN	B008	<i>Eriachne tenuiculmis</i>
BURPEN	B218	<i>Eriachne tenuiculmis</i>
CALM	BS34	<i>Eriachne tenuiculmis</i>
CALM	BS34	<i>Eriachne tenuiculmis</i>
CALM	BS34	<i>Eriachne tenuiculmis</i>
CALM	BS30	<i>Eriachne tenuiculmis</i>
CALM	BS15	<i>Eriachne tenuiculmis</i>
CALM	BS1	<i>Eriachne tenuiculmis</i>
CALM	BS12	<i>Eriachne tenuiculmis</i>
CAPPRE	M006	<i>Eriachne tenuiculmis</i>
CAPPRE	MOPP2	<i>Eriachne tenuiculmis</i>
DOLISL	D115	<i>Eriachne tenuiculmis</i>
DOLISL	D088	<i>Eriachne tenuiculmis</i>
DOLISL	D095	<i>Eriachne tenuiculmis</i>

DOLISL	D101	Eriachne tenuiculmis
HDRAIL	H213	Eriachne tenuiculmis
HDRAIL	H204	Eriachne tenuiculmis
HDRAIL	H190	Eriachne tenuiculmis
HDRAIL	H189	Eriachne tenuiculmis
HDRAIL	H261	Eriachne tenuiculmis
HDRAIL	HOPP	Eriachne tenuiculmis
HDRAIL	H225	Eriachne tenuiculmis
PAN	PAN065	Eriachne tenuiculmis
PAN	PAN036	Eriachne tenuiculmis
PAN	PAN068	Eriachne tenuiculmis
PAN	PAN069	Eriachne tenuiculmis
PAN	PAN083	Eriachne tenuiculmis
PAN	PAN046	Eriachne tenuiculmis
WANGEL	1161	Eriachne tenuiculmis
WANGEL	1090	Eriachne tenuiculmis
WANGEL	1097	Eriachne tenuiculmis
WANGEL	1103	Eriachne tenuiculmis
WANGEL	1117	Eriachne tenuiculmis
WANGEL	1119	Eriachne tenuiculmis
WANGEL	1143	Eriachne tenuiculmis
WANGEL	1129	Eriachne tenuiculmis
WANGEL	1153	Eriachne tenuiculmis
WANGEL	1145	Eriachne tenuiculmis
WANGEL	1087	Eriachne tenuiculmis
WANGEL	0348	Eriachne tenuiculmis
WANGEL	1127	Eriachne tenuiculmis
WANGEL	0143	Eriachne tenuiculmis
WANGEL	0036	Eriachne tenuiculmis
WANGEL	0030	Eriachne tenuiculmis
WANGEL	0023	Eriachne tenuiculmis
WANGEL	0021	Eriachne tenuiculmis
WANGEL	0017	Eriachne tenuiculmis
WANGEL	0054	Eriachne tenuiculmis
WANGEL	0072	Eriachne tenuiculmis
WANGEL	0360	Eriachne tenuiculmis
WANGEL	0141	Eriachne tenuiculmis
WANGEL	1085	Eriachne tenuiculmis
WANGEL	0321	Eriachne tenuiculmis
WANGEL	0037	Eriachne tenuiculmis
WANGEL	0349	Eriachne tenuiculmis
WANGEL	0369	Eriachne tenuiculmis
WANGEL	0434	Eriachne tenuiculmis
WANGEL	0438	Eriachne tenuiculmis
WANGEL	0563	Eriachne tenuiculmis
WANGEL	0129	Eriachne tenuiculmis

**Records of *Abutilon trudgenii* from recent surveys**

<b>Survey area</b>	<b>Site number</b>	<b>Species</b>
CAPPRE	M049	Abutilon trudgenii
CAPPRE	M032	Abutilon trudgenii
CAPPRE	M026	Abutilon trudgenii
CAPPRE	M019	Abutilon trudgenii
CAPPRE	M079	Abutilon trudgenii
CAPPRE	M009	Abutilon trudgenii
HDRAIL	H285	Abutilon trudgenii
HDRAIL	H145	Abutilon trudgenii
HDRAIL	H140	Abutilon trudgenii
HDRAIL	H119	Abutilon trudgenii
HDRAIL	H013	Abutilon trudgenii
HDRAIL	H003	Abutilon trudgenii
HDRAIL	HOPP	Abutilon trudgenii
PAN	PAN083	Abutilon trudgenii
PAN	PAN001	Abutilon trudgenii
PAN	PAN27B	Abutilon trudgenii
PAN	PAN083	Abutilon trudgenii
PAN	PAN083	Abutilon trudgenii
PAN	PAN083	Abutilon trudgenii
PAN	PAN22B	Abutilon trudgenii
WANGEL	0084	Abutilon trudgenii
WANGEL	0241	Abutilon trudgenii
WANGEL	0012	Abutilon trudgenii
WANGEL	0027	Abutilon trudgenii
WANGEL	0043	Abutilon trudgenii
WANGEL	0073	Abutilon trudgenii
WANGEL	0574	Abutilon trudgenii
WANGEL	1134	Abutilon trudgenii
WANGEL	0068	Abutilon trudgenii

## Appendix 5: Flora list for the Panorama survey area, showing the records for the Abydos Plain, foothills of the Gorge Range and the Gorge Range separately

The list is presented in family order, with the families indicated by the family numbers (FCODE, the left hand column) used by the Western Australian Herbarium. Naturalised species are indicated by an asterisk (\*).

The data is from the 81 floristic survey quadrats, with records added for species not recorded in the quadrats indicated by a hatch symbol in front of the record.

FC OD E	Species Name	Foot hills	Abydo s Plain	Gorge Ranges
007	Cheilanthes vellea			2
020	Typha domingensis			1
031	Aristida contorta		1	
031	Aristida holathera var. holathera	3	11	
031	Aristida hygrometrica		1	
031	Aristida latifolia		1	1
031	Bothriochloa	1		
031	Brachyachne convergens	#1		
031	Brachyachne prostrata		#1	
031	*Cenchrus ciliaris	5	2	5
031	Chrysopogon fallax	2	4	
031	Cymbopogon ambiguus	3	6	16
031	Cymbopogon obtectus	1	2	
031	Cymbopogon procerus	2		8
031	*Cynodon dactylon		#1	1
031	Dactyloctenium radulans			1
031	Dichanthium fecundum	2		
031	Dichanthium sericeum subsp. humilius	#1		
031	Digitaria brownii	1		

031	Enneapogon caerulescens var. caerulescens	4	1	1
031	Enneapogon oblongus	1		3
031	Eragrostis cumingii	2		
031	Eragrostis eriopoda	1	11	
031	Eragrostis ?leptocarpa		1	
031	Eragrostis tenellula	2	#1	4
031	Eragrostis xerophila	#1		
031	Eriachne aristidea		5	
031	Eriachne benthamii			1
031	Eriachne ciliata	#1		2
031	Eriachne mucronata (typical form)	4		5
031	Eriachne obtusa	1	4	
031	Eriachne pulchella subsp. dominii	8	9	5
031	Eriachne sp. aff. festucacea	1		
031	Eriachne sp. Port Hedland		1	2
031	Eriachne tenuiculmis	1		5
031	Eulalia aurea		#1	
031	Heteropogon contortus	1		
031	Iseilema dolichotrichum	1		
031	Leptochloa fusca subsp. fusca		#1	

031	<i>Panicum decompositum</i>			1
031	<i>Paraneurachne muelleri</i>	2	8	
031	<i>Paspalidium clementii</i>		1	
031	<i>Paspalidium tabulatum</i> (Whim Creek form)			1
031	<i>Schizachyrium fragile</i>		2	
031	<i>Setaria dielsii</i>			2
031	<i>Sorghum plumosum</i>	2		
031	<i>Sporobolus australasicus</i>	3	3	
031	<i>Themeda</i> aff. <i>triandra</i> (MET 16,046)			1
031	<i>Themeda avenacea</i>	1		
031	<i>Themeda</i> sp. Panorama			2
031	<i>Themeda triandra</i>	1		1
031	<i>Triodia angusta</i> (Panorama form)	#1		
031	<i>Triodia angusta</i> (Shaw River form)		#1	1
031	<i>Triodia brizoides</i>	#1	1	14
031	<i>Triodia epactia</i>	13	6	17
031	<i>Triodia lanigera</i>		18	
031	<i>Triodia longiceps</i>			6
031	<i>Triodia melvillei</i>			1
031	<i>Triodia schinzii</i>		4	
031	<i>Triodia</i> sp. Panorama	5		2
031	<i>Triodia wiseana</i> var. <i>brevifolia</i> ?	8		27
031	<i>Triodia wiseana</i> var. <i>wiseana</i>	#2	#1	
031	<i>Yakirra australiensis</i> var. <i>australiensis</i>	1	3	

032	<i>Bulbostylis barbata</i>	3	11	10
032	<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	1		11
032	<i>Cyperus iria</i>	1		
032	<i>Cyperus squarrosus</i>	1		
032	<i>Cyperus vaginatus</i>			8
032	<i>Cyperus viscidulus</i>	1		1
032	<i>Eleocharis atropurpurea</i>	1		
032	<i>Fimbristylis dichotoma</i>	1	2	2
032	<i>Fimbristylis littoralis</i>	1		
032	<i>Fimbristylis microcarya</i>	2		1
032	<i>Fimbristylis simulans</i>	3		3
032	<i>Fuirena ciliaris</i>	1		
032	<i>Lipocarpa microcephala</i>	2		
032	<i>Schoenoplectus littoralis</i>			1
032	<i>Schoenus falcatus</i>			3
087	<i>Ficus opposita</i> var. <i>indecora</i>	#1		5
087	<i>Ficus platypoda</i> var. D			1
090	<i>Grevillea pyramidalis</i>	2		8
090	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	4	11	16
090	<i>Hakea chordophylla</i>		1	1
090	<i>Hakea lorea</i> ssp. <i>lorea</i>	#1	13	14
092	<i>Santalum lanceolatum</i>			1
097	<i>Lysiana casuarinae</i>		#1	
105	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>			1
105	<i>Salsola tragus</i>	1		
105	<i>Sclerolaena hostilis</i>		#1	

106	*Aerva javanica	1	1	1
106	Alternanthera nana	2		1
106	Alternanthera nodiflora	1		
106	Amaranthus aff. pallidiflorus (WAS1127)	2		6
106	Gomphrena canescens	#1		
106	Gomphrena cunninghamii	1		2
106	Ptilotus arthrolasius		1	
106	Ptilotus astrolasius	4	19	6
106	Ptilotus auriculifolius	2		
106	Ptilotus axillaris	3	2	
106	Ptilotus calostachyus var. calostachyus	2	3	5
106	Ptilotus clementii	2		
106	Ptilotus exaltatus var. exaltatus		1	
106	Ptilotus fusiformis var. fusiformis	#1	1	
106	Ptilotus gaudichaudii var. gaudichaudii		1	1
106	Ptilotus gomphrenoides var. gomphrenoides	#1		
106	Ptilotus incanus var. elongatus			4
106	Ptilotus mollis			1
106	Ptilotus murrayi var. murrayi	#1		
107	Boerhavia burbidgeana	1		1
107	Boerhavia coccinea	#1	1	4
107	Boerhavia gardneri	6	1	16
107	Boerhavia repleta		#1	

107	Boerhavia sp. (M92-7)	1		
108	Codonocarpus cotinifolius		#1	
110	Trianthema aff. triquetra (M3.35)	#1		
110	Trianthema oxycalyptra var. oxycalyptra	#1		
110	Trianthema pilosa	1	3	
110	Trianthema triquetra	#1		
110	Glinus oppositifolia	#1		
110	Mollugo molluginis	7	17	19
111	Calandrinia pumila		#1	
111	Portulaca oleracea		2	
113	Polycarpaea corymbosa var. corymbosa	1	7	
113	Polycarpaea holtzei	1	2	5
113	Polycarpaea longiflora (Whim Creek form, WC147-7)	1		1
113	Polycarpaea longiflora (White form, M13-7)	3		3
122	Tinospora smilacina		2	4
131	Cassytha capillaris	6	10	8
135	*Argemone ochroleuca			1
137	Cleome uncifera	4	11	3
137	Cleome viscosa	8	5	10
163	Acacia ?trachycarpa (PAN12-4)		1	
163	Acacia acradenia	7	1	27
163	Acacia adoxa var. adoxa			1



163	Acacia aff. drepanocarpa ssp. drepanocarpa (BM:C16)			1
163	Acacia ampliceps			4
163	Acacia ancistrocarpa	5	12	1
163	Acacia ancistrocarpa x trachycarpa			1
163	Acacia bivenosa	3	6	15
163	Acacia citriodora			1
163	Acacia colei		#1	1
163	Acacia coriacea subsp. pendens			8
163	Acacia coriacea subsp. sericophylla		3	1
163	Acacia dictyophleba		2	
163	Acacia elachantha		#1	1
163	Acacia ericifolia		#1	
163	Acacia farnesiana	#1		1
163	Acacia glaucocaesia		#1	
163	Acacia hilliana	#1		1
163	Acacia holosericea	#1	#1	1
163	Acacia inaequilatera	18	12	23
163	Acacia maitlandii			2
163	Acacia meliodora		#1	
163	Acacia orthocarpa	3		4
163	Acacia orthocarpa (wispy form)			1
163	Acacia pruinocarpa			1
163	Acacia ptychophylla			10
163	Acacia pyrifolia		#1	1
163	Acacia pyrifolia (slender, white)			10

163	Acacia sabulosa		#1	
163	Acacia sclerosperma subsp. sclerosperma		#1	1
163	Acacia sp. (Panorama M48)	#1		
163	Acacia sphaerostachya		2	
163	Acacia spondylophylla			12
163	Acacia stellaticeps	#1	10	1
163	Acacia synchronicia	2	2	
163	Acacia trachycarpa	1	1	1
163	Acacia tumida	4	7	10
163	Dichrostachys spicata			1
163	Neptunia dimorphantha	#1		
164	Cassia aff. oligophylla (BMor 152)			1
164	Cassia aff. oligophylla (thinly sericeous)		1	
164	Cassia glutinosa	1	6	18
164	Cassia helmsii			1
164	Cassia luerssenii	2		2
164	Cassia notabilis	7	9	6
164	Cassia oligoclada	#1		
164	Cassia oligophylla	1	1	3
164	Cassia oligophylla (Panorama form)		1	4
164	Cassia oligophylla x helmsii			1
164	Cassia pruinosa			1
164	Cassia 'symonii'	1	8	3
164	Cassia venusta	#1		3

164	<i>Petalostylis labicheoides</i>	3	#2	14
165	<i>Alysicarpus muelleri</i>		#1	
165	<i>Cajanus cinereus</i>			11
165	<i>Cajanus marmoratus</i>		3	1
165	<i>Crotalaria cunninghamii</i>	1		3
165	<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>	#1		
165	<i>Crotalaria medicaginea</i> (Burrup form; B65-11)	2		1
165	<i>Crotalaria ramosissima</i>		3	
165	Cullen aff. <i>lachnostachys</i> (MET 15,154)	1		1
165	Cullen <i>lachnostachys</i>		#1	
165	Cullen <i>leucanthum</i>	2	#1	6
165	Cullen <i>leucochaites</i>			1
165	Cullen <i>martinii</i>	1	3	
165	Cullen <i>pogonocarpum</i>	#1	1	
165	Cullen <i>stipulaceum</i>	3	#1	1
165	<i>Desmodium filiforme</i>		2	
165	<i>Indigastrum parviflorum</i> (Whim Creek form; W138-3)	2		
165	<i>Indigofera colutea</i>	2		1
165	<i>Indigofera linifolia</i>	1	#1	1
165	<i>Indigofera linnaei</i>		2	
165	<i>Indigofera monophylla</i> (PAN20-2)	15	2	
165	<i>Indigofera monophylla</i> (PAN57-9)			18
165	<i>Indigofera monophylla</i> (PAN58-17)	1	#1	8

165	<i>Indigofera monophylla</i> (PAN65-14)	#5		2
165	<i>Indigofera monophylla</i> (small calyx form)		12	
165	<i>Indigofera rugosa</i>		1	2
165	<i>Indigofera trita</i>			1
165	<i>Isotropis atropurpurea</i>	1	4	1
165	<i>Rhynchosia</i> cf. <i>minima</i>	4	1	9
165	<i>Rhynchosia</i> sp. King Bay (B181-13)		1	
165	<i>Sesbania cannabina</i>	1	#1	5
165	<i>Sesbania formosa</i>			1
165	<i>Swainsona formosa</i>	2		3
165	<i>Templetonia hookeri</i>			5
165	<i>Tephrosia</i> aff. <i>bidwillii</i> (HD153-5)		3	
165	<i>Tephrosia</i> aff. <i>clementii</i> (11)	4	1	2
165	<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	4		16
165	<i>Tephrosia</i> aff. <i>supina</i>	#1		
165	<i>Tephrosia</i> aff. <i>supina</i> (HD205-10)	3		4
165	<i>Tephrosia</i> aff. <i>supina</i> (HD237-23)	1		1
165	<i>Tephrosia</i> aff. <i>supina</i> (HD88-4)	#1		
165	<i>Tephrosia</i> aff. <i>supina</i> (MET 12,357)	#1		
165	<i>Tephrosia bidwillii</i>	1		
165	<i>Tephrosia simplicifolia</i>	2		
165	<i>Tephrosia</i> sp. B Kimberley Flora (C.A. Gardner 7300)	3		6

165	Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601)	1	12	1
165	Tephrosia spechtii	#1		3
165	Tephrosia supina	6		
165	Vigna lanceolata var. lanceolata	1		1
165	Vigna sp. Harding Dam (HD189-12)			1
165	Zornia chaetophora		1	
173	Tribulopsis angustifolia	2		
173	Tribulus hirsutus	4	2	
173	Tribulus platypterus			1
173	Tribulus suberosus	1		4
183	Polygala aff. isingii	1	1	16
183	Polygala linariifolia		2	
185	Euphorbia aff. australis		1	
185	Euphorbia aff. australis (B191)	3	6	1
185	Euphorbia aff. drummondii (HD195-16)	#1		1
185	Euphorbia aff. drummondii (MET 15,030)	1		7
185	Euphorbia australis		#1	
185	Euphorbia biconvexa	1		
185	Euphorbia clementii	1	#1	
185	Euphorbia coghlanii	2	2	12
185	Euphorbia sp. (PAN1-14B)		1	
185	Euphorbia sp. (PAN5-15)		1	
185	Euphorbia sp. (site 1089)	3		6
185	Euphorbia tannensis ssp. eremophila (Panorama form)	3	1	9

185	Flueggea virosa subsp. melanthesoides	3		10
185	Leptopus decaisnei var. decaisnei	2	1	1
185	Mallotus ?dispersus			1
185	Phyllanthus lacunellus		#1	
185	Phyllanthus maderaspatensis var. angustifolius	2		12
185	Ricinus communis			1
207	Atalaya hemiglauca	1		8
207	Dodonaea coriacea		2	3
215	Ventilago viminalis	#1		
220	Corchorus aff laniflorus (PAN 76)		1	7
220	Corchorus aff. aestuans			1
220	Corchorus aff. walcotti (K.J. Atkins 570)			1
220	Corchorus aff. walcottii (H251-3)		#1	
220	Corchorus elachocarpus		4	1
220	Corchorus incanus		#1	
220	Corchorus parviflorus	16	13	24
220	Corchorus sp. (M.E. Trudgen 21,247)		#1	
220	Corchorus sp. Panorama			1
220	Corchorus sp.A Kimberley Flora(K.F.Kennally & B.P.M.Hyland 10421)			1
220	Triumfetta aff. chaetocarpa (PAN3/4)		#1	

220	Triumfetta aff. chaetocarpa (Panorama form)	#2	#1	4
220	Triumfetta clementii	5		
220	Triumfetta maconochieana	1		7
220	Triumfetta propinqua	3		10
221	Abutilon aff. dioicum (HD72-14)			2
221	Abutilon aff. hannii (1)			#1
221	Abutilon aff. hannii (2)		#1	
221	Abutilon aff. lepidum (1) (MET 15 352)	1	#1	1
221	Abutilon aff. lepidum (4)	1	#1	
221	Abutilon otocarpum			1
221	Abutilon trudgenii	2	1	1
221	?Abutilon			#1
221	Gossypium australe (Burrup Peninsula form)	1	2	
221	Gossypium australe (Whim Creek form)	#1		4
221	Gossypium robinsonii			5
221	Hibiscus aff. platychlams (site 1139)	1	1	5
221	Hibiscus brachychlams		1	
221	Hibiscus coatesii	#1	1	3
221	Hibiscus goldsworthii			1
221	Hibiscus leptocladus	2	9	1
221	Hibiscus panduriformis	1		
221	Hibiscus platychlams			1
221	Sida aff. fibulifera (PAN 10-6)		1	

221	Sida cardiophylla	3	14	5
221	Sida clementii	1	#1	
221	Sida echinocarpa	#1	#1	
221	Sida rohlena var. rohlena		2	
221	Sida sp.A Kimberley Flora (P.A. Fryxell & L.A. Craven 3900)	#1		8
221	??Sida (M58)			#1
221	Sida sp		#1	#1
223	Keraudrenia nephrosperma	1	#1	
221	Melhania sp. Burrup			1
223	Waltheria indica		1	
223	Waltheria virgata	#1		
235	Bergia pedicellaris		#1	1
235	Bergia trimera		#1	1
243	Hybanthus aurantiacus	4	7	9
263	Pimelea ammocharis		1	
265	Ammannia auriculata	1		1
265	Ammannia baccifera	1		3
265	Rotala diandra	1		
272	Terminalia canescens	1		1
273	Corymbia flavescens		#1	
273	Corymbia ferritcola subsp. ferritcola			1
273	Corymbia hamersleyana	5	8	16
273	Corymbia sp. (PAN39-18)			1
273	Corymbia zygophylla		3	1
273	Eucalyptus camaldulensis var. obtusa			3
273	Eucalyptus leucophloia			8
273	Eucalyptus victrix	2		7

273	Melaleuca argentea		#1	2
273	Melaleuca glomerata			6
273	Melaleuca linophylla			4
275	Ludwigia perennis	2		
276	Gonocarpus ephemerus	1		#
276	Haloragis gossei		2	
281	Trachymene aff. oleracea (B61)	#1		2
302	Mitrasacme connata		1	
304	Carissa lanceolata	3	2	#1
305	Gymnanthera cunninghamii			1
305	Marsdenia angustata			1
305	Sarcostemma viminale subsp. australe			1
307	Bonamia linearis	2	16	2
307	Bonamia media var. villosa	1	1	17
307	Bonamia pannosa	8	3	1
307	Bonamia rosea	7	14	1
307	Bonamia sp. (HD94-6)	2	2	1
307	Evolvulus alsinoides var. villosicalyx		1	
307	Ipomoea muelleri			1
307	Polymeria aff. ambigua (PAN 26B-20)	1		2
307	Polymeria aff. calycina	5	5	5
307	Polymeria calycina		3	
307	Polymeria sp. (PAN1-16)		1	
307	Polymeria sp. (PAN4-14)		1	
307	Porana commixta	1		
310	Ehretia saligna var. saligna	1	#1	3

310	Heliotropium aff. cunninghamii (P65-12)			1
310	Heliotropium chrysocarpum		5	
310	Heliotropium cunninghamii	1	2	
310	Heliotropium curassavicum		#1	
310	Heliotropium heteranthum	1	1	
310	Heliotropium ovalifolium		1	
310	Heliotropium skeleton	1	10	2
310	Heliotropium tanythrix		#1	
310	Heliotropium tenuifolium			2
310	Trichodesma zeylanicum var. zeylanicum	5	2	7
311	Clerodendrum floribundum var. angustifolium	#2		1
311	Clerodendrum tomentosum	#1		4
311	Pityrodia sp. A Panorama (BMor 151)			1
315	Nicotiana benthamiana	1		1
315	Solanum diversiflorum	6	4	2
315	Solanum horridum	3		4
315	*Solanum nigrum			1
315	Solanum phlomoides	10	1	22
316	Stemodia grossa	5	1	8
316	Stemodia viscosa	2		
317	Dolichandrone heterophylla		#1	
331	Oldenlandia crouchiana	3	1	6
331	Oldenlandia galioides	1		
331	Synaptantha tillaeacea var. tillaeacea	2	3	

337	Mukia cf. maderaspatana	10	7	8
337	Mukia sp. Panorama			1
337	Trichosanthes cucumerina			3
339	Wahlenbergia tumidifruca	#1	1	1
340	Lobelia quadrangularis			3
341	Dampiera candidans	3		9
341	Goodenia cusackiana			7
341	Goodenia lamprosperma	2		
341	Goodenia microptera	4	13	3
341	Goodenia ? muelleriana		#1	
341	Goodenia stobbsiana	10	12	17
341	Scaevola amblyanthera var. centralis	6	2	
341	Scaevola parvifolia subsp. pilbarae		2	
345	Centipeda minima	2		
345	Flaveria australasica			3
345	Olearia fluvialis		#1	
345	Pentalepis trichodesmoides	#1		2
345	Pluchea dentex	1		
345	Pluchea dunlopii	1		
345	Pluchea ferdinandi-muelleri		2	
345	Pluchea rubelliflora	2		2
345	Pluchea tetranthera	#1	6	2
345	Pterocaulon serrulatum	3	5	2
345	Pterocaulon sphacelatum	9	3	2

345	Pterocaulon sphaeranthoides x sphacelatum	1	3	4
345	Streptoglossa bubakii	1		
345	Streptoglossa decurrens			1
345	Streptoglossa macrocephala		#1	
345	Streptoglossa odora		3	1

**APPENDIX 6:** Dendrogram showing the fusion of all the sites in the study, with the divisions into the 210, 60 and 10 group levels shown, as well as the habitat type of each site and the land system it was recorded in.

(210 , 60, 10 - group numbers for 210, 60 and 10 group level HAB - Habitat code)

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
0001	-----			1	-----			1	-----				Boolgeeda	sl	
0069	-----			1	-----			1	-----				Boolgeeda	sls	
0077	-----			1	-----			1	-----				Boolgeeda	sls	
0040	-----			1	-----			1	-----				Boolgeeda	scr	
0044	-----			1	-----			1	-----				Boolgeeda	daps	
0053	-----			1	-----			1	-----				Boolgeeda	scs	
0127	-----			1	-----			1	-----				Capricorn	sls	
1157	-----			1	-----			1	-----				River	sls	
0587	-----			1	-----			1	-----				Pyramid	scs	
0051	-----			1	-----			1	-----				Rocklea	sls	
0091	-----			1	-----			1	-----				Boolgeeda	sls	
0593	-----			1	-----			1	-----				Pyramid	sms	
0590	-----			1	-----			1	-----				Pyramid	sls	
1138	-----			1	-----			1	-----				Rocklea	ps	
0070	-----			2	-----			1	-----				Boolgeeda	sls	
0085	-----			2	-----			1	-----				Boolgeeda	sl	
1105	-----			2	-----			1	-----				Capricorn	sls	
0326	-----			2	-----			1	-----				Rocklea	sm	
0342	-----			2	-----			1	-----				Rocklea	scs	
0340	-----			2	-----			1	-----				Rocklea	smr	
0350A	-----			2	-----			1	-----				Rocklea	sms	
0352	-----			2	-----			1	-----				Rocklea	scs	
0354	-----			2	-----			1	-----				Rocklea	scs	
0358	-----			2	-----			1	-----				Capricorn	scs	
0452	-----			2	-----			1	-----				Capricorn	scs	
1086A	-----			2	-----			1	-----				Capricorn	sls	
H108	-----			3	-----			1	-----				River	ss	
H217	-----			3	-----			1	-----				Macroy	scs	
H187	-----			4	-----			1	-----				White Springs	scs	
H236	-----			4	-----			1	-----				Macroy	scs	
H193	-----			4	-----			1	-----				White Springs	dns	
H216	-----			4	-----			1	-----				Macroy	scs	
H181	-----			5	-----			1	-----				Uaroo	p	
PAN021	-----			5	-----			1	-----				Satirist	sls	
H290	-----			5	-----			1	-----				Macroy	ps	
PAN038	-----			6	-----			1	-----				Capricorn	sms	
PAN041	-----			6	-----			1	-----				Capricorn	sms	
PAN051	-----			6	-----			1	-----				Capricorn	sl	
PAN044	-----			6	-----			1	-----				Capricorn	sms	

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
PAN048				6					1					Capricorn	sms
PAN056				6					1					Capricorn	sms
PAN078				6					1					Capricorn	slr
PAN047				6					1					Capricorn	scs
PAN050				6					1					Capricorn	sms
PAN054				6					1					Capricorn	smr
PAN058				7					1					Platform	sms
PAN061				7					1					Platform	smr
PAN063				7					1					Capricorn	sls
PAN064				7					1					Capricorn	sms
0059				8					2						smr
1162				8					2					Rocklea	scr
0327				8					2					Rocklea	dnr
0329				8					2					Rocklea	smr
1112				8					2					Rocklea	smr
0339				8					2					Rocklea	scr
1100				8					2					Capricorn	sms
0065				9					2					Boolgeeda	dns
0432				9					2					Wona	dns
0437				9					2					Rocklea	dns
0439				9					2					Rocklea	sls
0460				9					2						sls
1082				9					2					Rocklea	dns
1083				10					2					Rocklea	sls
1111				10					2					Capricorn	sms
1086				10					2					Capricorn	scs
1108				10					2					Rocklea	smr
1098				10					2					Capricorn	scr
1095				10					2					Wona	sms
1104				10					2					Capricorn	scs
0066				11					2					Boolgeeda	scs
1180				11					2					Ruth	scs
1182				11					2					Ruth	daps
1110				12					2					Rocklea	scr
1118				12					2					Rocklea	smr
1116				12					2					Rocklea	scr
1130				12					2					Rocklea	smr
1150				12					2					Rocklea	scs
0128				13					2					Capricorn	daps
0131				13					2					Boolgeeda	dns
0272				13					2					Capricorn	ss
0440				13					2					Rocklea	scs
1124				13					2					Rocklea	scr
1178				13					2					Ruth	scs
1132				13					2					Rocklea	scr



site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
1164				13		2			1					Rocklea	smr
1174				13		2			1					Rocklea	sls
0331				14		2			1					Rocklea	scs
1172				14		2			1					Rocklea	smr
1096				14		2			1					Capricorn	scs
1142				14		2			1					Rocklea	ps
1081				15		3			1					Rocklea	scs
1160				15		3			1					Rocklea	sls
1158				15		3			1					Rocklea	ps
1152				16		3			1					Rocklea	scr
1170				16		3			1					Rocklea	scr
0698				17		4			1					Macroy	scs
H195				18		4			1					Rocklea	sms
H205				18		4			1					Rocklea	sl
H223				18		4			1					Wona	smr
H088				19		4			1					Talga	sms
PAN031				20		4			1					Rocklea	scs
PAN034				20		4			1					Rocklea	sms
H097				21		4			1					Macroy	sm
H145				21		4			1					Macroy	p
H174				21		4			1					Talga	ps
H191				22		5			1					White Springs	ps
H228				22		5			1					White Springs	scs
H231				22		5			1					Macroy	dap
PAN049				23		6			1					Capricorn	daps
PAN079				23		6			1					Capricorn	sls
PAN057				23		6			1					Capricorn	dns
PAN076				24		6			1					Capricorn	dns
PAN082				24		6			1					Capricorn	rp
0002				25		7			1					Boolgeeda	dn
0003				25		7			1					Boolgeeda	dn
0602				25		7			1					Ruth	sms
0045				25		7			1					Boolgeeda	dn
0047				25		7			1					Boolgeeda	dn
0007				26		7			1					Rocklea	sls
0008				26		7			1					Boolgeeda	sl
0004				27		7			1					Boolgeeda	sl
0005				27		7			1					Boolgeeda	sls
0025				27		7			1					River	sls
0033				28		7			1					Pyramid	sls
0058				28		7			1					Rocklea	scs
0073				28		7			1						sls
0056				29		7			1					Capricorn	scs
0060				29		7			1					Rocklea	smr
1131				29		7			1					Rocklea	sls

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
1102				30		7			1					Capricorn	scs
1140				30		7			1					Rocklea	ps
H198				30		7			1					White Springs	scs
H168				31		7			1					Robe	scs
H170				31		7			1					Robe	ps
0244				32		7			1					River	sls
0355				32		7			1						sls
0356				32		7			1						s
0597				32		7			1					Horseflat	sl
0598				32		7			1					Horseflat	sls
0335				33		7			1					Rocklea	smr
1121				34		7			1					Rocklea	sls
1148				34		7			1					Rocklea	dap
0035				35		7			1					Boolgeeda	dnr
0318				35		7			1					Rocklea	sms
0055				35		7			1					Capricorn	sl
0600				35		7			1					Ruth	scs
0333				35		7			1					Rocklea	dns
0057				35		7			1					Capricorn	sls
0050				36		7			1					Boolgeeda	p
0079				36		7			1					Boolgeeda	sls
0074				36		7			1					Rocklea	scs
0090				36		7			1					Boolgeeda	dn
0076				36		7			1					Rocklea	dn
0084				36		7			1					Boolgeeda	sls
0093				36		7			1					Boolgeeda	sls
0094				36		7			1					Ruth	scr
0573				36		7			1					Ruth	sl
0089				36		7			1					Boolgeeda	sls
0572				37		7			1						scs
0594				37		7			1					Pyramid	dns
0575A				37		7			1					River	d
0603				38		7			1					Ruth	dnr
0359				39		8			1					Capricorn	dn
0454				39		8			1					Capricorn	dns
1149				39		8			1					Rocklea	dn
0369				39		8			1					Capricorn	ds
1113				39		8			1					Rocklea	dns
1115				39		8			1					Rocklea	d
0436				40		8			1					Rocklea	dns
0367				41		9			1					Capricorn	dns
0368				41		9			1					Capricorn	scs
0444				41		9			1					Capricorn	sms
0443				41		9			1					Capricorn	scs
0453				41		9			1					Capricorn	dns

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
0445				42		9			1					Capricorn	dns
0446				42		9			1					Capricorn	scs
1092				42		9			1					Capricorn	scs
1084				42		9			1					Capricorn	dnr
1090				42		9			1					Capricorn	dns
1088				43		9			1					Capricorn	slr
0449				44		9			1					Capricorn	dns
0450				44		9			1					Capricorn	dns
0451				44		9			1						ss
0456				45		9			1					Capricorn	dns
0006				46		10			2					Rocklea	dns
0243				47		10			2					River	scr
1139				47		10			2					Rocklea	scr
PAN059				48		10			2					Capricorn	smr
PAN060				48		10			2					Capricorn	sms
0135				49		10			2					Capricorn	smr
1154				49		10			2					Rocklea	sls
0341				49		10			2					Rocklea	dns
0350				50		10			2					Rocklea	dap
0353				50		10			2					Rocklea	dns
PAN046				50		10			2					Capricorn	dns
PAN039				51		10			2					Capricorn	dap
PAN042				51		10			2					Capricorn	dap
PAN070				51		10			2					Capricorn	sms
H261				52		10			2					Newman	daps
H262				52		10			2					McKay	dn
0014				53		11			2					Boolgeeda	dns
0015				53		11			2					Boolgeeda	scs
0029				53		11			2					Sherlock	dap
H218				53		11			2					White Springs	scs
0240				54		11			2					River	dap
H154				55		11			2					Uaroo	dap
H159				55		11			2					Uaroo	p
H241				55		11			2					Macroy	sc
H166				55		11			2					Ruth	scs
PAN025				55		11			2					Platform	scs
0345				56		11			2					Rocklea	scs
0347				56		11			2					Rocklea	sms
0448				56		11			2					Capricorn	scs
H192				56		11			2					White Springs	sls
PAN040				56		11			2					Capricorn	sls
PAN066				56		11			2					Capricorn	slr
H201				57		11			2					McKay	smr
H221				57		11			2					Rocklea	ss
H212				57		11			2					McKay	scs

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H202				57		11			2					Rocklea	scr
H076				58		11			2					Uaroo	scr
H087				59		11			2					Macroy	sl
H184				59		11			2					Ruth	sms
PAN030				60		11			2					Rocklea	sls
PAN037				60		11			2					Rocklea	sms
0344				61		12			2						scs
0346				61		12			2					Rocklea	scr
H038				62		12			2					Boolgeeda	dn
1188				63		12			2					Macroy	dnr
H074				64		13			2					Uaroo	p
H082				64		13			2					Mallina	p
H149				64		13			2					Uaroo	p
H120				64		13			2					Uaroo	p
H124				65		14			2					Uaroo	dn
H160				65		14			2					Uaroo	dns
H125				66		14			2					Uaroo	dn
0009				67		15			2					Boolgeeda	dn
0068				67		15			2					Boolgeeda	daps
0022				68		15			2					River	dap
0038				68		15			2					Boolgeeda	daps
0049				68		15			2					Boolgeeda	dns
0016				69		15			2					Sherlock	ds
0019				69		15			2					River	dap
0012				70		15			2					Boolgeeda	d
1134				70		15			2					River	daps
1125				70		15			2					Rocklea	daps
1155				70		15			2					River	daps
0241				71		15			2					River	dn
0242				71		15			2						dap
0574				71		15			2					River	dap
H140				72		15			2					Littoral	dap
H142				72		15			2					River	dap
0591				73		15			2					Pyramid	dap
0592				73		15			2					Pyramid	dap
1136				74		15			2					Rocklea	dap
1137				74		15			2					Rocklea	dap
0036				75		16			2					Boolgeeda	smr
PAN035				75		16			2						rpv
H190				76		16			2					McKay	dn
H214				76		16			2					Macroy	scr
H200				76		16			2					McKay	sl
H211				77		16			2					McKay	dap
H203				78		16			2					Rocklea	smr
H199				79		16			2					Rocklea	sms

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H283				79		16			2					Macroy	scr
H072				80		17			2					Boolaloo	scr
H102				80		17			2					Boolaloo	scr
H273				80		17			2					Macroy	rpg
H089				81		17			2					Macroy	scr
0143				82		18			2						daps
1176				82		18			2					River	daps
H045				83		18			2					River	dap
H050				84		18			2					River	dnr
H051				84		18			2					River	dap
H257				84		18			2					Jamindie	dap
H016				85		19			2					Boolgeeda	dap
H034				85		19			2					Boolgeeda	dap
H029				85		19			2					Boolgeeda	daps
H030				85		19			2					Boolgeeda	daps
H035				85		19			2					Boolgeeda	dap
H026				85		19			2					Boolgeeda	dn
H046				85		19			2					River	dap
0013				86		20			3					Boolgeeda	daps
0130				86		20			3					Capricorn	sls
1159				86		20			3					River	dns
0042				87		20			3					Boolgeeda	sc
0043				87		20			3					Boolgeeda	dn
0028				88		20			3					Sherlock	scs
0599				88		20			3					Horseflat	sms
0568				89		20			3						sls
0027				90		21			3					Sherlock	scs
0039				90		21			3					Boolgeeda	sls
0041				90		21			3					Boolgeeda	scs
1135				91		22			3					Rocklea	sls
H265				92		22			3					Macroy	ps
0092				93		23			3					Boolgeeda	sl
0433				94		23			3					Rocklea	ss
0435				94		23			3					Rocklea	scs
0343				95		23			3						sc
1174A				95		23			3					Rocklea	ds
0134				96		23			3					Boolgeeda	sls
PAN053				96		23			3					Capricorn	sm
PAN055				97		23			3					Capricorn	scs
0030				98		24			3					Sherlock	d
0087				99		25			3					Boolgeeda	dap
0136				100		26			3					Capricorn	dn
0137				101		26			3					Capricorn	s
1129				102		27			3					Rocklea	dns
1144				102		27			3					Rocklea	ds

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H209				103		27			3					White Springs	d
H215				103		27			3					Rocklea	dap
H224				104		28			3					Rocklea	d
H225				104		28			3					Rocklea	dns
H285				105		28			3					Wona	d
H196				106		29			3					White Springs	dn
H197				106		29			3					White Springs	dn
H207				107		29			3					Macroy	dn
H219				107		29			3					Macroy	dap
H208				107		29			3					Macroy	dn
1143				108		30			3					Rocklea	scs
H081				109		30			3					Robe	sl
H084				109		30			3					Uaroo	py
H107				109		30			3					River	sms
H003				110		30			3					Coolibah	ps
H048				110		30			3					Coolibah	pg
H258				111		30			3					Macroy	pg
0026				112		31			3					Rocklea	pg
0596				113		32			3					Pyramid	pg
H049				114		33			3					Coolibah	pg
H279				115		33			3					Christmas	pg
H150				116		34			3					Uaroo	li
H151				116		34			3					Littoral	li
H037				117		35			4					Boolgeeda	sms
H043				117		35			4					Boolgeeda	sl
H060				117		35			4					Macroy	scs
H226				117		35			4					Macroy	scs
H106				118		35			4					Mallina	ss
H180				118		35			4					Macroy	sc
H094				119		36			4					Macroy	ps
PAN017				119		36			4					Macroy	ps
H287				120		36			4					Capricorn	smr
PAN080				121		36			4					Capricorn	sms
PAN045				122		36			4					Capricorn	smr
PAN073				122		36			4					Capricorn	smr
PAN052				122		36			4					Capricorn	scs
PAN067				122		36			4					Capricorn	slr
PAN074				122		36			4					Capricorn	sms
H095				123		37			4					Macroy	d
H098				123		37			4					Macroy	dap
PAN028				123		37			4					Satirist	dn
H096				123		37			4					Macroy	dn
H252				123		37			4					Macroy	dns
H251				124		37			4					Granitic	py
PAN012				125		37			4					Uaroo	p

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
PAN023				126		37			4					Platform	dns
PAN024				126		37			4					Platform	dn
PAN019				127		38			4					Macroy	scs
PAN022				127		38			4					Satirist	scs
PAN020				128		38			4					Macroy	scs
PAN026				129		38			4						scs
PAN027				130		38			4					Satirist	scs
PAN033				130		38			4					Rocklea	scs
PAN029				130		38			4					Rocklea	scs
PAN043				131		38			4					Capricorn	scs
0010				132		39			5					Boolgeeda	rp
1114				132		39			5					Rocklea	rp
1114				132		39			5					Rocklea	rp
0061				132		39			5					Rocklea	smr
0338				133		39			5					Rocklea	smr
1166				133		39			5					Rocklea	scr
1128				134		39			5					Rocklea	smr
PAN081				135		39			5					Capricorn	rp
0017				136		40			6					River	ds
0126				137		40			6					Capricorn	daps
0141				137		40			6					Boolgeeda	dns
0018				138		40			6					River	dn
0037				138		40			6					Boolgeeda	dns
0020				138		40			6					River	d
0075				139		40			6					Boolgeeda	ds
0088				139		40			6					Boolgeeda	ds
0563				139		40			6					Boolgeeda	ds
0575B				139		40			6					River	ds
0086				140		40			6					Boolgeeda	d
H061				141		40			6					Macroy	dap
H064				141		40			6					River	dap
H220				141		40			6					River	dap
H143				141		40			6					Macroy	dap
H079				142		40			6					Mallina	dap
H176				142		40			6					Talga	dap
H292				142		40			6					Macroy	dap
H289				143		40			6					Macroy	dap
PAN032				144		40			6					Rocklea	dap
PAN036				144		40			6					Rocklea	daps
0021				145		41			6					River	daps
0023				145		41			6					River	daps
0349				146		41			6					Rocklea	dap
0245				147		41			6					River	daps
1127				147		41			6					River	daps
1161				147		41			6					River	daps

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
1153				147		41			6					River	daps
H062				147		41			6					River	dap
H189				148		41			6					Rocklea	dnr
H213				148		41			6					Rocklea	daps
H222				148		41			6					Granitic	dap
PAN062				148		41			6					Platform	dap
PAN065				149		41			6					Capricorn	daps
PAN071				149		41			6					Capricorn	daps
PAN068				149		41			6					Capricorn	daps
PAN075				149		41			6					Capricorn	daps
PAN077				150		41			6					Capricorn	daps
1151				151		42			6					River	dap
0054				152		43			6					Capricorn	dns
0072				152		43			6					Pyramid	daps
0129				152		43			6					Capricorn	daps
PAN069				152		43			6					Capricorn	daps
0348				153		43			6					Rocklea	dnr
0321				154		43			6					Rocklea	ds
0337				155		43			6					Rocklea	daps
1141				155		43			6					Rocklea	dnr
0434				156		43			6					Rocklea	daps
0438				156		43			6					Rocklea	daps
1085				157		43			6					Rocklea	daps
1087				157		43			6					Rocklea	daps
1097				157		43			6					Capricorn	daps
1103				157		43			6					Capricorn	daps
1094				158		44			6					Capricorn	dnr
1099				158		44			6					Capricorn	dnr
1107				159		44			6					Rocklea	dns
1119				159		44			6					Rocklea	dns
1106				160		44			6					Capricorn	smr
1117				161		45			6					Rocklea	dn
1145				161		45			6					Rocklea	dn
0034				162		46			7					Pyramid	sl
0601				162		46			7					Ruth	sl
0597A				162		46			7					Horseflat	pg
0081B				163		46			7					Boolgeeda	sc
0564C				163		46			7					Rocklea	sl
0595A				163		46			7					Pyramid	pg
0598A				164		47			7					Horseflat	sl
0431				165		48			7					Wona	scs
0463				165		48			7					Wona	scs
0464				165		48			7						scs
1093				165		48			7					Wona	scs
0441				166		48			7					Wona	pg



site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
0442				166		48			7					Wona	pg
1089				167		48			7					Wona	scs
H186				168		49			7					White Springs	pg
H269				168		49			7					Wona	pg
H188				168		49			7					White Springs	pg
H284				168		49			7					Wona	pg
H286				168		49			7					Wona	pg
H194				169		49			7					White Springs	pg
H230				169		49			7					White Springs	dap
H229				169		49			7					White Springs	pg
H001				170		50			8					Adrian	pg
H234				170		50			8					Christmas	pg
H245				170		50			8					Christmas	p
H138				171		50			8					Christmas	pg
H280				171		50			8					Christmas	pg
H268				171		50			8					Wona	pg
H206				172		50			8					Rocklea	scr
H004				173		50			8					Cowra	pg
H058				173		50			8					Cowra	pg
H005				174		50			8					Cowra	pg
H057				174		50			8					Cowra	pg
H007				174		50			8					Adrian	pg
H139				174		50			8					Adrian	pg
H002				175		51			8					Adrian	sc
H006				175		51			8					Adrian	sls
H010				176		51			8					Jamindie	py
H012				176		51			8					Boolgeeda	sl
H021				176		51			8					Jamindie	sl
H056				176		51			8					Jamindie	pg
H020				176		51			8					Jamindie	pg
H055				176		51			8					Jamindie	py
H233				177		51			8					Newman	ps
H244				177		51			8					Jamindie	p
H255				177		51			8					Newman	d
H256				177		51			8					Jamindie	ps
H063				178		52			9					Macroy	slr
H291				179		52			9					Macroy	sl
H131				180		52			9					Uaroo	sc
H133				180		52			9					Uaroo	scs
H134				180		52			9					Uaroo	scs
H132				180		52			9					Uaroo	scs
H067				181		53			9					Macroy	sl
H071				181		53			9					Boolaloo	sl
H078				181		53			9					Robe	dap
H274				182		53			9					Macroy	p

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H099				183		53			9					Boolaloo	p
H266				183		53			9					Macroy	dap
H073				184		53			9					Uaroo	p
H077				184		53			9					River	dap
H237				185		53			9					Macroy	dn
H240				185		53			9					Macroy	sl
H068				186		53			9					Boolaloo	dn
H086				186		53			9					Macroy	d
H070				186		53			9					Macroy	dap
H080				186		53			9					Mallina	dap
H090				186		53			9					Macroy	dnr
H092				187		53			9					Macroy	dap
H091				188		53			9					Uaroo	p
H167				188		53			9					Uaroo	sm
H173				188		53			9					Uaroo	p
H254				188		53			9					Macroy	dn
H263				188		53			9					Macroy	p
H115				189		53			9					Uaroo	p
H157				189		53			9					Mallina	p
H155				189		53			9					Uaroo	p
H183				189		53			9					Uaroo	p
H185				189		53			9					Uaroo	p
H103				190		53			9					Uaroo	p
H135				190		53			9					Uaroo	p
H114				190		53			9					Uaroo	dn
H147				190		53			9					Uaroo	p
H117				190		53			9					Uaroo	p
H123				190		53			9					Uaroo	dap
H104				190		53			9					Uaroo	pg
H152				190		53			9					Uaroo	dn
H105				191		54			9					Uaroo	p
H148				191		54			9					Uaroo	py
H156				191		54			9					Uaroo	py
H158				191		54			9					Uaroo	py
H110				192		54			9					Uaroo	p
H111				192		54			9					Uaroo	p
H112				192		54			9					Uaroo	p
H153				192		54			9					Uaroo	p
PAN009				192		54			9					Uaroo	p
H065				193		55			9					Macroy	p
PAN011				193		55			9					Uaroo	p
H066				193		55			9					Macroy	dn
PAN001				193		55			9					Uaroo	p
H093				194		55			9					Uaroo	p
H100				194		55			9					Macroy	py

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H178				194		55			9					Macroy	p
H144				194		55			9					Macroy	p
PAN018				194		55			9					Macroy	ps
H267				194		55			9					Boolaloo	p
PAN014				194		55			9					Uaroo	ps
PAN002				194		55			9					Uaroo	p
PAN004				194		55			9					Uaroo	p
PAN003				194		55			9					Uaroo	p
PAN016				194		55			9					Macroy	ps
PAN013				194		55			9					Uaroo	p
PAN015				194		55			9					Macroy	ps
H069				195		55			9					Macroy	s
H288				195		55			9					Macroy	scs
H246				195		55			9					Macroy	sc
H253				195		55			9					Macroy	sls
H227				195		55			9					Macroy	ps
H242				195		55			9					Macroy	p
H235				195		55			9					Macroy	p
H232				195		55			9					Macroy	ps
H083				196		55			9					Mallina	d
H239				196		55			9					Macroy	sc
H260				196		55			9					Macroy	py
H238				196		55			9					Macroy	sl
H270				196		55			9					Boolaloo	ps
H249				196		55			9					Macroy	sm
H250				196		55			9					Boolgeeda	sc
H264				196		55			9					Macroy	p
H275				196		55			9					Macroy	sc
H075				197		56			9					Uaroo	p
H126				197		56			9					Uaroo	p
H101				197		56			9					Macroy	s
H141				197		56			9					Macroy	py
H276				197		56			9					Macroy	p
H085				197		56			9					Macroy	sms
H169				197		56			9					Uaroo	dn
H118				197		56			9					Uaroo	p
H119				197		56			9					Uaroo	p
H121				197		56			9					Uaroo	p
H122				197		56			9					Uaroo	p
H171				197		56			9					Uaroo	sc
H172				197		56			9					Uaroo	py
H182				197		56			9					Uaroo	p
H281				198		56			9					Macroy	dap
H282				198		56			9					Macroy	dn
H113				199		56			9					Uaroo	p

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H116				199		56			9					Uaroo	p
H129				199		56			9					Uaroo	p
H130				199		56			9					Uaroo	p
H128				199		56			9					Uaroo	p
H127				199		56			9					Uaroo	p
H136				199		56			9					Uaroo	p
H163				199		56			9					Uaroo	p
H165				199		56			9					Uaroo	p
H161				199		56			9					Uaroo	p
H137				199		56			9					Uaroo	p
H162				199		56			9					Uaroo	py
PAN005				200		56			9					River	p
PAN006				200		56			9					Uaroo	p
PAN007				200		56			9					Uaroo	sc
PAN008				200		56			9					Uaroo	p
PAN010				200		56			9					Uaroo	p
H109				201		57			9					Mallina	dap
H247				202		57			9					Macroy	dap
H248				203		57			9					Macroy	dap
H259				203		57			9					Macroy	dap
H210				204		57			9					River	p
H243				205		58			9					Newman	smr
H271				205		58			9					Newman	sm
H272				205		58			9					McKay	sm
H008				206		59			10					Boolgeeda	py
H011				206		59			10					Boolgeeda	sl
H014				206		59			10					Boolgeeda	sl
H028				206		59			10					Boolgeeda	sls
H017				206		59			10					Boolgeeda	ss
H023				206		59			10					Boolgeeda	sls
H031				206		59			10					Boolgeeda	sms
H054				206		59			10					Boolgeeda	py
H027				206		59			10					Divide	dap
H032				206		59			10					Boolgeeda	dn
H036				206		59			10					Boolgeeda	sl
H033				206		59			10					Boolgeeda	s
H039				206		59			10					Boolgeeda	p
H040				206		59			10					Boolgeeda	sms
H042				206		59			10					Boolgeeda	dap
H052				206		59			10					Boolgeeda	ps
H053				206		59			10					Boolgeeda	dn
H009				207		59			10					Boolgeeda	py
H019				207		59			10					Jamindie	dap
H013				207		59			10					Boolgeeda	py
H015				207		59			10					Boolgeeda	s

site	0	0.4287	0.6113	210	0.7940	60	0.9767	1.1593	10	1.3420	1.5247	1.7073	1.8900	Land System	HAB
H024				207		59			10					Boolgeeda	py
H022				207		59			10					Boolgeeda	py
H025				207		59			10					Boolgeeda	p
H018				208		59			10					Jamindie	sl
H041				209		59			10					Boolgeeda	dap
H044				210		60			10					River	du
H047				210		60			10					Boolgeeda	du
	0	0.4287	0.6113		0.7940		0.9767	1.1593		1.3420	1.5247	1.7073	1.8900		

A  
FLORA  
AND  
VEGETATION SURVEY  
OF THE PROPOSED MINE AREAS  
AND ACCESS ROAD FOR THE PANORAMA  
PROJECT

prepared for

ASTRON ENVIROMENTAL

by

Malcolm Trudgen  
Consultant Botanist,

Brian Morgan  
Consultant Biologist

E.A. Griffin  
Consultant Botanist

M.E. Trudgen & Associates  
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Volume 2

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## **APPENDIX 7: Description of the two levels of floristic groups defined for the Panorama study area**

This appendix presents the parts of a floristic analysis with two levels of analysis (a 60 member group and a 210 member group) of a data set of 673 sites, 81 of which were recorded in the current study, 287 for the Port Hedland to Hope Downs rail botanical study (Maier and Trudgen in prep.) and the remainder (305) from the Chichester Range area (mostly on the plateau, but some on the Abydos Plain). The latter part of the data set was recorded for the West Angelas project ERMP study by Trudgen and Casson (1998).

The two levels of floristic groups defined are presented together, to show the relationship of the lower level groups (210 group level) to the higher groups (60 group level). That is under each group defined at the 60 group level the groups from the 210 group level that fall within it are given.

For each group defined at the 60 group level:

- the number of sites in the group is given;
- the average number of species per site is given;
- the number of sites in the different locations is given;
- the number of sites in the different land systems is given;
- the number of sites in the different landforms is given; and
- the most commonly occurring species are listed, with their site frequency and range of cover recorded.

For each group defined at the 210 group level:

- the number of sites in the group;
- the average number of species per site is given;
- the number of sites in the different locations is given;
- the number of sites in the different land systems is given;
- the number of sites in the different landforms is given;
- the relevant section of the dendrogram is given to show the relationships within the 210 level group described;
- the vegetation description for each site in the group is given;
- the soil description for each site in the group is given; and
- the most commonly occurring species are listed, with their site frequency and range of cover recorded.

Location code for the quadrats and releves:

PAN = Panorama,

WANGEL = West Angelas ERMP botanical study,

HDRAIL = Port Hedland to Hope Downs rail study

See the text, section 6 for the codes for the landform units (sls , 12 scs , 12 sms etc )



The classification gave the following grouping for the Panorama part of the data:

<b>GP60</b>	<b>GP21 0</b>
1	5
1	6
1	7
4	20
6	23
6	24
10	48
10	50
10	51
11	55
11	56
11	60
16	75
23	96
23	97
36	119
36	121
36	122
37	123
37	125
37	126
38	127
38	128
38	129
38	130
38	131
39	135
40	144
41	148
41	149
41	150
43	152
54	192
55	193
55	194
56	200

The left hand column shows the groups at the sixty group level and the right hand column shows the groups at the 210 group level.

**60 Group Level, Member: 1,****Group statistics**

Number of sites: 49

Average number of species per site: 14

Sites from: WANGEL - 26 PAN - 15 HDRAIL - 8

Sites from Land Systems: Capricorn - 17 Boolgeeda - 9 Rocklea - 8 Macroy - 4  
Pyramid - 3

Sites in Landforms: sls - 12 scs - 12 sms - 10 smr - 3 sl - 3 ps - 2 ss - 1  
sm - 1 daps - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Triodia wiseana - 100%, 25-33% to >70%

Corymbia hamersleyana - 57%, <1% to 1-5%

Acacia inaequilatera - 49%, <1% to 1-5%

Acacia bivenosa - 47%, <1% to 10-25%

Mollugo molluginis - 45%, <1% to <1%

Cassia glutinosa - 43%, <1% to <1%

**210 Floristic Group Level: Group 5,**

Number of sites: 3

Average number of species per site: 18

Sites from: HDRAIL - 2 PAN - 1

Sites from Land Systems: Satirist - 1 Uaroo - 1 Macroy - 1

Sites in Landforms: p - 1 ps - 1 sls - 1

**Portion of Dendrogram: (Area and Site on left)**

HDRAIL H181	_____
PAN PAN021	_____   _____
HDRAIL H290	_____   _____

**Vegetation Descriptions of the sites in the group:**

HDRAIL H181: Corymbia hamersleyana scattered low mallees over Acacia inaequilatera scattered tall shrubs over A. bivenosa scattered shrubs over A. stellaticeps scattered low shrubs over Triodia wiseana mid-dense hummock grassland

PAN PAN021: Acacia inaequilatera scattered tall shrubs over Acacia bivenosa open shrubland over Triodia wiseana hummock grassland.

HDRAIL H290: Acacia inaequilatera scattered tall shrubs over Acacia bivenosa, A. ancistrocarpa open shrubland over Triodia wiseana, T. lanigera mid-dense hummock grassland

**Soil:**

HDRAIL H181: Light brown loamy sand with small patches of calcrete. Some areas with thin algal crusts.

PAN PAN021: Dull orange-brown calcareous loam, setting surface. gravel and pebbles mostly calcareous.

HDRAIL H290: Orange-brown clay loam with scatters to more or less continuous quartz pebbles with occasional calcareous nodules.

Common Species:

(Name - % of Sites, Range of Cover)

Triodia wiseana - 100%, 25-33% to 50-70%

Acacia inaequilatera - 100%, <1% to <1%

Acacia bivenosa - 100%, <1% to 5-10%

Ptilotus astrolasius - 67%, <1% to <1%

Cassytha capillaris - 67%, <1% to <1%

Cassia notabilis - 67%, <1% to <1%

Corchorus parviflorus - 67%, <1% to <1%

Mukia maderaspatana - 67%, <1% to <1%

Enneapogon caerulescens var. caerulescens - 67%, <1% to <1%

Scaevola amblyanthera var. centralis - 67%, <1% to <1%

Hakea lorea ssp. lorea - 67%, <1% to <1%

Bonamia sp. (H94-6) - 67%, <1% to <1%

**210 Floristic Group Level: Group 6,**

Number of sites: 10

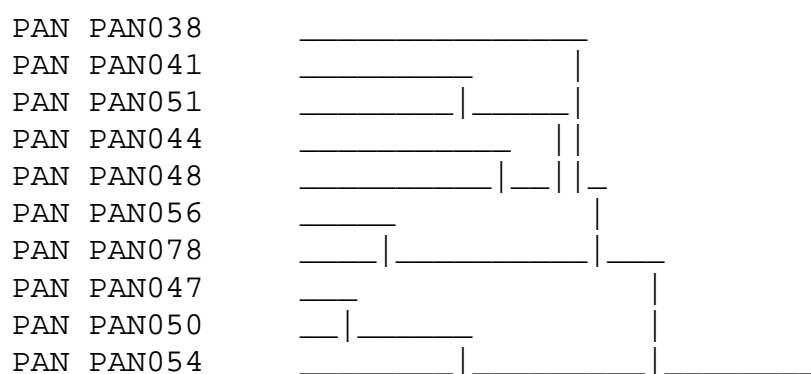
Average number of species per site: 15

Sites from: PAN - 10

Sites from Land Systems: Capricorn - 10

Sites in Landforms: sms - 6 scs - 1 sl - 1 slr - 1 smr - 1

Portion of Dendrogram: (Area and Site on left)



Vegetation Descriptions of the sites in the group:

PAN PAN038 Acacia inaequilatera scattered tall shrubs over Corchorus (=PAN 1-6) scattered low shrubs to low open shrubland and Triodia wiseana hummock grassland.

PAN PAN041 Corymbia hamersleyana (PAN1) scattered low trees over Acacia inaequilatera high open shrubland over Acacia sp (=PAN 38-4), Indigofera monophylla (P41-3) scattered shrubs over Triodia wiseana (Triodia brizoides) closed hummock grassland with Cassytha capillaris

- PAN PAN051      *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland in parts over *Triodia wiseana* hummock grassland.
- PAN PAN044      *Acacia* (=P38-4) open shrubland over *Triodia wiseana* hummock grassland to closed hummock grassland.
- PAN PAN048      *Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla* shrubland over *Triodia wiseana* hummock grassland.
- PAN PAN056      *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides*, *Triodia wiseana* closed hummock grassland.
- PAN PAN078      *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over *Triodia wiseana* (*Triodia brizoides*) hummock grassland.
- PAN PAN047      *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia*, *Acacia spondylophylla* scattered shrubs over *Triodia wiseana* hummock grassland.
- PAN PAN050      *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.
- PAN PAN054      *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Soil:

- PAN PAN038      Fine brown sand and silt with gravel and cobbles, some outcrop. Calcretisation evident, some hardpan exposed.
- PAN PAN041      Orange-brown fine sand and silt with gravel.
- PAN PAN051      Rusty-brown fine sand and silt with gravel.
- PAN PAN044      Orange-brown fine sand and silt with gravel and some outcrop.
- PAN PAN048      Reddish brown medium to fine sand with silt and gravel.
- PAN PAN056      Reddish brown medium fine sand with some silt and lots of gravel.
- PAN PAN078      Orange-brown fine-medium sand and silt with gravel, cobble and outcrop.
- PAN PAN047      Gravelly pebbly cobbly orange-brown loamy sand. Pebbles to cobbles cover >90% soil surface.
- PAN PAN050      Gravelly orange-brown fine sandy silt. Some outcrop on slope.

PAN PAN054 Cobbly, rocky, orange-brown loamy sand. >50% covered by rock.

Common Species:

(Name - % of Sites, Range of Cover)

Triodia wiseana - 100%, 25-33% to >70%

Acacia inaequilatera - 100%, <1% to 1-5%

Polygala aff. isingii - 90%, <1% to <1%

Mollugo molluginis - 80%, <1% to <1%

Indigofera monophylla (PAN57-9) - 80%, <1% to <1%

Acacia acradenia - 70%, <1% to 1-5%

Hakea lorea ssp. lorea - 60%, <1% to <1%

Goodenia stobbsiana - 60%, <1% to <1%

Acacia spondylophylla - 60%, <1% to 10-25%

Boerhavia gardneri - 60%, <1% to <1%

**210 Floristic Group Level: Group 7,**

Number of sites: 4

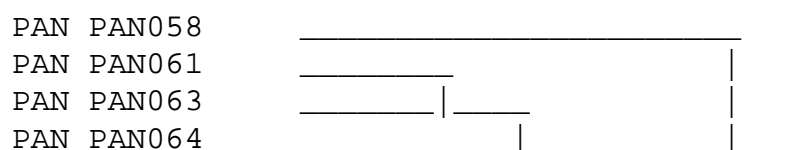
Average number of species per site: 23

Sites from: PAN - 4

Sites from Land Systems: Capricorn - 2 Platform - 2

Sites in Landforms: sms - 2 smr - 1 sls - 1

Portion of Dendrogram: (Area and Site on left)



Vegetation Descriptions of the sites in the group:

PAN PAN058 Grevillea pyramidalis scattered tall shrubs over Corchorus (=1-6) low open shrubland over Triodia wiseana hummock grassland.

PAN PAN061 Grevillea pyramidalis, Cassia glutinosa scattered tall shrubs over Triodia wiseana hummock grassland to closed hummock grassland.

PAN PAN063 Corymbia(P63-22) scattered low trees over Acacia pyriformia (slender, white), Acacia acradenia scattered tall shrubs over Triodia wiseana hummock grassland.

PAN PAN064 Triodia wiseana hummock grassland.

Soil:

PAN PAN058 Gravelly, rocky, orange-brown sandy loam with surface calcrete.

PAN PAN061 Gravelly, pebbly, cobbly, rocky, brown loamy sand. Bare ground ~10-20% with ~70-80% rock cover on surface.

PAN PAN063 Gravelly, pebbly, cobbly, orange-brown (loamy) sand.

PAN PAN064      Dark orange- brown medium to fine sand and silt with gravel.

Common Species:

(Name - % of Sites, Range of Cover)

- Cymbopogon ambiguus - 100%, <1% to <1%
- Solanum phlomoides - 100%, <1% to <1%
- Acacia acradenia - 100%, <1% to <1%
- Corchorus parviflorus - 100%, <1% to 1-5%
- Grevillea pyramidalis - 100%, <1% to <1%
- Triodia wiseana - 100%, 25-33% to 50-70%
- Bulbostylis barbata - 75%, <1% to <1%
- Rhynchosia minima - 75%, <1% to <1%
- Mollugo molluginis - 75%, <1% to <1%
- Boerhavia gardneri - 75%, <1% to <1%
- Polygala aff. isingii - 75%, <1% to <1%
- Indigofera monophylla (PAN58-17) - 75%, <1% to <1%

**60 Group Level, Member: 4,**

**Group statistics**

- Number of sites: 10
- Average number of species per site: 28
- Sites from: HDRAIL - 7 PAN - 2 WANGEL - 1
- Sites from Land Systems: Rocklea - 4 Macroy - 3 Talga - 2 Wona - 1
- Sites in Landforms: sms - 3 scs - 2 sm - 1 sl - 1 p - 1 ps - 1 smr - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

- Triodia wiseana - 100%, 10-25% to 50-70%
- Acacia inaequilatera - 80%, <1% to 1-5%
- Mollugo molluginis - 70%, <1% to <1%
- Cassia glutinosa - 70%, <1% to <1%
- Rhynchosia minima - 60%, <1% to <1%
- Solanum phlomoides - 60%, <1% to <1%
- Triodia epactia - 60%, <1% to 33-50%
- Aristida holathera var. holathera - 50%, <1% to <1%
- Boerhavia paludosa - 50%, <1% to <1%
- Corchorus parviflorus - 50%, <1% to 1-5%
- Acacia orthocarpa - 50%, <1% to 1-5%

**210 Floristic Group Level: Group 20,**

- Number of sites: 2
- Average number of species per site: 18
- Sites from: PAN - 2
- Sites in Landforms: scs - 1 sms - 1
- Sites from Land Systems: Rocklea - 2

Portion of Dendrogram: (Area and Site on left)

PAN PAN031

PAN PAN034

Vegetation Descriptions of the sites in the group:

PAN PAN031 Acacia inaequilatera scattered tall shrubs over Indigofera monophylla (grey leaflet form) (Corchorus p1-6) low shrubland over Triodia epactia hummock grassland.

PAN PAN034 Acacia inaequilatera scattered tall shrubs over Triodia wiseana hummock grassland.

Soil:

PAN PAN031 Orange-brown gravelly pebbly loam with gravel and pebble surface (including a lot of quartz).

PAN PAN034 Pebbly, cobbly loamy silty sand. Areas of calcrete on surface.

Common Species:

(Name - % of Sites, Range of Cover)

Acacia inaequilatera - 100%, <1% to <1%

Triodia epactia - 100%, <1% to 1-5%

Solanum phlomoides - 100%, <1% to <1%

Cassia luerssenii - 100%, <1% to <1%

Acacia orthocarpa - 100%, <1% to <1%

Triodia wiseana - 100%, 25-33% to 50-70%

Corchorus parviflorus - 100%, <1% to 1-5%

Indigofera monophylla (PAN20-2) - 100%, <1% to 10-25%

**60 Group Level, Member: 6,****Group statistics**

Number of sites: 5

Average number of species per site: 26

Sites from: PAN - 5

Sites from Land Systems: Capricorn - 5

Sites in Landforms: dns - 2 rp - 1 sls - 1 daps - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Cassia glutinosa - 100%, to <1%

Triodia wiseana - 100%, 5-10% to >70%

Corchorus aff laniflorus (PAN 76) - 80%, to <1%

Indigofera monophylla (PAN57-9) - 80%, to <1%

Petalostylis labicheoides - 80%, <1% to 10-25%

Euphorbia coghlanii - 80%, <1% to <1%

Acacia acradenia - 80%, <1% to 50-70%

Acacia tumida - 60%, <1% to <1%

Corymbia hamersleyana - 60%, <1% to <1%

Polymeria ambigua - 60%, <1% to <1%

Tephrosia aff. rosea (HD292-37) - 60%, to <1%

Mukia maderaspatana - 60%, <1% to <1%

*Cajanus cinereus* - 60%, <1% to 1-5%

*Acacia pyrifolia* (bark not corky) - 60%, <1% to 10-25%

*Phyllanthus maderaspatensis* var. *angustifolius* - 60%, <1% to <1%

### **210 Floristic Group Level: Group 23,**

Number of sites: 3

Average number of species per site: 29

Sites from: PAN - 3

Sites from Land Systems: Capricorn - 3

Sites in Landforms: daps - 1 dns - 1 sls - 1

### **Portion of Dendrogram: (Area and Site on left)**

PAN PAN049	_____
PAN PAN079	_____   _____
PAN PAN057	_____   _____

### **Vegetation Descriptions of the sites in the group:**

PAN PAN049      *Corymbia hamersleyana* scattered low trees over *Acacia tumida*, *Acacia acradenia*, *Petalostylis labicheoides* open scrub over *Cajanus cinereus*, *Indigofera monophylla* (PAN57-9) open shrubland over *Triodia wiseana* hummock grassland.

PAN PAN079      *Acacia pyrifolia* ((slender, white)) high open shrubland to high shrubland over *Indigofera monophylla* (PAN57-9), *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Corchorus* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

PAN PAN057      *Corymbia hamersleyana* scattered low trees over *Acacia tumida* scattered tall shrubs over *Petalostylis labicheoides*, *Acacia acradenia*, tall shrubland over *Acacia spondylophylla*, *Tephrosia* aff. *rosea* (HD292-37) open shrubland over *Triodia wiseana* hummock grassland

### **Soil:**

PAN PAN049      Brown loamy sand.

PAN PAN079      Red-brown sandy loam (pebbly in places).

PAN PAN057      Gravel to cobble mix with dull red-brown loam between rock fragments.

### **Common Species:**

(Name - % of Sites, Range of Cover)

*Triodia wiseana* - 100%, 25-33% to 25-33%

*Cassia glutinosa* - 100%, to <1%

*Corymbia hamersleyana* - 100%, <1% to <1%

*Indigofera monophylla* (PAN57-9) - 100%, to <1%

*Tephrosia* aff. *rosea* (HD292-37) - 100%, to <1%

*Acacia acradenia* - 100%, <1% to 50-70%



*Petalostylis labicheoides* - 100%, <1% to 10-25%  
*Cymbopogon ambiguus* - 67%, <1% to <1%  
*Polymeria ambigua* - 67%, <1% to <1%  
*Acacia bivenosa* - 67%, to <1%  
*Acacia pyrifolia* (bark not corky) - 67%, <1% to 10-25%  
*Cassytha capillaris* - 67%, to <1%  
*Mollugo molluginis* - 67%, <1% to <1%  
*Euphorbia* aff. *drummondii* (MET 15 030) - 67%, to <1%  
*Swainsona formosa* - 67%, <1% to <1%  
*Acacia tumida* - 67%, <1% to <1%  
*Phyllanthus maderaspatensis* var. *angustifolius* - 67%, <1% to <1%  
*Corchorus* aff. *laniflorus* (PAN 76) - 67%, to <1%  
*Trichodesma zeylanicum* - 67%, <1% to <1%  
*Euphorbia coghlanii* - 67%, <1% to <1%

### **210 Floristic Group Level: Group 24,**

Number of sites: 2  
 Average number of species per site: 21  
 Sites from: PAN - 2  
 Sites from Land Systems: Capricorn - 2  
 Sites in Landforms: dns - 1 rp - 1

### **Portion of Dendrogram: (Area and Site on left)**

PAN PAN076 \_\_\_\_\_  
 PAN PAN082 \_\_\_\_\_ | \_\_\_\_\_

### **Vegetation Descriptions of the sites in the group:**

PAN PAN076 *Eucalyptus victrix* scattered low trees to trees over *Acacia acradenia*, *Acacia pyrifolia* (slender form) high open shrubland over *Cajanus cinereus* scattered shrubs to open shrubland over *Themeda* sp. Panorama, *Triodia wiseana* tussock, hummock grassland.

PAN PAN082 *Clerodendrum floribundum* var. *angustifolium* scattered tall shrubs over *Triodia wiseana*, *Themeda* sp. Panorama very open hummock/tussock grassland.

### **Soil:**

PAN PAN076 Very variable. Banks light brown fine to coarse sand. Bed cobbly to gravelly.

PAN PAN082

### **Common Species:**

(Name - % of Sites, Range of Cover)  
*Cymbopogon procerus* - 100%, <1% to <1%  
*Triodia wiseana* - 100%, 5-10% to >70%  
*Cajanus cinereus* - 100%, <1% to 1-5%  
*Mukia maderaspatana* - 100%, <1% to <1%

Cassia glutinosa - 100%, <1% to <1%  
 Euphorbia coghlanii - 100%, <1% to <1%  
 Corchorus aff laniflorus (PAN 76) - 100%, <1% to <1%  
 Themeda sp. Panorama - 100%, 5-10% to 10-25%

**60 Group Level, Member: 10,  
 Group statistics**

Number of sites: 16  
 Average number of species per site: 21  
 Sites from: WANGEL - 8 PAN - 6 HDRAIL - 2  
 Sites from Land Systems: Capricorn - 7 Rocklea - 6 McKay - 1 Newman - 1  
 River - 1  
 Sites in Landforms: dns - 4 dap - 3 smr - 2 sms - 2 scr - 2 dn - 1 daps - 1 sls - 1

**Common Species:**

(Name - % of Sites, Range of Cover)  
 Triodia epactia - 100%, 5-10% to 50-70%  
 Grevillea wickhamii subsp. aprica - 81%, <1% to 10-25%  
 Goodenia stobbsiana - 62%, <1% to <1%  
 Corymbia hamersleyana - 56%, <1% to 1-5%  
 Acacia tumida - 50%, <1% to 33-50%  
 Cymbopogon ambiguus - 44%, <1% to <1%

**210 Floristic Group Level: Group 48,**

Number of sites: 2  
 Average number of species per site: 21  
 Sites from: PAN - 2  
 Sites from Land Systems: Capricorn - 2  
 Sites in Landforms: smr - 1 sms - 1

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN059            \_\_\_\_\_  
 PAN PAN060            \_\_\_\_\_|\_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

PAN PAN059            Eucalyptus leucophloia scattered low trees over Acacia  
 acradenia open shrubland over Triodia epactia hummock grassland.

PAN PAN060            Eucalyptus (?=P60-1) sp scattered low trees over Triodia  
 brizoides (Triodia epactia) closed hummock grassland.

**Soil:**

PAN PAN059            Brown loam amongst outcrop, gravelly to pebbly.

PAN PAN060            Chocolate-brown fine sand and silt with large gravel.

**Common Species:**

(Name - % of Sites, Range of Cover)  
 Ptilotus incanus var. elongatus - 100%, <1% to <1%

Triumphetta maconochieana - 100%, <1% to <1%  
 Solanum phlomoides - 100%, <1% to <1%  
 Solanum horridum - 100%, <1% to <1%  
 Triodia epactia - 100%, 5-10% to 25-33%  
 Eucalyptus leucophloia - 100%, <1% to 1-5%  
 Grevillea wickhamii subsp. aprica - 100%, <1% to <1%  
 Dampiera candidans - 100%, <1% to <1%  
 Sida sp.A Kimberley Flora(P.A.Fryxell & L.A.Craven 3900) - 100%, <1% to <1%  
 Cassia venusta - 100%, <1% to <1%  
 Acacia inaequilatera - 100%, <1% to <1%  
 Acacia acradenia - 100%, <1% to <1%  
 Cymbopogon ambiguus - 100%, <1% to <1%  
 Triumphetta aff. chaetocarpa (Panorama form) - 100%, <1% to <1%  
 Goodenia stobbsiana - 100%, <1% to <1%  
 Bonamia media var. villosa - 100%, <1% to <1%

### **210 Floristic Group Level: Group 50,**

Number of sites: 3  
 Average number of species per site: 18  
 Sites from: WANGEL - 2 PAN - 1  
 Sites from Land Systems: Rocklea - 2 Capricorn - 1  
 Sites in Landforms: dns - 2 dap - 1

### **Portion of Dendrogram: (Area and Site on left)**

WANGEL 0350	_____
WANGEL 0353	_____   _____
PAN PAN046	_____   _____

### **Vegetation Descriptions of the sites in the group:**

WANGEL 0350 Acacia monticola~ Grevillea wickhamii and Acacia tumida high open shrubland over Acacia bivenosa open shrubland over Triodia pungens hummock grassland

WANGEL 0353 Acacia tumida and Grevillea wickhamii high open shrubland over Triodia pungens hummock grassland

PAN PAN046 Corymbia hamersleyana over Grevillea wickhamii ssp aprica high shrubland over Petalostylis labicheoides, Acacia acradenia high open shrubland over Acacia spondylophylla open shrubland over Triodia epactia hummock grassland.

### **Soil:**

WANGEL 0350 = site 248 but more loamy

WANGEL 0353 Pebbly/cobbly/gravelly coarse sand amongst boulders

PAN PAN046 Gravelly to cobbly, orange-brown loam.

Common Species:

(Name - % of Sites, Range of Cover)

Grevillea wickhamii subsp. aprica - 100%, 1-5% to 10-25%

Corymbia hamersleyana - 100%, &lt;1% to &lt;1%

Triumfetta maconochieana - 100%, &lt;1% to &lt;1%

Acacia tumida - 100%, &lt;1% to 5-10%

Triodia epactia - 100%, 33-50% to 50-70%

Acacia bivenosa - 67%, &lt;1% to 10-25%

Polymeria ambigua - 67%, &lt;1% to &lt;1%

Dampiera candicans - 67%, &lt;1% to &lt;1%

Cassytha capillaris - 67%, &lt;1% to &lt;1%

Indigofera monophylla (grey leaflet form) - 67%, &lt;1% to &lt;1%

Ehretia saligna var. saligna - 67%, &lt;1% to &lt;1%

210 Floristic Group Level: Group 51,

Number of sites: 3

Average number of species per site: 15

Sites from: PAN - 3

Sites from Land Systems: Capricorn - 3

Sites in Landforms: dap - 2 sms - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN039	_____
PAN PAN042	_____
PAN PAN070	_____   _____

Vegetation Descriptions of the sites in the group:

PAN PAN039 Pre-burnt description : Acacia tumida low woodland to low open forest (pre-fire) over Petalostylis labicheoides, Gossypium robinsonii high shrubland over Cajanus cinereus, Tephrosia aff. rosea (HD292-37) shrubland over Triodia epactia very open hummock gr

PAN PAN042 Acacia tumida low open forest to open forest over Petalostylis labicheoides scattered tall shrubs over Triodia epactia hummock grassland.

PAN PAN070 Acacia tumida low open forest to open forest over Triodia epactia hummock grassland.

Soil:

PAN PAN039 Brown loamy sand with some rocks.

PAN PAN042 Red-brown coarse sand to loamy sand.

PAN PAN070 Orange-brown medium to fine sand with gravel and cobbles, outcrop upslope.

Common Species:

(Name - % of Sites, Range of Cover)

Triodia epactia - 100%, 5-10% to 50-70%

Grevillea wickhamii subsp. aprica - 100%, <1% to <1%

Acacia tumida - 100%, 33-50% to 33-50%

Eriachne mucronata - 67%, <1% to <1%

Goodenia stobbsiana - 67%, <1% to <1%

Petalostylis labicheoides - 67%, 1-5% to 5-10%

Hibiscus aff. platyklamys (site 1139) - 67%, <1% to <1%

Tephrosia aff. rosea (HD292-37) - 67%, <1% to 5-10%

## 60 Group Level, Member: 11,

### Group statistics

Number of sites: 25

Average number of species per site: 15

Sites from: HDRAIL - 13 WANGEL - 7 PAN - 5

Sites from Land Systems: Rocklea - 6 Capricorn - 3 Uaroo - 3 Ruth - 2 White Springs - 2

Sites in Landforms: scs - 7 sls - 3 dap - 3 sms - 3 scr - 2 ss - 1 smr - 1 sl - 1 sc - 1

### Common Species:

(Name - % of Sites, Range of Cover)

Triodia epactia - 100%, 10-25% to >70%

Acacia inaequilatera - 60%, <1% to 1-5%

Mollugo molluginis - 52%, <1% to <1%

Solanum phlomoides - 48%, <1% to <1%

## 210 Floristic Group Level: Group 55,

Number of sites: 5

Average number of species per site: 13

Sites from: HDRAIL - 4 PAN - 1

Sites from Land Systems: Uaroo - 2 Macroy - 1 Ruth - 1 Platform - 1

Sites in Landforms: scs - 2 dap - 1 p - 1 sc - 1

### Portion of Dendrogram: (Area and Site on left)

HDRAIL H154	_____	
HDRAIL H159	_____   _____	
HDRAIL H241	_____   _____	
HDRAIL H166	_____   _____	
PAN PAN025	_____   _____   _____	

### Vegetation Descriptions of the sites in the group:

HDRAIL H154 Triodia epactia, T. secunda mid-dense hummock grassland

HDRAIL H159 Triodia epactia mid-dense hummock grassland

HDRAIL H241 Acacia orthocarpa open scrub over Triodia epactia mid-dense hummock grassland

HDRAIL H166 Acacia inaequilatera scattered tall shrubs over Triodia epactia mid-dense hummock grassland

PAN PAN025 Acacia inaequilatera scattered low trees over Triodia epactia grassland.

Soil:

HDRAIL H154 Red clay loam, hardset surface.

HDRAIL H159 Orange-brown fine silty sand, hard setting.

HDRAIL H241 Orange-brown medium-fine sand.

HDRAIL H166 Red-brown fine sandy loam with continuous surface layer of ?granite and quartz pebbles, stones and exposed rock.

PAN PAN025 Dark brown-orange fine sand with silt and surface of large gravel.

Common Species:

(Name - % of Sites, Range of Cover)

Triodia epactia - 100%, 33-50% to 50-70%

Bulbostylis barbata - 100%, <1% to <1%

Mollugo molluginis - 80%, <1% to <1%

Fimbristylis dichotoma - 80%, <1% to <1%

**210 Floristic Group Level: Group 56,**

Number of sites: 6

Average number of species per site: 11

Sites from: WANGEL - 3 PAN - 2 HDRAIL - 1

Sites from Land Systems: Capricorn - 3 Rocklea - 2 White Springs - 1

Sites in Landforms: scs - 2 sls - 2 slr - 1 sms - 1

Portion of Dendrogram: (Area and Site on left)

WANGEL 0345	_____		
WANGEL 0347	_____   _____		
WANGEL 0448	_____   _____		
HDRAIL H192	_____   _____   _____		
PAN PAN040	_____   _____   _____		
PAN PAN066	_____   _____   _____		

Vegetation Descriptions of the sites in the group:

WANGEL 0345 Scattered low trees of Eucalyptus leucophloia over Triodia pungens hummock grassland

WANGEL 0347 Eucalyptus leucophloia and Corymbia hamersleyana low open woodland over low scattered shrubs of Acacia bivenosa over Triodia pungens hummock grassland

- WANGEL 0448      *Triodia pungens* hummock grassland
- HDRAIL H192      *Cassia luerssenii* scattered tall shrubs over *Triodia epactia* mid-dense hummock grassland
- PAN PAN040      *Corymbia hamersleyana*, *Eucalyptus leucophloia* scattered low trees over *Acacia ptychophylla* low shrubland to low open heath over *Triodia epactia* hummock grassland.
- PAN PAN066      (pre-burn) *Corymbia* (PAN1-3) scattered low trees over *Acacia inaequilatera*, *Acacia acradenia* high open shrubland over *Triodia epactia* hummock grassland.
- Soil:
- WANGEL 0345      Light orange-brown gravelly/pebbly loam with angular pebble surface. Outcropping sandstone?
- WANGEL 0347      Dull orange-brown pebbly loam with large cobbles
- WANGEL 0448      Terracotta coloured pebbly loam with pebble surface~ some massive (siliceous) outcrop
- HDRAIL H192      Gravelly, pebbly coarse red sand.
- PAN PAN040      Dull light brown gravelly to pebbly (some cobbles) loam. About 2-3% of surface is outcrop. Thinly layered light brown with some thicker bands which are more silicious.
- PAN PAN066      Gravelly to cobbly orange-brown loamy sand. Rock covers about 60% soil surface.

Common Species:

- (Name - % of Sites, Range of Cover)
- Triodia epactia* - 100%, 33-50% to 50-70%
- Cassia glutinosa* - 83%, <1% to <1%
- Goodenia stobbsiana* - 67%, <1% to <1%
- Acacia bivenosa* - 67%, <1% to <1%
- Mollugo molluginis* - 67%, <1% to <1%

**210 Floristic Group Level: Group 60,**

- Number of sites: 2
- Average number of species per site: 23
- Sites from: PAN - 2
- Sites from Land Systems: Rocklea - 2
- Sites in Landforms: sls - 1 sms - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN030 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN030 Acacia inaequilatera scattered low trees over Indigofera monophylla (grey), Corchorus (=PAN1) low open shrubland over Triodia epactia (Triodia angusta(30-2)) grassland.

PAN PAN037 Acacia inaequilatera scattered tall shrubs over Triodia epactia (Triodia angusta) hummock grassland with Corchorus (=PAN 1-6) low open shrubland.

Soil:

PAN PAN030 Calcareous, chocolate brown at surface, orange-brown at depth (shallow), fine-medium sand with silt. Quartz and darker pebbles. Same outcrop.

PAN PAN037 Brown fine sand and silt with gravel, calcareous.

Common Species:

(Name - % of Sites, Range of Cover)

Acacia synchronicia - 100%, <1% to <1%

Triodia epactia - 100%, 33-50% to 50-70%

Solanum phlomoides - 100%, <1% to <1%

Indigofera monophylla (PAN20-2) - 100%, <1% to <1%

Acacia inaequilatera - 100%, <1% to <1%

Pterocaulon sphacelatum - 100%, <1% to <1%

Corchorus parviflorus - 100%, <1% to 5-10%

Bonamia pannosa - 100%, <1% to <1%

Euphorbia aff. australis (B191) - 100%, <1% to <1%

**60 Group Level, Member: 16,****Group statistics**

Number of sites: 9

Average number of species per site: 32

Sites from: HDRAIL - 7 PAN - 1 WANGEL - 1

Sites from Land Systems: McKay - 3 Rocklea - 2 Macroy - 2 Boolgeeda - 1 unknown - 1

Sites in Landforms: smr - 2 scr - 2 sl - 1 rpv - 1 dn - 1 dap - 1 sms - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Triodia epactia - 100%, <1% to 50-70%

Cleome viscosa - 100%, <1% to <1%

Polycarpaea longiflora - 78%, <1% to <1%

Mukia maderaspatana - 78%, <1% to <1%

Aerva javanica - 67%, <1% to <1%

Polymeria ambigua - 67%, <1% to <1%

Atalaya hemiglaucula - 56%, <1% to <1%

Amaranthus pallidiflorus - 56%, <1% to <1%

Cymbopogon ambiguus - 56%, <1% to 50-70%



Solanum phlomoides - 56%, <1% to <1%  
 Trichodesma zeylanicum - 56%, <1% to <1%  
 Enneapogon oblongus - 56%, <1% to <1%  
 Corchorus lasiocarpus subsp. lasiocarpus - 56%, <1% to <1%  
 Rhynchosia minima - 56%, <1% to 5-10%  
 Pterocaulon sphaeranthoides x sphacelatum - 56%, <1% to <1%  
 Acacia inaequilatera - 56%, <1% to 5-10%  
 Hybanthus aurantiacus - 44%, <1% to <1%  
 Trachymene oleracea - 44%, <1% to <1%  
 Eriachne mucronata - 44%, <1% to <1%  
 Dysphania rhadinostachya - 44%, <1% to <1%

**210 Floristic Group Level: Group 75,**

Number of sites: 2

Average number of species per site: 26

Sites from: PAN - 1 WANGEL - 1

Sites from Land Systems: unknown - 1 Boolgeeda - 1

Sites in Landforms: rpv - 1 smr - 1

Portion of Dendrogram: (Area and Site on left)

WANGEL 0036 \_\_\_\_\_  
 PAN PAN035 \_\_\_\_\_ | \_

Vegetation Descriptions of the sites in the group:

WANGEL 0036 Scattered Triodia wiseana~ Triodia pungens and Cymbopogon ambiguus hummocks and tussocks

PAN PAN035 Tephrosia sp.B Kimberley Flora(C.A.Gardner 7300) open shrubland over Triumfetta (35-5) low open shrubland over Cymbopogon ?ambiguus (P35-8), Triodia epactia tussock, hummock open grassland.

Soil:

WANGEL 0036 Brown sandy loam in cracks in basic igneous rock

PAN PAN035 Dull red-brown gravelly, pebbly loam amongst boulders and outcrop.

Common Species:

(Name - % of Sites, Range of Cover)

Cleome viscosa - 100%, <1% to <1%

Leptopus decaisnei var. decaisnei - 100%, <1% to <1%

Acacia inaequilatera - 100%, <1% to <1%

Polycarpaea longiflora - 100%, <1% to <1%

Cymbopogon ambiguus - 100%, <1% to 1-5%

Triodia epactia - 100%, <1% to 1-5%

Aerva javanica - 100%, <1% to <1%

Triodia wiseana - 100%, <1% to 5-10%

Polymeria ambigua - 100%, <1% to <1%

Boerhavia gardneri - 100%, <1% to <1%

Cenchrus ciliaris - 100%, <1% to <1%

**60 Group Level, Member: 23,**

**Group statistics**

Number of sites: 8

Average number of species per site: 13

Sites from: WANGEL - 6 PAN - 2

Sites from Land Systems: Rocklea - 3 Boolgeeda - 2 Capricorn - 2 unknown - 1

Sites in Landforms: scs - 2 sm - 1 ds - 1 sc - 1 sl - 1 ss - 1 sls - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Hakea lorea ssp. lorea - 88%, <1% to <1%

Triodia wiseana - 75%, to <1%

Corymbia hamersleyana - 75%, <1% to <1%

Acacia pyrifolia (bark not corky) - 50%, <1% to 1-5%

Boerhavia gardneri - 50%, <1% to <1%

**210 Floristic Group Level: Group 96,**

Number of sites: 2

Average number of species per site: 14

Sites from: PAN - 1 WANGEL - 1

Sites from Land Systems: Boolgeeda - 1 Capricorn - 1

Sites in Landforms: sls - 1 sm - 1

**Portion of Dendrogram: (Area and Site on left)**

WANGEL 0134 \_\_\_\_\_  
 PAN PAN053 \_\_\_\_\_ | \_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

WANGEL 0134 Scattered shrubs of Grevillea pyramidalis over Triodia wiseana open hummock grassland

PAN PAN053 Acacia inaequilatera scattered tall shrubs over Acacia sp (=P53-1) open shrubland over Triodia brizoides closed hummock grassland.

**Soil:**

WANGEL 0134 Red-brown loam with pebbly surface

PAN PAN053

**Common Species:**

(Name - % of Sites, Range of Cover)

Triodia wiseana - 100%, <1% to <1%

Hakea lorea ssp. lorea - 100%, <1% to <1%

Bonamia media var. villosa - 100%, <1% to <1%

Mollugo molluginis - 100%, <1% to <1%

*Ptilotus astrolasius* - 100%, <1% to <1%

*Polygala aff. isingii* - 100%, <1% to <1%

### **210 Floristic Group Level: Group 97,**

Number of sites: 1

Average number of species per site: 8

Sites from: PAN - 1

Sites from Land Systems: Capricorn - 1

Sites in Landforms: scs - 1

### **Portion of Dendrogram: (Area and Site on left)**

PAN PAN055 \_\_\_\_\_

### **Vegetation Descriptions of the sites in the group:**

PAN PAN055 *Hakea lorea* ssp. *lorea*, *Corymbia hamersleyana* scattered low trees over *Triodia wiseana* hummock grassland.

### **Soil:**

PAN PAN055 Gravelly, pebbly (some cobbles) dull red, brown loam with gravel, pebble surface, small amount of outcrop.

### **Common Species:**

(Name - % of Sites, Range of Cover)

*Indigofera rugosa* - 100%, <1% to <1%

*Boerhavia gardneri* - 100%, <1% to <1%

*Corymbia hamersleyana* - 100%, <1% to <1%

*Acacia acradenia* - 100%, <1% to <1%

*Triodia wiseana* - 100%, to

*Polygala aff. isingii* - 100%, <1% to <1%

*Hakea lorea* ssp. *lorea* - 100%, <1% to <1%

*Bulbostylis barbata* - 100%, <1% to <1%

### **60 Group Level, Member: 36,**

#### **Group statistics**

Number of sites: 9

Average number of species per site: 21

Sites from: PAN - 7 HDRAIL - 2

Sites in Landforms: smr - 3 ps - 2 sms - 2 slr - 1 scs - 1

Sites from Land Systems: Capricorn - 7 Macroy - 2

#### **Common Species:**

(Name - % of Sites, Range of Cover)

*Triodia brizoides* - 100%, 25-33% to >70%

*Acacia inaequilatera* - 78%, <1% to 1-5%

*Solanum phlomoides* - 78%, <1% to <1%

*Acacia acradenia* - 67%, <1% to 1-5%

*Hakea lorea* ssp. *lorea* - 67%, <1% to <1%

*Acacia bivenosa* - 67%, <1% to 10-25%

Cassia glutinosa - 67%, <1% to <1%  
 Corchorus parviflorus - 67%, <1% to 10-25%  
 Cymbopogon ambiguus - 56%, <1% to <1%  
 Mollugo molluginis - 44%, <1% to <1%  
 Bonamia media var. villosa - 44%, <1% to <1%  
 Goodenia stobbsiana - 44%, <1% to <1%  
 Triodia epactia - 44%, <1% to 10-25%  
 Indigofera monophylla (PAN57-9) - 44%, <1% to 33-50%

**210 Floristic Group Level: Group 119,**

Number of sites: 2  
 Average number of species per site: 27  
 Sites from: HDRAIL - 1 PAN - 1  
 Sites from Land Systems: Macroy - 2  
 Sites in Landforms: ps - 2

**Portion of Dendrogram: (Area and Site on left)**

HDRAIL H094 \_\_\_\_\_  
 PAN PAN017 \_\_\_\_\_ | \_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

HDRAIL H094 Acacia ancistrocarpa, A. inaequilatera high open shrubland over scattered low shrubs over Triodia brizoides, T. aff. basedowii, T. lanigera mid-dense hummock grassland

PAN PAN017 Acacia bivenosa scattered shrubs over Triodia brizoides hummock grassland.

**Soil:**

HDRAIL H094 Red fine sandy loam with continuous surface layer of pebbles of quartz and ?ironstone.

PAN PAN017 Fine reddish-brown sand with gravel and cobbles.

**Common Species:**

(Name - % of Sites, Range of Cover)  
 Goodenia stobbsiana - 100%, <1% to <1%  
 Triodia brizoides - 100%, 33-50% to 50-70%  
 Triodia lanigera - 100%, <1% to 1-5%  
 Sida cardiophylla - 100%, <1% to <1%  
 Ptilotus astrolasius - 100%, <1% to <1%  
 Mollugo molluginis - 100%, <1% to <1%  
 Cleome uncifera - 100%, <1% to <1%  
 Cassia notabilis - 100%, <1% to <1%  
 Corchorus parviflorus - 100%, <1% to <1%

**210 Floristic Group Level: Group 121,**

Number of sites: 1

Average number of species per site: 30  
 Sites from: PAN - 1  
 Sites from Land Systems: Capricorn - 1  
 Sites in Landforms: sms - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN080 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN080 Acacia inaequilatera, Grevillea wickhamii ssp aprica scattered tall shrubs over Triodia brizoides(P80-1) hummock grassland.

Soil:

PAN PAN080 Brown loamy sand, pebbly, rocky, cobbly, with rock buttresses exposed.

Common Species:

(Name - % of Sites, Range of Cover)

- Triumfetta propinqua - 100%, <1% to <1%
- Cheilanthes vellea - 100%, <1% to <1%
- Cassia oligophylla - 100%, <1% to <1%
- Tribulus suberosus - 100%, <1% to <1%
- Hybanthus aurantiacus - 100%, <1% to <1%
- Euphorbia coghlanii - 100%, <1% to <1%
- Cassia glutinosa - 100%, <1% to <1%
- Cyperus cunninghamii subsp. cunninghamii - 100%, <1% to <1%
- Triodia epactia - 100%, <1% to <1%
- Grevillea wickhamii subsp. aprica - 100%, <1% to <1%
- Tephrosia spechtii - 100%, <1% to <1%
- Sida sp.A Kimberley Flora(P.A.Fryxell & L.A.Craven 3900) - 100%, <1% to <1%
- Acacia ptychophylla - 100%, <1% to <1%
- Triumfetta maconochieana - 100%, <1% to <1%
- Polygala aff. isingii - 100%, <1% to <1%
- Solanum phlomoides - 100%, <1% to <1%
- Acacia inaequilatera - 100%, <1% to <1%
- Corchorus aff laniflorus (PAN 76) - 100%, 1-5% to 1-5%
- Gossypium australe (Whim Creek form) - 100%, <1% to <1%
- Euphorbia aff. drummondii (MET 15 030) - 100%, <1% to <1%

**210 Floristic Group Level: Group 122,**

Number of sites: 5  
 Average number of species per site: 18  
 Sites from: PAN - 5  
 Sites in Landforms: smr - 2 scs - 1 slr - 1 sms - 1  
 Sites from Land Systems: Capricorn - 5

Portion of Dendrogram: (Area and Site on left)

PAN PAN045	_____
PAN PAN073	_____   _____
PAN PAN052	_____   _____
PAN PAN067	_____   _____
PAN PAN074	_____   _____   _____

Vegetation Descriptions of the sites in the group:

PAN PAN045 Acacia inaequilatera, Acacia acradenia scattered tall shrubs over Acacia bivenosa scattered shrubs over Triodia brizoides open hummock grassland to hummock grassland.

PAN PAN073 Eucalyptus leucophloia(P73-1) scattered low trees over Acacia inaequilatera, Acacia acradenia scattered high shrubs over Cassia glutinosa scattered shrubs over Triodia brizoides closed hummock grassland.

PAN PAN052 Acacia inaequilatera scattered tall shrubs over Acacia bivenosa shrubland over Acacia spondylophylla low open shrubland over Triodia brizoides hummock grassland.

PAN PAN067 Acacia inaequilatera scattered tall shrubs over Indigofera monophylla, Corchorus (=PAN 1-6), low open heath over Triodia brizoides (Triodia epactia) closed hummock grassland.

PAN PAN074 Acacia inaequilatera scattered tall shrubs over Indigofera monophylla (grey = P48-8), Corchorus(= PAN1-6) low open heath over Triodia brizoides closed hummock grassland.

Soil:

PAN PAN045 Gravelly, cobbly, rocky brown loamy sand. Surface cover >90% rock.

PAN PAN073 Soil is gravelly, cobbly, rocky, bouldery, orange-brown loamy sand.

PAN PAN052 Gravelly, cobbly, rocky, orange-brown loam sand. Almost scree slope with rock cover of surface >80%.

PAN PAN067 Orange-brown fine silty sand with gravel, cobbles and outcrop.

PAN PAN074 Orange-brown fine sand and silt with gravel and cobbles.

Common Species:

(Name - % of Sites, Range of Cover)

Triodia brizoides - 100%, 25-33% to >70%

Acacia inaequilatera - 100%, <1% to 1-5%

Solanum phlomoides - 100%, <1% to <1%

Acacia acradenia - 80%, <1% to 1-5%

Hakea lorea ssp. lorea - 80%, <1% to <1%

Bonamia media var. villosa - 80%, <1% to <1%

Corchorus parviflorus - 80%, <1% to 10-25%  
 Cassia glutinosa - 80%, <1% to <1%  
 Acacia bivenosa - 80%, <1% to 10-25%  
 Triodia wiseana - 60%, <1% to 10-25%  
 Eucalyptus leucophloia - 60%, <1% to 1-5%  
 Euphorbia tannensis ssp. eremophila (Panorama form) - 60%, <1% to <1%  
 Indigofera monophylla (PAN57-9) - 60%, <1% to 33-50%

**60 Group Level, Member: 37,  
Group statistics**

Number of sites: 9  
 Average number of species per site: 27  
 Sites from: HDRAIL - 5 PAN - 4  
 Sites from Land Systems: Macroy - 4 Platform - 2 Satirist - 1 Granitic - 1  
 Uaroo - 1  
 Sites in Landforms: dn - 3 dns - 2 d - 1 dap - 1 p - 1 py - 1

**Common Species:**

(Name - % of Sites, Range of Cover)  
 Bonamia rosea - 100%, <1% to <1%  
 Triodia epactia - 89%, <1% to 50-70%  
 Goodenia stobbsiana - 89%, <1% to <1%  
 Acacia ancistrocarpa - 89%, <1% to 50-70%  
 Grevillea wickhamii subsp. aprica - 78%, <1% to 5-10%  
 Paraneurachne muelleri - 67%, <1% to <1%  
 Corchorus parviflorus - 67%, <1% to 10-25%  
 Sida cardiophylla - 67%, <1% to <1%  
 Acacia acradenia - 67%, <1% to 50-70%  
 Aristida holathera var. holathera - 67%, <1% to <1%  
 Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601) - 67%, <1% to <1%  
 Trichodesma zeylanicum - 56%, <1% to <1%  
 Hybanthus aurantiacus - 56%, <1% to <1%  
 Goodenia microptera - 56%, <1% to <1%  
 Acacia inaequilatera - 56%, <1% to 1-5%  
 Ptilotus astrolasius - 56%, <1% to <1%  
 Eragrostis eriopoda - 56%, <1% to <1%  
 Indigofera monophylla (small calyx form) - 56%, <1% to <1%  
 Bonamia linearis - 44%, <1% to <1%  
 Dampiera candicans - 44%, <1% to <1%

**210 Floristic Group Level: Group 123,**

Number of sites: 5  
 Average number of species per site: 29  
 Sites from: HDRAIL - 4 PAN - 1  
 Sites from Land Systems: Macroy - 4 Satirist - 1  
 Sites in Landforms: dn - 2 dns - 1 dap - 1 d - 1

**Portion of Dendrogram: (Area and Site on left)**

HDRAIL H095

HDRAIL H098	_____   _____
PAN PAN028	_____   _____
HDRAIL H096	_____   _____
HDRAIL H252	_____   _____

Vegetation Descriptions of the sites in the group:

HDRAIL H095 Corymbia semiclara low open woodland over Acacia acradenia high shrubland over Triodia ?lanigera, T. epactia hummock grassland and Chrysopogon fallax tussock grassland

HDRAIL H098 Corymbia semiclara low open woodland over Acacia acradenia open heath over Triodia epactia, T. schinzii hummock grassland

PAN PAN028 Corymbia hamersleyana scattered low trees over Grevillea wickhamii ssp aprica high open shrubland over Acacia acradenia open scrub over Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601) low shrubland over Polymeria (1-22) scattered low shrubs and Triodia ep

HDRAIL H096 Corymbia semiclara low open woodland over Acacia acradenia, A. ancistrocarpa open scrub over Triodia epactia open hummock grassland and Themeda triandra tussock grassland

HDRAIL H252 Corymbia hamersleyana scattered low trees over Acacia ancistrocarpa, A. acradenia closed heath over Triodia epactia, T. lanigera mid-dense hummock grassland

Soil:

HDRAIL H095 Orange brown fine sandy silt.

HDRAIL H098 Orange-brown fine sandy loam.

PAN PAN028 Orange-brown fine to medium grained sand gravelly to pebbly in places (and probably below surface)

HDRAIL H096 Red clay loam, mostly hardset surface.

HDRAIL H252 Red-brown fine sandy loam with pebbles & stones of quartz and another unidentified rock.

Common Species:

(Name - % of Sites, Range of Cover)

Bonamia rosea - 100%, <1% to <1%

Acacia ancistrocarpa - 100%, <1% to 50-70%

Triodia epactia - 100%, 5-10% to 50-70%

Acacia acradenia - 100%, 10-25% to 50-70%

Chrysopogon fallax - 80%, <1% to 50-70%

Aristida holathera var. holathera - 80%, <1% to <1%

Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601) - 80%, <1% to <1%

Grevillea wickhamii subsp. aprica - 80%, <1% to 1-5%



Corchorus parviflorus - 80%, <1% to 10-25%  
 Goodenia stobbsiana - 80%, <1% to <1%  
 Goodenia microptera - 80%, <1% to <1%  
 Cassytha capillaris - 80%, <1% to <1%  
 Corymbia semiclara - 60%, 1-5% to 5-10%  
 Hybanthus aurantiacus - 60%, <1% to <1%  
 Sida cardiophylla - 60%, <1% to <1%  
 Indigofera monophylla (small calyx form) - 60%, <1% to <1%  
 Ptilotus astrolasius - 60%, <1% to <1%  
 Eriachne mucronata - 60%, <1% to <1%  
 Bonamia linearis - 60%, <1% to <1%  
 Paraneurachne muelleri - 60%, <1% to <1%

**210 Floristic Group Level: Group 125,**

Number of sites: 1  
 Average number of species per site: 18  
 Sites from: PAN - 1  
 Sites in Landforms: p - 1  
 Sites from Land Systems: Uaroo - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN012 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN012 Corymbia zygophylla scattered trees over Acacia tumida, Grevillea wickhamii subsp. aprica, Acacia inaequilatera open scrub over Acacia ancistrocarpa shrubland over Triodia schinzii closed hummock grassland.

Soil:

PAN PAN012 Orange-red brown fine sand with silt.

Common Species:

(Name - % of Sites, Range of Cover)  
 Acacia tumida - 100%, 50-70% to 50-70%  
 Corymbia zygophylla - 100%, 1-5% to 1-5%  
 Grevillea wickhamii subsp. aprica - 100%, <1% to <1%  
 Goodenia stobbsiana - 100%, <1% to <1%  
 Bonamia rosea - 100%, <1% to <1%  
 Sida cardiophylla - 100%, <1% to <1%  
 Triodia schinzii - 100%, <1% to <1%  
 Cassia glutinosa - 100%, <1% to <1%  
 Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601) - 100%, <1% to <1%  
 Acacia sp. (PAN 12-4) - 100%, <1% to <1%  
 Acacia ancistrocarpa - 100%, 10-25% to 10-25%  
 Mollugo molluginis - 100%, <1% to <1%  
 Ptilotus astrolasius - 100%, <1% to <1%  
 Eragrostis eriopoda - 100%, <1% to <1%  
 Cassia 'symonii' - 100%, <1% to <1%

Indigofera monophylla (small calyx form) - 100%, <1% to <1%

Acacia inaequilatera - 100%, <1% to <1%

Hibiscus leptocladus - 100%, <1% to <1%

### 210 Floristic Group Level: Group 126,

Number of sites: 2

Average number of species per site: 23

Sites from: PAN - 2

Sites in Landforms: dn - 1 dns - 1

Sites from Land Systems: Platform - 2

### Portion of Dendrogram: (Area and Site on left)

PAN PAN023 \_\_\_\_\_  
 PAN PAN024 \_\_\_\_\_|\_\_\_\_\_

### Vegetation Descriptions of the sites in the group:

PAN PAN023 Scattered low trees of Acacia inaequilatera, Corymbia hamersleyana over Acacia tumida high shrubland over Petalostylis labicheoides open scrub over Indigofera monophylla (grey leaflet form)(P23-2) shrubland over Bonamia rosea scattered low shrubs to low s

PAN PAN024 Acacia tumida, Acacia inaequilatera, Grevillea wickhamii ssp aprica, Acacia ancistrocarpa + variant (24-9) open scrub over Corchorus (1-6), Indigofera monophylla (PAN20-2) low open shrubland over Triodia epactia hummock grassland.

### Soil:

PAN PAN023 Orange-brown gravelly, pebbly sandy loam.

PAN PAN024 Orange-brown loamy sand.

### Common Species:

(Name - % of Sites, Range of Cover)

Acacia inaequilatera - 100%, <1% to <1%

Goodenia stobbsiana - 100%, <1% to <1%

Acacia tumida - 100%, <1% to 10-25%

Bonamia rosea - 100%, <1% to <1%

Hybanthus aurantiacus - 100%, <1% to <1%

Hibiscus leptocladus - 100%, <1% to <1%

Paraneurachne muelleri - 100%, <1% to <1%

Corchorus parviflorus - 100%, <1% to 1-5%

Corymbia hamersleyana - 100%, <1% to <1%

Triodia epactia - 100%, <1% to 33-50%

Euphorbia sp. (site 1089) - 100%, <1% to <1%

Indigofera monophylla (PAN20-2) - 100%, <1% to 1-5%

Trichodesma zeylanicum - 100%, <1% to <1%

Grevillea wickhamii subsp. aprica - 100%, <1% to 5-10%

**60 Group Level, Member: 38,****Group statistics**

Number of sites: 8

Average number of species per site: 19

Sites from: PAN - 8

Sites from Land Systems: Macroy - 2 Rocklea - 2 Satirist - 2 Capricorn - 1  
unknown - 1

Sites in Landforms: scs - 8

**Common Species:**

(Name - % of Sites, Range of Cover)

Corchorus parviflorus - 75%, &lt;1% to &lt;1%

Mollugo molluginis - 75%, &lt;1% to &lt;1%

Eriachne pulchella - 75%, &lt;1% to &lt;1%

Acacia inaequilatera - 75%, to &lt;1%

Triodia epactia - 62%, &lt;1% to 10-25%

Acacia acradenia - 62%, &lt;1% to &lt;1%

Triodia sp. Panorama - 62%, &lt;1% to 50-70%

Indigofera monophylla (PAN20-2) - 62%, &lt;1% to &lt;1%

Goodenia stobbsiana - 50%, &lt;1% to &lt;1%

Bonamia rosea - 50%, &lt;1% to &lt;1%

Ptilotus astrolasius - 50%, &lt;1% to &lt;1%

Acacia bivenosa - 50%, &lt;1% to &lt;1%

Bulbostylis barbata - 50%, &lt;1% to &lt;1%

**210 Floristic Group Level: Group 127,**

Number of sites: 2

Average number of species per site: 18

Sites from: PAN - 2

Sites from Land Systems: Satirist - 1 Macroy - 1

Sites in Landforms: scs - 2

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN019

PAN PAN022

\_\_\_\_\_ | \_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

PAN PAN019 Acacia victoriae? (Corymbia hamersleyana) scattered tall shrubs to low trees over Acacia ancistrocarpa, Acacia bivenosa scattered tall shrubs over Cassia stricta, Cassia glutinosa scattered shrubs over Triodia epactia, Triodia ?basedowii hummock grassland

PAN PAN022 Acacia inaequilatera scattered tall shrubs over Triodia epactia hummock grassland.

**Soil:**

PAN PAN019 Orange-brown very gravelly, pebbly loam.

PAN PAN022      Very gravelly, pebbly orange-brown loam with gravel-pebble surface.

Common Species:

(Name - % of Sites, Range of Cover)

Mollugo molluginis - 100%, <1% to <1%

Heliotropium heteranthum - 100%, <1% to <1%

Bulbostylis barbata - 100%, <1% to <1%

Acacia acradenia - 100%, <1% to <1%

Eriachne pulchella - 100%, <1% to <1%

Synaptantha tillaeacea var. tillaeacea - 100%, <1% to <1%

Ptilotus calostachyus var. calostachyus - 100%, <1% to <1%

Triodia epactia - 100%, <1% to 10-25%

**210 Floristic Group Level: Group 128,**

Number of sites: 1

Average number of species per site: 19

Sites from: PAN - 1

Sites from Land Systems: Macroy - 1

Sites in Landforms: scs - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN020 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN020      Corymbia PAN1 (20-5) scattered low trees over Acacia inaequilatera, Acacia bivenosa scattered tall shrubs over Triodia aff basedowii (20-1) hummock grassland.

Soil:

PAN PAN020      Pebbly, cobbly, orange-brown loamy sand with white calcareous nodules present. Crusty in places (white calcareous clay crust?)

Common Species:

(Name - % of Sites, Range of Cover)

Acacia inaequilatera - 100%, <1% to <1%

Corymbia hamersleyana - 100%, <1% to <1%

Scaevola amblyanthera var. centralis - 100%, <1% to <1%

Triodia epactia - 100%, <1% to <1%

Goodenia stobbsiana - 100%, <1% to <1%

Goodenia microptera - 100%, <1% to <1%

Oldenlandia crouchiana - 100%, <1% to <1%

Bonamia rosea - 100%, <1% to <1%

Heliotropium chrysocarpum - 100%, <1% to <1%

Indigofera monophylla (PAN20-2) - 100%, <1% to <1%

Haloragis gossei - 100%, <1% to <1%

Corchorus parviflorus - 100%, <1% to <1%

Bonamia sp. (H94-6) - 100%, <1% to <1%

Hibiscus aff. platyklamys (site 1139) - 100%, <1% to <1%  
 Cassia aff. oligophylla (thinly sericeous) - 100%, <1% to <1%  
 Triodia lanigera - 100%, <1% to <1%  
 Ptilotus astrolasius - 100%, <1% to <1%  
 Cassytha capillaris - 100%, <1% to <1%  
 Acacia bivenosa - 100%, <1% to <1%

**210 Floristic Group Level: Group 129,**

Number of sites: 1  
 Average number of species per site: 26  
 Sites from: PAN - 1  
 Sites from Land Systems: unknown - 1  
 Sites in Landforms: scs - 1

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN026 \_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

PAN PAN026 Acacia inaequilatera, Acacia acradenia, Grevillea wickhamii ssp aprica scattered tall shrubs over Triodia angusta (26-1) hummock grassland.

**Soil:**

PAN PAN026 Gravelly, pebbly, cobbly orange-brown loamy sand.

**Common Species:**

(Name - % of Sites, Range of Cover)

Enneapogon caerulescens var. caerulescens - 100%, <1% to <1%  
 Bonamia media var. villosa - 100%, <1% to <1%  
 Acacia inaequilatera - 100%, to  
 Euphorbia clementii - 100%, <1% to <1%  
 Corchorus parviflorus - 100%, <1% to <1%  
 Acacia ancistrocarpa - 100%, <1% to <1%  
 Mukia maderaspatana - 100%, <1% to <1%  
 Acacia acradenia - 100%, <1% to <1%  
 Goodenia stobbsiana - 100%, <1% to <1%  
 Grevillea wickhamii subsp. aprica - 100%, <1% to <1%  
 Bonamia rosea - 100%, <1% to <1%  
 Aristida holathera var. holathera - 100%, <1% to <1%  
 Cleome uncifera - 100%, <1% to <1%  
 Goodenia microptera - 100%, <1% to <1%  
 Triodia sp. Panorama - 100%, <1% to <1%  
 Indigofera monophylla (PAN20-2) - 100%, <1% to <1%  
 Euphorbia tannensis ssp. eremophila (Panorama form) - 100%, <1% to <1%  
 Tephrosia aff. rosea (HD292-37) - 100%, <1% to <1%  
 Cassia 'symonii' - 100%, <1% to <1%  
 Cassytha capillaris - 100%, <1% to <1%

**210 Floristic Group Level: Group 130,**

Number of sites: 3

Average number of species per site: 22

Sites from: PAN - 3

Sites from Land Systems: Rocklea - 2 Satirist - 1

Sites in Landforms: scs - 3

Portion of Dendrogram: (Area and Site on left)

PAN PAN027	_____
PAN PAN033	_____   _____
PAN PAN029	_____   _____

Vegetation Descriptions of the sites in the group:

PAN PAN027      Acacia inaequilatera scattered tall shrubs over Triodia angusta, Triodia wiseana closed hummock grassland.

PAN PAN033      Acacia inaequilatera scattered tall shrubs over Triodia angusta hummock grassland to closed hummock grassland.

PAN PAN029      Acacia inaequilatera scattered tall shrubs over Triodia wiseana, Triodia angusta hummock grassland.

Soil:

PAN PAN027      Calcareous orange-brown fine sand and silt with quartz and darker gravel. Some outcrop, one small patch fine silt, little gravel.

PAN PAN033      Gravelly, cobbly, orange-brown sandy loam.

PAN PAN029      Light brown gravelly silty sand with gravel, pebbles.

Common Species:

(Name - % of Sites, Range of Cover)

Eriachne pulchella - 100%, &lt;1% to &lt;1%

Triodia sp. Panorama - 100%, 33-50% to 50-70%

Acacia inaequilatera - 100%, &lt;1% to &lt;1%

Triumfetta clementii - 100%, &lt;1% to &lt;1%

Corchorus parviflorus - 100%, &lt;1% to &lt;1%

Indigofera monophylla (PAN20-2) - 100%, &lt;1% to &lt;1%

Bonamia pannosa - 67%, &lt;1% to &lt;1%

Cassia notabilis - 67%, &lt;1% to &lt;1%

Tephrosia supina - 67%, &lt;1% to &lt;1%

Bonamia rosea - 67%, &lt;1% to &lt;1%

Solanum phlomoides - 67%, &lt;1% to &lt;1%

Mukia maderaspatana - 67%, &lt;1% to &lt;1%

Goodenia stobbsiana - 67%, &lt;1% to &lt;1%

Acacia acradenia - 67%, &lt;1% to &lt;1%

Pterocaulon sphacelatum - 67%, &lt;1% to &lt;1%

Mollugo molluginis - 67%, &lt;1% to &lt;1%

Ptilotus astrolasius - 67%, <1% to <1%  
 Triodia wiseana - 67%, 25-33% to 33-50%  
 Boerhavia gardneri - 67%, <1% to <1%  
 Cleome uncifera - 67%, <1% to <1%

**210 Floristic Group Level: Group 131,**

Number of sites: 1  
 Average number of species per site: 10  
 Sites from: PAN - 1  
 Sites in Landforms: scs - 1  
 Sites from Land Systems: Capricorn - 1

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN043 \_\_\_\_\_

**Vegetation Descriptions of the sites in the group:**

PAN PAN043 Triodia longiceps (43-1) (Triodia epactia) open hummock grassland.

**Soil:**

PAN PAN043 Orange-brown, gravelly, pebbly (some cobbles) loam.

**Common Species:**

(Name - % of Sites, Range of Cover)

Acacia bivenosa - 100%, <1% to <1%  
 Eriachne pulchella subsp. dominii - 100%, <1% to <1%  
 Triodia epactia - 100%, <1% to <1%  
 Acacia ptychophylla - 100%, <1% to <1%  
 Mollugo molluginis - 100%, <1% to <1%  
 Bulbostylis barbata - 100%, <1% to <1%  
 Polygala aff. isingii - 100%, <1% to <1%  
 Triodia sp. Panorama - 100%, 25-33% to 25-33%  
 Polycarpaea holtzei - 100%, <1% to <1%  
 Fimbristylis simulans - 100%, <1% to <1%

**60 Group Level, Member: 39,**

**Group statistics**

Number of sites: 7  
 Average number of species per site: 14  
 Sites from: WANGEL - 6 PAN - 1  
 Sites in Landforms: rp - 3 smr - 3 scr - 1  
 Sites from Land Systems: Rocklea - 6 Boolgeeda - 1 Capricorn - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Tinospora smilacina - 71%, <1% to <1%  
 Flueggea virosa subsp. melanthesoides - 71%, <1% to <1%  
 Trichosanthes cucumerina - 71%, <1% to <1%  
 Jasminum didymum subsp. lineare - 71%, <1% to <1%

Acacia coriacea subsp. pendens - 71%, <1% to <1%  
 Solanum lasiophyllum - 57%, <1% to <1%  
 Terminalia canescens - 57%, 1-5% to 5-10%  
 Cymbopogon ambiguus - 57%, <1% to 1-5%  
 Clerodendrum floribundum var. angustifolium - 57%, <1% to 5-10%  
 Mukia maderaspatana - 43%, <1% to <1%  
 Rhagodia eremaea - 43%, <1% to <1%  
 Triodia wiseana - 43%, <1% to <1%  
 Paspalidium tabulatum (Whim Creek form) - 43%, <1% to <1%  
 Brachychiton acuminatus - 43%, <1% to <1%  
 Ficus platypoda var. platypoda - 43%, <1% to <1%

**210 Floristic Group Level: Group 135,**

Number of sites: 1  
 Average number of species per site: 15  
 Sites from: PAN - 1  
 Sites from Land Systems: Capricorn - 1  
 Sites in Landforms: rp - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN081 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN081 Acacia coriacea subsp. pendens low woodland over Triodia wiseana hummock grassland.

Soil:

PAN PAN081

Common Species:

(Name - % of Sites, Range of Cover)  
 Triodia wiseana - 100%, <1% to <1%  
 Corchorus sp.A Kimberley Flora(K.F.Kenneally & B.P.M.Hyland 10421) - 100%, <1% to <1%  
 Clerodendrum tomentosum var. lanceolatum - 100%, <1% to <1%  
 Acacia coriacea subsp. pendens - 100%, <1% to <1%  
 Solanum phlomoides - 100%, <1% to <1%  
 Flueggea virosa subsp. melanthesoides - 100%, <1% to <1%  
 Triumfetta propinqua - 100%, <1% to <1%  
 Cajanus cinereus - 100%, <1% to <1%  
 Tinospora smilacina - 100%, <1% to <1%  
 Cleome viscosa - 100%, <1% to <1%  
 Boerhavia coccinea - 100%, <1% to <1%  
 Cymbopogon ambiguus - 100%, <1% to <1%  
 Paspalidium tabulatum (Whim Creek form) - 100%, <1% to <1%  
 Amaranthus aff. pallidiflorus (WAS1127) - 100%, <1% to <1%  
 Acacia bivenosa - 100%, <1% to <1%



**60 Group Level, Member: 40,****Group statistics**

Number of sites: 21

Average number of species per site: 42

Sites from: WANGEL - 11 HDRAIL - 8 PAN - 2

Sites from Land Systems: Boolgeeda - 6 River - 6 Macroy - 4 Rocklea - 2 Talga - 1

Sites in Landforms: dap - 9 ds - 5 daps - 2 d - 2 dns - 2 dn - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Triodia epactia - 86%, &lt;1% to 33-50%

Phyllanthus maderaspatensis var. angustifolius - 86%, &lt;1% to &lt;1%

Stemodia grossa - 86%, &lt;1% to &lt;1%

Cleome viscosa - 86%, &lt;1% to &lt;1%

Euphorbia coghlanii - 81%, to &lt;1%

Eragrostis tenellula - 76%, &lt;1% to &lt;1%

Acacia trachycarpa - 76%, &lt;1% to 50-70%

Sesbania cannabina - 71%, &lt;1% to &lt;1%

Ammannia baccifera - 71%, &lt;1% to &lt;1%

Cenchrus ciliaris - 71%, &lt;1% to &gt;70%

Pluchea rubelliflora - 67%, &lt;1% to &lt;1%

Goodenia lamprosperma - 62%, &lt;1% to &lt;1%

Eragrostis cumingii - 57%, &lt;1% to &lt;1%

Cyperus vaginatus - 57%, &lt;1% to 5-10%

Amaranthus pallidiflorus - 52%, &lt;1% to &lt;1%

Flueggea virosa subsp. melanthesoides - 52%, &lt;1% to 1-5%

Eucalyptus victrix - 52%, &lt;1% to 25-33%

Mukia maderaspatana - 52%, &lt;1% to &lt;1%

Hibiscus panduriformis - 52%, &lt;1% to 1-5%

Cyperus squarrosus - 52%, &lt;1% to &lt;1%

**210 Floristic Group Level: Group 144,**

Number of sites: 2

Average number of species per site: 56

Sites from: PAN - 2

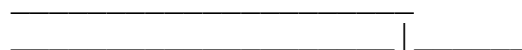
Sites from Land Systems: Rocklea - 2

Sites in Landforms: dap - 1 daps - 1

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN032

PAN PAN036

**Vegetation Descriptions of the sites in the group:**

PAN PAN032 Eucalyptus victrix(34-5) scattered trees over Corymbia hamersleyana scattered low trees over Acacia trachycarpa, Acacia acradenia scattered tall shrubs over Cullen leucanthum tall shrubland to shrubland over \*Cenchrus ciliaris grassland to closed grasslan

PAN PAN036 Eucalyptus victrix scattered trees over Acacia tumida, Acacia inaequilatera, Petalostylis labicheoides scattered tall shrubs over Tephrosia aff. rosea (HD292-37) scattered shrubs over Sorghum plumosum, Triodia epactia tussock, hummock grassland.

Soil:

PAN PAN032 Orange-brown loamy fine sand.

PAN PAN036 Orange-brown fine sand. Cobbles in bed. Some loamy (wet) patches.

Common Species:

(Name - % of Sites, Range of Cover)

Eucalyptus victrix - 100%, <1% to <1%

Ludwigia perennis - 100%, to <1%

Alternanthera nana - 100%, <1% to <1%

Lipocarpha microcephala - 100%, <1% to <1%

Acacia inaequilatera - 100%, <1% to <1%

Acacia tumida - 100%, <1% to <1%

Petalostylis labicheoides - 100%, <1% to <1%

Rhynchosia minima - 100%, to <1%

Euphorbia coghlanii - 100%, to <1%

Corchorus parviflorus - 100%, <1% to <1%

Acacia acradenia - 100%, <1% to <1%

Carissa lanceolata - 100%, <1% to <1%

Polymeria ambigua - 100%, <1% to <1%

Stemodia grossa - 100%, <1% to <1%

Stemodia viscosa - 100%, <1% to <1%

Goodenia lamprosperma - 100%, <1% to <1%

Centipeda minima - 100%, <1% to <1%

Flueggea virosa subsp. melanthesoides - 100%, <1% to <1%

Phyllanthus maderaspatensis var. angustifolius - 100%, <1% to <1%

Cullen leucanthum - 100%, <1% to <1%

**60 Group Level, Member: 41,**

**Group statistics**

Number of sites: 17

Average number of species per site: 34

Sites from: WANGEL - 7 PAN - 6 HDRAIL - 4

Sites in Landforms: daps - 12 dap - 4 dnr - 1

Sites from Land Systems: River - 7 Capricorn - 5 Rocklea - 3 Granitic - 1

Platform - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Melaleuca glomerata - 100%, <1% to 50-70%

Flueggea virosa subsp. melanthesoides - 82%, <1% to 5-10%

Cyperus vaginatus - 82%, <1% to 10-25%

Cleome viscosa - 82%, <1% to <1%

*Phyllanthus maderaspatensis* var. *angustifolius* - 76%, <1% to <1%  
*Euphorbia coghlanii* - 76%, <1% to <1%  
*Acacia pyrifolia* (bark not corky) - 76%, <1% to <1%  
*Acacia coriacea* subsp. *pendens* - 76%, <1% to 1-5%  
*Stemodia grossa* - 76%, <1% to <1%  
*Triodia epactia* - 76%, <1% to 10-25%  
*Eucalyptus camaldulensis* var. *obtusa* - 71%, <1% to 33-50%  
*Sesbania cannabina* - 71%, <1% to <1%  
*Cenchrus ciliaris* - 71%, to 10-25%  
*Eriachne tenuiculmis* - 59%, <1% to 5-10%  
*Eucalyptus victrix* - 53%, <1% to 10-25%  
*Amaranthus pallidiflorus* - 53%, <1% to <1%  
*Pluchea rubelliflora* - 53%, <1% to 1-5%  
*Eragrostis tenellula* - 47%, <1% to <1%  
*Acacia ampliceps* - 47%, <1% to 10-25%  
*Lobelia quadrangularis* - 41%, <1% to 1-5%

### **210 Floristic Group Level: Group 148,**

Number of sites: 4  
 Average number of species per site: 36  
 Sites from: HDRAIL - 3 PAN - 1  
 Sites from Land Systems: Rocklea - 2 Platform - 1 Granitic - 1  
 Sites in Landforms: dap - 2 daps - 1 dnr - 1

### **Portion of Dendrogram: (Area and Site on left)**

HDRAIL H189	_____	
HDRAIL H213	_____   _____	
HDRAIL H222	_____   _____	
PAN PAN062	_____   _____   _____	

### **Vegetation Descriptions of the sites in the group:**

HDRAIL H189      *Eucalyptus victrix* low open woodland over *Melaleuca glomerata* high shrubland over *Eriachne tenuiculmis* open tussock grassland and *Cyperus vaginatus* scattered sedges

HDRAIL H213      *Eucalyptus camaldulensis* open woodland over *Acacia coriacea* scattered low trees to low open woodland over *Melaleuca linophylla* closed scrub over *Cyperus vaginatus* open to closed sedgeland with *Eriachne tenuiculmis* scattered tussock grasses

HDRAIL H222      *Eucalyptus camaldulensis* low open forest over *Melaleuca glomerata* high shrubland over *Echinochloa colona* very open tussock grassland and *Cyperus vaginatus* very open sedgeland

PAN PAN062      *Eucalyptus camaldulensis* open forest over *Melaleuca glomerata*, *Atalaya hemiglaucula* low forest over *Cyperus vaginatus* open sedgeland to sedgeland over \**Cynodon dactylon*, \**Cenchrus ciliaris* grassland.

### **Soil:**

HDRAIL H189	Loamy sand with pebbles, cobbles and large rocks.
HDRAIL H213	Bouldery, cobbly, pebbly river sand.
HDRAIL H222	Brown clay-loam
PAN PAN062	Light brown sandy loam.

Common Species:

(Name - % of Sites, Range of Cover)

*Stemodia grossa* - 100%, <1% to <1%

*Phyllanthus maderaspatensis* var. *angustifolius* - 100%, <1% to <1%

*Sesbania cannabina* - 100%, <1% to <1%

*Euphorbia coghlanii* - 100%, <1% to <1%

*Pluchea rubelliflora* - 100%, <1% to 1-5%

*Melaleuca glomerata* - 100%, 10-25% to 33-50%

*Cleome viscosa* - 100%, <1% to <1%

*Atalaya hemiglauca* - 100%, <1% to 1-5%

*Cyperus vaginatus* - 100%, 1-5% to 10-25%

*Flueggea virosa* subsp. *melanthesoides* - 100%, <1% to <1%

*Eragrostis tenellula* - 75%, <1% to <1%

*Tinospora smilacina* - 75%, <1% to <1%

*Setaria verticillata* - 75%, <1% to <1%

*Lobelia quadrangularis* - 75%, <1% to 1-5%

*Acacia coriacea* subsp. *pendens* - 75%, <1% to 1-5%

*Acacia pyrifolia* (bark not corky) - 75%, <1% to <1%

*Amaranthus pallidiflorus* - 75%, <1% to <1%

*Malvastrum americanum* - 75%, <1% to <1%

*Euphorbia* sp. (site 1089) - 75%, <1% to <1%

*Eucalyptus camaldulensis* var. *obtusa* - 75%, 1-5% to 33-50%

**210 Floristic Group Level: Group 149,**

Number of sites: 4

Average number of species per site: 33

Sites from: PAN - 4

Sites in Landforms: daps - 4

Sites from Land Systems: Capricorn - 4

Portion of Dendrogram: (Area and Site on left)

PAN PAN065	_____
PAN PAN071	_____   _____
PAN PAN068	_____   _____
PAN PAN075	_____   _____   _____

Vegetation Descriptions of the sites in the group:

PAN PAN065 *Eucalyptus camaldulensis* var. *obtusa*, *Eucalyptus victrix* open woodland over *Acacia coriacea* subsp. *pendens*, *Atalaya hemiglauca* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla* high shrubland over *Tephrosia* aff. *rosea* (HD292-37) scattered

PAN PAN071 Eucalyptus victrix scattered trees over Acacia coriacea ssp pendens, Atalaya hemiglauca low open woodland over Melaleuca glomerata, Melaleuca linophylla, Flueggia virosa ssp melanthesioides open to closed scrub over Triodia epactia, Cenchrus ciliaris, Cym

PAN PAN068 Eucalyptus victrix, Acacia coriacea var. pendens scattered low trees over Melaleuca linophylla, Melaleuca glomerata shrubland to high shrubland over Cymbopogon (=65) scattered tussock grasses.

PAN PAN075 Eucalyptus victrix scattered trees over Melaleuca linophylla, Melaleuca glomerata open scrub.

Soil:

PAN PAN065 Sand to cobble mixture, with some silt, dull brown.

PAN PAN071 Fine to medium grained light brown and with some gravel, loamy in places, pebbly in others.

PAN PAN068 Sand to cobble mix, very variable, some small particles of coarse brown sand.

PAN PAN075 Varies from loamy banks to gravelly to cobbly banks and bed.

Common Species:

(Name - % of Sites, Range of Cover)

Cleome viscosa - 100%, <1% to <1%

Melaleuca glomerata - 100%, 1-5% to 50-70%

Acacia pyrifolia (bark not corky) - 100%, <1% to <1%

Melaleuca linophylla - 100%, 10-25% to 33-50%

Euphorbia coghlanii - 100%, <1% to <1%

Cyperus vaginatus - 100%, <1% to 10-25%

Acacia coriacea subsp. pendens - 100%, <1% to 1-5%

Cymbopogon procerus - 100%, <1% to 1-5%

Eucalyptus victrix - 100%, <1% to 1-5%

Flueggea virosa subsp. melanthesoides - 100%, <1% to 5-10%

Rhynchosia minima - 75%, <1% to <1%

Sesbania cannabina - 75%, <1% to <1%

Atalaya hemiglauca - 75%, <1% to <1%

Crotalaria cunninghamii - 75%, <1% to <1%

Corchorus parviflorus - 75%, <1% to <1%

Hybanthus aurantiacus - 75%, <1% to <1%

Cullen leucanthum - 75%, <1% to <1%

Mukia maderaspatana - 75%, <1% to <1%

Stemodia grossa - 75%, <1% to <1%

Triodia epactia - 75%, <1% to 1-5%

**210 Floristic Group Level: Group 150,**

Number of sites: 1

Average number of species per site: 21  
 Sites from: PAN - 1  
 Sites from Land Systems: Capricorn - 1  
 Sites in Landforms: daps - 1

Portion of Dendrogram: (Area and Site on left)

PAN PAN077 \_\_\_\_\_

Vegetation Descriptions of the sites in the group:

PAN PAN077 Eucalyptus victrix, Melaleuca argentea open forest over Acacia ampliceps, Melaleuca glomerata scattered tall shrubs over Schoenus falcatus, Cyperus vaginatus, Triodia longiceps sedgeland, hummock grassland.

Soil:

PAN PAN077

Common Species:

(Name - % of Sites, Range of Cover)

Eucalyptus victrix - 100%, 10-25% to 10-25%  
 Melaleuca glomerata - 100%, <1% to <1%  
 Stemodia grossa - 100%, <1% to <1%  
 Lobelia quadrangularis - 100%, <1% to <1%  
 Cajanus cinereus - 100%, <1% to <1%  
 Ficus opposita var. indecora - 100%, <1% to <1%  
 Phyllanthus maderaspatensis var. angustifolius - 100%, <1% to <1%  
 Eucalyptus camaldulensis var. obtusa - 100%, <1% to <1%  
 Melaleuca argentea - 100%, 5-10% to 5-10%  
 Petalostylis labicheoides - 100%, <1% to <1%  
 Triodia epactia - 100%, 1-5% to 1-5%  
 Triodia longiceps - 100%, <1% to <1%  
 Cymbopogon procerus - 100%, <1% to <1%  
 Tephrosia aff. rosea (HD292-37) - 100%, <1% to <1%  
 Cyperus vaginatus - 100%, 5-10% to 5-10%  
 Schoenus falcatus - 100%, 10-25% to 10-25%  
 Acacia ampliceps - 100%, <1% to <1%  
 Cassia notabilis - 100%, <1% to <1%  
 Gossypium robinsonii - 100%, <1% to <1%  
 Corchorus parviflorus - 100%, <1% to <1%

**60 Group Level, Member: 43,**

**Group statistics**

Number of sites: 14  
 Average number of species per site: 32  
 Sites from: WANGEL - 13 PAN - 1  
 Sites in Landforms: daps - 10 dnr - 2 ds - 1 dns - 1  
 Sites from Land Systems: Rocklea - 8 Capricorn - 5 Pyramid - 1

**Common Species:**

(Name - % of Sites, Range of Cover)

Terminalia canescens - 100%, <1% to 50-70%  
 Flueggea virosa subsp. melanthesoides - 93%, <1% to 1-5%  
 Cyperus vaginatus - 93%, <1% to 1-5%  
 Eriachne tenuiculmis - 86%, <1% to 10-25%  
 Acacia coriacea subsp. pendens - 79%, <1% to 5-10%  
 Phyllanthus maderaspatensis var. angustifolius - 79%, <1% to <1%  
 Stemodia grossa - 64%, <1% to 5-10%  
 Euphorbia coghlanii - 64%, <1% to <1%  
 Eragrostis cumingii - 64%, <1% to <1%  
 Ehretia saligna var. saligna - 57%, <1% to <1%  
 Pluchea rubelliflora - 57%, <1% to <1%  
 Sesbania cannabina - 57%, <1% to <1%  
 Cymbopogon ambiguus - 57%, <1% to <1%  
 Acacia pyrifolia (bark not corky) - 57%, <1% to 1-5%  
 Crotalaria medicaginea - 50%, <1% to <1%  
 Trichodesma zeylanicum - 43%, <1% to <1%  
 Triodia epactia - 43%, 1-5% to 10-25%  
 Ammannia baccifera - 43%, <1% to <1%  
 Swainsona formosa - 43%, <1% to <1%  
 Eriachne festucacea - 43%, <1% to 5-10%

### **210 Floristic Group Level: Group 152,**

Number of sites: 4

Average number of species per site: 30

Sites from: WANGEL - 3 PAN - 1

Sites from Land Systems: Capricorn - 3 Pyramid - 1

Sites in Landforms: daps - 3 dns - 1

### **Portion of Dendrogram: (Area and Site on left)**

WANGEL 0054	_____	
WANGEL 0072	_____   _____	
WANGEL 0129	_____   _____	
PAN PAN069	_____   _____   _____	

### **Vegetation Descriptions of the sites in the group:**

WANGEL 0054 Terminalia canescens low woodland over Triodia pungens hummock grassland with scattered Eriachne tenuiculmis tussocks

WANGEL 0072 Scattered trees of Eucalyptus camaldulensis var. obtusa over low open woodland of Terminalia canescens over scattered tall shrubs of Acacia coriacea ssp. pendulans over Triodia wiseana hummock grassland

WANGEL 0129 Terminalia canescens low woodland over Triodia pungens very open hummock grassland

PAN PAN069 Terminalia canescens open woodland over Flueggea virosa subsp. melanthesoides scattered tall shrubs over Eriachne tenuiculmis, Triodia epactia open tussock, hummock grassland to grassland.

Soil:

WANGEL 0054 The creek bed was a mixed grain sized gravel with some pebbles~ outcrop and boulders. The banks were light brown sandy loam~ very pebbly

WANGEL 0072 Bed of mosaic~ large cobble area and sandy areas~ mostly former

WANGEL 0129 Cobbly/bouldery creek bed with some gravel and some red-brown silty material

PAN PAN069 Pebbly, cobbly, rocky, bouldery, brown coarse sand to loamy sand (banks of creek).

Common Species:

(Name - % of Sites, Range of Cover)

*Eriachne tenuiculmis* - 100%, <1% to 5-10%

*Flueggea virosa* subsp. *melanthesoides* - 100%, <1% to 1-5%

*Euphorbia coghlanii* - 100%, <1% to <1%

*Triodia epactia* - 100%, 5-10% to 10-25%

*Terminalia canescens* - 100%, 10-25% to 50-70%

*Trichodesma zeylanicum* - 75%, <1% to <1%

*Cyperus vaginatus* - 75%, <1% to <1%

*Pluchea rubelliflora* - 75%, <1% to <1%

*Cassia glutinosa* - 75%, <1% to <1%

*Cyperus cunninghamii* subsp. *cunninghamii* - 75%, <1% to <1%

*Cymbopogon ambiguus* - 75%, <1% to <1%

*Phyllanthus maderaspatensis* var. *angustifolius* - 75%, <1% to <1%

*Ehretia saligna* var. *saligna* - 75%, <1% to <1%

*Acacia arida* - 75%, <1% to <1%

**60 Group Level, Member: 54,****Group statistics**

Number of sites: 9

Average number of species per site: 31

Sites from: HDRAIL - 8 PAN - 1

Sites from Land Systems: Uaroo - 9

Sites in Landforms: p - 6 py - 3

**Common Species:**

(Name - % of Sites, Range of Cover)

*Triodia schinzii* - 100%, 25-33% to 50-70%

*Acacia stellaticeps* - 100%, 1-5% to 33-50%

*Aristida holathera* var. *holathera* - 89%, <1% to <1%

*Mollugo molluginis* - 89%, <1% to <1%

*Hybanthus aurantiacus* - 89%, <1% to <1%

*Chrysopogon fallax* - 78%, <1% to <1%

*Polymeria ambigua* - 78%, <1% to <1%



Corchorus incanus - 78%, <1% to <1%  
 Eriachne obtusa - 78%, <1% to 5-10%  
 Cajanus marmoratus - 78%, <1% to <1%  
 Hibiscus leptocladus - 67%, <1% to <1%  
 Pluchea tetranthera - 67%, <1% to <1%  
 Digitaria brownii - 67%, <1% to <1%  
 Eragrostis eriopoda - 67%, <1% to <1%  
 Ptilotus astrolasius - 56%, <1% to <1%  
 Schizachyrium fragile - 56%, <1% to <1%  
 Bonamia rosea - 56%, <1% to 5-10%  
 Goodenia microptera - 56%, <1% to <1%  
 Eriachne aristidea - 56%, <1% to <1%  
 Bonamia linearis - 56%, <1% to <1%

### 210 Floristic Group Level: Group 192,

Number of sites: 5  
 Average number of species per site: 33  
 Sites from: HDRAIL - 4 PAN - 1  
 Sites in Landforms: p - 5  
 Sites from Land Systems: Uaroo - 5

### Portion of Dendrogram: (Area and Site on left)

HDRAIL H110	_____	
HDRAIL H111	_____   _____	
HDRAIL H112	_____   _____	
HDRAIL H153	_____   _____	
PAN PAN009	_____   _____   _____	

### Vegetation Descriptions of the sites in the group:

HDRAIL H110 Acacia colei, Grevillea pyramidalis scattered tall shrubs over Acacia stellaticeps, Bonamia rosea low open shrubland over Triodia schinzii mid-dense hummock grassland

HDRAIL H111 Grevillea pyramidalis scattered low trees over Acacia stellaticeps low shrubland to shrubland over Corchorus incanus, Ptilotus astrolasius, P. arthrolasius, Bonamia rosea low open shrubland over Triodia schinzii mid-dense hummock grassland with Cajanus ma

HDRAIL H112 Melaleuca lasiandra scattered tall shrubs over Acacia ancistrocarpa, A. colei, Carissa lanceolata scattered shrubs over Acacia stellaticeps, Corchorus incanus, Bonamia rosea low open shrubland over Triodia schinzii mid-dense hummock grassland with \*Cenchr

HDRAIL H153 Acacia stellaticeps low open shrubland over Triodia schinzii mid-dense hummock grassland

PAN PAN009 Eucalyptus (P8-2) scattered trees over Acacia stellaticeps. Open heath and Triodia ?basedowii grassland.

Soil:

HDRAIL H110	Orange-brown sand
HDRAIL H111	Orange-brown loamy fine sand with setting surface.
HDRAIL H112	Orange-brown loamy clay
HDRAIL H153	Orange-brown fine-medium silty sand.
PAN PAN009	Fine orange-brown to reddish brown sand with silt.

Common Species:

(Name - % of Sites, Range of Cover)

<i>Ptilotus astrolasius</i>	- 100%, <1% to <1%
<i>Mollugo molluginis</i>	- 100%, <1% to <1%
<i>Hibiscus leptocladus</i>	- 100%, <1% to <1%
<i>Hybanthus aurantiacus</i>	- 100%, <1% to <1%
<i>Goodenia microptera</i>	- 100%, <1% to <1%
<i>Bonamia rosea</i>	- 100%, <1% to 5-10%
<i>Aristida holathera</i> var. <i>holathera</i>	- 100%, <1% to <1%
<i>Triodia schinzii</i>	- 100%, 25-33% to 50-70%
<i>Polymeria ambigua</i>	- 100%, <1% to <1%
<i>Acacia stellaticeps</i>	- 100%, 1-5% to 33-50%
<i>Indigofera monophylla</i> (small calyx form)	- 100%, <1% to <1%
<i>Cajanus marmoratus</i>	- 80%, <1% to <1%
<i>Cleome uncifera</i>	- 80%, <1% to <1%
<i>Eriachne aristidea</i>	- 80%, <1% to <1%
<i>Eragrostis eriopoda</i>	- 80%, <1% to <1%
<i>Corchorus incanus</i>	- 80%, <1% to <1%
<i>Bonamia media</i> var. ? <i>media</i>	- 80%, <1% to <1%
<i>Eriachne obtusa</i>	- 80%, <1% to <1%
<i>Sida cardiophylla</i>	- 60%, <1% to <1%
<i>Hakea lorea</i> ssp. <i>lorea</i>	- 60%, <1% to <1%

**60 Group Level, Member: 55,****Group statistics**

Number of sites:	34
Average number of species per site:	26
Sites from:	HDRAIL - 24 PAN - 10
Sites in Landforms:	p - 14 ps - 7 sc - 4 py - 2 sls - 1 sm - 1 sl - 1 s - 1 d - 1
Sites from Land Systems:	Macroy - 22 Uaroo - 8 Boolaloo - 2 Boolgeeda - 1
Mallina	- 1

**Common Species:**

(Name - % of Sites, Range of Cover)

<i>Triodia lanigera</i>	- 100%, <1% to >70%
<i>Goodenia microptera</i>	- 82%, <1% to <1%
<i>Bonamia rosea</i>	- 82%, <1% to 1-5%
<i>Acacia ancistrocarpa</i>	- 79%, <1% to 50-70%

Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601) - 76%, <1% to 1-5%  
 Indigofera monophylla (small calyx form) - 76%, <1% to 1-5%  
 Mollugo molluginis - 76%, <1% to <1%  
 Acacia inaequilatera - 65%, <1% to 1-5%  
 Bonamia linearis - 62%, <1% to 1-5%  
 Aristida holathera var. holathera - 62%, <1% to 10-25%  
 Sida cardiophylla - 59%, <1% to <1%  
 Goodenia stobbsiana - 56%, <1% to 5-10%  
 Ptilotus astrolasius - 56%, <1% to <1%  
 Corchorus parviflorus - 53%, <1% to 10-25%  
 Grevillea wickhamii subsp. aprica - 44%, <1% to 33-50%  
 Aristida contorta - 44%, <1% to 1-5%  
 Cleome uncifera - 41%, <1% to <1%

### **210 Floristic Group Level: Group 193,**

Number of sites: 4  
 Average number of species per site: 37  
 Sites from: HDRAIL - 2 PAN - 2  
 Sites from Land Systems: Macroy - 2 Uaroo - 2  
 Sites in Landforms: p - 3 dn - 1

### **Portion of Dendrogram: (Area and Site on left)**

HDRAIL H065	_____
PAN PAN011	_____   _____
HDRAIL H066	_____   _____
PAN PAN001	_____   _____

### **Vegetation Descriptions of the sites in the group:**

HDRAIL H065 Acacia ancistrocarpa scattered shrubs over Corchorus parviflorus scattered low shrubs over Triodia lanigera hummock grassland

PAN PAN011 Acacia inaequilatera, Acacia tumida, Grevillea wickhamii subsp. aprica scattered tall shrubs over Acacia ancistrocarpa scattered shrubs over Triodia schinzii hummock grassland.

HDRAIL H066 Acacia tumida closed scrub over Bonamia rosea low open shrubland over Triodia lanigera mid-dense hummock grassland

PAN PAN001 Corymbia scattered low trees over Acacia pyrifolia, Acacia PAN 1-2 scattered tall shrubs over Acacia ancistrocarpa scattered shrubs over Corchorus (1-6) low shrubland and Triodia (1-1) hummock grassland.

### **Soil:**

HDRAIL H065 Red brown loamy sand.

PAN PAN011 Orange-brown loamy sand, and some coarse sand grains.

HDRAIL H066 Red clay loam, hard set surface.

PAN PAN001 Orange-brown loamy fine to coarse sand ("Pindan Sand")

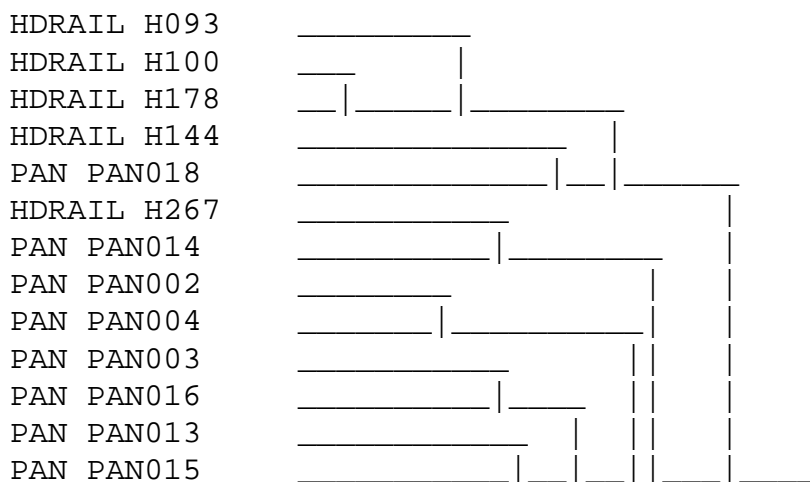
Common Species:

- (Name - % of Sites, Range of Cover)
- Ptilotus astrolasius - 100%, <1% to <1%
- Triodia lanigera - 100%, <1% to 25-33%
- Goodenia stobbsiana - 100%, <1% to <1%
- Paraneurachne muelleri - 100%, <1% to <1%
- Aristida holathera var. holathera - 100%, <1% to <1%
- Goodenia microptera - 100%, <1% to <1%
- Corchorus parviflorus - 100%, <1% to 10-25%
- Bonamia rosea - 100%, <1% to 1-5%
- Euphorbia aff. australis (B191) - 100%, <1% to <1%
- Isotropis atropurpurea - 75%, <1% to <1%
- Hibiscus leptocladus - 75%, <1% to <1%
- Mollugo molluginis - 75%, <1% to <1%
- Acacia tumida - 75%, <1% to >70%
- Eragrostis eriopoda - 75%, <1% to <1%
- Acacia ancistrocarpa - 75%, <1% to <1%
- Cassia notabilis - 75%, <1% to <1%
- Cleome uncifera - 75%, <1% to <1%
- Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601) - 75%, <1% to <1%
- Heliotropium skeleton - 75%, <1% to <1%
- Eriachne pulchella subsp. dominii - 75%, <1% to <1%

**210 Floristic Group Level: Group 194,**

- Number of sites: 13
- Average number of species per site: 23
- Sites from: PAN - 8 HDRAIL - 5
- Sites from Land Systems: Macroy - 6 Uaroo - 6 Boolaloo - 1
- Sites in Landforms: p - 8 ps - 4 py - 1

Portion of Dendrogram: (Area and Site on left)



Vegetation Descriptions of the sites in the group:

- HDRAIL H093      *Acacia ancistrocarpa* high shrubland over *Indigofera monophylla*, *Bonamia rosea* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland
- HDRAIL H100      *Acacia ancistrocarpa* open shrubland over *Triodia lanigera* mid-dense hummock grassland
- HDRAIL H178      *Acacia ancistrocarpa*, *A. acradenia* open shrubland over *Bonamia rosea* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland
- HDRAIL H144      *Acacia ancistrocarpa* open heath over *Triodia lanigera* mid-dense hummock grassland
- PAN PAN018      *Acacia bivenosa* (bushy form) (18-1), *Acacia ancistrocarpa* high open shrubland over *Triodia ?basedowii* (=1-1) hummock grassland.
- HDRAIL H267      *Acacia bivenosa* scattered tall shrubs over *A. stellaticeps* low shrubland over *Triodia lanigera* closed hummock grassland
- PAN PAN014      *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* open shrubland over *Triodia ?basedowii* (1-1) hummock grassland.
- PAN PAN002      *Corymbia* (Pan1-1) scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii*, *Acacia* PAN 1-2 scattered tall shrubs over *Acacia stellaticeps* shrubland over *Triodia ?basedowii* hummock grassland and *Corchorus* PAN 1-6 low open shrubland to scattered l
- PAN PAN004      *Grevillea wickhamii* ssp *aprica* scattered tall shrubs over *Acacia stellaticeps* >20% low shrubland over *Triodia ?basedowii* hummock grassland (>60%).
- PAN PAN003      *Grevillea wickhamii* subsp. *aprica* open heath to open scrub over *Acacia ancistrocarpa*. Scattered shrubs over *Acacia stellaticeps* low shrubland to shrubland and *Triodia ?basedowii* hummock grassland.
- PAN PAN016      *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered low trees over *Acacia ancistrocarpa*, *Acacia bivenosa* high open shrubland over *Triodia ?basedowii* hummock grassland.
- PAN PAN013      *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp *aprica*, (*Acacia inaequilatera*) over *Acacia ancistrocarpa* high shrubland over *Indigofera monophylla* (small calyx form, *Tephrosia* sp Bungaroo Creek (MET 11601), *Corchorus parviflorus*, Go
- PAN PAN015      *Grevillea wickhamii* subsp *aprica* (*Acacia inaequilatera*) scattered tall shrubs over *Acacia ancistrocarpa* high shrubland over *Acacia bivenosa*

shrubland over *Goodenia stobbsiana*, *Corchorus* (=P1-6) low shrubland and *Triodia ?basedowii* hummock grassland.

Soil:

- HDRAIL H093 Orange-brown fine silty sand
- HDRAIL H100 Orange-red fine sandy loam. Continuous surface layer of quartz and 'ironstone' pebbles on surface.
- HDRAIL H178 Orange-brown clay loam.
- HDRAIL H144 Orange brown sandy loam with continuous surface layer of pebbles and stones of quartz and ironstone.
- PAN PAN018 Cobbly, pebbly orange-brown loamy sand. Surface covered in washed cobbles/pebbles.
- HDRAIL H267 Red coarse sandy loam.
- PAN PAN014 Gravelly/pebbly. Orange-brown loamy sand. Lots of pebbles on surface. Sandy in west corner.
- PAN PAN002 Orange-brown loamy fine to coarse sand with gravel in places.
- PAN PAN004 Orange-brown loamy fine sand with some coarse grains. Setting surface.
- PAN PAN003 Red-brown fine to coarse loamy sand.
- PAN PAN016 Very pebbly, gravelly orange-brown loam
- PAN PAN013 Fine to coarse grained orange brown sand, NW corner quite pebbly.
- PAN PAN015 (1) Fine medium orange-brown sand with silt (2) Fine orange-brown to reddish-brown sand with silt and gravel, cobbles.

Common Species:

(Name - % of Sites, Range of Cover)

- Tephrosia* sp. Bungaroo Creek (M.E. Trudgen 11601) - 100%, <1% to <1%
- Triodia lanigera* - 100%, 10-25% to >70%
- Mollugo molluginis* - 92%, <1% to <1%
- Ptilotus astrolasius* - 92%, <1% to <1%
- Acacia ancistrocarpa* - 92%, <1% to 50-70%
- Corchorus parviflorus* - 85%, <1% to 5-10%
- Goodenia microptera* - 85%, <1% to <1%
- Bonamia linearis* - 77%, <1% to 1-5%
- Bonamia rosea* - 77%, <1% to 1-5%
- Goodenia stobbsiana* - 69%, <1% to 5-10%

Grevillea wickhamii subsp. aprica - 69%, <1% to 33-50%  
 Indigofera monophylla (small calyx form) - 69%, <1% to 1-5%  
 Cleome uncifera - 69%, <1% to <1%  
 Hakea lorea ssp. lorea - 62%, <1% to <1%  
 Cassytha capillaris - 54%, <1% to <1%  
 Acacia inaequilatera - 54%, <1% to <1%

**60 Group Level, Member: 56,  
 Group statistics**

Number of sites: 33  
 Average number of species per site: 35  
 Sites from: HDRAIL - 28 PAN - 5  
 Sites from Land Systems: Uaroo - 26 Macroy - 6 River - 1  
 Sites in Landforms: p - 23 py - 3 dn - 2 sc - 2 dap - 1 s - 1 sms - 1

**Common Species:**

(Name - % of Sites, Range of Cover)  
 Aristida holathera var. holathera - 94%, <1% to 10-25%  
 Acacia stellaticeps - 94%, <1% to 33-50%  
 Triodia lanigera - 88%, <1% to 50-70%  
 Mollugo molluginis - 88%, <1% to <1%  
 Bonamia linearis - 85%, <1% to <1%  
 Indigofera monophylla (small calyx form) - 79%, <1% to 1-5%  
 Cassia notabilis - 79%, <1% to <1%  
 Eragrostis eriopoda - 76%, <1% to 1-5%  
 Acacia inaequilatera - 76%, <1% to 1-5%  
 Goodenia microptera - 76%, <1% to <1%  
 Acacia ancistrocarpa - 67%, <1% to 10-25%  
 Hibiscus leptocladus - 67%, <1% to <1%  
 Corchorus elachocarpus - 64%, <1% to 10-25%  
 Bulbostylis barbata - 64%, <1% to <1%  
 Acacia colei - 64%, <1% to 50-70%  
 Bonamia rosea - 61%, <1% to 1-5%  
 Paraneurachne muelleri - 55%, <1% to 1-5%  
 Triodia epactia - 55%, <1% to 33-50%  
 Sida cardiophylla - 55%, <1% to 1-5%  
 Eriachne obtusa - 55%, <1% to 25-33%

**210 Floristic Group Level: Group 200,**

Number of sites: 5  
 Average number of species per site: 30  
 Sites from: PAN - 5  
 Sites from Land Systems: Uaroo - 4 River - 1  
 Sites in Landforms: p - 4 sc - 1

**Portion of Dendrogram: (Area and Site on left)**

PAN PAN005	_____
PAN PAN006	_____   _____
PAN PAN007	_____   _____

PAN PAN008

PAN PAN010

Vegetation Descriptions of the sites in the group:

PAN PAN005 Acacia stellaticeps scattered low shrubs over Triodia ?pungens (PS-1), Triodia ?basedowii hummock grassland.

PAN PAN006 No tree or tall shrub layer. Acacia stellaticeps shrubland over Triodia ?basedowii. Triodia ?pungens grassland with Corchorus ?sidoides low open shrubland.

PAN PAN007 Acacia stellaticeps low open heath over Pluchea tetranthera scattered low shrubs over Triodia ?basedowii hummock grassland over Eragrostis eriopoda scattered hummock grasses.

PAN PAN008 Acacia coriacea (PAN2-4), Acacia (PAN 1-2), Grevillea wickhamii scattered tall shrubs over Acacia stellaticeps, scattered shrubs over Corchorus (fine grey leaf P8-1), grey leaf pea (P8-2). 10-15% low shrubland over Triodia ?basedowii (PAN 1-1) hummock gra

PAN PAN010 Eucalyptus ?hamersleyana, Eucalyptus low trees over Acacia P1-2, scattered tall shrubs over Acacia ancistrocarpa scattered tall shrubs over Triodia ?basedowii hummock grassland and Crotalaria.

Soil:

PAN PAN005 Orange-brown fine (to medium) sand. Crusty surface in places, in some places a dark thick crust (blue green algae?).

PAN PAN006 Dull orange-brown fine sand with silt.

PAN PAN007 Dull orange-brown fine sand, some silt.

PAN PAN008 Orange-brown loamy sand. Some crusting at surface.

PAN PAN010 Orange-brown fine grained sand (more reddish at depth).

Common Species:

(Name - % of Sites, Range of Cover)

Bonamia linearis - 100%, <1% to <1%

Acacia stellaticeps - 100%, <1% to 33-50%

Hakea lorea ssp. lorea - 100%, <1% to <1%

Eragrostis eriopoda - 100%, <1% to 1-5%

Triodia lanigera - 100%, 5-10% to 50-70%

Bonamia rosea - 80%, <1% to <1%

Pluchea tetranthera - 80%, <1% to <1%

Hibiscus leptocladus - 80%, <1% to <1%

Corchorus elachocarpus - 80%, <1% to 5-10%

Eriachne aristidea - 80%, <1% to <1%

Mollugo molluginis - 80%, <1% to <1%



*Ptilotus astrolasius* - 80%, <1% to <1%  
*Sida cardiophylla* - 80%, <1% to <1%  
*Polymeria ambigua* - 60%, <1% to <1%  
*Goodenia microptera* - 60%, <1% to <1%  
*Eriachne obtusa* - 60%, <1% to <1%  
*Cajanus marmoratus* - 60%, <1% to 1-5%  
*Aristida holathera* var. *holathera* - 60%, <1% to 1-5%  
*Polycarpaea corymbosa* var. *corymbosa* - 60%, <1% to <1%  
*Triodia epactia* - 60%, <1% to 33-50%

## APPENDIX 8: Flora list for the Panorama survey with the flora list for the Port Hedland to Hope Downs survey list

The flora list for the current survey is presented with the flora list for the Port Hedland to Hope Downs rail survey (Maier and Trudgen in prep.) list to enable comparison between the surveys.

Key to columns: F = family number; N = naturalised (indicated by an asterisk (\*)); HD = Port Hedland to Hope Downs; P = Panorama.

F	N	NAME	H D	P
		<b>ALGAE</b>		
		CHARACEAE		
		Chara sp.	1	
		<b>PTERIDOPHYTA</b>		
		<b>ADIANTACEAE</b>		
007		Cheilanthes brownii	1	
007		Cheilanthes lasiophylla	2	
007		Cheilanthes sieberi subsp. sieberi	7	
007		Cheilanthes sp.	2	
007		Cheilanthes vellea		2
013		Marsilea ?drummondii	2	
013		Marsilea exarata	2	
013		Marsilea hirsuta	1	
013		Marsilea sp.	3	
		<b>ANGIOPHYTA</b>		
		<b>Monocotyledonae</b>		
		<b>TYPHACEAE</b>		
020		Typha domingensis	3	1
		<b>POTAMOGETONACEAE</b>		
023		Potamogeton tricarinatus	1	
023		Ruppia sp.	1	
		<b>HYDROCHARITACEAE</b>		
029		Vallisneria spiralis	1	
		<b>POACEAE</b>		
031		Acrachne racemosa	1	
031		Amphipogon caricinus	2	
031		Aristida burbridgeae	1	
031		Aristida contorta	82	1
031		Aristida holathera var. holathera	14 9	14
031		Aristida hygrometrica		1
031		Aristida inaequiglumis	40	
031		Aristida latifolia	15	2
031		Aristida obscura	1	
031		Astrebla elymoides	1	
031		Astrebla pectinata	2	
031		Bothriochloa ewartiana	1	
031		Bothriochloa sp.		1
031		Brachyachne convergens	14	1
031		Brachyachne prostrata	8	1
031	*	Cenchrus ciliaris	86	12
031	*	Cenchrus setigerus	9	
031		Chloris pectinata	5	
031		Chloris pumilio	1	
031		Chloris truncata	1	
031		Chrysopogon fallax	69	6
031		Cymbopogon ?ambiguus	3	
031		Cymbopogon ?bombycinus	3	
031		Cymbopogon ambiguus	41	25
031		Cymbopogon obtectus	29	3
031		Cymbopogon procerus	10	10
031	*	Cynodon dactylon		1
031		Dactyloctenium radulans	12	1
031		Dichanthium fecundum	2	2
031		Dichanthium sericeum subsp. humilium	16	1
F	N	NAME	H D	P

031		Dichanthium sericeum subsp. sericeum	2	
031		Digitaria bicornis	2	
031		Digitaria brownii	30	1
031		Digitaria ctenantha	4	
031		Digitaria longiflora	1	
031		Diplachne fusca	9	
031	*	Echinochloa colona	2	
031		Enneapogon ?purpurescens	1	
031		Enneapogon caerulescens var. caerulescens	19	6
031		Enneapogon caerulescens var. occidentalis	1	
031		Enneapogon clelandii	8	
031		Enneapogon oblongus	10	4
031		Enneapogon polyphyllus	31	
031		Enneapogon sp.		1
031		Enteropogon ?acicularis	1	
031		Enteropogon acicularis	5	
031		Eragrostis ?elongata	9	
031		Eragrostis cumingii	51	2
031		Eragrostis desertorum	2	
031		Eragrostis dielsii	6	
031		Eragrostis eriopoda	92	12
031		Eragrostis falcata	6	
031		Eragrostis ?leptocarpa		1
031	*	Eragrostis minor	4	
031		Eragrostis parviflora	4	
031		Eragrostis setifolia	2	
031		Eragrostis speciosa	3	
031		Eragrostis tenellula	24	6
031		Eragrostis xerophila	10	1
031		Eriachne aristidea	87	6
031		Eriachne avenacea	4	
031		Eriachne benthamii	7	1
031		Eriachne ciliata	1	2
031		Eriachne festucea	6	
031		Eriachne filiformis	2	
031		Eriachne helmsii	2	
031		Eriachne lanata	11	

031		Eriachne mucronata (arid form) (MET 12 736)	1	
031		Eriachne mucronata (typical form)	32	9
031		Eriachne obtusa	45	6
031		Eriachne pulchella	7	
031		Eriachne pulchella subsp. dominii	50	22
031		Eriachne sp. aff. festucea		1
031		Eriachne sp. Port Hedland	24	3
031		Eriachne tenuiculmis	7	6
031		Eulalia aurea	17	1
031		Heteropogon contortus	5	1
031		Ischaemum albovillosum	2	
031		Iseilema dolichotrichum	11	1
031		Iseilema eremaeum	1	
031		Iseilema vaginiflorum	10	
031		Leptochloa fusca subsp. fusca		1
031		Monachather paradoxus	1	
031		Panicum decompositum	9	1
031		Panicum laevinode	12	
031		Paractaenum refractum	3	
031		Paraneurachne muelleri	69	10
031		Paspalidium aff. jubiflorum (MET 15,807)	1	
031		Paspalidium basicladum	2	
031		Paspalidium clementii	15	1
031		Paspalidium constrictum	1	
031		Paspalidium jubiflorum	2	
031		Paspalidium rarum	4	
031		Paspalidium tabulatu m (Whim Creek form)	3	1

F	N	NAME	H D	P
031		Perotis rara	18	
031		Schizachyrium fragile	39	2
031		Setaria dielsii	2	2
031		Setaria surgens	2	
031	*	Setaria verticillata	12	
031		Sorghum plumosum	9	2
031		Sporobolus actinocladus	5	
031		Sporobolus australasicus	52	6
031		Sporobolus mitchellii	1	
031		Sporobolus virginicus	1	
031		Themeda aff. triandra (MET 16,046)	5	1
031		Themeda avenacea	1	1
031		Themeda sp. Panorama		2
031		Themeda sp. Hamersley Station (M.E. Trudgen 11431)	3	
031		Themeda triandra	23	2
031		Tragus australianus	3	
031		Triodia aff. basedowii	13	
031		Triodia angusta	8	
031		Triodia angusta (Panorama form)		1
031		Triodia angusta (Shaw River form)		1
031		Triodia basedowii	34	
031		Triodia brizoides	7	15
031		Triodia epactia	15	36
031		Triodia lanigera	94	18
031		Triodia longiceps	32	6
031		Triodia melvillei		1
031		Triodia schinzii	16	4
031		Triodia secunda	10	
031		Triodia sp. Panorama		7
031		Triodia wiseana	42	35
031		Triodia wiseana var. wiseana		1
031		Tripogon loliiformis	15	
031		Triraphis mollis	1	

031		Urochloa holosericea subsp. velutina	3	
031		Urochloa pubigera	1	
031		Whiteochloa airoides	1	
031		Xerochloa laniflora	1	
031		Yakirra australiensis var. australiensis	47	5
		<b>CYPERACEAE</b>		
032		Bulbostylis barbata	81	24
032		Bulbostylis burbridgeae	4	
032		Bulbostylis turbinata	2	
032		Cyperus ?conicus	6	
032		Cyperus blakeanus	16	
032		Cyperus bulbosus	1	
032		Cyperus castaneus var. brevimucronatus	1	
032		Cyperus cunninghamii	5	
032		Cyperus cunninghamii subsp. cunninghamii		12
032		Cyperus difformis	2	
032		Cyperus hesperius	2	
032		Cyperus iria	4	1
032		Cyperus ixiocarpus	7	
032		Cyperus squarrosus	18	1
032		Cyperus vaginatus	17	8
032		Cyperus viscidulus		2
032		Eleocharis atropurpurea		1
032		Fimbristylis dichotoma	34	5
032		Fimbristylis littoralis		1
032		Fimbristylis microcarya	7	3
032		Fimbristylis neilsonii	1	
032		Fimbristylis oxystachya	3	
032		Fimbristylis rara	9	
032		Fimbristylis simulans	4	6
032		Fimbristylis sp.		1
032		Fuirena ciliaris	1	1
032		Lipocarpha microcephala	6	2
032		Schoenoplectus lateriflorus	1	

032		Schoenoplectus litoralis		1
032		Schoenoplectus subulatus	4	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
		<b>D</b>		
032		Schoenus falcatus		3
		<b>COMMELINACEAE</b>		
047		Commelina ensifolia	1	
047		Murdannia graminea	3	
		<b>ANGIOPHYTA</b>		
		<b>Dicotocotyledonae</b>		
		<b>MORACEAE</b>		
087		Ficus brachypoda	4	
087		Ficus opposita var. indecora		5
087		Ficus platypoda var. D		1
		<b>PROTEACEAE</b>		
090		Grevillea berryana	1	
090		Grevillea pyramidalis	18	10
090		Grevillea wickhamii subsp. aprica	51	31
090		Hakea chordophylla	20	2
090		Hakea lorea ssp. lorea	64	27
		<b>SANTALACEAE</b>		
092		Anthobolus leptomerioides	11	
092		Santalum lanceolatum	9	1
		<b>LORANTHACEAE</b>		
097		Amyema fitzgeraldii	1	
097		Amyema hilliana	2	
097		Amyema preissii	1	
097		Lysiana casuarinae		1
		<b>CHENOPODIACEAE</b>		
105		Atriplex bunburyana	3	
105		Atriplex codonocarpa	2	
105		Chenopodium melanocarpum forma melanocarpum	3	
105		Dissocarpus paradoxus	1	
105		Dysphania kalpari	2	
105		Dysphania plantaginella	1	
105		Dysphania rhadinostachya	17	

105		Dysphania rhadinostachya subsp. rhadinostachya		1
105		Dysphania sphaerosperma	2	
105		Einadia nutans	1	
105		Enchylaena tomentosa	9	
105		Enchylaena tomentosa var. tomentosa	1	
105		Halosarcia ?halocnemoides subsp. tenuis	1	
105		Halosarcia ?pergranulata	1	
105		Halosarcia ?pterigosperma	1	
105		Halosarcia halocnemoides subsp. nov.	1	
105		Halosarcia halocnemoides subsp. tenuis	1	
105		Halosarcia indica subsp. ?	1	
105		Halosarcia indica subsp. ?leiostachya	1	
105		Halosarcia indica subsp. julacea	1	
105		Maireana aff. georgei	3	
105		Maireana carnososa	2	
105		Maireana melanocoma	4	
105		Maireana planifolia	10	
105		Maireana planifolia x villosa	1	
105		Maireana pyramidata	5	
105		Maireana tomentosa	1	
105		Maireana triptera	13	
105		Maireana villosa	8	
105		Neobassia astrocarpa	1	
105		Rhagodia eremaea	21	
105		Salsola tragus	33	1
105		Sclerolaena bicornis	1	
105		Sclerolaena cornishiana	15	
105		Sclerolaena costata	6	
105		Sclerolaena cuneata	6	
105		Sclerolaena densiflora	5	

105		<i>Sclerolaena diacantha</i>	3	
105		<i>Sclerolaena eriakantha</i>	2	
105		<i>Sclerolaena hostilis</i>		1
		<b>AMARANTHACEAE</b>		
106		<i>Achyranthes aspera</i>	13	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
106	*	<i>Aerva javanica</i>	29	3
106		<i>Alternanthera angustifolia</i>	1	
106		<i>Alternanthera nana</i>	19	3
106		<i>Alternanthera nodiflora</i>	9	1
106		<i>Amaranthus</i> aff. <i>pallidiflorus</i> (WAS1127)		8
106		<i>Amaranthus mitchellii</i>	6	
106		<i>Amaranthus pallidiflorus</i>	35	
106		<i>Amaranthus</i> sp.	1	
106		<i>Amaranthus</i> sp. (HD102)	5	
106		<i>Gomphrena canescens</i>	11	1
106		<i>Gomphrena cunninghamii</i>	14	3
106		<i>Hemichroa diandra</i>	2	
106		<i>Ptilotus aervoides</i>	9	
106		<i>Ptilotus arthrolasius</i>	2	1
106		<i>Ptilotus astrolasius</i>	50	29
106		<i>Ptilotus auriculifolius</i>	6	2
106		<i>Ptilotus axillaris</i>	4	6
106		<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>	35	10
106		<i>Ptilotus carinatus</i>	7	
106		<i>Ptilotus clementii</i>	1	3
106		<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	23	1
106		<i>Ptilotus fusiformis</i> var. <i>fusiformis</i>	14	2
106		<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>		2
106		<i>Ptilotus gomphrenoides</i>	18	
106		<i>Ptilotus gomphrenoides</i> var. <i>gomphrenoides</i>		1

106		<i>Ptilotus helipteroides</i> var. <i>helipteroides</i>	3	
106		<i>Ptilotus incanus</i> var. <i>elongatus</i>	8	4
106		<i>Ptilotus latifolius</i>	3	
106		<i>Ptilotus mollis</i>		1
106		<i>Ptilotus murrayi</i> var. <i>murrayi</i>		1
106		<i>Ptilotus obovatus</i>	49	
106		<i>Ptilotus polystachyus</i>	13	
106		<i>Ptilotus polystachyus</i> forma <i>arthrotrichus</i>	2	
106		<i>Ptilotus schwartzii</i> forma <i>schwartzii</i>	1	
106		<i>Ptilotus</i> sp.	1	
		<b>NYCTAGINACEAE</b>		
107		<i>Boerhavia burbidgeana</i>	2	2
107		<i>Boerhavia coccinea</i>	40	5
107		<i>Boerhavia gardneri</i>	1	23
107		<i>Boerhavia paludosa</i>	20	
107		<i>Boerhavia repleta</i>	4	1
107		<i>Boerhavia schomburgkiana</i>	1	
107		<i>Boerhavia</i> sp. (M92-7)		1
		<b>GYROSTEMONACEAE</b>		
108		<i>Codonocarpus cotinifolius</i>	2	1
		<b>AIZOACEAE</b>		
110		<i>Trianthema</i> aff. <i>triquetra</i> (M3.35)		1
110		<i>Trianthema cussackiana</i>	2	
110		<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>	4	1
110		<i>Trianthema pilosa</i>	12	5
110		<i>Trianthema</i> sp.		1
110		<i>Trianthema triquetra</i>	14	1
110		<i>Trianthema turgidifolia</i>	1	
		<b>MOLLUGINACEAE</b>		
110 A		<i>Glinus oppositifolia</i>		1
110 A		<i>Mollugo cerviana</i>	12	

110 A		Mollugo molluginis	11 1	43
		<b>PORTULACACEAE</b>		
111		Calandrinia polyandra	10	
111		Calandrinia pumila	3	1
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
111		Calandrinia quadrivalvis	3	
111		Calandrinia sp.	1	
111		Calandrinia sp. (Port Hedland)	2	
111		Calandrinia stagnensis	1	
111		Portulaca oleracea	32	2
111		Portulaca pilosa	8	
		<b>CARYOPHYLLACEAE</b>		
113		Polycarpaea corymbosa var. corymbosa	47	8
113		Polycarpaea holtzei	21	8
113		Polycarpaea longiflora	11	
113		Polycarpaea longiflora (pale form)	7	
113		Polycarpaea longiflora (red form)	3	
113		Polycarpaea longiflora (Whim Creek form, WC147-7)		2
113		Polycarpaea longiflora (White form, M13-7)		6
113		Polycarpaea sp.	2	1
		<b>MENISPERMACEAE</b>		
122		Tinospora smilacina	31	6
		<b>LAURACEAE</b>		
131		Cassytha capillaris	22	24
131		Cassytha filiformis	20	
		<b>PAPAVERACEAE</b>		
135	*	Argemone ochroleuca	2	1
		<b>CAPPARACEAE</b>		
137 A		Cadaba capparoides	1	
137 A		Capparis spinosa var. nummularia	4	
137 A		Capparis umbonata	1	

137 A		Cleome uncifera	32	18
137 A		Cleome viscosa	94	23
		<b>BRASSICACEAE</b>		
138		Lepidium pedicellosum	2	
138		Lepidium phlebopetalum	1	
138		Lepidium pholidogynum	8	
138		Stenopetalum decipiens	1	
		<b>DROSERACEAE</b>		
143		Drosera burmanni	1	
		<b>BYBLIDACEAE</b>		
154		Byblis filifolia	2	
154		Byblis liniflora	7	
		<b>SURIANACEAE</b>		
160		Stylobasium spathulatum	7	
		<b>MIMOSACEAE</b>		
163		Acacia ?trachycarpa (PAN12-4)		1
163		Acacia acradenia	27	35
163		Acacia adoxa var. adoxa	2	1
163		Acacia adsurgens	4	
163		Acacia aff. aneura (scythe-shaped; MET 15,743)	7	
163		Acacia aff. catenulata	1	
163		Acacia aff. drepanocarpa ssp. drepanocarpa (BM:C16)		1
163		Acacia aff. inaequilatera (little phyllode form)	1	
163		Acacia aff. inaequilatera (MET 15,011)	4	
163		Acacia ampliceps	10	4
163		Acacia ancistrocarpa	93	18
163		Acacia ancistrocarpa x trachycarpa	1	1

163		Acacia aneura (grey bushy form; MET 15 732)	3	
163		Acacia aneura var. ?	1	
163		Acacia aneura var. ?aneura/intermedia	15	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
163		Acacia aneura var. aff. longicarpa (MET 16,050)	9	
163		Acacia aneura var. conifera	1	
163		Acacia arida	3	
163		Acacia atkinsiana	5	
163		Acacia ayersiana	1	
163		Acacia bivenosa	53	24
163		Acacia bivenosa (wispy/weeping form)	4	
163		Acacia citrinoviridis	7	
163		Acacia citriodora		1
163		Acacia colei	61	1
163		Acacia coriacea subsp. coriacea	19	
163		Acacia coriacea subsp. pendens	23	8
163		Acacia coriacea subsp. sericophylla	1	4
163		Acacia cowleana	1	
163		Acacia dictyophleba	9	2
163		Acacia elachantha		1
163		Acacia elachantha golden hairy variant	1	
163		Acacia ericifolia		1
163		Acacia eriopoda	1	
163		Acacia farnesiana	9	1
163		Acacia glaucocaesia		1
163		Acacia hilliana	2	1
163		Acacia holosericea		1
163		Acacia inaequilatera	10	53
			5	
163		Acacia maitlandii	21	2
163		Acacia marramamba	3	
163		Acacia meliodora		1
163		Acacia monticola	5	
163		Acacia orthocarpa	19	7

163		Acacia orthocarpa (wispy form)		1
163		Acacia pachyacra	10	
163		Acacia pruinocarpa	22	1
163		Acacia ptychophylla	2	10
163		Acacia pyrifolia		1
163		Acacia pyrifolia (green)	2	
163		Acacia pyrifolia (slender, white)	30	10
163		Acacia retivenea subsp. clandestina	1	
163		Acacia sabulosa	1	1
163		Acacia sclerosperma subsp. sclerosperma	3	1
163		Acacia sp.	1	1
163		Acacia sp. (Panorama M48)		1
163		Acacia sphaerostachya	2	3
163		Acacia spondylophylla	6	12
163		Acacia stellaticeps	79	11
163		Acacia stenophylla	2	
163		Acacia synchronicia	2	4
163		Acacia tenuissima	5	
163		Acacia tetragonophylla	14	
163		Acacia trachycarpa	25	3
163		Acacia tumida	60	21
163		Acacia victoriae	21	
163		Acacia wanyu	7	
163		Acacia xiphophylla	11	
163		Dichrostachys spicata	7	1
163		Neptunia dimorphantha	7	1
		<b>CAESALPINIACEAE</b>		
164		Cassia ?helmsii x symonii	1	
164		Cassia ?oligophylla x glaucifolia	2	
164		Cassia aff. luerssenii (HD227-5)	1	
164		Cassia aff. oligophylla (BMor 152)		1
164		Cassia aff. oligophylla (thinly sericeous)	7	1
164		Cassia artemisioides	2	
164		Cassia glutinosa	57	25



164		Cassia glutinosa x 'stricta'	1	
164		Cassia hamersleyensis	1	
164		Cassia hamersleyensis x sp. Karajini (MET 10 392)	1	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
164		Cassia helmsii	34	1
164		Cassia luerssenii	22	4
164		Cassia luerssenii x 'stricta'	2	
164		Cassia notabilis	13 4	22
164		Cassia oligoclada		1
164		Cassia oligophylla	71	5
164		Cassia oligophylla (Panorama form)		5
164		Cassia oligophylla x helmsii	12	1
164		Cassia pruinosa	22	1
164		Cassia sp.		1
164		Cassia sp. Karajini (MET 10,392)	6	
164		Cassia 'stricta'	1	
164		Cassia sturtii	8	
164		Cassia 'symonii'	12	12
164		Cassia venusta	13	3
164		Petalostylis cassioides	10	
164		Petalostylis labicheoides	15	17
		<b>PAPILIONACEAE</b>		
165		?Glycine sp.	1	
165		Alysicarpus muelleri	3	1
165		Alysicarpus rugosus	4	
165		Cajanus cinereus	25	11
165		Cajanus marmoratus	9	4
165		Crotalaria cunninghamii	15	4
165		Crotalaria dissitiflora subsp. benthamiana	11	1
165		Crotalaria medicaginea	13	
165		Crotalaria medicaginea (Burrup form; B65-11)		3

165		Crotalaria ramosissima	7	4
165		Cullen aff.lachnostachys (MET 15,154)		2
165		Cullen cinereum	6	
165		Cullen graveolens	5	
165		Cullen lachnostachys	7	1
165		Cullen leucanthum	6	8
165		Cullen leucochaites	18	1
165		Cullen martinii	16	5
165		Cullen pogonocarpum	3	2
165		Cullen stipulaceum	17	4
165		Desmodium aff. campylocaulon	2	
165		Desmodium filiforme	8	2
165		Desmodium muelleri	2	
165		Erythrina vespertilio	1	
165		Glycine canescens	12	
165		Glycine tomentella	1	
165		Gompholobium polyzygum	1	
165		Indigastrum parviflorum	1	
165		Indigastrum parviflorum (Whim Creek form; W138-3)		2
165		Indigofera aff. monophylla (HD195-15)	4	
165		Indigofera colutea	26	3
165		Indigofera georgei	1	
165		Indigofera ixocarpa	1	
165		Indigofera linifolia	6	2
165		Indigofera linnaei	2	2
165		Indigofera monophylla (brown calyx form)	31	
165		Indigofera monophylla (PAN20-2)		18
165		Indigofera monophylla (PAN57-9)		18
165		Indigofera monophylla (PAN58-17)		9

165		Indigofera monophylla (PAN65-14)		2
165		Indigofera monophylla (small calyx form)	11 1	13
165		Indigofera monophylla (small leaflet form)	9	
165		Indigofera rugosa	7	3
165		Indigofera sp. (HD162-8)	1	
165		Indigofera sp. (HD19)	4	
165		Indigofera trita	8	1
165		Isotropis atropurpurea	43	6
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
		<b>D</b>		
165		Kennedia cf. prorepens (HD229-11)	1	
165		Kennedia cf. prorepens (HD284-7)	3	
165		Leptosema anomalum	2	
165		Lotus australis	1	
165		Lotus cruentus	1	
165		Mirbelia viminalis	2	
165		Papillionaceae sp.	1	
165		Rhynchosia cf. minima	58	14
165		Rhynchosia sp. King Bay (B181-13)		1
165		Sesbania cannabina	12	7
165		Sesbania formosa		1
165	*	Stylosanthes hamata	2	
165		Swainsona formosa	4	5
165		Swainsona kingii	1	
165		Swainsona sp.	2	
165		Swainsona stenodonta	3	
165		Templetonia hookeri		5
165		Tephrosia aff. bidwillii (HD153-5)	4	4
165		Tephrosia aff. clementii (10) (HD88-3)	1	
165		Tephrosia aff. clementii (11)	3	7
165		Tephrosia aff. clementii (12) (HD1-32)	1	

165		Tephrosia aff. clementii (2)	1	
165		Tephrosia aff. clementii (7) (HD191-11)	3	
165		Tephrosia aff. clementii (8) (HD106)	4	
165		Tephrosia aff. clementii (9) (HD284-6)	11	
165		Tephrosia aff. densa (HD31-4)	10	
165		Tephrosia aff. rosea (HD112-18)	1	
165		Tephrosia aff. rosea (HD145-7)	1	
165		Tephrosia aff. rosea (HD292-37)	2	20
165		Tephrosia aff. supina		1
165		Tephrosia aff. supina (HD133-20)	10	
165		Tephrosia aff. supina (HD193-15)	2	
165		Tephrosia aff. supina (HD205-10)	4	7
165		Tephrosia aff. supina (HD237-23)	3	2
165		Tephrosia aff. supina (HD254-5)	1	
165		Tephrosia aff. supina (HD88-4)	1	1
165		Tephrosia aff. supina (MET 12,357)		1
165		Tephrosia aff. uniovulata (HD76)	2	
165		Tephrosia arenicola	2	
165		Tephrosia bidwillii	3	1
165		Tephrosia leptoclada	1	
165		Tephrosia rosea var. clementii	6	
165		Tephrosia rosea var. glabrior	18	
165		Tephrosia simplicifolia	9	2
165		Tephrosia sp.		3
165		Tephrosia sp. (HD133)	1	

165		Tephrosia sp.B Kimberley Flora(C.A.Gardner 7300)	2	9
165		Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601)	46	14
165		Tephrosia spechtii		3
165		Tephrosia supina		7
165		Tephrosia uniovulata	1	
165		Vigna lanceolata	12	
165		Vigna lanceolata var. lanceolata		2
165		Vigna sp. Harding Dam (HD189-12)		1
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
165		Zornia albiflora	5	
165		Zornia chaetophora		1
165		Zornia muelleriana subsp. congesta	9	
		<b>ZYGOPHYLLACEAE</b>		
173		Tribulopsis angustifolia		2
173		Tribulus astrocarpus	4	
173		Tribulus hirsutus	21	7
173		Tribulus macrocarpus	6	
173		Tribulus platypterus	6	1
173		Tribulus suberosus	10	5
173		Tribulus terrestris	1	
		<b>MELIACEAE</b>		
178		Owenia reticulata	3	
		<b>POLYGALACEAE</b>		
183		Polygala aff. isingii	7	18
183		Polygala linariifolia	6	2
		<b>EUPHORBIACEAE</b>		
185		Adriana tomentosa var. tomentosa	1	
185		Euphorbia aff. australis		1
185		Euphorbia aff. australis (B191)	29	10
185		Euphorbia aff. australis var. 1 (MET 12 337)	2	

185		Euphorbia aff. boophthona (large seed form)	2	
185		Euphorbia aff. coghlanii (HD186-18)	3	
185		Euphorbia aff. drummondii (HD195- 16)	7	1
185		Euphorbia aff. drummondii (MET 15,030)		8
185		Euphorbia aff. myrtoides (HD47-9)	1	
185		Euphorbia australis		1
185		Euphorbia australis (mid-green form)	12	
185		Euphorbia biconvexa	7	1
185		Euphorbia boophthona	1	
185		Euphorbia clementii	1	2
185		Euphorbia coghlanii	78	16
185	*	Euphorbia hirta	1	
185		Euphorbia sp. (BPBS10-50)	6	
185		Euphorbia sp. (HD234-15A)	1	
185		Euphorbia sp. (PAN1- 14B)		1
185		Euphorbia sp. (PAN5- 15)	4	1
185		Euphorbia sp. (site 1089)	65	9
185		Euphorbia tannensis ssp. eremophila (Panorama form)	8	13
185		Euphorbia tannensis subsp. eremophila (Hamersley form)	6	
185		Flueggea virosa subsp. melanthesoides	9	13
185		Leptopus decaisnei	3	
185		Leptopus decaisnei var. decaisnei		4
185		Mallotus ?dispersus	1	1
185		Mallotus nesophilus	4	
185		Phyllanthus aridus	4	
185		Phyllanthus lacunellus	15	1

185		Phyllanthus maderaspatensis var. angustifolius	41	14					
185	*	Ricinus communis		1					
185		Sebastiania chamaelea	1						
		<b>CELASTRACEAE</b>							
199		Maytenus sp. Mt Windell	2						
		<b>STACKHOUSIACEAE</b>							
202		Stackhousia intermedia	8						
202		Stackhousia muricata	1						
		<b>SAPINDACEAE</b>							
207		Atalaya hemiglauca	28	9					
207		Dodonaea coriacea	16	5					
207		Dodonaea petiolaris	14						
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>					
		<b>RHAMNACEAE</b>							
215		Ventilago viminalis		1					
		<b>TILIACEAE</b>							
220		Corchorus aff laniflorus (PAN 76)		8					
220		Corchorus aff. aestuans		1					
220		Corchorus aff. walcotti (K.J. Atkins 570)		1					
220		Corchorus aff. walcottii (H251-3)	4	1					
220		Corchorus crozophorifolius	4						
220		Corchorus elachocarpus	37	5					
220		Corchorus incanus	59	1					
220		Corchorus lasiocarpus subsp. lasiocarpus	44						
220		Corchorus parviflorus	27	53					
220		Corchorus sidoides	12						
220		Corchorus sp. (HD200)	9						
220		Corchorus sp. (HD260)	12						
220		Corchorus sp. (M.E. Trudgen 21,247)		1					
220		Corchorus sp. Panorama		1					
220		Corchorus sp.A Kimberley Flora(K.F.Kenneally & B.P.M.Hyland 10421)		1					
220		Corchorus tectus		31					
220		Corchorus tridens		12					
220		Triumfetta ?centralis		1					
220		Triumfetta aff. chaetocarpa (HD123)		1					
220		Triumfetta aff. chaetocarpa (PAN3/4)			1				
220		Triumfetta aff. chaetocarpa (Panorama form)			4				
220		Triumfetta chaetocarpa		27					
220		Triumfetta clementii	6	5					
220		Triumfetta maconochieana	6	8					
220		Triumfetta propinqua	1	13					
220		Triumfetta sp.		1					
220		Triumfetta sp. (HD292)		10					
		<b>MALVACEAE</b>							
221		Abutilon aff. dioicum (HD72-14)		2					
221		Abutilon aff. doicum (HD195)		7					
221		Abutilon aff. doicum (HD72-14)		5					
221		Abutilon aff. hannii (1)		1					
221		Abutilon aff. hannii (2)		1					
221		Abutilon aff. lepidum (1) (MET 15 352)	9	2					
221		Abutilon aff. lepidum (4)		2					
221		Abutilon amplum	1						
221		Abutilon cunninghamii	1						
221		Abutilon fraseri	11						
221		Abutilon lepidum	24						
221		Abutilon leucopetalum	3						
221		Abutilon macrum	6						
221		Abutilon malvifolium	2						
221		Abutilon otocarpum	19	1					
221		Abutilon oxycarpum subsp. prostratum	2						

221		Abutilon sp. (HD164)	10	
221		Abutilon sp. (HD173-3)	4	
221		Abutilon trudgenii	7	4
221		?Abutilon sp. (P62)		1
221		Gossypium australe (Burrup Peninsula form)	40	4
221		Gossypium australe (Whim Creek form)	5	4
221		Gossypium robinsonii	15	5
221		Hibiscus aff. coatesii (site 664)	1	
221		Hibiscus aff. platyklamys (M35-11)	6	
221		Hibiscus aff. platyklamys (site 1139)	25	7
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
221		Hibiscus aff. sturtii (HD7-11)	3	
221		Hibiscus brachyclaenus	10	2
221		Hibiscus brachysiphonius	9	
221		Hibiscus burtonii	10	
221		Hibiscus coatesii	6	4
221		Hibiscus gardnerii	3	
221		Hibiscus goldsworthii	5	1
221		Hibiscus leptocladus	59	12
221		Hibiscus panduriformis	10	2
221		Hibiscus platyklamys	31	1
221		Hibiscus sp.		2
221		Hibiscus sp. (site 316)	1	
221		Hibiscus sturtii var. aff. campylochlamys (site 1398)	1	
221		Hibiscus sturtii var. aff. grandiflorus	3	
221		Lawrenzia viridigrisea	1	
221	*	Malvastrum americanum	21	
221		Sida ?echinocarpa	4	
221		Sida ?rohlena	4	

221		Sida aff. cardiophylla (M79-27)	23	
221		Sida aff. cardiophylla (site 1215)	36	
221		Sida aff. fibulifera (B64-13B)	1	
221		Sida aff. fibulifera (grey; MET 15 783)	1	
221		Sida aff. fibulifera (HD12-39)	23	
221		Sida aff. fibulifera (HD148-13)	3	
221		Sida aff. fibulifera (HD186.1)	13	
221		Sida aff. fibulifera (HD200-6)	4	
221		Sida aff. fibulifera (HD234-9)	1	
221		Sida aff. fibulifera (HD237-9)	4	
221		Sida aff. fibulifera (HD36-16)	3	
221		Sida aff. fibulifera (HD47)	2	
221		Sida aff. fibulifera (MET 16,494)	5	
221		Sida aff. fibulifera (oblong; MET 15 220)	1	
221		Sida aff. fibulifera (PAN 10-6)		1
221		Sida arenicola	27	
221		Sida atrovirens	3	
221		Sida billbarkeri ms.	7	
221		Sida calyxhymenia	2	
221		Sida cardiophylla	52	22
221		Sida clementii	24	2
221		Sida echinocarpa	8	1
221		Sida excedentifolia	2	
221		Sida platycalyx	3	
221		Sida rohlena subsp. rohlena	32	
221		Sida rohlena var. rohlena		2
221		? Sida sp. (M58)		2
221		Sida sp. (?no match)		1
221		Sida sp. (HD145)	1	
221		Sida sp. 'rugose'	12	

221		Sida sp.A Kimberley Flora(P.A.Fryxell & L.A.Craven 3900)		8
		<b>STERCULIACEAE</b>		
223		Brachychiton acuminatus	1	
223		Keraudrenia nephrosperma		2
223		Keraudrenia sp.	3	
223		Melhania oblongifolia	5	
223		Melhania sp. Burrup	2	1
223		Melhania sp. (Fortescue)	4	
223		Rulingia kempeana	2	
223		Waltheria indica	18	1
223		Waltheria virgata		1
		<b>ELATINACEAE</b>		
235		Bergia pedicellaris	4	1
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
235		Bergia perennis	2	
235		Bergia trimera	10	1
		<b>FRANKENIACEAE</b>		
236		Frankenia ?setosa	1	
236		Frankenia ambita	2	
236		Frankenia sp. (HD49)	1	
		<b>VIOLACEAE</b>		
243		Hybanthus aurantiacus	89	20
		<b>THYMELAEACEAE</b>		
263		Pimelea ammodaridensis	16	1
		<b>LYTHRACEAE</b>		
265		Ammannia auriculata	2	2
265		Ammannia baccifera	10	4
265		Ammannia multiflora	3	
265		Ammannia sp.	1	
265		Rotala diandra	2	1
		<b>COMBRETACEAE</b>		
272		Terminalia canescens	3	2
		<b>MYRTACEAE</b>		
273		Corymbia aspera	5	
273		Corymbia candida	7	
273		Corymbia deserticola	18	
273		Corymbia ferriticola subsp. ferriticola		1
273		Corymbia flavescens		1
273		Corymbia hamersleyana	70	29
273		Corymbia semiclara	6	
273		Corymbia sp. (PAN39-18)		1
273		Corymbia zygophylla	5	4
273		Eucalyptus camaldulensis var. obtusa	6	3
273		Eucalyptus gamophylla	16	
273		Eucalyptus leucophloia	5	8
273		Eucalyptus victrix	26	9
273		Eucalyptus xerothermica	1	
273		Melaleuca argentea	6	2
273		Melaleuca eleuterostachya	2	
273		Melaleuca glomerata	10	6
273		Melaleuca lasiandra	2	
273		Melaleuca linophylla	5	4
		<b>ONAGRACEAE</b>		
275		Ludwigia perennis		2
		<b>HALORAGACEAE</b>		
276		Gonocarpus ephemerus	2	2
276		Haloragis gossei	7	2
		<b>APIACEAE</b>		
281		Trachymene aff. oleracea (B61)		2
281		Trachymene oleracea	13	
		<b>PLUMBAGINACEAE</b>		
294		Muellerolimon salicorniaceum	1	
		<b>OLEACEAE</b>		
301		Jasminum didymum subsp. lineare	12	
		<b>LOGANIACEAE</b>		
302		Mitrasacme connata	3	1
		<b>APOCYNACEAE</b>		
304		Carissa lanceolata	16	5
		<b>ASCLEPIADACEAE</b>		
305		Cynanchum floribundum	3	
305		Gymnanthera cunninghamii	3	1

305		Marsdenia angustata		1
305		Marsdenia australis	1	
305		Rhyncharrhena linearis	5	
305		Sarcostemma viminale subsp. australe	2	1
		<b>CONVOLVULACEAE</b>		
307		Bonamia linearis	69	20
307		Bonamia media var. ?media	24	
307		Bonamia media var. villosa	8	19
307		Bonamia pannosa	13	12
307		Bonamia rosea	93	22
307		Bonamia sp.		2
307		Bonamia sp. (HD94-6)	19	5
307		Convolvulus erubescens	2	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
307		Evolvulus alsinoides var. decumbens	3	
307		Evolvulus alsinoides var. villosicalyx	60	1
307		Ipomoea coptica	5	
307		Ipomoea muelleri	17	1
307		Ipomoea polymorpha	3	
307		Merremia davenportii	2	
307		Operculina aequisejala	1	
307		Polymeria ?lanata	4	
307		Polymeria aff. ambigua (PAN 26B-20)		3
307		Polymeria aff. calycina		15
307		Polymeria ambigua/calycina	45	
307		Polymeria calycina		3
307		Polymeria lanata	1	
307		Polymeria sp.		1
307		Polymeria sp. (HD103-11)	1	
307		Polymeria sp. (PAN1-16)		1
307		Polymeria sp. (PAN4-14)		2
307		Polymeria sp. (site 1365)	14	

307		Porana commixta	30	1
		<b>BORAGINACEAE</b>		
310		Ehretia saligna	3	
310		Ehretia saligna var. saligna		4
310		Heliotropium ?conocarpum	9	
310		Heliotropium ?cunninghamii	3	
310		Heliotropium ?foliatum	3	
310		Heliotropium ?pachyphyllum	3	
310		Heliotropium ?parviantrum	18	
310		Heliotropium aff. cunninghamii (P65-12)		1
310		Heliotropium chrysocarpum	23	5
310		Heliotropium crispatum	4	
310		Heliotropium cunninghamii		4
310		Heliotropium curassavicum		1
310		Heliotropium diversifolium	2	
310		Heliotropium heteranthum	6	2
310		Heliotropium inexplicitum	1	
310		Heliotropium ovalifolium	1	1
310		Heliotropium skeleton	3	13
310		Heliotropium sp.		7
310		Heliotropium tanythrix		1
310		Heliotropium tenuifolium	14	2
310		Trichodesma zeylanicum	59	
310		Trichodesma zeylanicum (green)	2	
310		Trichodesma zeylanicum var. latisepalum	2	

310		Trichodesma zeylanicum var. zeylanicum		14
		<b>VERBENACEAE</b>		
311		Clerodendrum floribundum var. angustifolium	4	2
311		Clerodendrum tomentosum		5
311		Clerodendrum tomentosum var. lanceolatum	4	
		<b>CHLOANTHACEAE</b>		
311		Dicrastylis cordifolia	26	
A				
311		Pityrodia sp. Panorama (BMor 151)		1
A				
		<b>AVICENNIACEAE</b>		
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
312		Avicennia marina	2	
315		Nicotiana benthamiana	2	2
		<b>SOLANACEAE</b>		
315		Nicotiana umbratica	2	
315	*	Physalis minima	2	
315		Solanum cleistogamum	4	
315		Solanum diversiflorum	9	12
315		Solanum ellipticum	3	
315		Solanum gabrielae	12	
315		Solanum horridum	27	7
315		Solanum lasiophyllum	68	
315	*	Solanum nigrum	1	1
315		Solanum petrophilum	1	
315		Solanum phlomoides	68	33
315		Solanum sturtianum	1	
		<b>SCROPHULARIACEAE</b>		
316		Mimulus gracilis	4	
316		Peplidium sp. E (Flora of Australia)	1	
316		Stemodia grossa	72	14
316		Stemodia kingii	3	
316		Stemodia lathraia	16	
316		Stemodia viscosa	20	3
316		Striga curviflora	2	
316		Striga squamigera	1	
		<b>BIGNONIACEAE</b>		
317		Dolichandrone heterophylla	4	1
		<b>ACANTHACEAE</b>		
325		Dicladanthera forrestii	5	
325		Dipteracanthus aff. australasicus	1	
325		Rostellularia adscendens	1	
		<b>MYOPORACEAE</b>		
326		Eremophila cuneifolia	4	
326		Eremophila forrestii subsp. forrestii	23	
326		Eremophila lanceolata	5	
326		Eremophila latrobei subsp. filiformis	12	
326		Eremophila longifolia	24	
326		Eremophila sp. 1 (poor specimen)	1	
326		Eremophila sp. 2 (sterile)	1	
326		Eremophila youngii	1	
		<b>RUBIACEAE</b>		
331		Dentella minutissima	4	
331		Oldenlandia crouchiana	9	10
331		Oldenlandia galioides	4	1
331		Oldenlandia sp. 'gilgai'	7	
331		Psydrax attenuata	1	
331		Psydrax latifolia	12	
331		Psydrax suaveolens	4	
331		Spermacoce brachystema	2	
331		Synaptantha tillaeacea var. tillaeacea	38	6
		<b>CUCURBITACEAE</b>		
337	*	Citrullus colocynthis	2	
337		Cucumis sp.	1	
337		Mukia maderaspatana	81	
337		Mukia sp.		25
337		Mukia sp. Panorama		1
337		Trichosanthes cucumerina	3	3
		<b>CAMPANULACEAE</b>		



339		Wahlenbergia tumidifructa	26	3
		<b>LOBELIACEAE</b>		
340		Lobelia quadrangularis	5	3
		<b>GOODENIACEAE</b>		
341		Dampiera candicans	20	12
341		Goodenia aff. pascua	2	
341		Goodenia cusackiana	1	7
341		Goodenia lamprosperma	38	2
341		Goodenia microptera	90	20
341		Goodenia muelleriana	17	1
341		Goodenia prostrata	2	
341		Goodenia sp.		3
341		Goodenia stellata	1	
341		Goodenia stobbsiana	49	39
341		Goodenia triodiophila	3	
341		Scaevola acacioides	1	
<b>F</b>	<b>N</b>	<b>NAME</b>	<b>H</b>	<b>P</b>
			<b>D</b>	
341		Scaevola amblyanthera var. centralis	16	8
341		Scaevola browniana	15	
341		Scaevola parvifolia subsp. pilbarae	14	2
341		Scaevola spinescens (broad form)	3	
341		Scaevola spinescens (spiny, fine leaf)	1	
341		Velleia discophora	3	
		<b>STYLIDIACEAE</b>		
343		Stylidium sp. (HD)	6	
		<b>ASTERACEAE</b>		
345	*	Bidens bipinnata	2	
345		Blumea tenella	2	
345		Centipeda minima	9	2
345		Chrysocephalum aff. apiculatum	1	
345		Flaveria australasica	6	3
345		Flaveria sp. Tom Price (M.E. Trudgen 11246)	7	
345		Helichrysum gilesii	1	

345		Olearia fluvialis	2	1
345		Pentalepis trichodesmoides		2
345		Pluchea dentex	22	2
345		Pluchea dunlopii		1
345		Pluchea ferdinandi-muelleri	29	3
345		Pluchea rubelliflora	54	4
345		Pluchea tetranthera	67	8
345		Podolepis capillaris	2	
345		Pterocaulon ?sphaeranthoides x sphacelatum	80	
345		Pterocaulon serrulatum	27	7
345		Pterocaulon sp. (PAN1-47)		3
345		Pterocaulon sphacelatum	32	14
345		Pterocaulon sphaeranthoides	15	
345		Pterocaulon sphaeranthoides x sphacelatum		8
345		Rhodanthe margarethae	3	
345	*	Sigesbeckia orientalis	1	
345	*	Sonchus oleraceus	4	
345		Streptoglossa adscendens	2	
345		Streptoglossa bubakii	22	2
345		Streptoglossa cylindriceps	1	
345		Streptoglossa decurrens	5	1
345		Streptoglossa macrocephala	3	1
345		Streptoglossa odora	7	4
345		Vittadinia arida	7	
345		Vittadinia dissecta	1	
345		Vittadinia obovata	1	
345		Vittadinia sp. (HD268)	2	
345		Vittadinia virgata	2	



## **APPENDIX 9: Relevés recorded for vegetation mapping of the access road to the proposed Panorama mine site**

One hundred and two relevés were described to facilitate the mapping of the access road from the Port Hedland to Marble Bar road to the northern edge of the Sulphur Springs vegetation map area. They are listed here in numerical order.

### **M1**

*Acacia trachycarpa* high open shrubland to high shrubland over *Corchorus* sp. (MET 21247) low shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

Associated species: *Eriachne obtusa*, \**Aerva javanica*, *Eragrostis eriopoda*, *Olearia fluviialis*, *Indigofera colutea*.

Habitat and Soil: Low bank or drift of sand in the bed of a large river. Medium to coarse light orange-brown siliceous sand. Date: 18/10/2001.

Location: Shaw River near the Panorama project access road. At: 50K 07-42-517 UTM 77-07-983 (from GPS unit).

Notes: Only two plants of *Olearia fluviialis* were seen.

### **M2**

Scattered low trees of *Corymbia hamersleyana* over *Acacia trachycarpa* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris*, *Chrysopogon fallax* tussock grassland.

Associated species: *Indigofera rugosa*, *Atalaya hemiglauca*, *Eucalyptus camaldulensis* var. *obtusata*, *Petalostylis labicheoides*, *Rhynchosia* cf. *minima*, *Acacia pyrifolia* (slender, white), *Grevillea pyramidalis*, *Triodia epactia*, *Triodia angusta* (Shaw River form), *Cullen leucanthum*.

Habitat and Soil: Small creek through the edge of a gently undulating plain, near a large river. Light brown loam with some fine sand. Date: 18/10/2001.

Location: Panorama project access road. At: 50K 07-42-431 UTM 77-07-656 (from GPS unit).

Notes: A more incised creek with similar vegetation was seen near the 7km but this had no *Cullen leucanthum*.

### **M3**

*Triodia angusta* (Shaw River form) hummock grassland.

Associated species: *Pluchea tetranthera*, *Indigofera rugosa*, *Heliotropium*, *Acacia inaequilatera*, *Swainsona formosa*.

Habitat and Soil: Gentle slope into small creek. Light orange-brown soft loam (not setting hard), pebbly in places. Next to the creek recorded at M2 (on the north-west side). Date: 18/10/2001.

Location: Panorama project access road. At: 50K 07-42-420 UTM 77-07-675 (from GPS unit).

### **M4**

*Corymbia zygophylla* scattered low trees over *Acacia elachantha*, high open shrubland to open shrubland over *Triodia lanigera* (*Triodia epactia*) hummock grassland.

Associated species: *Polygala linarifolia*, *Grevillea pyramidalis*, *Bonamia rosea*, *Aristida holathera* var. *holathera*, *Cajanus marmoratus*, *Eragrostis eriopoda*, *Sida cardiophylla*, *Indigofera monophylla*, *Eriachne aristidea*.

Habitat and Soil: Low rise on a gently undulating plain. Orange-brown fine siliceous sand, silty. Date: 18/10/2001.

Location: West of the Panorama project access track about 0.8km from the Marble Bar road. At: 50K 07-41-706 UTM 77-07-236 (from GPS unit).

Notes: The occurrence 216km. from the Marble Bar road has some patches of *Triodia schinzii*.

#### **M5**

*Acacia inaequilatera*, *Acacia elachantha* high open shrubland to high shrubland over *Acacia stellaticeps* low shrubland over *Triodia epactia*, *Triodia lanigera* hummock grassland.

Habitat and Soil: Slight depression on a gently undulating plain. Date: 18/10/2001.

Location: About 1.6km south of the Marble Bar Road on the Panorama project access road. At: 50K 07-41-642M UTM 77-06-749 (from GPS unit).

Notes: Similar to PAN 22?, but with more tall shrubs and more *Acacia stellaticeps*.

#### **M6**

*Corymbia zygophylla* scattered low trees over *Acacia elachantha* scattered tall shrubs over *Triodia lanigera*, *Triodia epactia* hummock grassland.

Associated species: *Acacia ancistrocarpa*, *Acacia stellaticeps*, *Crotalaria ramosissima*, *Cajanus marmoratus*, *Eriachne aristidea*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera*, *Sida rohlenae* var. *rohlenae*, *Tinospora smilacina*.

Habitat and Soil: Gently undulating plain. Date: 18/10/2001.

Location: South of the Marble Bar road, adjacent (about 300+m west) to the Panorama project access road. At: 50K 07-41-490M UTM 77-06-513 (from GPS UNIT).

#### **M7**

*Corymbia zygophylla* scattered low trees over *Acacia elachantha* scattered high shrubs over *Acacia stellaticeps* scattered low shrubs over *Triodia schinzii*, *Triodia lanigera* grassland.

Associated species: *Cullen martini*, *Dolichandrone heterophylla*, *Mollugo molluginis*, \**Cenchrus ciliaris*, *Acacia trachycarpa*, *Corchorus elachocarpus*, *Hakea lorea* ssp. *lorea*, *Mukia maderaspatana*, *Trichodesma zeylanicum* var. *zeylanicum*.

Habitat and Soil: Gently undulating plain. Date: 18/10/2001.

Location: 3 km south of Marble Bar Road, adjacent (200m west) to the Panorama project access road. At: 50K 07-41-655M UTM 77-05-227 (from GPS unit).

#### **M8**

*Cullen lachnostachys* high open shrubland over *Pluchea tetranthera* scattered low shrubs over *Triodia lanigera* hummock grassland with *Corchorus* low open shrubland to open plain.

Associated species: *Acacia elachantha*, *Sida cardiophylla*, *Pimelia ammodaridensis*, *Hakea lorea* ssp. *lorea*, *Bonamia rosea*, *Bonamia linearis*, *Eragrostis eriopoda*, *Acacia trachycarpa*, *Indigofera rugosa*.

Habitat and Soil: Gently undulating plain. Light red-brown, silty, fine siliceous sand.  
Date: 18/10/2001.

Location: 3.5km south from Marble Bar Road, on the Panorama project access road.  
 At: 50K 07-41-783 UTM 77-04-759 (from GPS unit).

Notes: P8 grades into M8. P8 is at one end of the stand of *Cullen lachnostachys*. The Cullen was (2.2) to 3m tall. The southern part of the stand has a mixture of *Cullen lachnostachys* and *Cullen martinii* dominant (had no medium shrub layer).

### **M9**

*Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* high grassland.

Associated species: *Acacia coriacea* var. *sericophylla*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera*, *Bonamia linearis*, *Sida cardiophylla*, *Indigofera* aff. *monophylla*.

Habitat and Soil: Gently undulating plain. Orange-brown siliceous sand. Date: 19/10/2001.

Location: ca 4km south of Marble Bar Road and 300m west of the Panorama project access track. At: 50K 07-41-452 UTM 77-03-369 (from GPS unit).

Notes: The vegetation stand including M9 varies to M10 with the density of the two *Corymbia* species holding it together as a unit.

### **M10**

*Corymbia zygophylla*, *Corymbia hamersleyana* scattered low trees over *Acacia elachantha*, *Acacia coriacea* var. *sericophylla* scattered tall shrubs over *Acacia ancistrocarpa* scattered shrubs over *Acacia stellaticeps* scattered low shrubs to low open shrubland over *Triodia lanigera* hummock grassland.

Associated species: *Acacia holosericea*, *Acacia inaequilatera*, *Scaevola parvifolia* ssp. *pilbarae*, *Eragrostis eriopoda*.

Habitat and Soil: Gently undulating plain. Orange-brown siliceous sand.

Location: Panorama project access road. At: 50K 07-41-605 UTM 77-01-998 (from GPS unit).

Notes: Part of the same large stand as M9.

### **M11**

*Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Triodia lanigera* hummock grassland.

Associated species: *Bonamia rosea*, *Bonamia linearis*, *Ptilotus axillaris*, *Streptoglossa macrocephala*, *Acacia inaequilatera*, #*Eriachne aristidea*, #*Hibiscus* (common), #*Ptilotus axillaris*, *Crotalaria ramosissima*, *Tinospora smilacina*, *Cymbopogon obtectus*, *Tribulus platypterus*.

Habitat and Soil: Lower slope pebbly (some calcaretisation). Orange-brown fine siliceous sand (pan hard just below the surface). Date: 19/10/2001.

Location: Panorama project access road. At: 50K 07-41-830 UTM 77-01-445 (estimated from M12 AMG).

Notes: #Only recorded where the site was burnt. Stand about 100m wide. Some places had scattered low shrubs of *Acacia stellaticeps*. P11/12 as mapped includes areas with more *Grevillea wickhamii* ssp. *aprica* than *Acacia tumida*, but with *Triodia schinzii* not *Triodia lanigera*.

**M12**

*Eucalyptus camaldulensis* var. *obtusa*, *Eucalyptus victrix* open woodland to high open woodlands over *Atalaya hemiglauca* scattered low trees over *Petalostylis labicheoides*, *Cullen leucanthum* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

Associated species: \**Aerva javanica*, *Pterocaulon sphaeranthoides*, *Hibiscus panduriformis*, *Euphorbia coghlanii*, *Stemodia grossa*, *Acacia pyrifolia* (slender, white), *Indigofera colutea*, *Heliotropium*, *Cleome viscosa*, *Pluchea rubelliflora*, *Corchorus*.

Habitat and Soil: Bed of a large river, close to the west bank. Fine to medium grained pinkish-brown sand. Date: 19/10/2001. Photo: Roll1. MP1

Location: Bed of the Shaw River, near the west bank. Near the Panorama project access road. At: 50K 07-41-902 UTM 77-01-445 (from GPS unit).

**M13**

*Eucalyptus camaldulensis* var. *obtusa* high open woodland to high woodland over scattered low trees of *Atalaya hemiglauca* over *Melaleuca glomerata* scattered tall shrubs over *Cyperus vaginatus*, \**Cenchrus ciliaris* scattered sedges and grasses.

Associated species: *Pluchea rubelliflora*, \**Aerva javanica*, \**Cynodon dactylon*, *Alteranthera nodiflora*, Poaceae, *Sesbania cannabina*, *Heliotropium curassavicum*, *Cyperus* sp., *Hibiscus panduriformis*, *Stemodia grossa*, *Cullen leucanthum*, *Ammania baccifera*, *Ipomoea muelleri*.

Habitat and Soil: Fine to medium grained light pinkish brown sand, gravelly to cobbly in places. Date: 19/10/2001. Photo: Roll1. MP2

Location: Small 'low flow' channel in the bed of the Shaw River. Near the Panorama project access road. At: 50K 07-41-985 UTM 77-01-441 (from GPS unit).

Notes: A larger low flow channel with similar vegetation was also seen except it also has *Melaleuca argentea* and *Eucalyptus* in the overstorey. The largest channel had a sandy/cobbly (in patches) bed.

**M14**

*Melaleuca argentea* low woodland to woodland over *Acacia trachycarpa*, *Melaleuca glomerata* scattered tall shrubs over \**Cenchrus ciliaris* tussock grassland.

Associated species: \**Aerva javanica*, *Crotalaria cunninghamii*, *Petalostylis labicheoides*, *Ipomoea muelleri*, *Euphorbia coghlanii*, *Amaranthus* sp., *Hybanthus aurantiacus*, *Cleome viscosa*, \**Solanum nigrum*, *Atalaya hemiglauca*.

Habitat and Soil: Large sandy bank or drift in the bed of the Shaw River. Pale pinkish brown medium to coarse grained siliceous sand, gravelly in places. Date: 19/10/2001. Photo: Roll1. MP3

Location: Near the Panorama project access road. At: 50K 07-42-031 UTM 77-01-385 (from GPS unit).

**M15**

*Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* hummock grassland.

Associated species: *Ptilotus astrolasius*, *Streptoglossa macrocephala*, *Aristida holathera* var. *holathera*, *Pterocaulon sphacelatum* x *spacelatum*, *Cassia 'symonii'*, *Polycarpaea corymbosa* var. *corymbosa*, *Eriachne pulchella*, *Bulbostylis barbata*, *Cassia notabilis*, *Hakea lorea* ssp. *lorea*, *Mollugo molluginis*, *Hibiscus brachychlaenus*, *Bonamia linearis*, *Cymbopogon obtectus*.

Habitat and Soil: Near the edge of a gently undulating plain. Orange-red-brown fine siliceous sand (quite silty) with gravelly soil in places. Date: 19/10/2001. Photo: Roll1. MP4

Location: Panorama project access road. At: 50K 07-41-304 UTM 77-00-949 (from GPS unit).

Notes: To the south there was some *Corymbia hamersleyana* and *Acacia ancistrocarpa* in the unit.

### **M16**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* hummock grassland.

Associated species: *Acacia ancistrocarpa*, *Pluchea tetranthera*, *Pterocaulon sphaeranthoides* x *sphacelatum*, *Streptoglossa macrocephala*, *Bonamia* sp. (H94-6), *Cassia notabilis*, *Cassia glutinosa*, *Heliotropium skeleton*, *Bulbostylis barbata*, *Eriachne pulchella*, *Ptilotus astrolasius*.

Habitat and Soil: Gently undulating plain, near a large river. Red-brown gravelly-pebbly loam. Date: 19/10/2001. Photo: Roll1. MP5

Location: Panorama project access road. At: 50K 07-41-134 UTM 77-99-486 (from GPS unit).

Notes: Better development of site M15 types. Often has patches of *Acacia ancistrocarpa*.

### **M17**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea pyramidalis*, *Hakea lorea* ssp. *lorea*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* scattered low shrubs to low shrubland over *Triodia lanigera* hummock grassland.

Associated species: *Ptilotus astrolasius*, *Indigofera* aff. *monophylla*, *Goodenia microptera*, *Tephrosia* sp. Bungaroo Ck. (M.E. Trudgen 11601), *Ptilotus astrolasius*, *Heliotropium skeleton*, *Isotropis atropurpurea*, *Indigofera* aff. *monophylla*, *Bonamia linearis*, *Mollugo molluginis*, *Aristida holathera* var. *holathera*, *Dolichandrone heterophylla*, *Cassia 'symonii'*, *Bonamia rosea*, *Cassia glutinosa*.

Habitat and Soil: Gently undulating plain. Red-brown gravelly loam with thin sandy surface. Date: 20/10/2001. Photo: Roll1. MP6 (Volvo in the background, *Corymbia hamersleyana* RHS)

Location: Panorama project access road. At: 50K 07-07-098 UTM 76-98-440 (from GPS unit).

Notes: Where the area was burnt, *Corchorus elachocarpus* was common. The soil was more pebbly than earlier sites with *Acacia ancistrocarpa*. This unit differs from other *Acacia stellaticeps* units in having *Corymbia hamersleyana* common. This unit held together by 1): frequent *Corymbia hamersleyana* 2): patches of *Acacia ancistrocarpa* 3): no *Corymbia zygophylla* 4): patches of *Acacia stellaticeps* 5): scattered *Grevillea wickhamii* ssp. *aprica*, scattered *Acacia inaequilatera*.

### **M18**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form), hummock grassland.

Associated species: *Hybanthus aurantiacus*, *Eriachne obtusa*, *Corchorus elachocarpus*, *Hakea lorea* ssp. *lorea*, *Bonamia* sp. (H94-6), *Ptilotus axillaris*, *Oldenlandia crouchiana*,

*Enneapogon* (small heads), *Goodenia microptera*, *Cassia notabilis*, *Ptilotus calostachyus* var. *calostachyus* var. *calostachyus*, *Grevillea wickhamii* ssp. *aprica*.

Habitat and Soil: Slopes into a small creek line running west to east into the Shaw River, on the edge of a gently undulating plain. Strips <10-25m wide. Orange-red-brown pebbly loam. Date: 20/10/2001.

Location: Panorama project access road. At: 50K 07-41-165 UTM 76-99-368 (from GPS unit).

Notes: The *Triodia* had > 55% cover where the area had not been burnt recently.

### **M19**

*Hakea lorea* scattered trees over \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera*, *Triodia epactia* grassland.

Associated species: *Aristida holathera* var. *holathera*, *Isotropis atropurpurea*, *Crotalaria ramosissima*, *Hakea lorea* ssp. *lorea*, *Cullen martini*, *Cullen stipulaceum*, *Atalaya hemiglauca*, *Sida rohlenae* var. *rohlenae*, *Eragrostis eriopoda*. At edge of M19, close to creek : *Corchorus* aff. *walcottii* (H251-3).

Habitat and Soil: Light brown fine grained siliceous sand. Date: 20/10/2001.

Photo: Roll1. MP7 (very open)

Location: Panorama project access road. At: 50K 07-41-504 UTM 76-99-409 (from GPS unit).

Notes: Grades upslope to \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera* , *Triodia lanigera* grassland.

### **M20**

*Eucalyptus victrix* low woodland over *Cullen leucanthum* (Pan form) high shrubland to open scrub over *Stemodia grossa* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

Associated species: *Cyperus vaginatus*, *Stemodia grossa*, *Eragrostis tenellula*, *Phyllanthus lacunellus*, *Crotalaria cunninghamii*, *Eriachne obtusa*, *Cyperus* sp., *Triodia epactia*, *Acacia trachycarpa*.

Habitat and Soil: Small creek between some sand dunes. Light brown fine to medium grained siliceous sand. Date: 20/10/2001. Photo: Roll1. MP8 (white trees)

Location: Panorama project access road. At: 50K 07-41-608 UTM 76-99-389 (from GPS unit).

Notes: Upstream there was much less \**Cenchrus ciliaris* and *Triodia epactia* to open hummock grassland. The *Eragrostis tenellula* was common along the creek.

### **M21**

*Corymbia aspera* scattered trees to open woodland over *Hakea lorea* ssp. *lorea* scattered low trees over \**Cenchrus ciliaris*, *Triodia lanigera*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera* grassland (> 70% cover).

Associated species: *Cajanus marmoratus*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Eragrostis eriopoda*, *Crotalaria ramosissima*, *Cymbopogon obtectus*, *Corchorus elachocarpus*, *Hibiscus leptocladus*, *Corchorus incanus*, *Sida rohlenae* var. *rohlenae*, *Eriachne obtusa*, *Pimelea ammocharis*, *Trichodesma zeylanicum* var. *zeylanicum*, *Chrysopogon fallax*.

Habitat and Soil: Broad creek line, with no incised bed, > 50m across. Orange-brown loamy fine sand-loam. Date: 20/10/2001. Photo: Roll1. MP8 (white trees over grass)



Location: Panorama project access road, near Illyareena well. At: 50K 07-41-449 UTM 76-96-966 (from GPS unit).

Notes: Narrow strip of *Triodia lanigera*, *Triodia epactia* along the west edge occasionally 60m wide. Some patches of *Acacia tumida*.

### **M22**

*Grevillea wickhamii* ssp. *aprica* high open shrubland to high shrubland over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* hummock grassland.

Associated species: *Isotropis atropurpurea*, *Heliotropium skeleton*, *Goodenia stobbsiana*, *Pimelea ammocharis*, *Solanum diversiflorum*, *Goodenia microptera*, *Acacia inaequilatera*, *Corymbia hamersleyana*.

Habitat and Soil: Gently undulating plain. Orange-brown hard setting loam, with a thin surface of fine to medium grained siliceous sand. Date: 20/10/2001.

Location: Panorama project access road. At: 50K 07-40-773 UTM 76-97-059 (from GPS unit).

Notes: Transition from = 22/P03 to M15/16 north east of P003 is very broad. *Acacia stellaticeps* goes out before the *Grevillea wickhamii*.

### **M23**

*Corymbia hamersleyana* scattered low trees over *Acacia tumida* high open shrubland high shrubland over *Acacia ancistrocarpa* scattered tall shrubs over *Triodia schinzii* hummock grassland.

Associated species: *Isotropis atropurpurea*, *Heliotropium skeleton*, *Acacia inaequilatera*, *Cassia notabilis*, *Mollugo molluginis*, *Bonamia linearis*, *Bulbostylis barbata*, *Streptoglossa macrocephala*, *Goodenia microptera*, *Sida cardiophylla*, *Goodenia stobbsiana*, *Indigofera monophylla* (small calyx form), *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601).

Habitat and Soil: Gentle slope to the east on a gently undulating plain. Orange-brown sandy loam with thin surface of orange-brown fine to medium grained sand.

Date: 21/10/2001.

Location: Panorama project access road. At: 50K 07-39-757 UTM 76-89-604 (from GPS unit).

Notes: = P11/12 at this point, extends for ?150-200m (at least; - as far as could be seen) to the east. The area has been burnt (very patchy - some unburnt) about 2 to 3 years ago. *Corchorus parviflorus* was common in the burnt areas. A small area west of M23 had a *Acacia stellaticeps* layer. M23 possibly represents the *Acacia tumida* "node" (which is most of the unit) of P1/ P11/P12 unit ie: mostly *Acacia tumida*, little *Acacia inaequilatera*, little *Corymbia*, none or little *Grevillea wickhamii* ssp. *aprica*. *Triodia schinzii* holds it all together, an "association"? level unit with varying dominance in the upper shrub layer; but with some coherence in structure as well as much similarity in species composition.

### **M24**

*Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* high shrubland to high open shrub over *Triodia schinzii* hummock grassland.

Associated species: *Ptilotus astrolasius*, *Indigofera monophylla* (small calyx form), *Bonamia linearis*, *Chrysopogon fallax*, *Aristida holathera* var. *holathera*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Sida cardiophylla*, *Acacia tumida*, *Ptilotus axillaris*, *Goodenia stobbsiana*.

Habitat and Soil: Gentle slope to the east (to the Shaw River) on a gently undulating plain. Orange-brown sandy loam with a thin fine to medium grained sand layer on the surface. Date: 21/10/2001. Photo: Roll1. MP9 (Grevillea ++)

Location: Panorama project access road. At: 50K 07-39-150 UTM 76-88-607 (from GPS unit).

Notes: Burnt about 2 to 3 years ago. Transition from M23 to P13 (needs final codes): The *Triodia* changes quite abruptly, but the shrub layer more slowly (it was quite dense over the *Triodia lanigera* near the M24 boundary, but more open over *Triodia schinzii* away from the boundary).

#### **M 24A**

*Corymbia hamersleyana* scattered low trees over *Acacia tumida* tall shrubland to open scrub over *Triodia lanigera* hummock grassland.

Associated species: *Acacia inaequilatera*, *Cleome uncifera*, *Cassia notabilis*, *Bonamia linearis*, *Goodenia microptera*, *Goodenia stobbsiana*, *Heliotropium skeleton*, *Mollugo molluginis*, *Sida cardiophylla*, *Aristida holathera* var. *holathera*, *Indigofera monophylla* (small calyx form), *Bonamia pannosa*, *Isotropis atropurpurea*, *Paraneurachne muelleri*, *Grevillea pyramidalis*, *Cassia 'symonii'*.

Habitat and Soil: Gently undulating plain. Orange-brown sandy loam (set) with thin fine to medium grained sand surface. The sand is siliceous. Date: 19/10/2001.

Location: Panorama project access road, south-south east of Outside Well. At: 50K 07-39-251 UTM 76-86-642 (from GPS unit).

Notes: 1): This unit mostly has a quite high cover of *Acacia tumida*. 2): It differs mostly in that *Triodia schinzii* is replaced by *Triodia lanigera*. 3): Further south, the unit has a patch where *Acacia ancistrocarpa* and *Grevillea wickhamii* ssp. *aprica* are common. The area was burnt about 18 months ago.

#### **M25**

*Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia ancistrocarpa* (*Acacia inaequilatera*) high shrubland to open shrub over *Triodia lanigera* hummock grassland.

Associated species: *Solanum phlomoides*, *Indigofera monophylla* (small calyx form), *Heliotropium skeleton*, *Bonamia linearis*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Sida cardiophylla*, *Cassia notabilis*, *Goodenia stobbsiana*, *Paraneurachne muelleri*, *Hakea lorea* ssp. *lorea*, *Isotropis atropurpurea*, *Aristida holathera* var. *holathera*, *Mollugo molluginis*, *Goodenia microptera*.

Habitat and Soil: Gently undulating plain. Orange-brown sandy loam (set hard) with a thin surface cover of fine to medium grained siliceous sand. Date: 21/10/2001. Photo: Roll1. MP10 Volvo under a tree in background. vegetation burnt. Photo 11 taken 1.8km to the south, in an area not burnt for +/-10 years. The *Grevillea* was near its mature height, but the *Acacia* was still immature (2-2+m) and the *Triodia* was still small.

Location: Panorama project access road. South of Outside Well. At: 50K 07-39-043 UTM 76-86-002 (from GPS unit).

Notes: Similar to P13. Burnt about 12 to 18 months ago before recorded. There is a significant possibility that the amount of *Grevillea wickhamii* ssp. *aprica* is seral; ie. after long periods without fire there might be much less.

**M26**

*Corymbia hamersleyana* scattered low trees over *Acacia bivenosa*, *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia lanigera*, *Triodia brizoides* hummock grassland.

Associated species: *Acacia inaequilatera*, *Goodenia stobbsiana*, *Grevillea wickhamii* ssp. *aprica*.

Habitat and Soil: Rounded top of a spur from the plain towards the Shaw River. Very pebbly/gravelly red-brown loam. Date: 22/10/2001.

Location: Panorama project access road. At: 50K 76-80-000 UTM (from GPS unit).

Notes: This site is in a transition zone between T16 *Triodia lanigera* and a *Triodia brizoides* unit which seems to occur on the lower (more pebbly/less sandy) slopes.

**M27**

*Petalostylis labicheoides*, *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* closed shrubland to closed scrub over *Goodenia stobbsiana* scattered low shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Triodia epactia*, *Acacia stellaticeps*.

Habitat and Soil: Slight flow lines at the head of a broad low (small) valley/gully between two spurs from the edge of the plain down towards the Shaw River. Very pebbly/gravelly red-brown loam. Date: 22/10/2001. Photo: Roll1. MP? (Hills in background, view to east south east).

Location: Panorama project access road. At: 50K 07-39-042 UTM 78-79-981 (from GPS unit).

Notes: The stands are patches go 40m long. Burnt about 3 to 4 years ago, *Acacia acradenia* (juvenile, < 1m tall). Similar creek at 79046 has an *Acacia acradenia* stand (very similar, but about 200m long).

**M28**

*Triodia angusta*(Shaw River form) hummock grassland.

Associated species: *Acacia stellaticeps*, *Sclerolaena hostilis*, *Sporobolus australasicus*, *Brachyachne prostrata*, *Acacia bivenosa*, *Acacia inaequilatera*, *Cassia notabilis*, *Heliotropium* sp., *Oldenlandia crouchiana*.

Habitat and Soil: Gentle lower slopes of a very open small valley between two low spurs, the valley leads down towards the river from the plain. Red-brown gravelly sandy loam, loose (changes lower down slope to a pale brown sandy loam). Date: 22/10/2001. Photo: Roll1. MP? (hills, river and fire in background)

Location: Panorama project access road. At: 50K 07-39-170 UTM 76-79-939 (from GPS unit).

Notes: 1): A slight flow line has some species of damp wet sites (*Eragrostis cumingii*, *Pluchea rubelliflora*, *Stemodia grossa*, *Phyllanthus maderaspatensis*. 2): In places the *Sclerolaena* forms small patches of low open shrubland. 3): Flow areas next to slight flow lines were quite diverse. 4): Where a similar open small valley was looked at (50K-07-39-592 UTM 76-79-253) there were small areas of *Triodia wiseana* hummock grassland. There are larger areas of this vegetation (eg. near a granite outcrop to the east) on the lower ends of the spurs (outside 500m zone). The *Heliotropium* sp. was on the lower slopes and open areas.

**M29**

*Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* scattered tall shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Indigofera monophylla* (small calyx form), *Ptilotus calostachyus* var. *calostachyus*, *Oldenlandia crouchiana*, *Mollugo molluginis*, *Goodenia stobbsiana*, *Heliotropium skeleton*, *Cleome viscosa*, *Goodenia microptera*, *Eriachne pulchella*, *Polymeria* sp. (H94-6), *Cleome uncifera*.

Habitat and Soil: Lower part of the crest of a low spur running from the plain towards the river (ie: east to east south east). Brown gravelly/pebbly loam (pebbles of very mixed types). Date: 22/10/2001.

Location: Panorama project access road. At: 50K 07-39-216 UTM 76-80-137 (from GPS unit).

Notes: Burnt about 12 to 18 months ago.

**M30**

*Corymbia hamersleyana* scattered low trees over *Acacia ancistrocarpa* high open shrubland to high shrubland over *Triodia lanigera* hummock grassland.

Associated species: *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Cassia notabilis*, *Ptilotus calostachyus* var. *calostachyus*, *Bonamia rosea*, *Goodenia microptera*, *Mollugo molluginis*, *Bonamia pannosa*, *Heliotropium skeleton*, *Sida cardiophylla*, *Sida echinocarpa*.

Habitat and Soil: Gently sloping edge of a plain as it approaches the nearby hills. Sandy red-brown loam with thin sand cover. Pebbly in places. Date: 23/10/2001.

Location: Panorama project access road. At: 50K 07-38-886 UTM 76-79-499 (from GPS unit).

Notes: Burnt about 18 months before recorded. Population of *Abutilon trudgenii* (counted 13 individuals, most in a slight flow line to the north-north-west from near the road. 300m to the south the unit includes a small flowline with *Corymbia hamersleyana* scattered low trees over *Acacia tumida* (not *Acacia ancistrocarpa*) high open scrub over *Triodia lanigera* hummock grassland. This flowline was on the border between this and the adjoining *Triodia brizoides* unit.

**M31**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Corchorus parviflorus*, *Hakea lorea* ssp. *lorea*, *Cassia notabilis*, *Abutilon trudgenii* (2 plants seen), *Gossypium australe* (Burrup Peninsula form), *Carissa lanceolata* (one large spiny shrub).

Habitat and Soil: Gentle slope (to the south east). Orange-brown sandy loam (clayey). Date: 23/10/2001.

Location: Panorama project access road. At: 50K 07-39-044 UTM 78-77-800 (from GPS unit).

Notes: Mostly burnt +/- 10 years ago, but an area nearby burnt +/- 2 years ago. Boundary to *Triodia lanigera* at 50K 07-39-125 UTM 78-78-306

**M32**

*Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*, *Cullen stipulaceum*, *Corymbia hamersleyana*.

Habitat and Soil: Slight rise on the plain. Light brown gravelly loam with some 'calcrete' pebble. Date: 23/10/2001.

Location: Panorama project access road. At: 50K 07-38-732 UTM 76-78-108 (from GPS unit).

### **M33**

*Eriachne benthamii*, *Chrysopogon fallax* tussock grassland.

Associated species: *Pluchea tetranthera* (40cm tall), *Alternanthera nodiflora*, *Eragrostis* sp., *Aristida latifolia*, *Triodia epactia*, *Sida* aff. *fibulifera*, *Rhynchosia* cf. *minima*, *Goodenia* (in the creek), *Sesbania* (dead).

Habitat and Soil: Small 'collapse' hole (depression) about 13m long, 3-5m across at the outer edge. Red-brown cracking clay. Date: 23/10/2001.

Location: Panorama project access road. At: 50K 07-39-025 UTM 76-78-274 (from GPS unit).

Notes: Small areas like M33 and some small areas of loose cracking clay occur within vegetation similar to M31. One small area (west of the landing field and stock yards) of cracking clay that had been burnt had *Cullen stiplaceum* over *Corchorus parviflorus*, over *Sida* aff. *fibulifera*.

### **M34**

*Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* scattered (tall) shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Acacia glaucochaesia*, *Grevillea wickhamii* ssp. *aprica*, *Trichodesma zeylanicum* var. *zeylanicum*, *Salsola tragus*, *Acacia acradenia*, *Acacia ancistrocarpa*, *Corymbia hamersleyana*, *Oldenlandia crouchiana*, *Corchorus parviflorus*, *Goodenia microptera*, *Ptilotus auriculifolius*, *Cassia notabilis*, *Cleome viscosa*, *Scaevola amblyanthera* var. *centralis*, *Tribulus* sp., *Streptoglossa* sp.

Habitat and Soil: Lower spur (from the hill to the south), gentle northerly facing slope. Light brown gravelly-pebbly (cobble) loam (calcareous deposits in some outcrop in places). Nearby road pale brown (calcareous). This is a short distance up slope from P21. Date: 24/10/2001. Photo: Roll1. MP? (burnt hills in the background)

Location: Panorama project access road. At: 50K 07-41-158 UTM 76-75-620 (from GPS unit).

Notes: Varies to *Triodia* hummock grassland with very few shrubs. Slight rise just north of M34 has *Acacia bivenosa* (ie: P21 area). Also varies, lower down slope to include areas with scattered *Corymbia hamersleyana* over *Acacia ancistrocarpa*.

### **M35**

*Acacia inaequilatera* scattered tall shrubs over *Acacia glaucochaesia* scattered shrubs over *Triodia epactia*, \**Cenchrus ciliaris* grassland.

Associated species: *Atalaya hemiglauca*, *Acacia ancistrocarpa*, *Acacia tumida*, *Indigofera colutea*, *Rhynchosia* cf. *minima*, *Pluchea tetranthera*, *Corchorus parviflorus*, *Pterocaulon sphaeranthoides*, *Carissa lanceolata*, *Alysicarpus muelleri*, *Tephrosia supina*, *Salsola tragus*, *Aristida contorta*, *Corymbia aspera* (stunted), *Ptilotus murrayi* var. *murrayii*, *Acacia acradenia*.

Habitat and Soil: Flat area between two branches of a creek. Dull reddish-brown loamy fine sand to sandy loam (clay?). Date: 24/10/2001. Photo: Roll1. MP? (volvo in the background).

Location: Panorama project access road. At: 50K 07-40-503 UTM 76-76-251 (from GPS unit).

### **M36**

*Corymbia ?aspera* low open woodland over *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia pyrifolia* (slender, white), *Acacia acradenia* high open shrubland over \**Cenchrus ciliaris* *Triodia epactia* (*Chrysopogon fallax*, *Bothriochloa*) grassland.

Associated species: *Acacia farnesiana*, *Carissa lanceolata*, *Ipomoea muelleri*, *Eriachne benthamii*, *Bothriochloa* sp., *Malvastrum americanum*, *Atalaya hemiglauca*, *Chrysopogon fallax*, *Cullen stipulaceum*, *Acacia ancistrocarpa*, *Acacia trachycarpa*, *Acacia pyrifolia* (slender, white), *Santalum lanceolatum*, *Corchorus parviflorus*, *Hakea lorea* ssp. *lorea*, *Sida* aff. *fibulifera*, *Indigofera monophylla* (PAN 58-17), *Polymeria* aff. *calycina*, *Lysiana casuarinae*, *Acacia glaucocaesia*.

Habitat and Soil: Broad flowline to medium sized creek, without an incised bed. Dull light red-brown clay loam. Date: 24/10/2001.

Location: Panorama project access road. At: 50K 07-40-451 UTM 76-76-376 (from GPS unit).

Notes: In places this unit has narrow cracking clay soil 'gutters' <1m deep <1m wide. These have *Eriachne benthamii*, *Bothriochloa* sp. grassland along their edge. At the edges of the creek, there are stands of *Acacia acradenia* (in places). Where the site has not been burnt the *Acacia glaucocaesia* is 2.5-4m tall and the *Acacia trachycarpa* is > 3m tall. The edges of the stand grade to *Corymbia hamersleyana* low open woodland with more *Triodia epactia* than \**Cenchrus*. Shrub layer very variable. In places *Acacia glaucocaesia* replaces *Acacia tumida*. Some large patches of *Carissa lanceolata*.

### **M37**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Corchorus parviflorus* open heath [seral] over *Triodia epactia* hummock grassland.

Associated species: *Cullen* aff. *lachnostachys* (MET 15,154), *Cullen stipulaceum*, *Acacia glaucocaesia*, *Gossypium australe*, *Cassia notabilis*, *Sporobolus australasicus*, *Ptilotus auriculifolius*, *Abutilon trudgenii* (see note), \**Cenchrus ciliaris*, *Sida ?echinocarpa*, *Solanum diversiflorum*, *Acacia ancistrocarpa*, *Chrysopogon fallax*, *Bonamia* sp, *Ptilotus axillaris*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Polymeria* aff. *ambigua*.

Habitat and Soil: Gently sloping area, extends down towards (into) M35. Red-brown sandy loam (clayey?). Date: 24/10/2001.

Location: Panorama project access road. At: 50K 07-40-342 UTM 76-76-101 (from GPS unit).

Notes: The vegetation recorded at M37 runs west to a creek that runs south to north (This creek has *Corymbia hamersleyana*, *Acacia acradenia*, \**Cenchrus ciliaris*, *Triodia epactia*).

### **M38**

*Acacia orthocarpa* open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Tribulus suberosus*, *Cassia venusta*, *Corchorus parviflorus*, *Mollugo molluginis*, *Trichodesma zeylanicum* var. *zeylanicum*, *Bulbostylis barbarta*, *Sida* sp. A Kimberley Flora, *Amaranthus* sp., *Cleome viscosa*, *Solanum diversiflorum*, *Solanum*

*horridum*, *Hibiscus coatesii*, *Cassia notabilis*, *Solanum phlomoides*, *Abutilon ?lepidum* (shrub 1m died back), *Cymbopogon ambiguus*.

Habitat and Soil: North facing moderate to steep slopes. Brown gravelly-pebbly loam amongst rocks and outcrop. Date: 24/10/2001. Photo: Roll1. MP? (taken from above)

Location: Panorama project access road. At: 50K 07-41-337 UTM 76-74-848 (from GPS unit).

Notes: Burnt about  $\leq 18$  months before recorded. There were some patches of *Acacia ptychophylla* on the slopes and some areas where *Tephrosia* aff. *rosea* (HD 292-37) occurs as a fireweed (lower to mid slopes). Other patches (lower slopes) where one of the forms of *Indigofera monophylla* occurs as a fireweed, with quite high cover. *Cassia glutinosa* and *Euphorbia* sp. also on the lower slopes *Acacia inaequilatera* occurs on the very lower slopes.

### **M39**

*Corymbia hamersleyana* low open woodland over *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Acacia tumida* high open shrubland to high shrubland over *Corchorus parviflorus* low open heath (seral) over \**Cenchrus ciliaris*, *Triodia epactia* grassland.

Associated species: *Trichodesma zeylanicum* var. *zeylanicum*, *Pherocaulon sphaeranthoides*, *Solanum diversiflorum*, *Gossypium australe* (Burrup Peninsula form), *Acacia ancistrocarpa*, *Atalaya hemiglauca*, *Crotalaria cunninghamii*, *Cassia notabilis*, *Ptilotus auriculifolius*, *Cullen* aff. *lachnostachys* (MET 15,154), *Chrysopogon fallax*, *Boerhavia repleta*, *Euphorbia* sp., *Tephrosia* aff. *rosea* (HD 292-37), *Cymbopogon procerus*, *Acacia trachycarpa*, *Stemodia grossa*, *Pluchea tetranthera*, *Cullen stipulaceum*, *Corchorus parviflorus*, *Indigofera monophylla* (PAN 58-17).

Habitat and Soil: Broad floodbanks of a creek line, which has a small defined channel. Light brown sandy loam. Date: 24/10/2001.

Location: Panorama project access road. At: 50K 07-40-091 UTM 76-75-231 (from GPS unit).

Notes: Burnt about 3 years ago. The *Corymbia hamersleyana* was common.

### **M40**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Trichodesma zeylanicum* var. *zeylanicum*, *Cassia glutinosa*, *Tephrosia supina*, *Scaevola amblyanthera* var. *centralis*, *Ptilotus clementii*, *Corchorus parviflorus*, *Salsola tragus*, *Solanum diversiflorum*, *Solanum phlomoides*, \**Cenchrus ciliaris*, *Acacia acradenia*, *Bonamia* sp. (H94-6), *Cassia notabilis*, *Hibiscus leptocladus*, *Streptoglossa macrocephala*, *Cullen stipulaceum*, *Oldenlandia crouchiana*, *Sida cardiophylla*, *Mukia maderaspatana*, *Acacia bivenosa*, *Euphorbia australis*, *Heliotropium* sp.

Habitat and Soil: The upper and top slopes of a low rise. Gravelly-pebbly light brown loam (calcareous). Date: 24/10/2001.

Location: Panorama project access road. At: 50K 07-39-780 UTM 76-75-444 (from GPS unit).

Notes: Extends a long way to the east and west. At 50K 07-39-690 UTM 76-75-595, the grassland changes to *Triodia epactia* (going north), in a 'small' depression. Changes back to *Triodia wiseana* at 50K 07-39-463 UTM 76-75-721 (lower, southern, slope of another calcareous rise) which extends >200m? north and north west. The

depression has *Acacia glaucocaesia* high open shrubland over *Triodia epactia* hummock grassland. It also has some areas of cracking clay with *Eragrostis xerophila* open tussock grassland.

#### **M41**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland to open scrub over *Indigofera monophylla* (PAN 65-14) (low) open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Corchorus parviflorus*, *Hybanthus aurantiacus*, *Hibiscus leptocladus*, \**Cenchrus ciliaris*, *Goodenia stobbsiana*, *Trichodesma zeylanicum* var. *zeylanicum*, *Rhynchosia* cf. *minima*, *Grevillea wickhamii* ssp. *aprica*, *Paraneurachne muelleri*, *Solanum diversiflorum*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Cleome viscosa*, *Acacia ancistrocarpa*, *Polymeria* aff. *calycina*.

Habitat and Soil: Small creek between low spurs. Soft red-brown clayey loam. Date: 25/10/2001.

Location: Panorama project access road. At: 50K 07-39-890 UTM 76-74-705 (from GPS unit).

Notes: Burnt about 5 years ago. Creeks to the east of P23 have similar vegetation, some with much less *Acacia tumida* and more *Petalostylis* (burnt). There is also some to the west. Others have *Acacia acradenia* (eg: M41).

#### **M42**

*Corymbia hamersleyana* low open woodland to low woodland over *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Acacia tumida* high open shrubland to high shrubland over \**Cenchrus ciliaris*, *Triodia epactia* grassland.

Associated species: *Trichodesma zeylanicum* var. *zeylanicum*, *Solanum horridum*, *Solanum diversiflorum*, *Rhynchosia* cf. *minima*, *Euphorbia* sp. (site 1089), *Atalaya hemiglauca*, *Ficus opposita* var. *indecora*, *Tinospora smilacina*, *Mukia maderaspatana*, *Corchorus* (= PAN25), *Solanum phlomoides*, *Indigofera monophylla* (PAN 58-17), *Carissa lanceolata*, *Acacia tumida*, *Swainsona formosa*, *Pterocaulon sphaeranthoides*, *Stemodia grossa*, *Wahlenbergia tumidifruca*, *Pluchea ferdinandi-muelleri*, *Pluchea rubelliflora*, *Pluchea tetranthera*, *Cullen* aff. *lachnostachys* (MET 15,154), *Tephrosia rosea* var., *Sida cardiophylla*, *Polymeria* aff. *calycina*, *Cullen stipulaceum*, *Sida clementii*.

Habitat and Soil: Medium sized creek with a narrow channel and broad flow area on each side (flood plains). Red-brown sandy loam. Date: 25/10/2001.

Location: Panorama project access road. At: 50K 07-39-397 UTM 76-74-485 (from GPS unit).

Notes: Upstream from M39. Vegetation very similar.

#### **M43**

*Corymbia hamersleyana* scattered low trees over *Triodia* sp. Panorama open hummock grassland over \**Cenchrus ciliaris* open grassland.

Associated species: *Pterocaulon sphaeranthoides*, *Solanum diversiflorum*, *Corchorus parviflorus*, *Salsola tragus*, *Sida* aff. *fibulifera* (=M31), *Dysphania rhadinostachya* ssp. *rhadinostachya*, *Trianthema* aff. *triquetra* (M3-35), *Stemodia grossa*, \**Aerva javanica*, *Tephrosia* aff. *supina* (HD 237-23), *Acacia inaequilatera*, *Acacia ancistrocarpa*, *Chrysopogon fallax*, *Triodia epactia*, *Abutilon trudgenii* (2 plants), *Sporobolus australasicus*, *Rhynchosia* cf. *minima*.



Habitat and Soil: Gentle slope to flattish area on the north side of a medium sized creek, above the flood plain. O a lower gradient than most of the slopes from the rise next to the creek into it. Dull brown sandy loam. Date: 25/10/2001.

Location: Panorama project access road. At: 50K 07-39-389 UTM 76-74-531 (from GPS unit).

Notes: Area much too small to map. The *Triodia* sp. Panorama extends out of this small area onto the stony ridge, but the character of the vegetation otherwise becomes more typical of the ridge (=M40). About 30m upslope it changes to *Triodia wiseana*.

#### **M44**

*Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama, (*Triodia epactia*), hummock grassland with *Corchorus parviflorus* scattered low shrubs to low open heath [seral]

Associated species: *Cassia notabilis*, *Salsola tragus*, *Cassia 'symonii'*, *Cleome viscosa*, *Solanum diversiflorum*, *Chrysopogon fallax*, *Tephrosia clementii*.

Habitat and Soil: Flat to very gentle slope to the north. Gravelly bright orange-brown loam with a gravelly-pebbly surface (mostly dark gravel). Date: 25/10/2001. Photo: Roll1. MP? (dead grass).

Location: Panorama project access road. At: 50K 07-39-090 UTM 76-74-684 (from GPS unit).

Notes: Most of the area has been burnt about 12-18 months ago but patches (?more open) were not burnt. Old (not antique) pebble mound nearby (30m to NNE) (near M44 location). At 50K 07-39-053 UTM 76-74-741. The *Triodia* changes to *Triodia epactia* but otherwise the vegetation is very similar. At 50K 07-38-975 UTM 76-74-824. There is a cracking clay patch with *Eriachne benthamii* tussock grassland about 25x8m.

Associated species: *Dichanthum sericeum* ssp. *humilius*, *Aristida latifolia*, *Chrysopogon fallax*, *Sida fibulifera*, *Ptilotus gomphrenoides* var. *gomphrenoides*.

#### **M44A**

North of 50K 07-39-090 UTM 76-74-684 (from GPS unit) the vegetation changes to a mosaic of cracking clay types including annual grassland of *Dichanthum sericeum* ssp. *humilius*, *Eragrostis xerophila* tussock grassland. This is a swale between low rises. Changes back to *Triodia epactia* and the ground rises to the north. Assoc: *Abutilon malvifolium*, *Ptilotus gomphrenoides* var. *gomphrenoides*, *Crotalaria dissitiflora* ssp. *benthamii*, *Neptunia dimorphantha*. At 50K 07-38-831 UTM 76-74-903. North of here mosaic of small patches of *Triodia epactia* and cracking clay types, including patches of *Cassia oligophylla* low open shrubland over *Dichanthum sericeum* ssp. *humilius* annual grassland and scattered *Triodia epactia*, some areas with *Acacia glaucocoesia* scattered tall shrubs.

#### **M45**

*Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

Associated species: *Indigofera monophylla* (small calyx form), *Goodenia stobbsiana*, *Dampiera candicans*, *Triodia epactia*, *Trichodesma zeylanicum* var. *zeylanicum*, *Corchorus parviflorus*.

**Habitat and Soil:** Lower end of a long gently sloping colluvial spur. Gravelly-pebbly red-brown loam with a gravelly-pebbly (cobbles) surface layer. **Date:** 25/10/2001. **Location:** Panorama project access road. At: 50K 07-39-510 UTM 76-74-167 (from GPS unit).

**Notes:** Burnt about 3-5 years before recorded. Nearby, at 50K 07-39-066 UTM 76-73-434 there was a creek line with a very large population of *Cullen* aff. *lachnostachys* (MET 15,154) (also the creeks to the west).

#### **M46**

*Tephrosia* sp. B (Kimberley Flora) scattered shrubs to open shrubland over *Triodia epactia* hummock grassland.

**Associated species:** *Cymbopogon ambiguus*, \**Cenchrus ciliaris*, *Trichodesma zeylanicum* var. *zeylanicum*, *Clerodendrum floribundum* var. *angustifolium*, *Cassia oligophylla*, *Indigofera monophylla* (PAN 65-14), *Cassia glutinosa*, *Acacia inaequilatera*, *Oldenlandia crouchiana*, *Ventilago viminalis*, *Solanum phlomoides*, *Acacia ancistrocarpa*, *Ptilotus auriculifolius*.

**Habitat and Soil:** Very rocky crest and moderate slopes, of a small hill rising fairly abruptly from a plain. Red-brown loam amongst boulders, cobbles and outcrop.

**Date:** 25/10/2001.

**Location:** Panorama project access road. At: 50K 07-37-542 UTM 76-73-573 (from GPS).

#### **M47**

*Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

**Associated species:** *Ptilotus auriculifolius*, *Cassia notabilis*, *Sida cardiophylla*, *Acacia inaequilatera*, *Ptilotus axillaris*, *Eriachne pulchella*, *Trichodesma zeylanicum* ssp. *zeylanicum*, *Acacia glaucocaesia*, *Bulbostylis barbata*, *Cassia 'symonii'*, *Sporobolus australasicus*, *Heliotropium skeleton*, *Corchorus parviflorus*, *Cleome viscosa*, *Cassia glutinosa*, *Aristida contorta*, *Solanum horridum*, *Mollugo molluginis*, *Dysphania rhadinostachya*.

**Habitat and Soil:** Very gentle slopes (southerly and northerly). Orange-brown sandy loam gravelly to pebbly in places. **Date:** 25/10/2001.

**Location:** Panorama project access road. At: 50K 07-37-588 UTM 76-73-567 (from GPS unit).

**Notes:** Dead, burnt *Acacia ancistrocarpa* to > 2m. Includes some small groves of *Corymbia hamersleyana* low open woodlands over *Acacia tumida* and others over *Acacia ancistrocarpa*. At 50K 07-37-789 UTM 76-73-242. Large population (> 50 plants) of *Abutilon trudgenii*.

#### **M48**

*Acacia tumida* (*Acacia inaequilatera*) scattered tall shrubs to high open shrublands over *Acacia ancistrocarpa*, *Acacia acradenia* high open shrubland over *Triodia epactia* hummock grassland.

**Associated species:** *Cassia glutinosa*, *Grevillea wickhamii* ssp. *aprica*, *Ptilotus calostachyus* var. *calostachyus*, *Acacia* sp. (Panorama M48), *Dodonaea coriacea*, *Goodenia stobbsiana*, *Hakea lorea* ssp. *lorea*, *Triumfetta clementii*, *Cullen pogonocarpum*, *Ptilotus fusiformis* var. *fusiformis*, *Cymbopogon obtectus*, *Solanum horridum*.

Habitat and Soil: Gentle northerly facing slopes. Red-brown gravelly-pebbly loam with gravel surface. Date: 25/10/2001.

Location: Panorama project access road. At: 50K 07-37-800 UTM 76-72-418 (from GPS unit).

Notes: Not burnt for >10 years. The *Acacia* species tend to be in small groups with small open areas of *Triodia* between them. Grades upslope (towards the base of the ridge) to *Triodia epactia* hummock grassland with the *Acacia* species (mainly *Acacia tumida*) on the slight flow lines. There were some larger open areas on the lower slopes as well. North of M48 the ecotone to M47 is broad and has some *Acacia bivenosa* and *Acacia glaucocaesia* in the shrub layer and scattered *Triodia* sp. Panorama in the grassland layer.

### **M50**

*Eriachne benthamii* tussock grassland.

Associated species: *Cullen stipulaceum* (one plant), *Crotalaria dissitiflora* ssp. *benthamii*, *Streptoglossa bubakii*, *Goodenia lamprosperma*, *Neptunia dimorphantha*, *Ptilotus murrayi* var. *murrayi*, *Eragrostis xerophila*, *Dichanthium sericeum* ssp. *humilis*.

Habitat and Soil: Cracking clay patch on a gentle slope about 40 x 10m. Has a sinkhole (gutter) along the centre. Light brown sandy clay. Has black algal crust in places. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-37-322 UTM 76-72-290 (from GPS unit).

Notes: The *Cullen* is not typical in this vegetation type.

### **M51**

*Streptoglossa bubakii* open annual herbland over *Ptilotus murrayi* var. *murrayi*, *Fimbristylis* sp. annual herbland/sedgeland

Associated species: *Brachyachne convergens*, *Ptilotus murrayi* var. *murrayii*, *Rhynchosia* cf. *minima*.

Habitat and Soil: Cracking clay patch. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-37-322 UTM 76-72-290 (from GPS unit).

### **M52**

*Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

Associated species: *Goodenia stobbsiana*, *Corchorus parviflorus*, *Acacia glaucocaesia*, *Acacia ancistrocarpa*, *Solanum phlomoides*, *Acacia bivenosa*, *Indigofera monophylla* (PAN 58-17), *Grevillea pyramidalis*.

Habitat and Soil: Gentle slopes to the north and a low crest. Bright orange-brown gravelly sandy loam. Date: 26/10/2001. Photo: Roll1. MP?

Location: Panorama project access road. At: 50K 07-37-071 UTM 76-72-523 (from GPS unit).

Notes: Where fairly recently burnt, *Goodenia stobbsiana* was very common. Includes some small areas of *Triodia wiseana* on the lower slopes (near the border to vegetation =M47). No *Acacia glaucocaesia* or *Acacia bivenosa* in this burnt area, or on much of the releve.

**M53**

*Acacia inaequilatera* occasional tall shrubs over *Triodia* sp. Panorama hummock grassland. Varies downslope and to the north west to *Triodia* sp. Panorama, *Triodia epactia*

Associated species: *Acacia acradenia*, *Aristida contorta*, *Triodia epactia*, *Corchorus parviflorus*, *Pterocaulon sphacelatum* × *sphacelatum*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Acacia ancistrocarpa*, *Hibiscus coatesii*, *Cassia notabilis*, *Rhynchosia* cf. *minima*, *Trichodesma zeylanicum* var. *zeylanicum*, *Pterocaulon serrulatum*, *Triumfetta clementii*, *Trachymene* aff. *oleracea*, *Abutilon trudgenii* (one plant), *Eriachne pulchella*, *Boerhavia gardneri*, *Triumfetta maconochieana*.

Habitat and Soil: Gentle north facing slopes. Bright orange-brown gravelly loam (dark gravel was common on the surface). Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-37-249 UTM 76-71-964 (from GPS unit).

Notes: At 50K 07-37-629 UTM 76-71-410 changes to *Triodia brizoides* (see M54) and *Triodia* sp. (Long transect for records of associated species). Small upper flowlines have, 1): *Grevillea wickhamii* ssp. *aprica* high shrubland to open scrub. 2): *Grevillea wickhamii* ssp. *aprica*, *Petalostylis* high shrubland with occasional *Acacia inaequilatera* over *Dampiera candicans* low open shrubland over *Triodia epactia*, *Triodia* sp. Panorama hummock grassland.

**M53A**

*Acacia inaequilatera*, *Acacia acradenia*, *Petalostylis labicheoides* high shrubland over *Triodia* sp. Panorama hummock grassland.

Associated species: *Tephrosia rosea* var., *Scaevola amblyanthera*, *Goodenia stobbsiana*, *Corchorus parviflorus*, *Grevillea pyramidalis*, *Mukia maderaspatana*, *Andrachne*, *Trichodesma zeylanicum* var. *zeylanicum*, *Rhynchosia* cf. *minima*, *Ficus opposita* var. *indecora*, *Clerodendrum floribundum* var. *angustifolium*.

Habitat and Soil: Small creekline on gentle slopes. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-37-346 UTM 76-71-676 (from GPS unit).

**M54**

*Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Solanum phlomoides*, *Indigofera monophylla* (PAN 65-14), *Pluchea tetranthera*, *Dampiera candicans*, *Streptoglossa decurrens?* (dead), *Ptilotus calostachyus* var. *calostachyus*, *Sida cardiophylla*, *Fimbristylis* sp., *Tephrosia* (sp. small), *Dodonaea coriacea*, *Gossypium australe* (Whim Creek form).

Habitat and Soil: Lower to middle north facing slopes of a ridge. Dull red-brown gravelly, pebbly (cobble) loam with gravel/pebble surfaces. Date: 26/10/2001.

Photo: Roll1. MP? (*Acacia inaequilatera*)

Location: Panorama project access road. At: 50K 07-37-737 UTM 76-71-327 (from GPS unit).

Notes: Has *Indigofera* aff. *monophylla* (PAN 65-14) low shrubland layer in places (?seral). Not burnt for more than > 8-10 years ago.

**M55**

*Corymbia ferriticola* ssp. *ferriticola*, *Ficus platypoda* var. D scattered low trees/tall shrubs over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over patches of *Acacia orthocarpa* shrubs over *Triodia epactia* (*Eriachne mucronata* (typical form)) open grassland to grassland.

Associated species: *Solanum phlomoides*, *Cymbopogon ambiguus*, *Atalaya hemiglauca*.

Habitat and Soil: Steep rocky stabilised scree slopes and cliffs. Pebbly to cobbly red-brown gravelly loam. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-37-737 UTM 76-71-280 (estimated).

Notes: The *Eriachne mucronata* was on the rocks only.

**M56**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* high shrubland to open scrub over *Tephrosia* sp. B (Kimberley Flora) shrubland to open heath [seral] over *Corchorus parviflorus* low shrubland [seral] over *Triodia epactia* open hummock grassland to hummock grassland.

Associated species: *Stemodia grossa* *Pterocaulon sphaeranthoides* x *sphacelatum*, *Gossypium australe* (Burrup Peninsula form), *Tephrosia* aff. *rosea* (HD 292-37), *Grevillea pyramidalis*, *Pentalepis trichodesmoides*, *Pluchea rubelliflora*, *Rhynchosia* cf. *minima*, *Cassia notabilis*, *Swainsona formosa*, *Solanum diversiflorum*, *Polymeria* aff. *ambigua* (common), *Euphorbia* sp. (site 1089), *Tephrosia supina*, *Mollugo molluginis*.

Habitat and Soil: Small to medium sized flowline/creek between slight rises. Light brown gravelly sandy loam. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-36-890 UTM 76-71-448 (from GPS unit).

**M57**

*Acacia acradenia* scattered tall shrubs over *Pluchea ferdinandi-muelleri* low shrubland with *Triodia epactia*, \**Cenchrus ciliaris* grassland.

Associated species: *Hakea lorea* ssp. *lorea*, *Acacia glaucocoesia*, *Indigofera monophylla* (PAN 65-14), *Sida echinocarpa*, *Solanum diversiflorum*, *Cullen leucanthum*, *Cassia notabilis*, *Trianthema triquetra*, *Acacia trachycarpa*, *Goodenia lamprosperma*, *Triodia brizoides*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Cullen stipulaceum*, *Cleome viscosa*, *Mollugo molluginis*, *Eragrostis eriopoda*, *Stemodia grossa*, *Trianthema pilosa*, *Triodia* sp. Panorama, *Pluchea rubelliflora*, *Neptunia dimorphanta*, *Streptoglossa decurrens*, *Heliotropium* sp, *Euphorbia coghlanii*, *Crotalaria cunninghamii*.

Habitat and Soil: Floodplain of a medium sized creek. Light brown medium grained sand (some fine material). Date: 26/10/2001. Photo: Roll1. MP?24 (low shrubs - white trees RHS)

Location: Panorama project access road. At: 50K 07-36-039 UTM 76-71-056 (from GPS unit).

Notes: The hills north of the creek vegetation = P31.

**M58**

*Tephrosia* sp. B (Kimberley Flora) shrubs over *Triumfetta propinqua* low open shrubland over *Triodia epactia*, *Cymbopogon ambiguus* grassland.

Associated species: \**Aerva javanica*, *Acacia pyrifolia* (slender, white), *Salsola tragus*, *Paspalidium tabulatum* (Whim Creek form), *Solanum diversiflorum*, *Nicotiana benthamiana*, *Amaranthus* sp., *Mukia maderaspatana*, *Triodia brizoides*, *Solanum horridum*, *Heliotropium* (=M57), *Tribulus suberosus*, *Euphorbia* aff. *drummondii* (HD 195-16), *Corymbia hamersleyana*, *Corchorus parviflorus*, *Indigofera monophylla* (PAN 58-17), *Cleome viscosa*, *Triumfetta clementii*, *Boerhavia gardneri*, *Trachymene* aff. *oleracea* (B61), *Euphorbia tannensis* ssp. *eremophila* (Panorama form).

Habitat and Soil: Outcrop and boulders along the crest of a low west – east trending ridge. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-35-926 UTM 76-70-289 (from GPS unit).

Notes: Burnt about 12-18 months previous to recording. *Euphorbia tannensis* ssp. *eremophila* (Panorama form) was quite abundant. Some patches of *Acacia orthocarpa* on the slopes just below the site. Slopes into the flowline have *Triodia epactia* hummock grassland.

### **M59**

*Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Pluchea tetranthera*, *Corchorus parviflorus*, *Indigofera monophylla* (PAN 58-17), *Grevillea pyramidalis*, *Aristida contorta*, *Triodia brizoides*.

Habitat and Soil: Gentle east to north facing slope of a low spur from a small hill.

Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-35-449 UTM 76-70-158 (from GPS unit).

Notes: The opposite slope (about 30m east) has *Acacia inaequilatera* over *Triodia wiseana*.

### **M60**

*Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

Associated species: *Polycarpaea longiflora* (dead), *Corchorus parviflorus*, *Aristida contorta*, *Triodia brizoides*, *Boerhavia gardneri*, *Acacia bivenosa*, *Indigofera monophylla* (PAN 58-17), *Mollugo molluginis*.

Habitat and Soil: Gently undulating area. Bright orange-brown gravelly loam with strewn of gravel and pebbles. Date: 26/10/2001. Photo: Roll1. MP?26 (Dense *Triodia epactia*, few tall shrubs)

Location: Panorama project access road. At: 50K 07-35-366 UTM 76-70-791 (from GPS unit).

Notes: This vegetation was very extensive to the north, north east and north west. The *Corchorus parviflorus* and the *Indigofera monophylla* (PAN 58-17) were abundant where the area was burnt. There were some patches of *Acacia orthocarpa* (a few, near outcrops). The stand has scattered *Grevillea wickhamii* ssp. *aprica* and *Grevillea pyramidalis* individuals in places (mostly upslope). There was a patch of *Acacia bivenosa* to the north east. Some areas had some *Triodia wiseana* (to the north). There was one small area with quartz strewn on the soil surface. The slope up from the river had about 70 m of *Triodia* sp. Panorama, then a small area of *Triodia wiseana*, then vegetation similar to M60. Where the slopes were more gentle there were larger areas of *Triodia* sp. Panorama next to the creek.

**M61**

*Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

Associated species: *Corchorus* (=M31), *Streptoglossa decurrens*, *Ptilotus astrolasius*.

Habitat and Soil: A dip between two low rises. Soft, light brown loam. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-35-084 UTM 76-70-113 (from GPS unit).

Notes: The soil surface has much whitish (calcareous) material at the GPS point, although the nearby soil was the same, it had dark gravel on the surface.

**M62**

*Acacia glaucocaesia*, *Acacia farnesiana*, scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

Associated species: *Rhynchosia* cf. *minima*, *Streptoglossa decurrens*, *Acacia acradenia*, *Atalaya hemiglauca*.

Habitat and Soil: Broad flow line or creek. Red-brown loam. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-34-776 UTM 76-69-930 (from GPS unit).

Notes: The *Atalaya hemiglauca* were small trees, in two clusters. The vegetation was only like this for about 100-150 m and then turns into the vegetation recorded at M62A.

**M62A**

*Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* (high shrubland to) open scrub over *Triodia epactia* hummock grassland.

Habitat and Soil: Broad flowline or creek. Date: 26/10/2001.

Location: Panorama project access road. At: 50K 07-34-721 UTM 76-69-781 (from GPS unit).

Notes: >50m wide, > 300m long.

**M63**

*Eucalyptus victrix* scattered low trees over *Acacia tumida*, *Acacia trachycarpa* scattered tall shrubs over *Cullen leucanthum* scattered tall shrubs to open scrub over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs to open heath over *Corchorus parviflorus* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

Associated species: *Triodia brizoides*, *Crotalaria cunninghamii*, *Pterocaulon sphaeranthoides* x *sphacelatum*, *Polymeria* aff. *ambigua*, *Atalaya hemiglauca*, *Mukia maderaspatana*, *Ludwigia perennis* (in the creek bed).

Habitat and Soil: Medium sized creek, mostly 'flood plains' (high flow areas) next to the channel (this was about 8m across). Brown sandy loam (hard set). Date: 27/10/2001.

Location: 1.5km West of Lalla Rook Mine. Panorama project access road. At: 50K 07-34-936 UTM 76-70-390 (from GPS unit).

Notes: The density of the *Corchorus parviflorus* and the *Tephrosia* aff. *rosea* (HD 292-37) probably relates to fire age (< 5 years).

**M64**

*Acacia inaequilatera* scattered shrubs over *Indigofera monophylla* (PAN 65-14) low shrubland [seral] over *Triodia* sp. hummock grassland.

Associated species: *Tephrosia* aff. *supina* (material inadequate for further identification).

Habitat and Soil: Slopes of a low hill, up to some rock outcrop at the crest. Light brown, gravelly to cobbly soil, the surface is the same. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-34-941 UTM 76-69-262 (from GPS unit).

Notes: Burnt about 18 months ago. Very species poor.

**M65**

*Acacia orthocarpa* scattered shrubs over *Tephrosia* scattered shrubs over *Triodia angusta* (Panorama form), *Triodia* cf. *brizoides* open hummock grassland.

Associated species: *Gomphrena cunninghamii*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Sida* sp. A Kimberley Flora, *Mukia maderaspatana*, *Triumfetta maconochieana*, *Tribulus suberosus*, *Oldenlandia crouchiana*, *Amaranthus* (dead), *Solanum phlomoides*, *Boerhavia gardneri*, *Indigofera monophylla* (PAN 58-17), *Heliotropium skeleton*, *Polycarpaea longiflora* (Whim Creek form WC 147-7), *Eriachne mucronata* (typical form), *Cassia glutinosa*.

Habitat and Soil: Rocky crest of a low hill. Light brown-brown gravelly-pebbly loam amongst outcrop and boulders. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-34-944 UTM 76-69-246 (from GPS unit).

**M66**

*Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 20-2) low shrubland to open heath [seral] over *Triodia epactia* hummock grassland.

Associated species: *Triodia angusta* (Panorama form), *Tephrosia* aff. *supina* (material inadequate), *Solanum phlomoides*, *Corchorus parviflorus*.

Habitat and Soil: The slopes and crest of a low hill. Dull light red-brown gravelly/pebbly loam, with a pebbly surface. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-34-787 UTM 76-69-107 (from GPS unit).

Notes: The *Triodia angusta* (Panorama form) were only found on rocky areas of the crest. Lower slopes (to at least half way up) to the north are *Triodia* sp. Panorama, between this hill and the hill to the west north west. Very similar to M59. Creeks to the south have *Acacia tumida* over *Acacia acradenia*, and some *Corymbia hamersleyana*.

**M67**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* scattered shrubs to open shrubland over *Triodia wiseana* var. *wiseana* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Pluchea tetranthera*, *Pluchea ferdinandii-muelleri*, *Triodia brizoides*, *Corchorus parviflorus*, *Solanum phlomoides*, *Fimbristylis* sp. (perennial), *Heliotropium skeleton*, *Triodia epactia*.

Habitat and Soil: The mid to upper slopes of a low hill. Dull red-brown loam, very gravelly to cobbly, pebble surface. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-34-280 UTM 76-69-226 (from GPS unit).



Notes: Low areas of *Triodia* sp. Panorama between M64, M67 and the road had some small patches of *Triodia wiseana* on 'calcrete' areas. The crest = M66 but with less rocks. Lower slopes have *Triodia* sp. Panorama.

### **M68**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Acacia tumida* open scrub-scrub over *Tephrosia* aff. *rosea* (HD 292-37) open shrubland over *Corchorus parviflorus* low open shrubland over *Triodia epactia* open hummock grassland.

Associated species: *Polymeria* aff. *ambigua*, *Acacia inaequilatera*, *Scaevola amblyanthera* var. *centralis*, *Tephrosia supina*, *Cassia notabilis*, *Chrysopogon fallax*, *Clerodendrum* sp., *Cullen stipulaceum*, \**Cenchrus ciliaris*.

Habitat and Soil: Small to medium sized creek bed between low rises. Light brown gravelly sandy loam. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-34-023 UTM 76-69-305 (from GPS unit).

Notes: Pebble mound at 50K 07-34-453 UTM 76-69-186 (3 m x 1.5) Has large old dips (and some fresher looking dips). Another south west. At 50K 07-33-970 UTM 76-69-072 Part old and part reused, fairly recent.

### **M69**

*Acacia stellaticeps*, *Pluchea tetranthera* (low) open heath with *Triodia epactia* hummock grassland.

Associated species: *Corchorus parviflorus*, *Sida* sp. A Kimberly Flora, *Petalostylis labicheoides*.

Habitat and Soil: Gentle slopes in the bottom of a small area between hills (on a slight rise between two small creeks). Light pinkish brown, silty, fine to medium grained sand. Date: 27/10/2001. Photo: Roll1. MP?27 (Volvo in the background).

Location: Panorama project access road. At: 50K 07-33-615 UTM 76-68-123 (from GPS unit).

### **M70**

*Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*.

Habitat and Soil: Moderate to steep, north facing colluvial slopes below a ridgeline.

Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-33-749 UTM 76-68-038 (from GPS unit).

Notes: The vegetation recorded at this site formed a strip about 10m wide. Above this strip there is similar vegetation but with *Triodia brizoides*, rather than *Triodia wiseana*, dominant, in a strip about 15m wide.

### **M71**

*Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia orthocarpa* open shrubland to open heath over *Triodia epactia* hummock grassland.

Associated species: *Tephrosia spechtii*, *Ptilotus calostachyus* var. *calostachyus*, *Sida* sp. A Kimberly Flora, *Solanum phlomoides*, *Goodenia stobbsiana*, *Dampiera candicans*, *Dodonaea coriacea*, *Bonamia media* var. *villosa*, *Triumfetta* aff. *chaetocarpa* (Panorama form), *Mollugo molluginis*, *Cyperus cunninghamii* ssp. *cunninghamii*.

Habitat and Soil: Moderate slopes on a ridge complex, south facing. Silty, light pinkish brown, fine to medium grained siliceous sand, amongst pebbles, cobbles and outcrop of granite rocks. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-33-832 UTM 76-67-975 (from GPS unit).

Notes: The creek in a nearby open gully has *Acacia tumida* scrub.

### **M72**

*Grevillea wickhamii* ssp. *aprica*, *Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia epactia* hummock grassland.

Associated species: *Solanum phlomoides*, *Cymbopogon ambiguus*, *Cassia venusta*, *Triodia brizoides*, *Triumfetta maconochieana*, *Eriachne ciliata*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Tribulus suberosus*, *Polycarpaea longiflora* (Whim Creek form WC 147-7), *Tephrosia spechtii* (1 m tall), *Eriachne mucronata* (typical form).

Habitat and Soil: Very steep rocky north facing upper ridge slope. Red-brown gravelly pebbly loam amongst outcrop. (Rock iron and silica, mottled black and white). Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-33-927 UTM 76-68-0-68 (from GPS unit).

Notes: *Triodia brizoides* occurs on the very rockiest parts of the outcrop. A similar area to the east has *Acacia pruinocarpa* high open shrubland as an overstorey.

### **M73**

*Eucalyptus victrix* low open woodland to low woodland over *Acacia tumida* scattered tall shrubs to open scrub over *Cullen leucanthum* scattered tall shrubs to open scrub over *Bothriochloa*, *Triodia epactia*, *Chrysopogon fallax*, *Eriachne* sp. aff. *festucea* grassland.

Associated species: *Flueggea virosa* ssp. *melanthesoides*, *Acacia pyrifolia* (slender, white), *Gossypium robinsonii*, *Grevillea wickhamii* ssp. *aprica*, *Pluchea dentex*, *Swainsona formosa*, *Pterocaulon sphaeranthoides* x *sphacelatum*, *Cassia notabilis*, *Rhynchosia* cf. *minima*, *Euphorbia coghlanii*, *Eriachne obtusa*, *Stemodia viscosa*, *Eragrostis cumingii*, *Alteranthera nana*, *Atalaya hemiglauca*, *Bergia pedicellaris*, *Ludwigia perennis*, *Terminalia canescens*, *Tephrosia* sp. B (Kimberley Flora), *Goodenia lamprosperma*.

Habitat and Soil: Medium sized creekline with a small channel (5m across) and small floodplains. Light brown silty sand (the bed is cobbly). Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-33-264 UTM 76-67-887 (from GPS unit).

Notes: Has a strip a few metres wide of *Triodia epactia* hummock grassland at the outer edge. One large *Acacia tumida*, has become a small tree about 6m tall. The *Atalaya hemiglauca* was common in some places. Some sections have a very open upper shrub layer and less of the hummock grasses.

### **M74**

*Acacia orthocarpa* scattered shrubs (in patches) over *Tephrosia* sp. B (Kimberley flora) scattered shrubs over *Triodia epactia* scattered hummock grasses.

Associated species: *Euphorbia* aff. *drummondii* (HD 195-160), *Triumfetta propinqua*.

Habitat and Soil: Narrow strip of rock outcrop. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-32-932 UTM 76-78-115 (from GPS unit).

Notes: The *Acacia orthocarpa* was in patches. The *Tephrosia* was in the rocky areas.

#### **M75**

*Acacia bivenosa*, *Acacia trachycarpa* scattered shrubs over *Triodia epactia* hummock grassland.

Associated species: *Hakea lorea* ssp. *lorea*, *Solanum phlomoides*, *Sida cardiophylla*, *Corchorus parviflorus*, *Indigofera monophylla* (PAN 58-17), *Acacia inaequilatera*, *Triodia* sp. Panorama, *Goodenia stobbsiana*, *Acacia holosericea*, *Corymbia hamersleyana*.

Habitat and Soil: Gentle slopes to south and south east. Orange-brown silty fine to medium grained sand. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-33-032 UTM 76-67-760 (from GPS unit).

Notes: Has broad transition to adjoining areas of *Triodia* sp. Panorama.

#### **M76**

*Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

Associated species: *Acacia stellaticeps*, *Triodia epactia*, *Goodenia stobbsiana*, *Fimbristylis* (perennial).

Habitat and Soil: Low rises and slopes to a ridge. Orange-brown very gravelly pebbly, silty sand. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-32-734 UTM 76-67-228 (from GPS unit).

Notes: *Acacia stellaticeps* varies from absent to low open shrubland. *Gonocarpus ephemerus* was collected near M76.

#### **M77**

*Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered shrubs over *Acacia stellaticeps* low scattered shrubs to low open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Dampiera candidans*, *Bulbostylis barbata*, *Goodenia stobbsiana*.

Habitat and Soil: Upper colluvial slope below a ridge. Gently sloping. Date: 27/10/2001.

Location: Panorama project access road. At: 50K 07-32-800 UTM 76-67-121 (from GPS unit).

Notes: In low areas *Acacia spondylophylla* replaces *Acacia stellaticeps*. Small flowlines have *Acacia tumida* and *Petalostylis labicheoides*.

#### **M78**

*Tephrosia* aff. *rosea* (HD 292-37) open shrubland to shrubland over *Triodia epactia* hummock grassland.

Associated species: *Corymbia hamersleyana* (stunted), *Acacia tumida*, *Eragrostis eriopoda*, *Synaptantha tillaeacea* ssp. *tillaeacea*, *Bonamia rosea*, \**Cenchrus ciliaris*, *Boerhavia gardneri*, *Solanum phlomoides*, *Tephrosia* sp. B (Kimberley Flora), *Corchorus parviflorus*, *Sida cardiophylla*, *Indigofera colutea*, *Acacia inaequilatera*, *Cleome uncifera*, *Euphorbia*, *Mollugo molluginis*, *Atalaya hemiglauca* (stunted), *Goodenia stobbsiana*, *Eriachne obtusa*,

*Gossypium australe*, *Pterocaulon sphaeranthoides* x *spacelatum*, *Streptoglossa decurrens*, *Indigofera* aff. *monophylla*.

Habitat and Soil: Gentle south east facing slope next to a creek (between two creeks). Light, dull orange-brown silty, gravelly sand. Date: 28/10/2001. Photo: Roll2. MP27  
Location: Panorama project access road. At: 50K 07-32-533 UTM 76-67-511 (from GPS unit).

### **M79**

*Eucalyptus victrix* scattered low trees to low open woodland over *Acacia tumida* (*Acacia pyrifolia* (slender, white) scattered tall shrubs to high open shrubland over *Triodia epactia*, (*Bothriochoa* (=M73), *Chrysopogon fallax*) *Eriachne* sp. aff. *festucacea* grassland.

Associated species: *Pluchea dentex*, *Stemodia viscosa*, *Eriachne* sp. aff. *festucacea*, *Ludwigia*, *Stemodia grossa*, *Synaptantha tillaeacea* var. *tillaeacea*, *Euphorbia coghlanii*, *Bergia pedicellaris*, *Goodenia lamprosperma*, *Mukia maderaspatana*, *Gossypium robinsonii*, *Triodia brizoides*, \**Cenchrus ciliaris*, *Cassia helmsii*, *Cullen leucanthum*, *Pterocaulon sphaeranthoides* x *spacelatum*, *Carissa lanceolata*, *Petalostylis labicheoides*, *Flueggia virosa* ssp. *melanthesoides*, *Bergia trimera*, *Alternanthera nana*, *Marsilea ?hirsuta*, *Cassia 'symonii'*, *Euphorbia coghlanii*.

Habitat and Soil: Small creek with narrow high flow (flood areas) banks and a gravelly to cobbly bed. Some sandy gravelly patches. Date: 28/10/2001. Photo: Roll2. MP26

Location: Panorama project access road. At: 50K 07-32-500 UTM 76-67-568 (from GPS unit).

Notes: Many similarities to M73, but dryer and the banks/flood plain areas were narrower. The back of the floodbanks have patches to a strip of *Triodia epactia* hummock grassland (with *Tephrosia* aff. *rosea* (HD 292-37) in places). *Stemodia grossa* had a population of juvenile and some large somewhat woody shrubs (spreading) nearly 1 m tall. The small flowline joining the creek from the north west had *Acacia acradenia* high open shrubland to high shrubland with *Acacia pyrifolia* (slender, white), in places over *Triodia epactia*. The same creek (further upstream) was adjacent to M82 (see the notes for this site).

### **M79A**

*Acacia acradenia*. high shrubland over *Triodia epactia* open hummock grassland.

Habitat and Soil: Small creek with narrow high flow (flood areas) banks and a gravelly to cobbly bed. Some sandy gravelly patches. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-32-500 UTM 76-67-568.

Notes: This was the same creek as site M79 was recorded in, at the road crossing to the west. Essentially similar at the edges.

### **M80**

*Acacia inaequilatera* scattered tall shrubs to high open shrubland (small patches) over *Triodia wiseana* var. *wiseana* hummock grassland.

Associated species: *Grevillea pyramidalis*, *Indigofera monophylla* (PAN 58-17), *Bulbostylis barbata*, *Triodia epactia*, *Corchorus parviflorus*, *Cassia 'symonii'*.

Habitat and Soil: Upper slopes of a small rise on a low ridge system of small crests and gullies (open). Light brown gravelly pebbly loam. Cobbles and low outcrop were common. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-32-351 UTM 76-67-886 (from GPS unit).

Notes: Very species poor. The slopes to the west have *Triodia wiseana*. On some nearby lower slopes there were scattered plants of *Acacia orthocarpa*. The large creek to the north has *Acacia acradenia* scrub to high shrubland. Also 5 m from an antique pebble mound at 50K 07-32-351 UTM 76-67-886. Hills with sites M80/M81 seem to be mostly *Triodia epactia* with odd patches of *Triodia wiseana* on dykes or other different geology. Some of the hills were primarily *Triodia wiseana*, although this was not frequent.

### **M81**

*Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* (*Triodia wiseana*) hummock grassland with *Indigofera monophylla* (PAN 58-17) low open shrubland [seral].

Associated species: *Tephrosia* sp. B (Kimberley Flora) where rocky.

Habitat and Soil: North west facing stone in an area of low crests on a low ridge system. Lower to mid slopes. Orange-brown gravelly pebbly loam, cobbles and low outcrop common. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-32-321 UTM 76-68-030 (from GPS unit).

Notes: Very species poor. The *Indigofera monophylla* (PAN 58-17) was dying out (much was already dead).

### **M82**

*Acacia pyrifolia* (slender, white), (*Flueggia virosa* ssp. *melanthesoides*) scattered tall shrubs to high shrubland over *Cassia oligophylla*, (*Carissa lanceolata*) open shrubland over *Triodia epactia* open hummock grassland.

Associated species: *Corchorus parviflorus*, *Pterocaulon sphaeranthoides* x *sphacelatum*, *Atalaya hemiglauca*, *Triodia* sp. Panorama, *Ehretia saligna* var. *saligna*, *Tephrosia* aff. *rosea* (HD 292-37), \**Cenchrus ciliaris*, *Clerodendrum* sp., *Rhynchosia* cf. *minima*, *Cullen stipulaceum*, *Cullen leucanthum*, *Cleome uncifera*, *Andrachne decaisnei*, *Strepoglossa decurrens*, *Triodia brizoides*, *Swainsona formosa*.

Habitat and Soil: Small 'floodplain' next to a medium sized creek. Date: 28/10/2001.

Photo: Roll2. MP25? (tall shrubs - whitish *Acacia*).

Location: Panorama project access road. At: 50K 07-31-860 UTM 76-66-691 (from GPS unit).

Notes: Very patchy in all layers. The creek adjacent to M82 (=M79 creek upstream from 79A) has *Eucalyptus victrix* over *Terminalia canescens* (both open to scattered) otherwise similar to M79 (though a bit drier).

### **M83**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Petalostylis labicheoides* high open shrubland to high shrubland over *Triodia epactia* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Goodenia stobbsiana*, *Cassytha capillaris*, *Cymbopogon ambiguus*, *Pterocaulon sphaeranthoides* x *sphacelatum*, *Indigofera monophylla* (=M78), *Corchorus parviflorus*, *Tephrosia* aff. *rosea* (HD 292-37), *Triodia* sp. Panorama.

Habitat and Soil: Small creekline between hill slopes. Gravely, pebbly, silty sand (the bed of the channel was coarse sand to gravel and pebbles). Date: 28/10/2001.

Photo: Roll2. MP24

Location: Panorama project access road. At: 50K 07-31-434 UTM 76-67-204 (from GPS).

#### **M84**

*Acacia inaequilatera* scattered tall shrubs over *Acacia hilliana* low open heath and *Triodia brizoides* hummock grassland.

Associated species: *Corchorus parviflorus*, *Goodenia stobbsiana*, *Indigofera monophylla* var. (dead), *Ptilotus calostachyus* var. *calostachyus*.

Habitat and Soil: Gentle slope facing the east from below the rocky crest. Brown loam, very gravelly-cobbly with gravel-cobble surface. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-30-650 UTM 76-67-209 (from GPS unit).

Notes: Burnt about 12-18 months ago. Occurs as small patches next to the crests. A fairly recent pebble mound 10m from AMG.

#### **M85**

*Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides*, *Triodia* sp. Panorama hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Hakea*, *Cassia glutinosa*, *Fimbristylis* ++ (perennial), *Acacia acradenia*, *Indigofera monophylla* (PAN 58-17), *Acacia bivenosa*, *Acacia ancistrocarpa*, *Corchorus parviflorus*.

Habitat and Soil: Gentle slope to the east/north east. Gravely, pebbly red-brown loam. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-30-226 UTM 76-67-103 (from GPS unit).

#### **M86**

*Terminalia canescens*, *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia tumida*, *Acacia acradenia* scattered shrubs to high open shrubland over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs over *Triodia epactia* open hummock grassland.

Associated species: *Phyllanthus maderaspatensis* var. *angustifolius*, *Gossypium australe* (Burrup Peninsula form), *Euphorbia coghlanii*, *Alternanthera nana*, *Digitaria*, *Triodia brizoides*, *Goodenia lamprosperma*, *Cullen stipulaceum*, *Cullen leucanthum*, *Sorghum* ?, *Petalostylis labicheoides*, *Acacia pyrifolia* (slender, white), *Eriachne obtusa*, *Corchorus parviflorus*, *Pluchea* sp., *Themeda* aff *triandra*?, *Eriachne tenuiculmis*, *Marsilea* ?*hirsuta*, *Bergia pedicellaris*, *Panicum decompositum*.

Habitat and Soil: A small to medium sized creek. Light brown gravelly pebbly silty sand. Date: 28/10/2001. Photo: Roll2. MP23?

Location: Panorama project access road. At: 50K 07-29-769 UTM 76-67-070 (from GPS unit).

Notes: The flat areas next to the creek have *Acacia acradenia* open scrub.

#### **M87**

*Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* (*Triodia wiseana*) hummock grassland.

Associated species: *Pluchea tetranthera*, *Corymbia hamersleyana* (juvenile), *Fimbristylis* (perennial), *Boerhavia gardneri*.

Habitat and Soil: Steep slopes below the rocky top of a low hill. Light dull brown gravelly to cobbly loam. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-29-490 UTM 76-66-830 (from GPS unit).

Notes: Species poor. Another area had few *Eucalyptus leucophloia* and other shrubs. One rocky crest had a patch of *Clerodendrum* shrubs over *Triumfetta* and *Triodia brizoides* (above M87).

### **M88**

*Corymbia hamersleyana* scattered low trees to low open woodland over *Triodia epactia* hummock grassland with various shrub layers: 1): Occasional *Acacia ancistrocarpa* high open shrubland to high shrubland. 2): Occasional *Acacia tumida* high open shrubland. 3): Occasional *Tephrosia* aff. *rosea* (HD 292-37) open heath. 4): (Mostly or no shrub layer) *Acacia acradenia* high shrubland to open scrub. 5): Occasional *Grevillea wickhamii* ssp. *aprica* high open shrubland.

Associated species: *Triodia brizoides*, *Waltheria virgata*, *Grevillea wickhamii* ssp. *aprica*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Flueggia virosa* ssp. *melanthesoides*, *Ehretia saligna* var. *saligna*, *Ptilotus astrolasius*, *Cleome uncifera*, *Mollugo molluginis*, *Goodenia stobbsiana*, *Indigofera monophylla*. *Bonamia linearis*.

Habitat and Soil: Broad 'floodplain' next to a medium sized creek. Dull red-brown loamy sand, with some gravel and pebbles. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-28-802 UTM 76-66-823 (from GPS unit).

Notes: The vegetation of the creek bed was similar to that at M86 except it had *Eucalyptus victrix* (rather than *Corymbia hamersleyana*) with the *Terminalia canescens*. *Flueggia virosa* ssp. *melanthesoides*, *Ehretia saligna* var. *saligna* closer to the creek.

### **M89**

*Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia*, *Acacia synchronicia*, *Acacia bivenosa* scattered shrubs to open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland.

Associated species: *Sida cardiophylla*, *Indigofera monophylla* (PAN 58-17), *Boerhavia gardneri*, *Triumfetta clementii*, *Fimbristylis* (perennial - common in places).

Habitat and Soil: Moderate mid to lower slope, facing east. Light brown gravelly, pebbly loam. Date: 28/10/2001.

Location: Panorama project access road. At: 50K 07-28-040 UTM 76-66-664 (from GPS unit).

Notes: Where the stand had been burnt recently (12-18 months ago) the *Indigofera monophylla* (PAN 58-17) has been abundant (drying off).

### **M90**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* high open shrubland to open scrub over *Triodia epactia* hummock grassland.

Associated species: *Corchorus parviflorus*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Solanum phlomoides*, *Bonamia linearis*, *Indigofera monophylla* (PAN 20-2), *Acacia*

*bivenosa*, *Goodenia stobbsiana*, *Aristida holathera* var. *holathera*, *Ptilotus astrolasius*, *Gossypium australe* (Burrup Peninsula form), *Bonamia rosea*.

Habitat and Soil: Gently sloping area next to a large creek. Red-brown gravelly sandy loam. Date: 28/10/2001. Photo: Roll2. MP22

Location: Panorama project access road. At: 50K 07-27-002 UTM 76-66-666 (from GPS unit).

### **M91**

*Acacia inaequilatera* scattered tall shrubs over *Acacia tumida*, *Acacia bivenosa*, *Acacia acradenia* scattered shrubs (to small patches of open scrub) over *Triodia brizoides* hummock grassland.

Associated species: *Corchorus parviflorus*, *Goodenia stobbsiana*, *Sida cardiophylla*, *Acacia ancistrocarpa*, *Grevillea pyramidalis*, *Tephrosia* sp. Bungaroo Ck. (M.E.Trudgen 11601), *Solanum phlomoides*, *Corymbia hamersleyana*, *Cassia glutinosa*, *Hakea lorea* ssp. *lorea*.

Habitat and Soil: Gentle slopes on an area of low rises. Date: 28/10/2001. Photo: Roll2. MP21 (Volvo in background), Photo: Roll2. MP20 (Lower part of the gorge from the first slope).

Location: Panorama project access road. At: 50K 07-27-140 UTM 76-66-458 (from GPS unit).

Notes: The *Acacia* species tend to occur in small patches. They also occur in the small flowlines. Upslope there were more *Acacia acradenia* in patches. The small flowline adjacent to M91 has *Corymbia hamersleyana* scattered low trees over *Acacia tumida* open scrub over *Triodia epactia* scattered hummocks. Down stream a short distance the *Acacia* layer changes to mostly *Acacia acradenia*. A large old pebble mound at 50K 07-27-234 UTM 76-66-522.

### **M92**

*Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrub over *Indigofera monophylla* [seral] low shrubland to low open heath over *Triodia brizoides* hummock grassland.

Associated species: *Triumfetta propinqua*, *Gossypium australe* (Whim Ck. form), *Indigofera monophylla* (PAN 58-17), *Tribulus suberosus*, *Tephrosia* sp. B (Kimberley Flora), *Solanum phlomoides*, *Atalaya hemiglauc*, *Mollugo molluginis*, *Cassia glutinosa*.

Habitat and Soil: Steep slopes, easterly facing at the entrance to an open gorge. Red-brown gravelly-pebbly loam, amongst boulders and outcrop. Date: 28/10/2001.

Photo: Roll2. MP19

Location: Panorama project access road. At: 50K 07-27-023 UTM 76-65-422 (from GPS unit).

Notes: Similar vegetation extends onto the nearby north facing slopes, but has more *Acacia inaequilatera* and less of the other tall shrubs.

### **M93**

*Terminalia canescens* scattered low trees over *Triodia brizoides* scattered hummocks.

Associated species: *Tribulus suberosus*, *Cymbopogon ambiguus*, *Atalaya hemiglauc*, *Dichrostachys spicata*, *Flueggia virosa* ssp. *melanthesoides*, *Hibiscus goldsworthii*, *Paspalum tabulatum* (Whim Ck. form), *Eriachne mucronata* (typical form).

Habitat and Soil: Rocky linear crest of an east-west trending ridgeline. The rock is chert-like (siliceous). Date: 28/10/2001.



Location: Panorama project access road. At: 50K 07-26-859 UTM 76-65-326 (from GPS unit).

Notes: Varies to areas with no *Terminalia canescens* and a few *Eucalyptus leucophloia* and *Grevillea wickhamii* ssp. *aprica*. The *Atalaya hemiglauca* was a small tree 3-4m tall amongst the rocks on the north facing slope.

#### **M94**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Acacia bivenosa* scattered shrubs over *Triodia* sp. Panorama hummock grassland.

Associated species: *Solanum phlomoides*, *Sida cardiophylla*, *Corchorus parviflorus*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Salsola tragus*, *Cassia glutinosa*, *Mollugo molluginis*, *Indigofera monophylla* (PAN 58-17).

Habitat and Soil: Lower side slope of a low spur, west facing, gentle slope down to the creek. Dull light brown gravelly pebbly loam. Date: 29/10/2001.

Location: Panorama project access road. At: 50K 07-27-172 UTM 76-65-616 (from GPS unit).

Notes: The area of the unit was too small to map. Upper side (east) there was a thin strip of *Triodia wiseana* and a strip of *Triodia brizoides*.

#### **M95**

*Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Triodia wiseana*, *Acacia glaucocaesia*, *Cassia glutinosa*, *Cassia pruinosa*, *Indigofera monophylla* (PAN 58-17), *Acacia acradenia*, *Bonamia media* var. *villosa*, *Salsola tragus*, *Hakea lorea* ssp. *lorea*, *Corymbia hamersleyana*, *Boerhavia gardneri*, *Solanum phlomoides*, *Ptilotus exaltatus*, *Heliotropium skeleton*.

Habitat and Soil: Upper part of a gently sloping colluvial spur. Red-brown gravelly pebbly loam with a gravel, pebble surface. Date: 29/10/2001. Photo: Roll2. MP17 (with slopes =M92 and rocky crest =M93 in background)

Location: Panorama project access road. At: 50K 07-27-257 UTM 76-65-700 (from GPS unit).

Notes: There were some small flowlines with *Acacia acradenia* high open scrub. Some patches of *Triodia* occur, where the ground is more pebbly-cobbly. *Corymbia hamersleyana* scattered low trees on the slopes.

#### **M96**

*Acacia inaequilatera* scattered tall shrubs over scattered patches of *Acacia acradenia* high open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Hakea chordophylla*, *Corchorus parviflorus*, *Cassia glutinosa*, *Boerhavia gardneri*, *Indigofera monophylla* (PAN 58-17), *Grevillea wickhamii* ssp. *aprica*, *Acacia bivenosa*.

Habitat and Soil: Low rise in an open gorge in the next river. North-east facing moderate slope. Brown gravelly-pebbly loam with gravel-pebble surface. Calcretisation present in places. Date: 29/10/2001.

Location: Panorama project access road. At: 50K 07-27-211 UTM 76-65-146 (from GPS unit).

Notes: Varies to have patches of *Acacia bivenosa* instead of *Acacia acradenia*. This differs from M97 in the *Acacia bivenosa* and more common occurrence of *Corymbia hamersleyana*. The lower slope is more calcareous variant.

### **M97**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs to high open shrubland over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland.

Associated species: *Acacia bivenosa*, *Corchorus parviflorus*, *Goodenia stobbsiana*, *Acacia ancistrocarpa*, *Mukia maderaspatana*, *Clerodendrum* sp., *Indigofera monophylla* (PAN 58-17), *Acacia acradenia*, *Petalostylis labicheoides*, *Acacia tumida*.

Habitat and Soil: Gently sloping colluvial spurs from the hills towards the river, in an open gorge system. Date: 29/10/2001. Photo: Roll2. MP16 (Volvo)

Location: Panorama project access road. At: 50K 07-27-332 UTM 76-64-968 (from GPS unit).

Notes: The *Corchorus parviflorus* has high cover [seral] in places. The *Grevillea* may be seral (ie. the density of it may be due to fairly recent fire). The *Acacia ptychophylla* may get taller than 1 m if not burnt for some time.

### **M98**

*Acacia inaequilatera* tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Atalaya hemiglauca*, *Tribulus suberosus*, *Corchorus parviflorus*, *Boerhavia gardneri*, *Tephrosia* sp. B (Kimberley Flora), *Triumfetta propinqua*, *Euphorbia* aff. *drummondii* (HD 195-16), *Rhynchosia* cf. *minima*, *Grevillea pyramidalis*, *Gossypium australe* (Whim Ck. form), *Abutilon* aff. *dioicum* (HD 72-14).

Habitat and Soil: West facing steep slopes on ridge in open gorge complex. Date: 29/10/2001.

Location: Panorama project access road. At: 50K 07-27-673 UTM 76-64-968 (from GPS unit).

Notes: In places on the nearby slopes *Hakea chordophylla* was more common than *Acacia inaequilatera*. Some patches on the lower slopes had *Acacia acradenia* open shrubland. The small flowlines had *Acacia inaequilatera*, *Corymbia hamersleyana* scattered tall shrubs/low trees over *Acacia acradenia* high open shrubland.

### **M99**

*Acacia inaequilatera* tall scattered shrubs over *Acacia bivenosa* scattered shrubs over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Hakea* sp., *Solanum phlomoides*, *Indigofera* aff. *monophylla*, *Corchorus parviflorus*, *Corymbia hamersleyana*, *Cassia glutinosa*.

Habitat and Soil: South west moderate to steep slope on a low hill on an open gorge complex. Red-brown gravelly-pebbly loam. Date: 29/10/2001. Photo: Roll2. MP14 (?slope)

Location: Panorama project access road. At: 50K 07-27-523 UTM 76-64-685 (from GPS unit).

### **M100**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia* shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Corchorus parviflorus*, *Mollugo molluginis*, *Dodonaea coriacea*, *Dampiera candicans*, *Solanum phlomoides*, *Hakea* sp., *Heliotropium skeleton*.

Habitat and Soil: South easterly facing steep slopes. Gravelly pebbly, cobbly brown loam. Date: 29/10/2001.

Location: Panorama project access road. At: 50K 07-27-845 UTM 76-64-296 (from GPS unit).

Notes: Narrow strip at the base with *Triodia epactia*. *Tephrosia* aff. *rosea* (HD 292-37) was nearby, at edge of a creek.

### **M101**

*Triodia wiseana* hummock grassland.

Habitat and Soil: Easterly facing moderate lower slopes on a small hill. Date: 29/10/2001. Photo: Roll2. MP13 (Similar areas in the background)

Location: Panorama project access road. At: 50K 07-28-857 UTM 76-62-095 (from GPS unit).

Notes: Varies on low hills nearby to have scattered *Acacia inaequilatera* or *Corymbia hamersleyana* and scattered *Acacia acradenia*, which was most common on the lower slopes. In places has dense (clonal?) patches of *Indigofera rugosa*.

### **M102**

*Eucalyptus leucophloia*, *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia orthocarpa* (spindly form), *Hakea chordophylla* scattered tall shrubs over *Cassia glutinosa* scattered shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Solanum phlomoides*, *Corchorus parviflorus*, *Triodia wiseana*, *Indigofera* aff. *monophylla*.

Habitat and Soil: Steep south westerly facing slope. Red-brown gravelly-cobbly loam. Stabilised scree. Date: 29/10/2001. Photo: Roll2. MP12 (from below)

Location: Panorama project access road. At: 50K 07-28-193 UTM 76-63-243 (from GPS unit).

Notes: More *Eucalyptus leucophloia* below the outcrop at the upper edge. Varies nearby to similar to M91. Has some patches of *Acacia acradenia*.

**APPENDIX 10: Relevés recorded for vegetation mapping of the Sulphur Springs, Kangaroo Caves and Bernts survey areas and tracks between them**

**Relevés recorded for vegetation mapping of the Sulphur Springs survey area**

**B1**

*Triodia* sp. Panorama with scattered *Acacia bivenosa* shrubs to 1m.

Associated species: *Acacia spondylophylla*, *Acacia pyrifolia* (slender, white), *Acacia ptychophylla*, *Corchorus parviflorus* (30cm), *Ptilotus axillaris*, *Grevillea wickhamii* ssp. *aprica* (juvenile).

Habitat and Soil: Small area 30x6m on lower slope of a small ridge opposite site PAN40.

Date: 17/10/2001.

Location: Panorama project Area 1, main valley. At: 50K 07-28-534 UTM 76-60-620 (from GPS unit).

Notes: Applied to area nearby - which was interzonal with some *Acacia bivenosa*.

**B2**

Scattered *Acacia inaequilatera* over *Acacia bivenosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Eucalyptus leucophloia*, *Goodenia stobbsiana*, *Acacia spondylophylla*, *Corchorus parviflorus*.

Habitat and Soil: Lower to mid north-facing colluvial slopes of a medium high ridge. Brown pebbly gravelly loam with gravelly to pebbly, shaly surface with some outcropping shale.

Date: 17/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-538 UTM 76-60-482 (from GPS unit).

**B3**

Scattered *Acacia inaequilatera* over scattered *Acacia bivenosa* over *Triodia brizoides* hummock grassland.

Associated species: *Heliotropium skeleton*, *Ptilotus calostachyus* var. *calostachyus*, *Corchorus parviflorus*, *Goodenia stobbsiana*, *Dampiera candidans*, *Hakea chordophylla*, *Bonamia media* var. *villosa*, *Eucalyptus leucophloia*.

Habitat and Soil: Steep north, north-east facing upper slope of medium height ridge. Soil similar to B2.

Date: 17/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-503 UTM 76-60-418 (from GPS unit).

**B4**

*Acacia inaequilatera*, (*Hakea chordophylla*) scattered tall shrubs over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Corchorus parviflorus*, *Heliotropium skeleton*.

Habitat and Soil: Middle and upper slopes of both north and south-facing sides of medium ridge. Gravelly, pebbly brown loam. Outcrops of shale rock.

Date: 17/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-291 UTM 76-60-465 (from GPS unit).

Notes: *Dodonaea coriacea* was growing along the rocky ridge top.

### **B5**

*Acacia tumida* (50cm) 1.5-3m open high shrubland to high shrubland over *Triodia epactia* hummock grassland.

Associated species: *Eucalyptus leucophloia*.

Habitat and Soil: Steep upper slopes, north-facing, of a high ridge. Rock-chert. Skeletal red-brown loam amongst rocks. Date: 17/10/2001.

Location: Panorama project Area 1. At: 50K 07-23-378 UTM 76-60-307 (from GPS unit).

Notes: Included large areas of steeply sloping outcrop. A lot of regrowth *Acacia tumida* after fire.

### **B6**

*Eucalyptus leucophloia* scattered trees over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Dodonaea coriacea*, *Acacia bivenosa*, *Goodenia stobbsiana*, some *Triodia epactia* under rock ledges etc.

Habitat and Soil: Upper slopes and crest of a high ridge. Gravelly, pebbly brown loamy sand. Much exposed shale rock and much loose shale on the surface. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-483 UTM 76-60-208 (from GPS unit).

Notes: There was some *Triodia epactia* under rock ledges etc.

### **B7**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, (*Acacia bivenosa*) open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Corchorus parviflorus*.

Habitat and Soil: Steep south-facing slope of medium ridge. Gravelly, cobbly shale in brown loam matrix. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-474 UTM 76-60-393 (from GPS unit).

### **B8**

(*Acacia inaequilatera*) scattered tall shrub over *Triodia brizoides* hummock grassland.

Associated species:

Habitat and Soil: Medium slope of a high ridge. Date: 18/10/2001.

Location: Panorama project Area 1.

Notes: Sometimes scattered *Acacia* shrubs (*Acacia bivenosa*, *Acacia ptychophylla*, [*Acacia spondylophylla*, especially upslope of gullies]). In this area grades into B4 and B3.

### **B9**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla*, *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Acacia bivenosa* (scattered), *Indigofera monophylla* (very few), *Acacia ptychophylla* (very few).

Habitat and Soil: Low ridges and slopes. Gravelly, pebbly red-brown loam. Date: 18/10/2001.

Location: Panorama project Area 1.

Notes: Very similar to PAN041, PAN055, B2, PAN038, X2 (=B2/PAN038).

### **B10**

*Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla*, *Acacia spondylophylla* low shrubland to low open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland

Associated species: *Goodenia stobbsiana*, *Acacia bivenosa*, *Indigofera monophylla* (PAN 58-17).

Habitat and Soil: Mid to lower slopes of a medium ridge. Gravelly, pebbly shale with red-brown loam soil. 80% to 90% shale cover of surface. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-468 UTM 76-60-971 (from GPS unit).

Notes: *Acacia ptychophylla* tended to occur on upper slope and *Acacia spondylophylla* tended to occur more on lower slopes.

### **B11**

*Eucalyptus leucophloia* scattered trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla* open shrub over *Triodia brizoides* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Acacia ptychophylla*, *Hybanthus aurantiacus*.

Habitat and Soil: Upper south-facing slope of a medium ridge. Gravelly, pebbly shale with red-brown loam. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-768 UTM 76-60-829 (from GPS unit).

### **B12**

*Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland to low shrub over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*, *Cassia glutinosa*, *Acacia bivenosa*, *Corymbia hamersleyana*, *Templetonia hookeri* (upper slope).

Habitat and Soil: Lower to upper slope of a medium ridge, north facing. Gravelly, pebbly, cobbly red-brown loam. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-925 UTM 76-60-834 (from GPS unit).

### **B13**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open high shrubland to open shrubland over *Triodia wiseana* closed hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia*, *Acacia spondylophylla*, *Cassia glutinosa*, *Indigofera monophylla* (PAN 57-9).

Habitat and Soil: Steep slopes (lower to upper ) of a medium ridge. Gravelly, pebbly brown loam. Date: 18/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-055 UTM 76-60-749 (from GPS unit).

Notes: Nearby, similar vegetation stand over *Triodia brizoides*.

#### **B14**

Includes scattered *Corymbia hamersleyana* and some *Acacia acradenia* over *Triodia wiseana*, *Triodia brizoides* hummock grassland. No *Acacia spondylophylla*.

Habitat and Soil: North west facing slope.

Date: 17/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-268 UTM 76-61-114 (from GPS unit).

Notes: No Acacia

#### **B15**

*Eucalyptus leucophloia* low scattered trees over *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland.

Habitat and Soil: Lower slope of a north-facing colluvial spur. Gravelly, cobbly red-brown loam (>70% rock cover). Date: 19/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-702 UTM 76-59-972 (from GPS unit).

Notes: Areas near B15 of simply *Acacia bivenosa* over *Triodia epactia* or small open areas of *Triodia epactia* hummock grassland.

#### **B16**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Dampiera candidans*, *Corchorus sp.* Panorama, *Solanum phlomoides*, *Grevillea wickhamii ssp. aprica*, *Eriachne mucronata* (typical form), *Cyperus cunninghamii ssp. cunninghamii*.

Habitat and Soil: Rocky steep upper slopes of a high ridge. North facing, east and west facing. Red-brown loam in cobbly and rocky matrix amongst exposed sheet rock. Date: 19/10/2001.

Location: Panorama project Area 1, range adjacent to main valley. At: 50K 07-29-696 UTM 76-59-828 (from GPS unit).

Notes: unit occurs on lower to upper slopes. *Acacia bivenosa* also associated on lower slopes. Very similar to PAN045 and only 200m away on next ridge slope.

#### **B17**

*Eucalyptus leucophloia* scattered low trees over *Acacia tumida* scattered to high open shrubland over *Acacia hilliana* low shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Grevillea wickhamii ssp. aprica*, *Dampiera candidans*, *Dodonaea coriacea*, *Isotropis atropurpurea*

Habitat and Soil: Crest of a high ridge (sandstone). Rocky, bouldery matrix with red-brown sandy loam. Date: 19/10/2001.

Location: Panorama project Area 1, range adjacent to main valley. At: 50K 07-29-697 UTM 76-59-636 (from GPS unit).

Notes: *Acacia adoxa* var. *adoxo* seen in same vegetation community nearby. *Pluchea tetranthera* near to B17.

### **B18**

*Eucalyptus leucophloia* scattered low trees over (*Acacia bivenosa* scattered shrubs over) *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia brizoides* (*Triodia epactia*) hummock grassland.

Associated species: *Dampiera candidans*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica*, *Dodonaea coriacea*, *Solanum phlomoides*.

Habitat and Soil: Mid north east facing slope of a high ridge. Pebbly, cobbly matrix with brown sandy loam. Date: 19/10/2001.

Location: Panorama project Area 1, range adjacent to main valley. At: 50K 07-29-848 UTM 76-59-635 (from GPS unit).

### **B19**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland.

Associated species: *Acacia bivenosa* (nearer the creek line).

Habitat and Soil: Gentle rise on valley floor. Gravelly, pebbly brown loam. Abundant calcrete gravel, pebbles on the surface. Date: 20/10/2001.

Location: Panorama project Area 1, main valley near drilling camp. At: 50K 07-30-357 UTM 76-59-644 (from GPS unit).

### **B20**

*Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides*, *Acacia bivenosa* high open shrubland to high shrubland over *Acacia ptychophylla*, *Acacia spondylophylla* scattered low shrubs over *Triodia epactia*, (*Triodia angusta* (Shaw River form)) closed hummock grassland.

Associated species: *Dodonaea coriacea*, *Corymbia hamersleyana*.

Habitat and Soil: Narrow banks of a small creekline below the base of a high ridge. Gravelly, pebbly, cobbly red-brown sand. Date: 20/10/2001.

Location: Panorama project Area 1, main valley near drilling camp. At: 50K 07-30-067 UTM 76-59-671 (from GPS unit).

### **B21**

*Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland.

Associated species: (none sighted).

Habitat and Soil: Lower slope of colluvial spur on the valley floor, north facing. Gravelly, pebbly brown-red sandy loam. Date: 20/10/2001.

Location: Panorama project Area 1, main valley. At: 50K 07-28-852 UTM 76-60-408 (from GPS unit).

### **B22**

(*Eucalyptus leucophloia* scattered low trees over) *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* shrubland over *Acacia ptychophylla* (*Acacia spondylophylla* near gully edges) open low shrubland to low shrubland over *Triodia brizoides* hummock grassland.



Habitat: Mid-lower slope of medium ridge.

Date: 20/10/2001.

Notes: Nearby area on south side of ridge along north side of main valley in Sulphur Springs had B22 vegetation with *Acacia pruinocarpa* shrubs occurring at the head of small gullies on these slopes. Very few *Eucalyptus leucophloia* trees.

### **B23**

*Acacia inaequilatera* (*Acacia bivenosa*) scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Acacia spondylophylla* open low shrubland to shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica* (near gully), *Petalostylis labicheoides*, (within 20-30m of gully), *Goodenia cusackiana*, *Dodonaea coriacea*.

Habitat and Soil: Mid slope of steep south facing slope, medium height ridge.

Gravelly-pebbly shale with red-brown loam to clay loam. Date: 20/10/2001.

Location: Panorama project Area 1, ridge along north side of main valley. At: 50K 07-29-723 UTM 76-60-606 (from GPS unit).

### **B24**

*Acacia inaequilatera* scattered tall shrubs over *Acacia hilliiana* (*Acacia spondylophylla*) low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Dodonaea coriacea*, *Grevillea wickhamii* ssp. *aprica*, (near gully), *Corymbia hamersleyana*, *Goodenia cusackiana*, *Acacia maitlandii*, (upper slopes), *Solanum phlomoides*, *Goodenia stobbsiana*.

Habitat and Soil: Lower to upper slope of east-facing low ridge. Fairly steep.

Gravelly, pebbly shale with red-brown sandy loam. Date: 20/10/2001.

Location: Panorama project Area 1, main valley. At: 50K 07-29-524 UTM 76-60-660 (from GPS unit).

### **B25**

*Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Ptilotus astrolasius*, *Mollugo molluginis*, *Goodenia cusackiana*, *Goodenia stobbsiana*.

Habitat and Soil: Lower slope of south facing colluvial spur. Date: 21/10/2001.

Location: Panorama project Area 1, main valley. At: 50K 07-30-190 UTM 76-60-080 (from GPS unit).

Notes: *Acacia bivenosa* were just upslope on the spur.

### **B26**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Acacia tumida*, *Solanum phlomoides*, *Indigofera monophylla* (PAN 57-9), *Acacia bivenosa*, *Hakea chordophylla*, *Acacia adoxa* var. *adoxo*, *Dodonaea coriacea*, *Acacia acradenia*, *Dampiera candicans*, *Goodenia cusackiana*, *Cassia* aff. *oligophylla* (BMor 152).

Habitat and Soil: Steep north-facing, mid-upper slope. Gravelly, pebbly (shale) red-brown sandy loam. Date: 21/10/2001.

Location: Panorama project Area 1, main valley. At: 50K 07-30-768 UTM 76-59-512 (from GPS unit).

Notes: i) Generally the *Corymbia* was on the lower slopes and *Eucalyptus leucophloia* on higher slopes.

### **B27**

*Eucalyptus victrix* scattered trees to open woodland over *Acacia tumida*, *Acacia acradenia*, *Acacia pyriformis* (slender, white), *Gossypium robinsonii* high shrubland over *Petalostylis labicheoides*, *Cajanus cinereus*, *Cassia glutinosa*, *Tephrosia aff. rosea* (HD 292-37) open shrubland to shrubland over *Triodia epactia* hummock grassland.

Associated species: *Acacia maitlandii*, *Phyllanthus maderaspatensis* var. *angustifolius*.

Habitat and Soil: Banks adjacent to the creek bed. Red-brown sand. Date: 21/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-985 UTM 76-59-565 (from GPS unit).

### **B29**

*Acacia inaequilatera* scattered low trees over *Acacia acradenia* high open shrubland over *Acacia bivenosa* open shrubland over *Acacia hilliana*, *Acacia spondylophylla* scattered low shrublands over *Triodia brizoides* hummock grassland.

Associated species: *Dodonaea coriacea*, *Hakea chordophylla*, *Goodenia stobbsiana*, *Cassia aff. oligophylla* (BMor 152).

Habitat and Soil: Mid slope of east facing slope on a medium ridge. Gravelly, pebbly (shale), red-brown sandy loam. Date: 21/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-632 UTM 76-59-714 (from GPS unit).

Notes: Similar to P52, B22, X5.

### **B30**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over (*Cajanus cinereus* scattered shrubs over) *Triodia wiseana* hummock grassland

Associated species: *Corchorus aff. laniflorus* (PAN 76), *Grevillea wickhamii ssp. aprica*, *Grevillea pyramidalis*.

Habitat and Soil: Mid to upper slope of a low ridge with a small exposed rock pile on the crest. Gravelly, pebbly, cobbly brown sandy loam. Date: 21/10/2001.

Location: Panorama project Area 1, proposed tailings dam area. At: 50K 07-29-579 UTM 76-60-954 (from GPS unit).

Notes: The B30 vegetation occurs around the rock piles of these 'rock pile' ridges (typically only a small rockpile occurs at some point along the crest of these ridges). The *Cajanus cinereus* scattered shrubs were not wide spread in this vegetation unit. White calcrete formations, especially on the next small ridge to the north, which is similar in soil and geology.

### **B31**

*Ptilotus mollis* low shrubland over *Triodia melvillei*, (*Triodia wiseana*), *Eriachne mucronata* (typical form) very open to open hummock grassland/grassland.

Associated species: *Cyperus cunninghamii ssp. cunninghamii*, *Corchorus aff. laniflorus* (PAN 76) (below ridge), *Acacia inaequilatera*, *Cassia glutinosa* (small group 20m up

along ridge), *Streptoglossa decurrens* (60cm, juvenile 10cm), *Indigofera monophylla* (PAN 57-9) (below rock), *Goodenia stobbsiana*.

Habitat and Soil: Exposed shale wall (south facing) on the crest of a steep, medium height ridge. Sandy brown loam in matrix of shale gravel, pebbles and cobbles amongst exposed shale rock. Shale layers form shelves. Date: 22/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-082 UTM 76-60-315 (from GPS unit).

Notes: Also *Grevillea wickhamii* ssp. *aprica* and *Acacia acradenia* 10m up along the ridge and just on the north side of the crest.

### **B32**

*Acacia inaequilatera* high open shrubland over *Indigofera monophylla* (PAN 57-9) low shrubland to low open shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland.

Associated species: *Corchorus* aff. *laniflorus* (PAN 76), *Acacia acradenia* (especially on the upper slope), *Solanum phlomoides*.

Habitat and Soil: Mid to upper slope of a medium ridge (shale type), east-north east facing. Sandy brown loam in matrix of gravel, pebbles, and cobbles amongst exposed rock. Shale layers form shelves. Date: 22/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-099 UTM 76-60-330 (from GPS unit).

### **B33**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs to high open shrubland over *Corchorus* aff. *laniflorus* (PAN 76) scattered shrubs over *Triodia melvillei* (*Triodia wiseana*) hummock grassland.

Associated species: *Goodenia stobbsiana*, *Indigofera monophylla* (PAN 57-9), *Solanum phlomoides*, *Ptilotus mollis*.

Habitat and Soil: Upper north east facing slope of a medium shale ridge. Sandy brown loam on matrix of gravel, pebbles and cobbles amongst exposed shale rock. Shale layers form shelves. Date: 22/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-055 UTM 76-60-387 (from GPS unit).

### **B34**

*Acacia inaequilatera* (*Hakea chordophylla*) scattered tall shrubs over *Acacia orthocarpa* shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Corchorus* aff. *laniflorus* (PAN 76), *Goodenia stobbsiana*, *Cassia glutinosa*, *Corymbia hamersleyana*.

Habitat and Soil: Upper south-west facing slope of a low slate ridge. Gravelly, pebbly, cobbly brown loam. Exposed rock outcrops >80% surface covered by rock. Date: 22/10/2001.

Location: Panorama project Area 1, proposed tailings dam. At: 50K 07-30-733 UTM 76-60-238 (from GPS unit).

Notes: *Sida cardiophylla* collected near B34.

### **B35**

*Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 57-9) low open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Acacia acradenia* (occasional patches), *Corymbia hamersleyana*.

Habitat and Soil: Mid slopes, south-west facing, on medium ridge. Gravelly, pebbly, cobbly brown loam. Rock pile type rock, but signs of shale rock extrusion. Date: 22/10/2001.

Location: Panorama project Area 1, tailings dam. At: 50K 07-30-435 UTM 76-60-582 (from GPS unit).

### **B36**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* (*Triodia brizoides*) hummock grassland.

Associated species: *Indigofera monophylla* (PAN 57-9), *Goodenia stobbsiana*, *Solanum phlomoides*, *Corchorus* aff. *laniflorus* (PAN 76), *Cassia* 'symonii'.

Habitat and Soil: Mid slope, south west facing, of high shale ridge. Brown sandy loam in matrix of shale gravel, pebbles and cobbles. Date: 22/10/2001.

Location: Panorama project Area 1, proposed tailings dam. At: 50K 07-30-631 UTM 76-60-748 (from GPS unit).

### **B37**

*Acacia tumida* high shrubland to open scrub over *Templetonia hookeri*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia hilliana*, *Goodenia stobbsiana* low open shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Petalostylis labicheoides*, *Triumfetta maconochieana*, *Dampiera candicans*, *Solanum phlomoides*, *Eriachne mucronata* (typical form) (60m east of B37)

Habitat and Soil: Sandstone crest of a high hill. Red-brown sand. Date: 23/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-444 UTM 76-59-577 (from GPS unit).

### **B38**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* (*Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides* high shrubland to open scrub over *Triodia melvillei* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Solanum phlomoides*, *Dampiera candicans*, *Hakea chordophylla*.

Habitat and Soil: Upper slopes of a high ridge, north east facing. Gravelly, pebbly, cobbly red-brown sand. Exposed rock outcrop. Date: 23/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-189 UTM 76-58-776 (from GPS unit).

### **B39**

*Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland.

Date: 23/10/2001.

Location: Panorama project Area 1.

Notes: Observed through binoculars on a steep rock face on the other side of a very deep (70m) gully. 300 m east of B38.

### **B40**

*Eucalyptus leucophloia* scattered low trees over *Triodia brizoides* hummock grassland.  
Date: 23/10/2001.

Location: Panorama project Area 1.

Notes: Another B40 area has scattered *Acacia inaequilatera* while another has patches of *Indigofera monophylla* (PAN57-9) scattered low shrubs to low open shrubland.

#### **B41**

Scattered *Cassia pruinosa*, *Cassia glutinosa* shrubs over *Indigofera monophylla* (PAN 58-17) low open heath over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*.

Habitat and Soil: Small valley floor amongst range of hills between upper chert and volcanics. Gravelly, pebbly, cobbly red-brown clayey loam. Date: 23/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-003 UTM 76-58-257 (from GPS unit).

#### **B42**

(*Acacia inaequilatera* scattered tall shrubs over) *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Acacia hilliana*, *Corchorus parviflorus*, *Solanum phlomoides*, *Ptilotus calostachyus* var. *calostachyus*, *Cassia pruinosa*.

Habitat and Soil: Crest and slopes of a low hill. Gravelly, pebbly, cobbly red-brown loam. Date: 23/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-872 UTM 76-58-219 (from GPS unit).

Notes: *Acacia adoxa* var. *adoxo* itself forms a low shrubland to low open heath

#### **B43**

*Eucalyptus victrix* scattered trees over *Atalaya hemiglauca*, *Acacia pruinocarpa*, *Ehretia saligna* var. *saligna*, *Acacia tumida*, *Ficus platypoda* high open shrubland over *Cassia glutinosa*, *Cassia venusta* scattered shrubs over *Triodia epactia* hummock grassland.

Associated species: *Cymbopogon ambiguus*, *Eriachne mucronata* (typical form), *Cyperus cunninghamii* ssp. *cunninghamii*, *Triumfetta propinqua*, *Triumfetta maconochieana*, *Clerodendrum tomentosum*, *Solanum phlomoides*, *Eriachne ciliata*.

Habitat and Soil: Lower slopes of a steep rocky bank/walls in a narrow gorge just above the flow line. Soils were skeletal. Date: 23/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-127 UTM 76-59-669 (from GPS unit).

Notes: i) *Melaleuca argentea* (5m) on flow line 40m upstream.

ii) At 50K 07-28-937 UTM 76-59-599: a B43 type but has half a dozen *Acacia coriacea* ssp. *pendens* with a lot of *Atalaya hemiglauca*, *Acacia pruinocarpa* and *Ficus platypoda*. Also: *Cyperus cunninghamii* ssp. *cunninghamii*, *Euphorbia* aff. *drummondii* (HD 195-16). *Pluchea rubelliflora* 200m upstream of B43a in creekline.

#### **B44**

*Eucalyptus leucophloia* scattered low trees over (*Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over) *Tephrosia spechtii*, *Acacia orthocarpa*, *Indigofera monophylla* (PAN 58-17)) low open heath over *Triodia brizoides*, *Triodia epactia* hummock grassland.

Associated species: *Sida* sp. A (Kimberley Flora), *Acacia adoxa* var. *adoxo*, (upper slopes), *Solanum phlomoides*.

Habitat and Soil: Mid slope, north-east facing, of a high ridge. Gravelly, pebbly cobbly red-brown sand. Date: 23/10/2001. Photo: Roll1. MP

Location: Panorama project Area 1. At: 50K 07-29-144 UTM 76-59-437 (from GPS unit).

Notes: On upper slope scattered *Grevillea wickhamii*; *Acacia adoxa* var. *adoxo*, *Indigofera monophylla* tends to be on the lower slope. Another area has *Acacia hilliana* low open shrubland to scattered shrubs.

#### **B45**

*Eucalyptus leucophloia* (*Corymbia hamersleyana*) scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Solanum phlomoides*, *Corchorus parviflorus*, *Dodonaea coriacea*.

Habitat and Soil: Mid-slope of a high ridge (volcanics), south-south-west facing. Gravelly, pebbly, cobbly brown sand. Date: 24/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-163 UTM 76-59-209 (from GPS unit).

Notes: *Cullen leucochaites* near B45, 300m on the next ridge south.

#### **B46**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* shrubland to open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Cassia glutinosa*, *Indigofera monophylla* (PAN 58-17), *Acacia inaequilatera*, *Corchorus parviflorus*, *Solanum phlomoides*, *Grevillea wickhamii* ssp. *aprica*, *Acacia adoxa* var. *adoxo* (on the upper slopes).

Habitat and Soil: Slopes of moderate ridges. Gravelly, pebbly, cobbly brown sand. Date: 24/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-328 UTM 76-59-120 (from GPS unit).

Notes: Similar to B38 but different geology and no *Petalostylis labicheoides*. *Dodonaea coriacea* on hill types in other areas of B46.

#### **B47**

*Eucalyptus leucophloia* (*Corymbia hamersleyana*) scattered low trees over *Acacia tumida* low open forest over *Acacia orthocarpa*, *Petalostylis labicheoides*, *Cassia glutinosa* high open shrubland over (*Tephrosia spechtii*), *Corchorus parviflorus* scattered low shrubs to shrubland over *Triodia epactia* hummock grassland.

Associated species: In the creekline downslope is *Corymbia zygophylla*, *Flueggia virosa* subsp. *melanthesoides*. On higher rocky slope were *Acacia pruinocarpa*. *Atalaya hemiglauca* also on the lower slopes.

Habitat and Soil: Steep sloping gorge walls. Date: 24/10/2001.

Location: Panorama project Area 1.

Notes: Related to B43.

#### **B48**

*Eucalyptus leucophloia* scattered low trees over (*Acacia inaequilatera* scattered tall shrubs over) *Triodia wiseana* hummock grassland.

Associated species: .not completed

Habitat and Soil: Lower and mid slopes on volcanic low, medium ridges. Date: 24/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-715 UTM 76-58-265 (from GPS unit).

Notes:

#### **B49**

*Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 65-14) shrubland to open heath over *Triodia wiseana* hummock grassland.

Associated species: *Cymbopogon ambiguus*, *Rhynchosia cf. minima*, *Solanum phlomoides*, *Eucalyptus leucophloia* (upper slopes), *Acacia bivenosa* (scattered), *Acacia acradenia* (shrubland on lower slopes).

Habitat and Soil: Steep mid slope, north-west facing on a high ridge. Gravelly, pebbly, cobbly brown sand with much exposed rock. Date: 24/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-612 UTM 76-58-033 (from GPS unit).

#### **B50**

*Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa*, *Cassia glutinosa* open shrubland to shrubland over *Corchorus* sp. Panorama scattered low shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Hakea chordophylla*, *Acacia pruinocarpa*, *Indigofera monophylla* (PAN 57-9), *Solanum phlomoides*.

Habitat and Soil: West facing slope of a high rocky ridge. Gravelly, pebbly, cobbly brown sandy loam with rock outcrops. Soil surface cover by >80% rock. Date: 25/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-943 UTM 76-59-983 (from GPS unit).

Notes: Similar to B3.

#### **B51**

*Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* closed hummock grassland.

Associated species: *Sida* sp. A (Kimberley Flora), *Cassia glutinosa*, *Dodonaea coriacea*, *Triumfetta maconochieana*, *Corchorus* sp. Panorama.

Habitat and Soil: East facing slope of a medium ridge, mid slope. Gravelly, pebbly, cobbly red-brown loam. Date: 25/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-461 UTM 76-60-077 (from GPS unit).

#### **B52**

*Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* (C) low open shrubland to scattered low shrubs over *Triodia brizoides* open hummock grassland to hummock grassland.

Associated species: *Triumfetta propinqua*, *Streptoglossa decurrens*, *Solanum phlomoides*, *Eriachne mucronata* (typical form), *Cyperus cunninghamii* ssp. *cunninghamii*.

Habitat and Soil: Steep upper slope of a high ridge with slope of exposed rock outcrop-craggy. Date: 25/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-108 UTM 76-60-214 (from GPS unit).

### **B53**

*Acacia inaequilatera* scattered tall shrubs over *Cullen leucanthum*, (*Grevillea wickhamii* ssp. *aprica*) high open shrubland over *Acacia acradenia* open heath to closed heath over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.

Associated species: *Corymbia hamersleyana*, *Grevillea pyramidalis*.

Habitat and Soil: Lower slopes, valley floor (200-300m across). Date: 25/10/2001.

Location: Panorama project Area 1. At: 50K 07-27-844 UTM 76-58-762 (from GPS unit).

Notes: i) *Stemodia grossa* forms open herbland to herbland in low lying areas.

ii) similar area has little *Acacia inaequilatera* and includes *Corymbia hamersleyana* scattered low trees.

### **B54**

*Eucalyptus leucophloia* scattered low trees over *Acacia orthocarpa* (wispy form) open high shrubland over *Acacia adoxa* var. *adoxo* low open shrubland over *Triodia brizoides*, (*Triodia epactia*) hummock grassland.

Associated species: *Cassia glutinosa*, *Dodonaea coriacea*, *Corchorus parviflorus*, *Acacia hilliana*, *Goodenia stobbsiana*, *Triumfetta maconochieana*, *Corymbia ferriticola* ssp. *ferriticola*.

Habitat and Soil: Crest of a high rocky ridge (sandstone). Brown sandy loam soil in matrix of gravels, pebbles and cobbles with much rock outcrop. >90% surface covered by rock. Date: 26/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-041 UTM 76-59-615 (from GPS unit).

### **B55**

*Corymbia ferriticola* ssp. *ferriticola*, *Eucalyptus leucophloia* low open woodland over *Triodia epactia*, (*Triodia brizoides*), *Cymbopogon ambiguus* grassland/hummock grassland.

Associated species: *Cassia glutinosa*, *Eriachne mucronata* (typical form).

Habitat and Soil: Rocky breakaway at the edge of the crest of a high sandstone ridge.

Date: 26/10/2001.

Location: Panorama project Area 1.

### **B56**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* high shrubland to open scrubs over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Solanum phlomoides*.

Habitat and Soil: Lower slope, east-north-east facing, of a colluvial spur. Gravelly, pebbly, cobbly red-brown loam. Date: 26/10/2001.

Location: Panorama project Area 1.

Notes: areas of B56 had *Eucalyptus leucophloia*, not *Corymbia hamersleyana*.



With associated species: includes *Acacia adoxa* var. *adoxo*, *Acacia bivenosa*, *Dodonaea coriacea*.

### **B57**

*Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) high open shrubland over low *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Cassia pruinosa*, *Indigofera monophylla* (PAN 58-17), *Tephrosia* aff. *rosea* (HD 292-37), *Cassia glutinosa*

Habitat and Soil: Mid to upper slope of a medium ridge, north-east facing. Gravelly, pebbly, cobbly red-brown sandy loam. Date: 26/10/2001.

Location: Panorama project Area 1.

Notes: some areas with *Grevillea wickhamii* ssp. *aprica* (scattered) in tall shrub layer *Tephrosia* aff. *rosea* (HD 292-37) forming low open shrubland. *Cymbopogon ambiguus* forming very open grassland.

### **B58**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* (wispy form) open high shrubland over *Gossypium australe* (Whim Creek form) open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Solanum phlomoides*, *Triumfetta propinqua*, *Cymbopogon ambiguus*, *Mukia* sp. Panorama.

Habitat and Soil: Steep, upper slope of a high ridge (volcanic), north-north-east facing. Gravelly, pebbly, cobbly brown loam to clayey loam. Date: 26/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-218 UTM 76-59-248 (from GPS unit).

### **B59**

*Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), (*Gossypium australe* (Whim Creek form)) scattered tall shrubs over *Tephrosia spechtii*, *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Cullen leucochaites*.

Habitat and Soil: North facing upper slope, high ridge (Volcanics). Date: 26/10/2001.

Location: Panorama project Area 1.

Notes: some areas did not have the *Gossypium australe* (Whim Creek form) scattered shrubs and did not have *Cullen leucochaites* present. Also some scattered *Grevillea wickhamii* ssp. *aprica* occurs. Associated species include *Sida* sp. A (Kimberley Flora), *Dodonaea coriacea*, *Corchorus parviflorus*.

### **B60**

*Corymbia hamersleyana* scattered low trees over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.

Associated species: None sighted.

Habitat and Soil: Lower slopes of the colluvial spurs and adjacent valley floor (many drainage lines). Gravelly, pebbly, cobbly brown sandy loam. Date: 27/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-531 UTM 76-58-326 (from GPS unit).

**B61**

Scattered *Cullen leucochaites* shrubs to open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.

Associated species: *Acacia inaequilatera*.

Habitat and Soil: Crest of a medium high ridge, east facing. Date: 27/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-115 UTM 76-58-679 (from GPS unit).

**B62**

*Cajanus cinereus* open to closed heath over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Cymbopogon ambiguus*.

Habitat and Soil: Steep sides of a steep gully, gully running south. Date: 27/10/2001.

Location: Panorama project Area 1.

**B63**

*Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white) open scrub over *Carissa lanceolata*, *Cajanus cinereus*, *Cassia oligophylla*, *Cassia glutinosa* closed scrub

Associated species: *Cymbopogon ambiguus*, *Phyllanthus maderaspatensis*, *Solanum phlomoides*, *Abutilon* aff. *dioicum* (HD 72-14), *Hibiscus* aff. *platyklamys* (site 1139), *Tephrosia* aff. *supina* (HD 237-23).

Habitat and Soil: Creek bed banks. Date: 27/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-388 UTM 76-57-510 (from GPS unit).

**B64**

*Acacia inaequilatera* scattered tall shrub over *Tephrosia spechtii* scattered shrubs to open shrubland over *Triodia wiseana* hummock grassland.

Habitat and Soil: Slope. Date: 27/10/2001.

Location: Panorama project Area 1.

Notes: Observed from about 50m away from unit B64.

**B65**

*Acacia orthocarpa* (wispy form) over *Triodia brizoides* hummock grassland.

Date: 27/10/2001.

Location: Panorama project Area 1.

Notes: Observed from approximately 100m away.

**B66**

*Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Cassia glutinosa*, *Acacia acradenia*, *Acacia inaequilatera*, *Acacia bivenosa* in lower lying areas.

Habitat and Soil: Low rise on sloped valley floor. Pebbly, gravelly, cobbly brown sandy loam. >90% rock cover of the surface. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-530 UTM 76-60-669 (from GPS unit).

Notes: Not burnt for >10years (large hummocks). Related to X7 units. Valley floor with sparse overstorey vegetation on rises and dissected by creekline vegetation.

### **B67**

*Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Cymbopogon ambiguus*, *Pentalepis trichodesmoides*, *Corymbia hamersleyana*.

Habitat and Soil: Mid slope of a low ridge, north-north-east facing. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-814 UTM 76-60-971 (from GPS unit).

### **B68**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Indigofera rugosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Boerhavia gardneri*, *Corchorus parviflorus*, *Acacia acradenia*.

Habitat and Soil: Lower slopes of a colluvial spur at base of a high ridge. Gravelly, pebbly, brown loam. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-751 UTM 76-61-410 (from GPS unit).

### **B69**

*Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Acacia inaequilatera*.

Habitat and Soil: Mid to upper slopes, south-west facing of a high ridge. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-593 UTM 76-61-125 (from GPS unit).

Notes: Similar to B30.

### **B70**

*Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* shrubland over *Triodia wiseana* hummock grassland.

Habitat and Soil: Low to upper slope of a medium ridge, north facing. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-279 UTM 76-61-400 (from GPS unit).

Notes: Slope 70m away.

### **B71**

*Acacia inaequilatera*, (*Hakea chordophylla*) scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland.  
Associated species: *Goodenia stobbsiana*, *Corchorus parviflorus*, *Corymbia hamersleyana*, *Eriachne mucronata* (typical form), *Acacia acradenia*.

Habitat and Soil: South facing slope of a medium ridge. Gravelly, pebbly, cobbly brown sandy loam. Date: 29/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-911 UTM 76-61-269 (from GPS unit).

### **B72**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Acacia spondylophylla* low open shrubland to shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Corymbia hamersleyana*, *Eucalyptus leucophloia*, *Acacia acradenia*, *Goodenia stobbsiana*.

Habitat and Soil: North-facing, lower to upper slopes (shale geology) of medium ridge. Date: 29/10/2001.

Location: Panorama project Area 1. At: 50K 07-28-865 UTM 76-60-909 (from GPS unit).

### **B73**

*Eucalyptus leucophloia* scattered low trees over *Acacia adoxa* var. *adoxo*, *Acacia hilliana* low open heath over *Triodia melvillei* hummock grassland.

Associated species: *Dampiera candidans*, *Hakea chordophylla*, *Acacia acradenia*, *Tephrosia* aff. *supina*.

Habitat and Soil: Upper slopes of a high ridge, east and west facing. Gravelly, pebbly, cobbly red-brown sandy loam. Date: 29/10/2001.

Location: Panorama project Area 1. At: 50K 07-30-375 UTM 76-57-939 (from GPS unit).

Notes: Burnt within last 2 years. Adjacent area to B73 which was very similar to B73, but with *Acacia acradenia* high shrubland.

### **B74**

*Acacia inaequilatera* scattered tall shrubs over *Tephrosia spechtii* low open shrubland over *Triodia wiseana* hummock grassland.

Habitat and Soil: North facing slope of a medium ridge. Date: 29/10/2001.

Location: Panorama project Area 1.

Notes: Observed from 60m.

### **B109**

*Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Triodia wiseana* (from next vegetation unit).

Habitat and Soil: Low shale ridge crest. Gravel, pebbles, cobbles and rock outcrop matrix with brown sand. Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-31-642 UTM 76-59-839 (from GPS unit).

**B110**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Hakea chordophylla*.

Habitat and Soil: Lower slopes of shale ridges. Gravelly, pebbly, cobbly brown sand (tested). Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-31-578 UTM 76-59-787 (from GPS unit).

Notes: Some areas of just *Acacia orthocarpa* over *Triodia wiseana*.

**B114**

*Acacia inaequilatera*, *Acacia bivenosa* scattered tall shrubs over *Acacia hilliana* low shrubland to open heath over *Triodia epactia* hummock grassland.

Associated species: *Goodenia cusackiana*, *Grevillea wickhamii* ssp. *aprica*, *Eucalyptus leucophloia*.

Habitat and Soil: Lower slopes of colluvial spurs. Gravelly, pebbly, cobbly brown loam. Date: 3/11/2001.

Location: Panorama project Area 1.

**B115**

*Acacia inaequilatera*, *Grevillea wickhamii* subsp. *aprica*, *Acacia bivenosa* scattered high shrubs over *Acacia hilliana* shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Cassia pruinosa*, *Goodenia cusackiana*, *Dodonaea coriacea*.

Habitat and Soil: Lower slopes of a high ridge (just upslope of B114). Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-578 UTM 76-59-013 (from GPS unit).

**B116**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Hakea chordophylla*, *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*.

Habitat and Soil: Valley floor, flat. Gravelly, pebbly brown sand. Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-665 UTM 76-58-730 (from GPS unit).

**B117**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia hilliana*, *Acacia adoxa* var. *adoxa*, *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Acacia maitlandii*, *Corchorus* aff. *laniflorus* (PAN 76), *Cassia glutinosa*, *Tephrosia* aff. *rosea* (HD 292-37), *Sida* (C).

Habitat and Soil: Low to mid slope. Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-759 UTM 76-58-646 (from GPS unit).

**B118**

*Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Indigofera monophylla* (PAN 58-17), *Petalostylis labicheoides*, *Corchorus* aff. *laniflorus* (PAN 76), *Solanum phlomoides*.

Habitat and Soil: Upper slope of high ridge (upslope of B117) and west facing just below a rocky crest/cliff. Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-795 UTM 76-58-644 (from GPS unit).

Notes: The *Petalostylis labicheoides* strayed in from crest unit B119.

### **B119**

*Acacia inaequilatera*, *Petalostylis labicheoides* high open shrubland to high shrubland over *Corchorus* aff. *laniflorus* (PAN 76), *Euphorbia* aff. *drummondii* (HD195-16) low open shrubland over *Triodia* sp. Panorama, *Triodia brizoides* hummock grassland.

Associated species: *Goodenia cusackiana*, *Grevillea wickhamii* ssp. *aprica*, *Ptilotus mollis*.

Habitat and Soil: Rocky outcrop shelves at and just below the crest of a high ridge. Shaley brown loam. Date: 3/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-839 UTM 76-58-653 (from GPS unit).

Notes: Burnt within last 2 to 3 years.

### **B120**

*Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* subsp. *aprica*, *Acacia acradenia* high shrubland over *Acacia adoxa* var. *adoxo* scattered low shrubs to low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Dampiera candicans*, *Cassia glutinosa*, *Dodonaea coriacea*.

Habitat and Soil: Lower east facing slopes of a high ridge. Date: 3/11/2001.

Location: Panorama project Area 1.

### **B121**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* tall shrubs over *Acacia hilliana* low open shrubland to low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Cassia glutinosa*, *Dampiera candicans*, *Goodenia stobbsiana*, *Acacia spondylophylla* (lower slopes).

Habitat and Soil: Lower to mid slopes of a medium, east facing ridge. Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-751 UTM 76-58-879 (from GPS unit).

Notes: *Eucalyptus leucophloia* on the upper slopes.

### **B122**

*Acacia acradenia*, *Acacia inaequilatera*, *Acacia bivenosa* high open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Dodonaea coriacea*, *Acacia adoxa* var. *adoxo*, *Acacia hilliana*.

Habitat and Soil: North-east facing lower to upper slope of a medium ridge (shale).

Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-719 UTM 76-59-089 (from GPS unit).

Notes: ?Similar to P45.

### **B123**

*Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla* low open shrubland to low shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland.

Associated species: *Goodenia cusackiana*, *Hakea chordophylla*, *Acacia bivenosa*, *Grevillea pyramidalis*.

Habitat and Soil: Lower slopes of a medium to high ridge. Shale ridge (soil not tested). Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-612 UTM 76-59-401 (from GPS unit).

### **B124**

*Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Dodonaea coriacea*, *Hakea chordophylla*, *Goodenia cusackiana*, *Ptilotus mollis*, *Cassia 'symonii'*.

Habitat and Soil: Crest of a shale ridge with rocky shale shelf outcrop (soil not tested). Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-750 UTM 76-59-443 (from GPS unit).

### **B125**

*Acacia acradenia*, *Acacia inaequilatera* high open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Grevillea wickhamii ssp. aprica*, *Dampiera candicans*, *Triodia wiseana*, *Corchorus aff. laniflorus* (PAN 76), *Solanum phlomoides*.

Habitat and Soil: North-east facing mid to upper slope on high shale ridge. Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-31-172 UTM 76-58-933 (from GPS unit).

### **B126**

*Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii ssp. aprica*, *Petalostylis labicheoides*, *Acacia acradenia*, *Acacia inaequilatera* high shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Acacia hilliana*, *Dampiera candicans*, *Indigofera monophylla* (PAN57-9), *Acacia adoxa* var. *adoxo*, *Dodonaea coriacea*, *Solanum phlomoides*, *Goodenia stobbsiana*.

Habitat and Soil: Lower to mid slope. Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-31-019 UTM 76-58-344 (from GPS unit).

Notes: Similar to B122. Last burnt less than about 3 to 4 years ago.

### **B127**

*Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Petalostylis labicheoides*, *Corchorus* aff. *laniflorus* (PAN 76), *Goodenia stobbsiana*.

Habitat and Soil: Mid to upper slope, shale. Gravelly, pebbly, cobbly shale matrix.

Date: 4/11/2001.

Location: Panorama project Area 1. At: 50K 07-30-896 UTM 76-58-775 (from GPS unit).

### **B129**

*Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub over, *Petalostylis labicheoides*, *Cajanus cinereus* (*Acacia tumida*) high shrubland over *Triodia epactia*, (*Triodia* sp. Panorama, *Triodia wiseana*).

Date: 21/10/2001.

Location: Panorama project Area 1 (upstream of PAN077).

At: 50K 07-30-920 UTM 76-59-801 (from GPS unit).

Notes: i) An area P75b in the Kangaroo Caves area is similar to P75 but over *Triodia wiseana* hummock grassland.

ii) Larger creek system downstream of B133. *Eucalyptus victrix* along the creek banks and no *Acacia tumida* at this point. Otherwise similar vegetation. Also *Stemodia grossa* herbland. At: 50K 07-28-598 UTM 76-57-970 on southern perimeter of the Sulphur Springs survey area.

### **B130**

*Triodia wiseana* hummock grassland.

Habitat: Lower slopes of rock pile ridges with fewer patches of exposed boulders.

Location: The releve was recorded in the proposed tailings dam valley, in the central north-east part of the Sulphur Springs survey area.

Notes: Considerable areas of simple *Triodia wiseana* hummock grassland (no or very few scattered low trees/shrubs).

### **B131**

*Acacia inaequilatera* scattered tall shrubs to open high shrubland over *Triodia wiseana* hummock grassland.

Habitat: Lower to mid slopes of low to medium ridges.

Location: in the Tailings Dam valley in the Sulphur Springs survey area.

Notes: No *Indigofera monophylla* dominant strata (cf. B35).

### **B132**

*Indigofera monophylla* (PAN 65-14) scattered low shrubs to low open shrubland over *Triodia wiseana* hummock grassland.

Habitat: Lower to upper slopes in the Kangaroo Caves Formation geological unit.

Location: It was 100 to 200 metres south of releve B59, near the south-west perimeter of the Sulphur Springs survey area.

Notes: Similar to B49 but had no tall shrub layer and only scattered to open low shrubland of *Indigofera monophylla* (PAN 65-14).

Date: 24/10/2001.



**B133**

*Acacia tumida* low open forest over *Acacia acradenia*, *Cajanus cinereus*, *Acacia pyrifolia* (slender, white), *Cassia glutinosa* closed scrub over *Indigofera monophylla* (PAN 65-14) low shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Acacia colei*.

Habitat and Soil: Banks of the creekline at the base of volcanic hills. Gravelly, pebbly, cobbly brown loam. Date: 24/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-499 UTM 76-57-970 (from GPS unit).

Notes: *Stemodia grossa* can form herblands along creek banks adjacent to the creek bed in higher order creeks.

**B134**

*Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), *Grevillea wickhamii* ssp. *Aprica* high open shrubland over *Indigofera monophylla* (PAN 58-17), *Tephrosia spechtii* low shrubland over *Triodia brizoides* hummock grassland.

Habitat: lower and midslopes in the Kangaroo Formation geological unit.

Location: In south-west part of Sulphur Springs survey area.

Note: related to B57 and B135.

**B135**

*Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *Aprica* open high shrubland over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland to low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Cassia 'symonii'*, *Cassia glutinosa*, *Solanum phlomoides*.

Habitat: lower and midslopes in the Kangaroo Formation geological unit.

Location: In south-west part of Sulphur Springs survey area.

Note: related to B57 and B135.

**B136**

*Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.

Associated species: include *Acacia colei*, *Grevillea wickhamii* ssp. *Aprica*, *Acacia inaequilatera*, *Rhynchosia* cf. *minima*, *Acacia acradenia*.

Habitat: Adjacent to the creekline on the valley floor.

Location: near the southern perimeter of Sulphur Springs survey area. It occurred along with another vegetation unit as part of a mosaic of units.

Notes: Differs from B60 by having a layer of *Acacia bivenosa* shrubland.

**B138**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland to shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland.

Habitat: lower slopes of a high ridge in the Kangaroo Caves Formation geological units.

Location: It was recorded in the southern part of the Sulphur Springs survey area, north and east of B62 (downslope). At: 50K 07-28-993 UTM 76-57-995 (from GPS unit).

**B139**

*Terminalia canescens* low woodland over *Atalaya hemiglauca*, *Acacia colei*, *Acacia acradenia*, *Cajanus cinereus* open shrubland over *Stemodia grossa*.

Associated species: *Acacia pyrifolia* (slender, white), *Tephrosia spechtii*, *Cyperus vaginatus*, *Sporobolus australasicus*, *Flueggea virosa* subsp. *melanthesoides*, *Cymbopogon ambiguus*, *Ammannia baccifera*.

Habitat and Soil: Rock slopes in gullies adjacent to the creek bed. Date: 27/10/2001.

Location: Panorama project Area 1. At: 50K 07-29-152 UTM 76-59-575 (from GPS unit).

#### **B140**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, (*Grevillea wickhamii* ssp. *aprica*) open scrub over *Petalostylis labicheoides* high open shrubland over *Triodia epactia*, *Triodia wiseana* hummock grassland.

Associated species: *Dampiera candicans*, *Goodenia stobbsiana*, *Indigofera monophylla* (PAN 57-9), *Corchorus* aff. *Laniflorus* (PAN76)

Habitat and Soil: Banks of a small flow line draining across the valley to the north. Gravelly, pebbly red-brown sandy loam. Date: 28/10/2001.

Location: Panorama project Area 1. At: 50K 07-31-174 UTM 76-60-914 (from GPS unit).

#### **B141**

*Eucalyptus camaldulensis* var. *obtusa*, *Eucalyptus victrix*, *Melaleuca argentea* open forest over *Acacia amplexiceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia* sp. Panorama sedgeland, hummock grassland.

Associated species: *Clerodendrum tomentosum*, *Schoenus falcatus*, *Themeda* sp. Panorama.

Date: 28/10/2001.

Habitat: banks of creekline.

Location: Panorama project Area 1. At: 50K 07-31-941 UTM 76-60-708 (from GPS unit).

Notes: Large areas very similar to P77 and include *Melaleuca argentea*, *Schoenus falcatus*, *Acacia amplexiceps*, *Typha domingensis*, with a small area of *Schoenus falcatus* grassland seen. A lot of large *Eucalyptus camaldulensis* var. *obtusa*. Water running slowly on October 28/10/2001.

#### **B143**

*Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) scattered shrubs over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana*.

Habitat: on upper slopes of hill range in the Kangaroo Caves Formation geological unit.

Location: about 100m west of B59, in south-west part of Sulphur Springs.

Notes: Similar to B59, but without *Tephrosia spechtii* low open shrubland and *Gossypium australe* (Whim Creek form) scattered shrubs.

#### **PAN039 (Notes)**

Creek in main valley, Sulphur Springs: similar to PAN039 but with *Acacia tumida* part of a high shrubland strata or forms a low open woodland. Also *Acacia pyrifolia* (slender, white) in high shrubland layer.

## Relevés recorded for vegetation mapping of the Kangaroo Caves survey area

### **B75**

*Corchorus* aff. *laniflorus* (PAN 76), *Dampiera candicans*, *Solanum phlomoides*, *Ptilotus mollis* scattered low shrubs to low open shrubland over *Triodia melvillei*, (*Triodia wiseana*) hummock grassland.

Associated species: *Indigofera monophylla* (PAN57-9), *Acacia spondylophylla*, *Eucalyptus leucophloia*.

Habitat and Soil: Crest of a high shale ridge. Sandy loam in matrix of layers of shale rock. Date: 30/10/2001.

Location: Panorama project Area 2. At: 50K 07-32-516 UTM 76-54-639 (from GPS unit).

Notes: Very similar to B31.

### **B76**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Dampiera candicans*, *Sida* sp. A (Kimberley Flora), *Cymbopogon ambiguus*.

Habitat and Soil: Rocky crest of a high shale ridge. Sandy loam in shale layer matrix. Date: 30/10/2001.

Location: Panorama project Area 2. At: 50K 07-32-751 UTM 76-54-262 (from GPS unit).

### **B77**

*Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla*, *Indigofera monophylla* (PAN57-9) low shrubland over *Triodia brizoides* hummock grassland.

Date: 30/10/2001.

Location: Panorama project Area 2.

Note: low to mid slopes on east face of next ridge to west had areas of *Eucalyptus leucophloia* over *Acacia spondylophylla* low open shrubland over *Triodia brizoides* (*Triodia wiseana*) hummock grassland (At: 50K 07-32-610 UTM 76-53-547).

### **B78**

*Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia bivenosa* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Hakea chordophylla*, *Cassia glutinosa*.

Habitat and Soil: Valley floor adjacent to main drainage line. Gravelly, pebbly, cobbly brown sand. Date: 30/10/2001.

Location: Panorama project Area 2. At: 50K 07-33-782 UTM 76-54-017 (from GPS unit).

### **B79**

*Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla*, *Waltheria virgata*, *Dampiera candicans*, *Goodenia cusackiana* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

Associated species: *Indigofera monophylla* (PAN57-9), *Acacia inaequilatera*, *Cymbopogon ambiguus*, *Acacia acradenia*, *Dodonaea coriacea*.

Habitat and Soil: Rocky upper slope of a high shale ridge, east facing. Date: 30/10/2001.

Location: Panorama project Area 2. At: 50K 07-33-340 UTM 76-53-890 (from GPS unit).

### **B80**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla* scattered tall shrubs to high open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Dampiera candicans*, *Grevillea pyramidalis*, *Acacia acradenia*, *Solanum phlomoides*, *Tephrosia spechtii*.

Habitat and Soil: Lower to mid slopes of a steep shale slope (with ?laterite), east facing. Gravelly, pebbly, cobbly matrix with red-brown loam. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-33-477 UTM 76-52-975 (from GPS unit).

### **B81**

*Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera*, *Acacia bivenosa* high open shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Corymbia hamersleyana*, *Goodenia stobbsiana*, *Tribulus suberosus*, *Hakea chordophylla*, *Cassia pruinosa*.

Habitat and Soil: Crest and below crest of a steep high shale ridge (hill). Gravelly, pebbly, cobbly matrix with red-brown loam. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-33-427 UTM 76-53-002 (from GPS unit).

Notes: Nearby were *Dampiera candicans*, *Solanum phlomoides*, *Cyperus cunninghamii* ssp. *cunninghamii*.

### **B82**

*Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia adoxa* var. *adoxo* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

Associated species: *Goodenia stobbsiana*, *Solanum phlomoides*, *Dampiera candicans*.

Habitat and Soil: Low to upper slopes of colluvial spur (east facing) of a medium shale ridge. Gravelly, pebbly, cobbly red-brown loam. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-33-117 UTM 76-52-770 (from GPS unit).

Notes: Burnt less than about three years ago.

### **B83**

*Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana*, (*Triodia brizoides*) hummock grassland.

Associated species: *Indigofera monophylla* (PAN57-9), *Tribulus suberosus*, *Solanum phlomoides*, *Corchorus parviflorus*, *Dampiera candicans*.

Habitat and Soil: Upper slope, east facing sandstone ridge. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-32-486 UTM 76-53-683 (from GPS unit).

**B84**

*Eucalyptus leucophloia* scattered low trees over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Acacia inaequilatera*, *Triodia longiceps*, *Acacia spondylophylla*.

Habitat and Soil: Just below crest on a steep south-facing slope of a high ridge. Gravelly, pebbly, cobbly with rock outcrop matrix with brown sandy loam (not tested). Date: 31/10/2001. Photo: Roll x. MP

Location: Panorama project Area 2. At: 50K 07-32-307 UTM 76-53-807 (from GPS unit).

Notes: Similar to B40, B45.

**B85**

*Eucalyptus leucophloia* scattered low trees over *Acacia tumida* high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Tribulus suberosus*, *Dampiera candicans*, *Corchorus parviflorus*.

Habitat and Soil: Crest of a high sandstone ridge. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-32-261 UTM 76-53-836 (from GPS unit).

**B86**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Acacia tumida*, *Dampiera candicans*.

Habitat and Soil: Upper slope just below crest and crest of a high sandstone ridge. Date: 31/10/2001.

Location: Panorama project Area 2. At: 50K 07-32-025 UTM 76-54-127 (from GPS unit).

**B87**

*Grevillea wickhamii* ssp. *aprica*, (*Acacia inaequilatera*) scattered tall shrubs to high open shrubland over *Tephrosia spechtii* open shrubland over *Triodia epactia* (*Triodia brizoides*) hummock grassland.

Associated species: *Corchorus* aff. *laniflorus* (PAN 76), *Solanum phlomoides*, *Indigofera monophylla* (PAN57-9), *Cassia glutinosa*, *Acacia adoxa* var. *adoxo*, *Triodia longiceps*.

Habitat and Soil: North-facing mid slope of a high ridge of Rhyolite dome. Gravelly, pebbly, cobbly red-brown sand. Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-32-422 UTM 76-53-396 (from GPS unit).

**B88**

*Acacia inaequilatera* scattered tall shrub over *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN57-9) *Acacia ptychophylla* low open shrubland to scattered low shrubs over *Triodia brizoides* hummock grassland.

Associated species: *Triodia longiceps*, *Corchorus* aff. *laniflorus* (PAN 76), *Cymbopogon ambiguus*, *Sida* (sp. A (Kimberley Flora)).

Habitat and Soil: North-facing lower slope of a high Rhyolite ridge. Matrix of gravel, pebbles, cobbles with red-brown sand. Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-32-336 UTM 76-53-532 (from GPS unit).

### **B89**

*Terminalia canescens* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggea virosa* subsp. *melanthesoides*, *Acacia pyrifolia* (slender, white) open scrub over *Triodia* sp. Panorama, *Cyperus vaginatus* sedgeland/grassland and *Flaveria australasica*, *Stemodia grossa* herbland

Associated species: *Acacia coriacea* var. *pendens*.

Habitat and Soil: Creek flood banks. Brown sand. Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-32-125 UTM 76-53-619 (from GPS unit).

### **B90**

*Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* sp. Panorama, *Tephrosia* sp. B (Kimberley Flora), *Tephrosia spechtii* open shrubland to scattered shrubs over *Triodia longiceps*, (*Triodia epactia*) open hummock grassland.

Associated species: *Cymbopogon ambiguus*, *Ficus platypoda* (C), *Euphorbia* aff. *drummondii* (HD 195-16), *Tribulus suberosus*, *Cajanus cinereus*.

Habitat and Soil: Rocky shoulders, often lower to mid slope of Rhyolite dome and adjacent creekline. Brown sand in gravel, pebble, cobble, rock outcrop matrix. Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-32-097 UTM 76-53-670 (from GPS unit).

Notes: *Tinospora smilacina* collected near B90.

### **B91**

*Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia epactia* (*Triodia brizoides*) hummock grassland.

Associated species: *Acacia inaequilatera*, *Corchorus* sp. Panorama, *Sida* sp. A (Kimberley Flora), *Triumfetta maconochieana*.

Habitat and Soil: Gully slopes and crest of a medium ridge on Rhyolite dome. Gravelly, pebbly, cobbly red-brown sand (not tested). Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-32-021 UTM 76-53-239 (from GPS unit).

### **B92**

*Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*,

Date: 1/11/2001.

Location: Panorama project Area 2.

Notes: Observed from adjacent slope.

**B128**

*Acacia tumida* open high shrubland to high shrubland over *Triodia melvillei* hummock grassland.

Habitat and Soil: Steep rocky shale slopes just below the crest of a high shale ridge.

Date: 17/10/2001.

Location: In the Kangaroo Caves survey area. At: 50K 07-32-636 UTM 76-54-443 (from GPS unit).

**B142**

*Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia wiseana* hummock grassland.

Habitat: On the west facing lower to upper slope of medium height ridge.

Located: Southern part of the Kangaroo Caves survey area.

Notes: Similar releve, B80, occurred on the east-facing slopes.

**PAN079 (Notes)**

Similar to P79 (*Acacia pyrifolia* (slender, white) high open shrubland to shrubland) but with *Eucalyptus victrix* scattered trees, *Melaleuca linophylla*, *Petalostylis labicheoides*. (*Melaleuca glomerata* and *Triodia* sp. Panorama upstream)

Habitat and Soil: Banks of creekline.

Location: Panorama project Area 2.

**Releves recorded for vegetation mapping of the Berndt's survey area****B94**

*Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Sida* sp. A (Kimberley Flora), *Grevillea wickhamii* ssp. *aprica*, *Indigofera monophylla* (PAN 58-17), *Solanum phlomoides*, *Acacia acradenia*.

Habitat and Soil: Lower slope of a low hill, north facing. Sandy loam in gravel, pebble, cobble matrix. Date: 1/11/2001.

Location: Panorama project Area 3. At: 50K 07-35-955 UTM 76-50-527 (from GPS unit).

Notes: Burnt less than 2years ago.

**B95**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Cassia notabilis*, *Ptilotus calostachyus* var. *calostachyus*, *Indigofera monophylla* (PAN 58-17), *Solanum phlomoides*, *Corchorus parviflorus*.

Habitat and Soil: Very low ridge in the valley, a few hundred metres from Honeyeater creek and 20m from the drainage line. Gravelly, pebbly brown sandy loam. Date: 1/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-156 UTM 76-50-381 (from GPS unit).

Notes: Burnt within last two years. Flow line = P39b unit.

### **B96**

*Corymbia hamersleyana* scattered low trees over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Solanum phlomoides*, *Cassia notabilis*.

Habitat and Soil: Very low ridge crest (similar to B94 but lower). Sandy loam in gravel, pebble, cobble matrix. Date: 1/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-006 UTM 76-50-239 (from GPS unit).

Notes: *Ptilotus astrolasius* near B96.

### **B97**

*Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Dampiera candicans*, *Hakea chordophylla*, *Sida* sp. A (Kimberley Flora), *Solanum phlomoides*, *Corchorus parviflorus*, *Ptilotus calostachyus* var. *calostachyus*.

Habitat and Soil: Crest of medium ridge between two high ridges. Gravelly pebbly, cobbly red-brown sand. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-500 UTM 76-50-424 (from GPS unit).

Notes: Similar to P59?

### **B98**

*Eucalyptus leucophloia* scattered low trees over *Triodia wiseana* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Corymbia hamersleyana*, *Solanum phlomoides*, *Dampiera candicans*, *Grevillea wickhamii* ssp. *aprica*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Cymbopogon ambiguus*.

Habitat and Soil: East facing mid to upper slope, on high ridge. Gravelly pebbly, cobbly red-brown sand (not tested). Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-750 UTM 76-50-598 (from GPS unit).

Notes: Not burnt for more than 7 to 10 years. *Corymbia hamersleyana* occurred near drainage lines.

### **B99**

*Grevillea wickhamii* ssp. *aprica* high shrubland over *Triodia epactia* hummock grassland.

Associated species: *Dampiera candicans*, *Eriachne mucronata* (typical form), *Cyperus cunninghamii* ssp. *cunninghamii*.

Habitat and Soil: Rocky crest of high chert ridge. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-552 UTM 76-50-738 (from GPS unit).

Notes: Burnt about less than 2 years ago.

### **B100**

*Eucalyptus leucophloia* scattered low trees over *Triodia epactia* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Cymbopogon ambiguus*, *Cassia glutinosa*, *Grevillea wickhamii* ssp. *aprica*, *Triumfetta maconochieana*.



Habitat and Soil: Upper slope of high ridge at head of a gully. Date: 2/11/2001.

Location: Panorama project Area 3.

### **B101**

*Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Ptilotus* var. *calostachyus* var. *calostachyus*.

Habitat and Soil: Slopes of gully walls on upper slopes of a high ridge. Gravelly pebbly, cobbly red-brown sandy loam. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-788 UTM 76-51-450 (from GPS unit).

### **B102**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland over *Triodia brizoides* hummock grassland.

Associated species: *Trichodesma zeylanicum* var. *zeylanicum*, *Goodenia stobbsiana*, *Corchorus parviflorus*, *Tribulus suberosus*, *Solanum horridum*.

Habitat and Soil: Mid to upper slopes of a gully on a high ridge. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-36-278 UTM 76-51-163 (from GPS unit).

### **B103**

*Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Acacia acradenia*, *Solanum phlomoides*, *Corchorus parviflorus*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form).

Habitat and Soil: Low calcrete ridges on the valley floor between Berndts hill range and the Shaw River. *Euphorbia tannensis* ssp. *eremophila* (Panorama form) Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-37-105 UTM 76-50-558 (from GPS unit).

Notes: Burnt less than 2 years ago. Similar to P57a and X7.

### **B104**

*Grevillea wickhamii* ssp. *aprica* scattered tall shrub to high open shrubland over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland.

Associated species: *Dampiera candidans*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Ptilotus calostachyus* var. *calostachyus*, *Goodenia stobbsiana*, *Corchorus parviflorus*.

Habitat and Soil: Low ridges in valley (as in B103). Date: 2/11/2001.

Location: Panorama project Area 3.

Notes: West 150 m of B105.

### **B105**

*Triodia angusta* (Shaw River form) hummock grassland.

Associated species: *Triodia wiseana*, *Corchorus parviflorus*.

Habitat and Soil: swales on valley floor between low ridges (type B103), between Berndts hills and the Shaw River. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-37-223 UTM 76-50-699 (from GPS unit).

Notes: Small patches with few species seen within them.

### **B106**

*Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Cajanus cinereus*, *Grevillea wickhamii* subsp. *aprica*, *Acacia pyrifolia* (slender, white) *Petalostylis labicheoides* open shrub over *Triodia angusta* (Shaw River form) hummock grassland.  
Associated species: *Corchorus parviflorus*, *Indigofera monophylla* (PAN 58-17), *Eriachne tenuiculmis*.

Habitat and Soil: Creek banks. Date: 2/11/2001.

Location: Panorama project Area 3.

Notes: 50m east of B105.

### **B107**

*Eucalyptus camaldulensis* var. *obtusata*, *Melaleuca argentea* open to closed forest over *Acacia ampliceps*, *Acacia coriacea* var. *pendens*, *Atalaya hemiglaucata* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggia virosa* ssp. *melanthesioides* scattered tall shrubs over *Cyperus vaginatus*. \**Cenchrus ciliaris*, *Cynodon dactylon*, \**Argemone ochroleuca* very open sedgeland and herbland, grassland.

Associated species: *Euphorbia* sp. (site 1089).

Habitat and Soil: Flood bank islands on the Shaw River bed. Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-37-311 UTM 76-50-337 (from GPS unit).

### **B108**

*Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Acacia acradenia* tall shrubs over *Triodia wiseana* hummock grassland.

Associated species: *Corchorus parviflorus*, *Pentalepis trichodesmoides*, *Ptilotus calostachyus* var. *calostachyus*, *Euphorbia tannensis* ssp. *eremophila* (Panorama form), *Cyperus cunninghamii* ssp. *cunninghamii*, *Boerhavia gardneri*, *Goodenia stobbsiana*.

Habitat and Soil: Low volcanic ridge. Gravelly pebbly, cobbly sandy loam (not tested). Date: 2/11/2001.

Location: Panorama project Area 3. At: 50K 07-35-800 UTM 76-50-829 (from GPS unit).

## **Releves recorded for vegetation mapping of the access track between Sulphur Springs and Kangaroo caves survey areas**

### **B111**

*Eucalyptus victrix* low woodland over *Acacia bivenosa*, *Acacia pyrifolia* (slender, white), *Acacia acradenia* high open shrubland over *Triodia wiseana*, *Cyperus vaginatus* open hummock grassland, sedgeland and *Stemodia grossa* herbland

Associated species: *Melaleuca linophylla*, *Melaleuca glomerata*, *Themeda* sp. Panorama, *Cajanus cinereus*, *Petalostylis labicheoides*.

Habitat and Soil: Creekline banks. Gravelly, pebbly, cobbly brown sand. Date: 3/11/2001.

Location: Panorama access track between project Areas 1 and 2. At: 50K 07-52-541 UTM 76-56-061 (from GPS unit).

Notes: *Typha domingensis* in the creek bed.

**B112**

*Corymbia hamersleyana* scattered low trees over *Acacia orthocarpa* high open shrubland over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Indigofera monophylla* (PAN57-9), *Hakea chordophylla*, *Cassia glutinosa*.

Habitat and Soil: Lower slopes of high ridges. Date: 3/11/2001.

Location: Panorama access track between project Areas 1 and 2. At: 50K 07-32-817 UTM 76-55-209 (from GPS unit).

**B113**

*Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland.

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Corchorus* sp. Panorama, *Pentalepsis trichodesmoides*, *Indigofera monophylla* (PAN57-9).

Habitat and Soil: Lower slopes of high ridges. Date: 3/11/2001.

Location: Panorama access track between project Areas 1 and 2. At: 50K 07-32-928 UTM 76-55-138 (from GPS unit).

Notes: areas of *Acacia orthocarpa* high open shrubland to open shrubland over *Triodia wiseana* hummock grassland.

**B137**

*Acacia acradenia*, (*Acacia inaequilatera*, *Hakea chordophylla*) high shrubland to high open shrubland over *Triodia wiseana* (*Triodia melvillei* hummock grassland).

Associated species: *Grevillea wickhamii* ssp. *aprica*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Goodenia stobbsiana*.

Habitat and Soil: Swales between low ridges on valley floors. Date: 3/11/2001.

Location: Panorama access track between project Areas 1 and 2. At: 50K 07-31-642 UTM 76-59-839 (from GPS unit).

Notes: Very similar to B66.

### **Relevés recorded for vegetation mapping of the access track between Kangaroo Caves and Berndt's survey area**

**B93**

*Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia melvillei* hummock grassland.

Associated species: *Goodenia stobbsiana*, *Ptilotus calostachyus* var. *calostachyus*, *Grevillea wickhamii* ssp. *aprica*, *Cassia glutinosa*.

Habitat and Soil: Low ridges and swales of the valley floor. Gravelly, pebbly red-brown sand >90% rock (gravel, pebble) cover. Date: 1/11/2001.

Location: Panorama project Area 2. At: 50K 07-35-148 UTM 76-51-307 (from GPS unit).

Notes: Burnt within about last two years (small hummocks with few very large ones).

**APPENDIX 11: Site data from the quadrats recorded for the floristic analysis**Key to recorders

MET = M.E. Trudgen

MST = Melinda S. Trudgen

BRM = Brian R. Morgan

MJH = Martin Henson

**PAN001**Described by: MET Date: 15/04/01Location: 16km from Marble Bar Road on Panorama access Road.Photo: 1 on roll PANR1AMG Zone: 50 739541mE, 7691388mN 739493mE, 7691397mN 739508mE, 7691444mNHabitat: Plain, near river. *Acacia inaequilatera*, *Acacia tumida*.Soil: Orange-brown loamy fine to coarse sand.Vegetation: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia tumida* scattered tall shrubs over *Acacia ancistrocarpa* scattered shrubs over *Corchorus parviflorus* low shrubland and *Triodia lanigera* hummock grassland.Vegetation Condition: General area appears very good, but burnt so difficult to judge.Fire Age: 1-2 yearsNotes: Small patches of *Triodia* left unburnt. Some of *Acacia tumida* not killed by fire. *Hakea chordophylla* outside plot (+). *Corchorus* is a pyrosere species, would be uncommon in absence of fire. Burnt areas with *Triodia* 15-20cm <10+ 3 pegs only.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon trudgenii</i>	+ <1 %	25-40cm	P1-36	
<i>Acacia trachycarpa</i>	+ <1 %	103cm	P1-48	
<i>Acacia tumida</i>	<1% <1 %		P1-2	
<i>Aristida holathera</i> var. <i>holathera</i>				
	+ <1 %	35cm	P1-40	
<i>Bonamia linearis</i>	1% 1-5%	10-30cm	(7 P1-8;1-57)	
<i>Bonamia pannosa</i>	+ <1 %	15-35cm	P1-17	
<i>Bonamia rosea</i>	>1% 1-5%	50cm	P1-39	
<i>Bulbostylis barbata</i>	+ <1 %	8-15cm	P1-5	
<i>Cassia glutinosa</i>	+ <1 %	20cm	P1-31	
<i>Cassia oligophylla</i>	+ <1 %	50cm	P1-56	
<i>Cassia 'symonii'</i>	+ <1 %	20cm	P1-42	
<i>Cassytha capillaris</i>	+ <1 %	30 cm	P1-58	
<i>Cenchrus ciliaris</i>	+ <1 %	50cm	P1-44	
<i>Chrysopogon fallax</i>	+ <1 %	50-60cm	P1-34	
<i>Cleome uncifera</i>	+ <1 %	15-20cm	P1-10	
<i>Cleome viscosa</i>	+ <1 %	40cm	P1-41	
<i>Corchorus parviflorus</i>	10-15% 10-25%	30-55cm	P1-6	
<i>Corymbia hamersleyana</i>	1-2+ 1-5%	3.5-8m	P1-3	*
<i>Cullen martinii</i>	+ <1 %	50 cm	P1-59	
<i>Cullen pogonocarpum</i>	+ <1 %	30cm	P1-49	
<i>Cymbopogon obtectus</i>	+ <1 %	10-50cm	P1-35	

<i>Eragrostis eriopoda</i>	+	<1 %	20cm	P1-43
<i>Eriachne pulchella</i> subsp. <i>dominii</i>				
	+	<1 %	10-28cm	P1-12
<i>Euphorbia</i> aff. <i>australis</i> (B191)				
	+	<1 %	1-5cm	P1-14;1-15
<i>Euphorbia coghlanii</i>	+	<1 %	40-55cm	P1-13
<i>Euphorbia</i> sp. (PAN1-14B)				
	+		1-2 cm	P1-14B
<i>Goodenia microptera</i>	+	<1 %	70cm	P1-18
<i>Goodenia stobbsiana</i>	+	<1 %	40cm	P1-11
<i>Gossypium australe</i> (Burrup Peninsula form)				
	+	<1 %	25cm	P1-33
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>				
	+	<1 %	90cm	P1-51
<i>Hakea chordophylla</i>	+	<1 %	2m	P1-52
<i>Heliotropium skeleton</i>	+	<1 %	80cm	P1-19
<i>Heliotropium</i> sp.	+	<1 %	6cm	P1-53
<i>Hibiscus leptocladus</i>	+	<1 %	50cm	P1-4
<i>Indigofera monophylla</i> (small calyx form)				
	+	<1 %	30-55cm	P1-9
<i>Isotropis atropurpurea</i>	+	<1 %	80cm	P1-20
<i>Leptopus decaisnei</i> var. <i>decaisnei</i>				
	+	<1 %	15-25cm	P1-60
<i>Mollugo molluginis</i>	+	<1 %		P1-29
<i>Mukia</i> sp.	+	<1 %	1m	P1-21
<i>Paraneurachne muelleri</i>	+	<1 %	50cm	P1-37
<i>Paspalidium clementii</i>	+	<1 %	10cm	P1-27
<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>				
	+	<1 %	5-15cm	P1-50
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	2cm	P1-22
<i>Polymeria</i> sp. (PAN1-16)	+	<1 %	2cm	P1-16
<i>Portulaca oleracea</i>	+	<1 %	3cm	P1-45
<i>Pterocaulon</i> sp. (PAN1-47)	+	<1 %	35cm	P1-47
<i>Pterocaulon sphaeranthoides</i> x <i>sphacelatum</i>				
	+	<1 %	50cm	P1-32
<i>Ptilotus astrolasius</i>	+	<1 %	60cm	P1-38
<i>Ptilotus fusiformis</i> var. <i>fusiformis</i>				
	+	<1 %	45cm	P1-28
<i>Rhynchosia</i> sp. King Bay (B181-13)				
	+	<1 %	30cm	P1-54
<i>Sida cardiophylla</i>	+	<1 %	55cm	P1-23
<i>Sida rohlena</i> var. <i>rohlena</i>				
	+	<1 %	50cm	P1-55
<i>Solanum diversiflorum</i>	+	<1 %	30cm	P1-25
<i>Sporobolus australasicus</i>	+	<1 %	10-15cm	P1-26
<i>Streptoglossa odora</i>	+	<1 %	25cm	P1-46
<i>Tephrosia</i> sp. Bungaroo Creek (M.E.Trudgen 11601)				
	+	<1 %	40cm	P1-7

<i>Trianthema pilosa</i>	+	<1 %	10-15cm	P1-30
<i>Triodia lanigera</i>	+	<1 %	30-50cm	P1-1
<i>Waltheria indica</i>	+	<1 %	65cm	P1-24

**PAN002**

Described by: MJH Date: 16/04/01

Location: About 14km W of Marble Bar Road to Panorama access track.

AMG Zone: 50 739725mE, 7692388mN 739711mE, 7692335mN 739666mE, 7692344mN

Habitat: Extremely gentle slope on plain, slopes to E.

Soil: Orange-brown loamy fine to coarse sand with gravel in places.

Vegetation: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *aprica*, *Acacia tumida* scattered tall shrubs over *Acacia stellaticeps* shrubland over *Triodia lanigera* hummock grassland and *Corchorus parviflorus* low open shrubland to scattered low shrubs.

Vegetation Condition: Very good - Excellent

Fire Age: 10-12 years?

Notes: Acacias quite big, but fire scarred stems on *Acacia inaequilatera*. Vegetation type appears to be fairly localised. Most of surrounding area has been burnt periodically. 3 pegs only.

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	+	<1 %	1m		
<i>Acacia coriacea</i> subsp. <i>sericophylla</i>	+	<1 %	1.5m	P2-4	corky bark
<i>Acacia inaequilatera</i>	<1	<1 %	2-3m		
<i>Acacia sphaerostachya</i>	+	<1 %	1m	P2-11	
<i>Acacia stellaticeps</i>	15-20	10-25%	1m	P2-1	Also P2-11
<i>Acacia tumida</i>	+	<1 %	2m		=1-2
<i>Bonamia linearis</i>	+	<1 %	(5)15cm	P2-10	
<i>Bulbostylis barbata</i>	+	<1 %	10cm		
<i>Cassia notabilis</i>	+	<1 %	20cm		
<i>Cassia 'symonii'</i>	+	<1 %	1m	P2-3	=1-42
<i>Cassytha capillaris</i>	+	<1 %	50cm	P2-9	
<i>Cleome uncifera</i>	+	<1 %	30cm		=1-10
<i>Corchorus parviflorus</i>	5-15	5-10%	0.5m		=1-6
<i>Corymbia hamersleyana</i>	1+	1-5%	5-6		=PAN 1-1
<i>Cymbopogon ambiguus</i>	+	<1 %	30cm		sterile
<i>Eragrostis eriopoda</i>	+	<1 %	40-50cm		
<i>Goodenia stobbsiana</i>	+	<1 %	20cm		=1-11
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+	<1 %	2m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	3.7m		
<i>Heliotropium chrysocarpum</i>	+	<1 %	0.3m	P2-6	ovalifolium
<i>Heliotropium skeleton</i>	+	<1 %	20cm		=1-19
<i>Hibiscus brachychlaenus</i>	+	<1 %	1.3m	P2-5	
<i>Hibiscus leptocladus</i>	+	<1 %	40cm		=1-4

Hybanthus aurantiacus	+	<1 %	60cm		
Indigofera monophylla (small calyx form)					
	+	<1 %	80cm		
Isotropis atropurpurea	+	<1 %	30cm		
Mollugo molluginis	+	<1 %	15cm		
Mukia sp.	+	<1 %	1.4m	P2-2	
Pluchea tetranthera	+	<1 %	40cm	P2-12	
Polymeria aff. calycina	+	<1 %	30cm		=1-22
Pterocaulon sphacelatum					
	+	<1 %	20cm		
Ptilotus astrolasius	+	<1 %	20cm		
Sida cardiophylla	+	<1 %	40cm		=1-23
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	20cm		
Triodia lanigera	20-25	10-25%	0.5m		

**PAN003**

Described by: MJH Date: 16/04/01

Location: About 12km from Marble Bar Road on W side of track, near huge termite mound.

Photo: 2 on roll MH1

Photo Notes: 26 PANR3

AMG Zone: 50 740153mE, 7694411mN 740144mE, 7694369mN 740194mE, 7694350mN

Habitat: Plain with slight slope up to west.

Soil: Red-brown fine to coarse loamy sand.

Vegetation: Grevillea wickhamii subsp. aprica open heath to open scrub over Acacia ancistrocarpa scattered shrubs over Acacia stellaticeps low shrubland to shrubland and Triodia lanigera hummock grassland.

Vegetation Condition: Excellent

Fire Age: >10 years

Notes: (Co-recorded by Melinda). Some small burnt stumps remaining but otherwise, no sign. Acacia stellaticeps in band through plot, not spread evenly. Grevillea tall, Acacia ancistrocarpa to 2m, quite well grown.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ancistrocarpa	+ <1 %	1-2m		
Acacia inaequilatera	+ <1 %	2.5m		
Acacia stellaticeps	15-20 10-25%	1-2m		
Aristida holathera var. holathera				
	+ <1 %	80cm	P3-9	
Boerhavia gardneri	+ <1 %	30 cm	P3-4B	
Bonamia linearis	+ <1 %	20-50cm		=1-8
Bonamia rosea	1 1-5%	40-50cm		Also P3-2(? = 1-39)
Bulbostylis barbata	+ <1 %	10cm		
Carissa lanceolata	+ <1 %	1.5m	P3-12	? Shrub
Cassia glutinosa	+ <1 %	1m		
Cassia notabilis	+ <1 %	90cm		

<i>Cassytha capillaris</i>	+	<1 %	50cm	P3-3	
<i>Chrysopogon fallax</i>	+	<1 %	50-60cm	P3-5	
<i>Cleome viscosa</i>	+	<1 %	20-30cm		
<i>Corchorus parviflorus</i>	+	<1 %	20cm		=1-6
<i>Corymbia hamersleyana</i>	+	<1 %	4m		1 only
<i>Euphorbia aff. australis</i> (B191)					
	+	<1 %	30-40cm	P3-8	?
<i>Goodenia microptera</i>	+	<1 %	25cm		
<i>Goodenia stobbsiana</i>	+	<1 %	30cm		=1-?
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>					
		40-60 33.3-50%	1.3m	P3-1	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	1.5m		regrowth
<i>Hybanthus aurantiacus</i>	+	<1 %	30-50 cm	P3-4,7,10	
<i>Indigofera monophylla</i> (small calyx form)					
		1-2 1-5%	40-50cm		
<i>Mollugo molluginis</i>	+	<1 %	15-20cm		
<i>Paraneurachne muelleri</i>	+	<1 %	70cm	P3-6	
<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>					
	+	<1 %	15cm	P3-11	?
<i>Ptilotus astrolasius</i>	+	<1 %	50cm		
<i>Sida cardiophylla</i>	+	<1 %	50cm		
<i>Tephrosia</i> sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	40cm		
<i>Triodia lanigera</i>		40-60 33.3-50%	40-50cm		

**PAN004**Described by: BRMDate: 16/04/01Location: 6km north of camp.Photo: 27 on roll PANR2AMG Zone: 50 740634mE, 7696065mN 740584mE, 7696075mN 704647mE, 7696112mNHabitat: Very gentle slope east to river.Soil: Orange-brown loamy fine sand with some coarse grains. Setting surface.Vegetation: *Grevillea wickhamii* ssp *aprica* scattered tall shrubs over *Acacia stellaticeps* low shrubland over *Triodia lanigera* hummock grassland.Vegetation Condition: ExcellentFire Age: +/- 10 years.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	+	<1 %	1.5-2m	
<i>Acacia sphaerostachya</i>	+	10-25%	1m	P4-17
<i>Acacia stellaticeps</i>	>20	10-25% 0.4 - 1m		
<i>Aristida holathera</i> var. <i>holathera</i>				
	+	<1 %	60cm	P4-5;P4-6
<i>Aristida latifolia</i>	+	<1 %	40cm	P4-11 extra tall
<i>Bonamia linearis</i>	+	<1 %	to 30cm	P4-2 (=1-8)
<i>Bonamia rosea</i>	+	<1 %	50cm	



Bulbostylis barbata	+	<1 %			
Cassia notabilis	+	<1 %	30cm		
Cassia 'symonii'	+	<1 %	1.5m		=1-42
Cassytha capillaris	+	<1 %	30-60cm		=2-9
Cleome uncifera	+	<1 %	30cm		=1-10
Corchorus aff laniflorus (PAN 76)					
	+	<1 %	70cm	P4-9	stems reddish brown.
Corchorus parviflorus	+	<1 %	40cm		=1-6
Cymbopogon ambiguus	+	<1 %	50cm	P4-3	
Dodonaea coriacea	+	<1 %	1m	P4-1	
Eragrostis eriopoda	+	<1 %	30cm		
Eriachne pulchella subsp. dominii					
	+	<1 %	15cm		
Eriachne sp. Port Hedland					
	+	<1 %	20cm	P4-7	
Goodenia microptera	+	<1 %			
Goodenia stobbsiana	+	<1 %	60cm		=2-11
Grevillea wickhamii subsp. aprica					
		<1% <1 %	(1m) 2-3m		
Hakea lorea ssp. lorea	+	<1 %	2m		
Heliotropium ovalifolium					
	+	<1 %	10cm		
Heliotropium skeleton	+	<1 %	30cm		=1-19
Hibiscus leptocladus	+	<1 %	40cm	P4-8	
Hybanthus aurantiacus	+	<1 %	50cm		
Isotropis atropurpurea	+	<1 %	30cm		
Mollugo molluginis	+	<1 %	10cm		
Mukia sp.	+	<1 %	15cm	P4-16	
Pluchea tetranthera	+	<1 %	30cm		
Polygala linariifolia	+	<1 %	15cm	P4-13	unknown
Polymeria sp. (PAN4-14)	+	<1 %	40cm	P4-14	creeper
Pterocaulon serrulatum	+	<1 %	50cm	P4-10	
Pterocaulon sphacelatum					
	+	<1 %	60cm		
Ptilotus astrolasius	+	<1 %	50cm		
Schizachyrium fragile	+	<1 %	15cm	P4-4	Little grass
Sida cardiophylla	+	<1 %	40 cm		=1-23
Streptoglossa odora	+	<1 %	30cm	P4-12	
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	40cm		
Trichodesma zeylanicum var. zeylanicum					
	+	<1 %	10cm	P4-15	
Triodia lanigera		>60% 50-75%	25-70cm		

**PAN005**

Described by: BRMDate: 17/04/01

Location: 0.2km along track off Marble Bar Road, east side of track (riverside).

Photo: 26 on roll PANR2?

AMG Zone: 50 742149mE, 7708015mN 742142mE, 7707967mN 742090mE, 7707972mN

Habitat: Low rise on gently undulating plain near river. Overall slight slope to river.

Soil: Orange-brown fine (to medium) sand. Crusty surface in places, in some places a dark thick crust (blue green algae?).

Vegetation: Acacia stellaticeps scattered low shrubs over Triodia epactia, Triodia lanigera hummock grassland.

Vegetation Condition: Very good

Fire Age: About > 5 years since fire

Notes: Just outside plot is Acacia sclerosperma and Grevillea pyramidalis. Small depressions on west side, Stemodia grossa and Corchorus elachocarpus.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia stellaticeps	+ <1 %	0.5-1m		
Aristida holathera var. holathera	+ <1 %	50cm	P5-7	
Bonamia linearis	+ <1 %	15cm		=1-8
Bonamia rosea	+ <1 %	30cm	P5-16	=1-39
Bulbostylis barbata	+ <1 %	10cm		
Cassia notabilis	+ <1 %	50cm		
Cleome uncifera	+ <1 %	30cm		=1-10
Corchorus elachocarpus	+ <1 %	40cm	P5-11	
Cymbopogon obtectus	+ <1 %	30cm	P5-12	Grass
Eragrostis eriopoda +	<1 %	30cm	=1-43	
Eriachne aristidea	+ <1 %	40cm	P5-6	
Eriachne obtusa	+ <1 %	60cm	P5-8	=4-7
Eriachne pulchella subsp. dominii	+ <1 %			
Euphorbia sp. (PAN5-15) +	<1 %	30cm	P5-15	=1-14
Fimbristylis dichotoma	+		P5-?	
Goodenia microptera	+ <1 %	10-30cm		Also P5-3
Hakea lorea ssp. lorea	+ <1 %	1;1.5m	P5-2;P5-9	
Heliotropium skeleton	+ <1 %	40cm		=1-19
Hibiscus leptocladus	+ <1 %	20cm		=1-4
Mollugo molluginis	+ <1 %	15cm		
Pluchea tetranthera	+ <1 %			Also P5-14
Polycarpaea corymbosa var. corymbosa	+ <1 %	8cm	P5-4	
Pterocaulon sphaeranthoides x sphacelatum	+ <1 %	20cm	P5-10	
Ptilotus astrolasius	+ <1 %	50cm		
Schizachyrium fragile	+ <1 %	15cm	P5-5	grass
Sida cardiophylla	+ <1 %	60cm		=1-23
Triodia epactia	~20% 10-25%	40cm	P5-1	
Triodia lanigera	~5-10% 5-10%			=1-1
Wahlenbergia tumidifructa	+ <1 %	50cm	P5-13	

**PAN006**Described by: MJH Date: 17/04/01Location: About 0.7km from Marble Bar Road, on west side of side track, approximately 100m off main track.AMG Zone: 50 741988mE, 7707401mN 741990mE, 7707354mN 742038mE, 7707366mNHabitat: Slight depression in undulating plain near river.Soil: Dull orange-brown fine sand with silt.Vegetation: Acacia stellaticeps shrubland over Triodia lanigera, Triodia epactia hummock grassland with Corchorus elachocarpus low open shrubland.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia inaequilatera	+ <1 %	1.5m		2 only. =PAN1-10
Acacia stellaticeps	35-40 33.3-50%	1m		
Aristida holathera var. holathera				
	+ <1 %	40cm	P6-5	
Bonamia linearis	+ <1 %	20cm		=PAN1-8, small
Bonamia rosea	+ <1 %	30cm		
Bulbostylis barbata	+ <1 %	10-18cm		
Cajanus marmoratus	+ <1 %	20cm	P6-7	Mulga/Vigna?
Chrysopogon fallax	+ <1 %	60cm		
Cleome uncifera	+ <1 %	20cm		
Corchorus elachocarpus	5 5-10%	50-100cm	P6-2	
Cymbopogon ambiguus	+ <1 %	50-60cm	P6-13	grass
Eragrostis eriopoda	+ <1 %	20cm		
Eriachne aristidea	+ <1 %	20cm	P6-10	
Eriachne obtusa	+ <1 %	30cm	P6-6;P6-12	grass
Fimbristylis dichotoma	+ <1 %	20cm	P6-4	
Goodenia microptera	+ <1 %	30cm		
Hakea lorea ssp. lorea	+ <1 %	1.8cm		
Heliotropium sp.	+ <1 %	20cm		
Hybanthus aurantiacus	+ <1 %	30cm	P6-9	
Indigofera monophylla (small calyx form)				
	+ <1 %	50cm		
Mitrasacme connata	+ <1 %	8cm	P6-8	basal rosette
Mollugo molluginis	+ <1 %	15cm		
Mukia sp.	+ <1 %	60cm	P6-3	
Paraneurachne muelleri	+ <1 %	40-50cm	P6-14	
Pluchea ferdinandi-muelleri				
	+ <1 %	15cm	P6-11	
Pluchea tetranthera	+ <1 %	80cm-1m		
Polycarpaea corymbosa var. corymbosa				
	+ <1 %	15cm		
Ptilotus astrolasius	+ <1 %	60cm		
Rhynchosia cf. minima	+ <1 %	10cm	P6-1	
Sida cardiophylla	+ <1 %	40cm		=1-23
Stemodia grossa	+ <1 %	50cm		
Triodia epactia	40 33.3-50%	50cm		

*Triodia lanigera* 25 25-33.3% 50cm

### PAN007

Described by: MET Date: 17/04/01

Location: Along Panorama Access Road from Marble Bar Road on east side of access road.

Photo: 26 on roll PANR1

AMG Zone: 50 742045mE, 7706457mN 741995mE, 7706441mN 741997mE, 7706391mN

Habitat: West facing slope and crest of a low rise on an undulating plain that slopes gently to east (overall).

Soil: Dull orange-brown fine sand, some silt.

Vegetation: *Acacia stellaticeps* low open heath over *Pluchea tetranthera* scattered low shrubs over *Triodia lanigera* hummock grassland over *Eragrostis eriopoda* scattered hummock grasses.

Vegetation Condition: Very good to Excellent

Fire Age: >10 years (?>15)

Notes: (Co-recorded by MST)

Few *Acacia inaequilatera* nearby. Only a few plants of *Triodia epactia*. In the SW corner, which was lower, the *Acacia stellaticeps* was taller, the *Triodia epactia* was in this corner. Swale between PAN7 and access track had *Pluchea tetranthera* low open shrubland with *Triodia epactia*. *Carissa* collected in this. Some *Fimbristylis* seen.

*Eragrostis* collected.

#### Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia stellaticeps</i>	35-40% 33.3-50%	0.5-1m		
<i>Bonamia linearis</i>	+ <1 %	25cm		=1-8
<i>Bonamia rosea</i>	+ <1 %	60cm		
<i>Cassytha capillaris</i>	+ <1 %	45cm	P7-3	=2-9
<i>Corchorus elachocarpus</i>	+ <1 %	50cm	P7-4	narrow
<i>Crotalaria ramosissima</i>	+ <1 %	7-15cm	P7-1;P7-6	
<i>Eragrostis eriopoda</i>	1-2% 1-5%		40cm	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+ <1 %	60cm		
<i>Heliotropium skeleton</i>	+ <1 %	50cm	P7-9	=1-19
<i>Hibiscus leptocladus</i>	+ <1 %	15-45cm	P7-7	=1-4
<i>Paraneurachne muelleri</i>	+ <1 %	40cm		
<i>Pluchea tetranthera</i>	+ <1 %	0.7-1m		
<i>Polygala linariifolia</i>	+ <1 %	30cm	P7-5	
<i>Polymeria calycina</i>	+ <1 %	45cm	P7-2	
<i>Ptilotus astrolasius</i>	+ <1 %	50cm		
<i>Sida cardiophylla</i>	+ <1 %	35 cm		=1-23
<i>Triodia epactia</i>	+ <1 %	35cm		Few plants in SW
<i>Triodia lanigera</i>	50% + 50-75%	30-60cm		

### PAN008

Described by: BRM Date: 17/04/01

Photo: 25? 26? on roll PANR2

AMG Zone: 50 741727mE, 7704912mN 741712mE, 7704864mN 741760mE, 7704849mN

Habitat: Flat to gently sloping area on gently undulating plains.

Vegetation: *Acacia coriacea* subsp. *coriacea*, *Acacia tumida*, *Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Acacia stellaticeps* scattered shrubs over *Corchorus elachocarpus*, *Cullen martinii* low shrubland over *Triodia lanigera* hummock grassland.

Soil: Orange-brown loamy sand. Some crusting at surface.

Vegetation Condition: Very good - Excellent

Fire Age: 3-5 years.

Notes: 40m from Access road.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia coriacea</i> subsp. <i>sericophylla</i>	+ <1 %	2-3m		=2-4
<i>Acacia dictyophleba</i>	+ <1 %	1.8m	P8-7	
<i>Acacia stellaticeps</i>	+ <1 %	1-2m		=2-1
<i>Acacia tumida</i>	+ <1 %	1-2m		=1-2
<i>Aerva javanica</i>	+ <1 %	80cm	P8-18	grey leaf
<i>Aristida hygrometrica</i>	+ <1 %	30cm	P8-12	
<i>Boerhavia coccinea</i>	+ <1 %	40cm	P8-20	? creeper
<i>Bonamia linearis</i>	+ <1 %	40cm		creeper =1-8
<i>Bonamia rosea</i>	+ <1 %	30cm	P8-5	=1-39?
<i>Cajanus marmoratus</i>	1 1-5%		P8-6	=1-54?
<i>Cenchrus ciliaris</i>	+ <1 %	30cm		
<i>Corchorus elachocarpus</i>	5-10% 5-10%	60cm	P8-1	fine leaf
<i>Crotalaria ramosissima</i>	+ <1 %	40cm	P8-4;P8-15	small grey leaf
<i>Cullen martinii</i>	+/- 1% <1 %	80cm	P8-2	grey leaf pea
<i>Eragrostis eriopoda</i>	+ <1 %	30cm		
<i>Eriachne aristidea</i>	+ <1 %	40cm	P8-11	grass
<i>Eriachne obtusa</i>	+ <1 %		P8-19	
<i>Euphorbia</i> aff. <i>australis</i> (B191)	+ <1 %	4cm		=1-14
<i>Euphorbia coghlanii</i>	+ <1 %	40cm		=1-13
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+ <1 %	2-3m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+ <1 %	1.8m		=1-52
<i>Hibiscus leptocladus</i>	+ <1 %	10cm		=1-4
<i>Indigofera linnaei</i>	+ <1 %	15cm	P8-10	?=1-15
<i>Indigofera rugosa</i>	+ <1 %	1-1.8m	P8-14	
<i>Mollugo molluginis</i>	+ <1 %	10cm		=1-29
<i>Pimelea ammocharis</i>	+ <1 %	1m	P8-8	
<i>Pluchea ferdinandi-muelleri</i>	+ <1 %	60cm		"tomentosa"
<i>Pluchea tetranthera</i>	+ <1 %	30cm		=2-12
<i>Polymeria calycina</i>	+ <1 %	30cm	P8-21	? erect
<i>Ptilotus astrolasius</i>	+ <1 %	40cm		
<i>Sida cardiophylla</i>	+ <1 %	30cm		=1-23
<i>Sida rohlenae</i> var. <i>rohlenae</i>	+ <1 %	60cm		=1-55

Tephrosia aff. bidwillii (HD153-5)	+	<1 %	30cm	P8-3	creeper
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)	+	<1 %	80cm		=1-7
Tinospora smilacina	+	<1 %	1.5m	P8-17	? vine
Trianthema pilosa	+	<1 %	10cm=1-30		=1-30
Triodia lanigera	30-40%	33.3-50%	30cm		=1-1
Yakirra australiensis var. australiensis	+	<1 %	15cm	P8-13	=1-27
Zornia chaetophora	+	<1 %	40cm	P8-9	?

**PAN009**Described by: MJH Date: 17/04/01Photo: 27 on roll PANR3AMG Zone: 50 741792mE, 7703413mN 741790mE, 7703463mN 741841mE, 7703470mNHabitat: Relatively flat, gentle slope to west on undulating plain west of Shaw river.Soil: Fine orange-brown to reddish brown sand with silt.Vegetation: Corymbia zygophylla scattered trees over Acacia stellaticeps open heath over Triodia lanigera hummock grassland.Vegetation Condition: Very good - ExcellentFire Age: > 10 years.Notes: Corymbia grows taller outside plot.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia coriacea subsp. sericophylla	+	<1 %	2m	only 1.
Acacia inaequilatera	+	<1 %	1.5m	just outside
Acacia stellaticeps	50	33.3-50%	1m	
Aristida holathera var. holathera	+	<1 %	60cm	
Bonamia linearis	+	<1 %	10cm	=1-8
Bonamia rosea	+	<1 %	40cm	
Cassytha capillaris	+	<1 %	30cm	P9-3
Cleome uncifera	+	<1 %	30cm	=1-10
Corymbia zygophylla	1.5	1-5%	2-3m	P9-2 "northern marri"
Eragrostis eriopoda	+	<1 %	25cm	
Eriachne aristidea	+	<1 %	30cm	P9-7
Goodenia microptera	+	<1 %	30cm	
Hakea lorea ssp. lorea	+	<1 %	1m	burnt
Heliotropium skeleton	+	<1 %	20cm	=P1-19 small white
Hibiscus leptocladus	+	<1 %	50cm	P9-4
Hybanthus aurantiacus	+	<1 %	20cm	
Indigofera monophylla (small calyx form)	+	<1 %	20cm	
Mollugo molluginis	+	<1 %	15cm	
Polymeria aff. calycina	+	<1 %	30cm	=1-22
Polymeria calycina	+	<1 %	20cm	P9-5 ?

<i>Ptilotus astrolasius</i>	+	<1 %	40cm	
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>				
	+	<1 %	40-50cm	P9-1
<i>Solanum diversiflorum</i>	+	<1 %	30cm	
<i>Tephrosia</i> aff. <i>bidwillii</i> (HD153-5)				
	+	<1 %	20cm;	P9-6;P9-9 ? pea
<i>Triodia lanigera</i>	60%	50-75%	50cm	
<i>Triodia schinzii</i>	60	50-75%	50cmc(P9-1)	

**PAN010**

Described by: MET Date: 17/04/01

Location: 6.9km from Marble Bar Road on Panorama Access Road (track).

Photo: 25 on roll PANR1

AMG Zone: 50 741600mE, 7701600mN 741599mE, 7701551mN 741554mE, 7701600mN

Habitat: Gently sloping area on a gently undulating plain. Some slight depressions.

Soil: Orange-brown fine grained sand (more reddish at depth).

Vegetation: *Corymbia hamersleyana*, *Corymbia zygophylla* low trees over *Acacia tumida*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia lanigera* hummock grassland and *Crotalaria ramosissima* scattered low shrubs with *Cassytha capillaris* open low lianes.

Vegetation Condition: Very good - Excellent (except *Triodia* not large)

Fire Age: <10 years

Notes: *Aristida* not included in vegetation description as not perennial.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	+ - 1% <1 %	1.5-2m		
<i>Acacia dictyophleba</i>	+ <1 %	2.2 m	P10-13	bark smooth
<i>Acacia stellaticeps</i>	+ <1 %	1.1 m		
<i>Acacia tumida</i>	<2% 1-5%	(2)3-4m	=1-2	=1-2
<i>Aristida holathera</i> var. <i>holathera</i>				
	<3 % 1-5%	45cm	=1-40	=1-40
<i>Bonamia linearis</i>	+ <1 %	25cm	P10-7	flowers white, =1-8
<i>Cajanus marmoratus</i>	+ <1 %	50cm	P10-4	Pea creeper
<i>Cassytha capillaris</i>	<5% 1-5%	35cm	=2-9	=2-9
<i>Chrysopogon fallax</i>	+ <1 %	70 cm		Just out
<i>Corchorus parviflorus</i>	+ <1 %	10cm	P10-17	
<i>Corymbia hamersleyana</i>	+ <1 %	4-5m		
<i>Corymbia zygophylla</i>	+ <1 %	3-5m	P10-1	Eucalyptus,
opposite				
<i>Crotalaria ramosissima</i>	+ <1 %	15-35cm	P10-2	
<i>Cullen martinii</i>	+ <1 %	70cm		
<i>Desmodium filiforme</i>	+ <1 %	30cm	P10-14	pea
<i>Dodonaea coriacea</i>	+ <1 %	1.2 m		Just out
<i>Eragrostis eriopoda</i>	+ <1 %	35cm		
<i>Eriachne aristidea</i>	+ <1 %	20cm		
<i>Euphorbia</i> aff. <i>australis</i>	+ <1 %	7cm	P10-3	=1-14
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>				

	+	<1 %	40cm	P10-10	
<i>Goodenia microptera</i>	+	<1 %	15cm		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	2 m		Just out
<i>Heliotropium skeleton</i>	+	<1 %	25cm	=1-19	
<i>Hibiscus leptocladus</i>	+	<1 %	55cm	=1-4	=1-4
<i>Hybanthus aurantiacus</i>	+	<1 %	70cm		
<i>Indigofera linnaei</i>	+	<1 %	25cm	P10-15	
<i>Indigofera monophylla</i> (small calyx form)					
	+	<1 %	50cm		
<i>Mollugo molluginis</i>	+	<1 %	10cm		
<i>Mukia</i> sp.	+	<1 %	1-2m	P10-5	=7-
<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>					
	+	<1 %	20cm	=1-50	dead, =1-50
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	20-30cm	=1-22	=1-22
<i>Ptilotus axillaris</i>	+	<1 %	5cm		
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>					
	+	<1 %	35-40cm		
<i>Sida</i> aff. <i>fibulifera</i> (PAN 10-6)					
	+	<1 %	15cm	P10-6	under tree
<i>Sida</i> sp.	+	<1 %	15 cm	P10-8	
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>					
	+	<1 %	10cm	P10-16	
<i>Tephrosia</i> aff. <i>bidwillii</i> (HD153-5)					
	+	<1 %	30cm	P10-9	
<i>Tinospora smilacina</i>	+	<1 %	15cm		
<i>Trianthema pilosa</i>	+	<1 %	5cm	=1-30	=1-30
<i>Triodia lanigera</i>	30-35%	33.3-50%	30-50cm		
<i>Yakirra australiensis</i> var. <i>australiensis</i>					
	+	<1 %	15cm	P10-11	

**PAN011**Described by: BRMDate: 17/04/01Location: 18.8km south of Marble Bar Road along west side of access road.Photo: 24 on roll PANR2AMG Zone: 50 739406mE, 7690324mN 739358mE, 7690333mN 739346mE, 7690285mNHabitat: Very slight depression in very gently undulating plain.Soil: Orange-brown loamy sand, and some coarse sand grains.Vegetation: *Acacia inaequilatera*, *Acacia tumida*, *Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Acacia ancistrocarpa* scattered shrubs over *Triodia schinzii* hummock grassland.Veg Condition:Fire Age: Most burnt 3-5 year ago (small patches <12m)Notes: *Acacia tumida* (<1%) burnt, regrowth <1mSpecies List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	+	<1 %	1 m	
<i>Acacia inaequilatera</i>	+	<1 %	3-4 m	



<i>Acacia tumida</i>	+	<1 %	1 m		=1-2, juvenile
<i>Aristida holathera</i> var. <i>holathera</i>					
	+	<1 %	30 cm	11-5	??=1-40
<i>Bonamia linearis</i>	+	<1 %	10 cm		=1-8
<i>Bonamia rosea</i>	+	<1 %	40 cm		=1-39
<i>Bulbostylis barbata</i>	+	<1 %	10 cm	30	
<i>Cassia notabilis</i>	+	<1 %	15 cm		
<i>Cleome uncifera</i>	+	<1 %	40 cm	11-4	
<i>Corchorus parviflorus</i>	+	<1 %	15 cm		=1-6
<i>Eragrostis eriopoda</i>	+	<1 %	10 cm		=1-43
<i>Eriachne obtusa</i>	+	<1 %	10 cm	11-14	
<i>Euphorbia</i> aff. <i>australis</i> (B191)					
	+	<1 %	10 cm	11-10	2nd spec. =1-15
<i>Goodenia microptera</i>	+	<1 %	40 cm	11-3,8,13	?=4-7
<i>Goodenia stobbsiana</i>	+	<1 %	30 cm		=1-11
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>					
	+	<1 %	1-3 m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	1 m		
<i>Heliotropium skeleton</i>	+	<1 %	60 cm		=1-19
<i>Indigofera monophylla</i> (small calyx form)					
	+	<1 %	20 cm	11-11	=1-9?
<i>Isotropis atropurpurea</i>	+	<1 %	40 cm	11-7	
<i>Mollugo molluginis</i>	+	<1 %	10 cm		=1-29
<i>Paraneurachne muelleri</i>	+	<1 %	40 cm	11-9	
<i>Ptilotus astrolasius</i>	+	<1 %	40 cm		=1-38
<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>					
	+	<1 %	50-60 cm	11-6;11-15	
<i>Sida cardiophylla</i>	+	<1 %	70 cm		=1-23
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>					
	+	<1 %	10 cm	11-12	
<i>Tephrosia</i> sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	30 cm		=1-7
<i>Triodia lanigera</i>	+	<1 %	30 cm		=1-1
<i>Triodia schinzii</i>	~40%	33.3-50%	40 cm	11-1	

**PAN012**Described by: MJH Date: 17/04/01

40x60m

Location: 19.95km in from Marble Bar Road.Photo: 25 on roll PANR3Photo Notes: 4 MH1AMG Zone: 50 739418mE, 7689222mN 739459mE, 7689216mN 739448mE, 7689155mNSoil: Orange-red brown fine sand with silt.Habitat: Flattish area on low rise on gently undulating plain.Vegetation: *Corymbia zygophylla* scattered trees over *Acacia tumida*, *Grevillea wickhamii* subsp. *aprica*, *Acacia inaequilatera* open scrub over *Acacia ancistrocarpa* shrubland over *Triodia schinzii* closed hummock grassland.Vegetation Condition: Excellent

Fire Age: > 10 years

Notes: Acacia growth probable in response to past burn. Lots of dead bushes fallen and Cover/Cover classed by regrowth. Plot length varied to fit stand of Acacia tumida.

Name	Cover/Cover class	Height	Spec	Notes
Acacia ?trachycarpa (PAN12-4)	+ <1 %	50 cm	P12-4	
Acacia ancistrocarpa	10-15 10-25%	1-2		
Acacia inaequilatera	+ <1 %	4 m		
Acacia tumida	50-60 50-75%	2-4 m	=1-2	
Bonamia rosea	+ <1 %	30 cm		
Cassia glutinosa	+ <1 %	50 cm	P12-3	light green
Cassia 'symonii'	+ <1 %	1 m	P12-2	glaucous
Corymbia zygophylla	1 1-5%	6 m	=9-2	
Eragrostis eriopoda	+ <1 %	30 cm		
Goodenia stobbsiana	+ <1 %	40 cm	=P1-11	
Grevillea wickhamii subsp. aprica	+ <1 %	3-4 m		
Hibiscus leptocladus	+ <1 %	40 cm	=P1-4	
Indigofera monophylla (small calyx form)	+ <1 %	50 cm		
Mollugo molluginis	+ <1 %	10 cm		
Ptilotus astrolasius	+ <1 %	30 cm		
Sida cardiophylla	+ <1 %	90 cm		
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)	+ <1 %	30 cm		
Triodia schinzii	+ <1 %	20-50 cm	P12-1	

### PAN013

Described by: MET Date: 17/04/01

Location: 21.85km from Marble Bar Road on Panorama Access Road.

Photo: 24 on roll PANR1

AMG Zone: 50 739144mE, 7687391mN 739191mE, 7687382mN 739180mE, 7687331mN

Habitat: Low rise on gently undulating plain.

Soil: Fine to coarse grained orange brown sand, NW corner quite pebbly.

Vegetation: Corymbia hamersleyana scattered low trees over Grevillea wickhamii ssp aprica, (Acacia inaequilatera) over Acacia ancistrocarpa high shrubland over Indigofera monophylla (small calyx form), Tephrosia sp Bungaroo Creek (MET 11601), Corchorus parviflorus, Gossypium australe (Burrup Peninsula form), Bonamia rosea scattered low shrubs over Triodia lanigera hummock grassland and Bonamia linearis, Polymeria aff. calycina low open lianes.

Vegetation Condition: Excellent

Fire Age: >10-15 years

Notes: To north, the hummock grass changes to Triodia schinzii. There was much less Triodia where Acacia ancistrocarpa was dense. Pisolithus sp (fungus) in plot.

#### Species List:

Name	Cover/Cover class	Height	Spec	Notes
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<i>Acacia ancistrocarpa</i>	≥20	10-25%	(1)1.5-		
<i>Acacia inaequilatera</i>	+	<1 %	(1)2-3.5		
<i>Acacia tumida</i>	+	<1 %	1.8 m	=P1-2	
<i>Aristida holathera</i> var. <i>holathera</i>					
	+	<1 %	45 cm	=P1-40	
<i>Bonamia linearis</i>	>2	1-5%	5-40 cm	=P1-8	
<i>Bonamia rosea</i>	+	<1 %	35 cm		
<i>Cassia notabilis</i>	+	<1 %	20-65 cm		
<i>Corchorus parviflorus</i>	+	<1 %	50 cm	=P1-6	
<i>Corymbia hamersleyana</i>	+	<1 %	4-6 m		outside plot
<i>Cymbopogon ambiguus</i>	+	<1 %	45 cm	P13-1	
<i>Goodenia microptera</i>	+	<1 %	30 cm		
<i>Gossypium australe</i> (Burrup Peninsula form)					
	+	<1 %	0.15-1 m		
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>					
	≤1	<1 %	(1)3-5 m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	2.3 m		
<i>Heliotropium chrysocarpum</i>					
	+	<1 %	15 cm	=13-2	
<i>Indigofera monophylla</i> (small calyx form)					
	+	<1 %	30 cm		
<i>Mollugo molluginis</i>	+	<1 %	10 cm		
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	15-30 cm	=P1-22	
<i>Pterocaulon serrulatum</i>	+	<1 %	35 cm	=P4-10	
<i>Pterocaulon sphacelatum</i>					
	+	<1 %	50 cm		
<i>Ptilotus astrolasius</i>	+	<1 %	45 cm		
<i>Sida cardiophylla</i>	+	<1 %	30 cm	=P1-23	
<i>Tephrosia</i> sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	40 cm		
<i>Triodia lanigera</i>	<10-55	25-33.3%	30-90 cm	=P1-1	patchy,
<i>Triodia schinzii</i>	+	<1 %	40 cm	=P11, P12	

**PAN014**Described by: BRMDate: 18/04/01Location: 26.1km along "Access" Road (south of Marble Bar Road).Photo: 23 on roll PANR2AMG Zone: 50 738960mE, 7683361mN 738946mE, 7683312mN 738897mE, 7683321mNHabitat: Gravelly/pebbly. Orange-brown loamy sand. Lots of pebbles on surface. Sandy in west corner.Soil: Gravelly/pebbly. Orange-brown loamy sand. Lots of pebbles on surface. Sandy in west corner.Vegetation: *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* open shrubland over *Triodia lanigera* hummock grassland.Vegetation Condition: Very Good - Excellent (fire affected?).Fire Age: 3-5 years ?

Notes: (Co-recorded by Melinda). Triodia generally quite small; trees not fire scarred.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ancistrocarpa	+ <1 %	2-3 m		
Acacia bivenosa	+ <1 %	1 m	P14-1	Bushy form
Acacia inaequilatera	+ <1 %	(1.5)2-3.		
Acacia stellaticeps	5-10 5-10%	0.5-1 m		
Bonamia linearis	+ <1 %	10 cm	=P1-8	
Bulbostylis barbata	+ <1 %	15 cm		
Cassia 'symonii'	+ <1 %	1.2-1.8 m	P14-2	?=P1-42
Corchorus parviflorus	+ <1 %	50 cm	=P1-6	
Eriachne pulchella subsp. dominii				
	+ <1 %	10 cm		
Goodenia microptera	+ <1 %	30 cm	=P1-18	
Goodenia stobbsiana	+ <1 %	40 cm	=P1-11	
Hakea lorea ssp. lorea	+ <1 %	2.5 m	=P1-52	
Mollugo molluginis	+ <1 %	15 cm	=P1-29	
Ptilotus astrolasius	+ <1 %	40 cm		
Solanum phlomoides	+ <1 %	50 cm	P14-4	
Tephrosia aff. clementii (11)				
	+ <1 %	20 cm	P14-3	5 leaf creeper
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)				
	+ <1 %	40 cm	=P1-7	
Triodia lanigera	35-40 33.3-50%	30 cm	=P1-1	

**PAN015**

Described by: MJH Date: 18/04/01

Location: 27.0km from Marble Bar Road.

Photo: 24 on roll PANR3

AMG Zone: 50 738744mE, 7682416mN 738749mE, 7682465mN 738798mE, 7682455mN

Habitat: Relatively flat area, gently undulating to west, on gently undulating plain near river.

Soil: (1) Fine medium orange-brown sand with silt (2) Fine orange-brown to reddish-brown sand with silt and gravel, cobbles.

Vegetation: Grevillea wickhamii subsp aprica (Acacia inaequilatera) scattered tall shrubs over Acacia ancistrocarpa high shrubland over Acacia bivenosa shrubland over Goodenia stobbsiana, Corchorus parviflorus low shrubland and Triodia lanigera hummock grassland.

Notes: The cobbly soil type intrudes in bands running NE to SW and meeting at the west side of the plot. The sand lies like a tongue in the middle and also at the NE corner.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ancistrocarpa	15 10-25%	1.5-2 m		
Acacia bivenosa	15 10-25%	1 m		
Acacia inaequilatera	+ <1 %	2-3 m		

Bonamia linearis	+	<1 %	40 cm	=P1-8	
Bonamia rosea	+	<1 %	20 cm		
Cassia 'symonii'	+	<1 %	1.5 m	P15-2	
Cassytha capillaris	+	<1 %	30 cm	P15-4	
Cleome uncifera	+	<1 %	20 cm	=P1-10	
Corchorus parviflorus	2	1-5%	80 cm	=P1-6	
Eriachne pulchella subsp. dominii					
	+	<1 %	20 cm		
Goodenia microptera	+	<1 %	30 cm		
Goodenia stobbsiana	10	5-10%	40-50 cm	=P1-11	
Grevillea wickhamii subsp. aprica					
	1	1-5%	2-3 m		
Hakea lorea ssp. lorea	+	<1 %	2 m		
Heliotropium chrysocarpum					
	+	<1 %	30 cm	P15-1	burr
Heliotropium skeleton	+	<1 %	30 cm	=P1-19	spindly one
Mollugo molluginis	+	<1 %	15 cm		
Paraneurachne muelleri	+	<1 %	35 cm	P15-3	grass
Ptilotus astrolasius	+	<1 %	50cm		
Ptilotus calostachyus var. calostachyus					
	+	<1 %	1 m		
Sida cardiophylla	+	<1 %	40 cm		
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)					
	+	<1 %	30-50 cm		
Triodia lanigera	60-70	50-75%	40-50 cm		

**PAN016**

Described by: MET Date: 18/04/01

Location: 29.3km from Marble Bar Road on Panorama Access Road.

Photo: 23 on roll PANR1

AMG Zone: 50 738763mE, 7680345mN 738720mE, 7680335mN 738731mE, 7680284mN

Habitat: Gentle slope on plain.

Soil: Very pebbly, gravelly orange-brown loam

Vegetation: Corymbia hamersleyana scattered low trees over Acacia inaequilatera scattered low trees over Acacia ancistrocarpa, Acacia bivenosa high open shrubland over Triodia lanigera hummock grassland.

Vegetation Condition: Excellent (where not burnt)

Fire Age: >15 years (adjacent areas to east =<12 months)

Notes: The Acacia ancistrocarpa occurred as scattered patches. Plot in small unburnt area surrounded by burnt areas. Made smaller to avoid burnt areas. Pyrosere species (Eriachne pulchella, Bonamia pannosa, Cleome viscosa, Panicum australiense) in small unburnt incursion ignored. Fungus (Polypore) on dead Acacia inaequilatera

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ancistrocarpa	1 <1 %			
Acacia bivenosa	1 <1 %	1-2.4 m		bushy form
Acacia inaequilatera	+ <1 %	(1)5 m		

Aristida holathera var. holathera				
	+	<1 %	45 cm	=P1-40
Bonamia linearis	+	<1 %	5-50 cm	=P1-8
Bonamia rosea	+	<1 %	30-70 cm	
Bonamia sp. (HD94-6)	+	<1 %	2 cm	P16-3
Bulbostylis barbata	+	<1 %	12 cm	
Cassytha capillaris	+	<1 %	40 cm	=P2-9
Cleome uncifera	+	<1 %	35 cm	P16-6 =P1-10, in bare
Corymbia hamersleyana	+	<1 %	6-7.5 m	
Cymbopogon ambiguus	+	<1 %	30 cm	P16-2
Eriachne pulchella subsp. dominii				
	+	<1 %	5 cm	P16-4
Euphorbia aff. australis (B191)				
	+	<1 %	7 cm	P16-5
Goodenia microptera	+	<1 %	5 cm	
Indigofera monophylla (small calyx form)				
	+	<1 %	25 cm	small leaflet
Mollugo molluginis	+	<1 %	10 cm	
Mukia sp.	+	<1 %	2 m	P16-7 Dead leaves dark
Paraneurachne muelleri	+	<1 %	20 cm	
Polycarpaea corymbosa var. corymbosa				
	+	<1 %	15 cm	=P1-50
Pterocaulon serrulatum	+	<1 %	35 cm	=P4-10
Ptilotus astrolasius	+	<1 %	35-50 cm	
Sida cardiophylla	+	<1 %	1 m	=P1-23
Solanum diversiflorum	+	<1 %	30 cm	
Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601)				
	+	<1 %	60 cm	
Triodia lanigera	+/-40	33.3-50%	20-50 cm	P16-1
Yakirra australiensis var. australiensis				
	+	<1 %	10 cm	

**PAN017**Described by: MJH Date: 18/04/01Location: 30.3km from Marble Bar Road. On east side of access track.Photo: 23 on roll PANR3AMG Zone: 50 739138mE, 7679424mN 739160mE, 7679379mN 739197mE, 7679410mNHabitat: Small, low rise on plain.Soil: Fine reddish-brown sand with gravel and cobbles.Vegetation: Acacia bivenosa scattered shrubs over Triodia brizoides hummock grassland.Notes: In depressions Triodia lanigera appears. Acacia inaequilatera and A. ancistrocarpa just outside plot. Acacia ancistrocarpa in depression.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia bivenosa	+	<1 %	1-1.2 m	
Aristida holathera var. holathera				

	+	<1 %	60 cm	
Bonamia pannosa	+	<1 %	40 cm	
Bulbostylis barbata	+	<1 %	12 cm	
Cassia notabilis	+	<1 %	30 cm	
Cassia 'symonii'	+	<1 %	80 cm	P17-12 glaucous
Cleome uncifera	+	<1 %	20 cm	=P1-10
Cleome viscosa	+	<1 %	30 cm	
Corchorus parviflorus	+	<1 %	30 cm	P17-1
Cymbopogon ambiguus	+	<1 %	40 cm	P17-14
Eriachne pulchella subsp. dominii				
	+	<1 %	15 cm	
Euphorbia aff. australis (B191)				
	+	<1 %	1-5 cm	P17-3;17-6
Genus sp. Unnamed	+	<1 %	20 cm	P17-7
Goodenia stobbsiana	+	<1 %	80 cm	=P1-11
Grevillea wickhamii subsp. aprica				
	+	<1 %	60 cm	
Heliotropium chrysocarpum				
	+	<1 %	50 cm	P17-4 burr
Heliotropium cunninghamii				
	+	<1 %	15 cm	P17-10
Hibiscus coatesii	+	<1 %	50 cm	P17-2
Indigofera monophylla (small calyx form)				
	+	<1 %	50 cm	dead
Mollugo molluginis	+	<1 %	15 cm	
Paraneurachne muelleri	+	<1 %	45 cm	P17-8
Polycarpaea corymbosa var. corymbosa				
	+	<1 %	15 cm	=P1-50
Polycarpaea holtzei	+	<1 %	5 cm	P17-5 white
Pterocaulon serrulatum	+	<1 %	80 cm	P17-11
Pterocaulon sphaeranthoides x sphacelatum				
	+	<1 %		P17-9
Ptilotus astrolasius	+	<1 %	50 cm	
Sida cardiophylla	+	<1 %	0.6-1 m	
Solanum diversiflorum	+	<1 %	30 cm	P17-13
Sporobolus australasicus	+	<1 %	15 cm	=P1-26
Triodia brizoides	60	50-75%	20-90 cm	??
Triodia lanigera	+	<1 %	40 cm	

**PAN018**Described by: BRMDate: 18/04/01

23x77m

Location: 32.6km south along "Access" Road from Marble Bar Road.Photo: 22 on roll PANR2AMG Zone: 50 739734mE, 7677324mN 739716mE, 7677317mN 739680mE, 7677382mNHabitat: Very slight low section of flat to very gently undulating plains.Soil: Cobbly, pebbly orange-brown loamy sand. Surface covered in washed cobbles/pebbles.

Vegetation: (*Acacia synchronicia*), *Acacia ancistrocarpa* high open shrubland over *Triodia lanigera* hummock grassland.

Veg Condition:

Fire Age: >5-10 years- large *Triodia* hummocks to 60cm.

Notes: (Co-recorded by Melinda). 1.5m gap from road edge to quadrat. A fairly horrible roadside plot - between current road and old road works. Possibly partly disturbed. Recently burnt area 50-100m to west. Near old airfield.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	2-3 1-5%	1.5-2.5 m		
<i>Acacia inaequilatera</i>	+ <1 %	2 m		
<i>Acacia synchronicia</i>	1-2 1-5%	2-2.5 m	P18-1	bushy form
<i>Aristida contorta</i>	+ <1 %	20 cm	18-5	
<i>Bonamia linearis</i>	+ <1 %	40 cm	=P1-8	scrambler
<i>Cassia glutinosa</i>	+ <1 %	1.5 m		
<i>Cleome uncifera</i>	+ <1 %	30 cm	=P1-10	
<i>Corchorus parviflorus</i>	+ <1 %	30 cm	18-7	=P1-6
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+ <1 %	10 cm		
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i> (Panorama form)	+ <1 %	80 cm	18-2	
<i>Goodenia stobbsiana</i>	+ <1 %	1 m	=P1-11	
<i>Indigofera monophylla</i> (small calyx form)	+ <1 %	50 cm	=P1-9	
<i>Mukia</i> sp.	+ <1 %	1.5 m	18-4	
<i>Mukia</i> sp.	+ <1 %	10 cm	18-6	Possibly juvenile
<i>Ptilotus astrolasius</i>	+ <1 %	40 cm	=P1-38	
<i>Tephrosia</i> sp. Bungaroo Creek(M.E.Trudgen 11601)	+ <1 %	60 cm		
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	+ <1 %	20 cm	18-3	prickly Strep?
<i>Triodia epactia</i>	+ <1 %	80 cm??		
<i>Triodia lanigera</i>	35-45 33.3-50%	50 cm	=P1-1	

### PAN019

Described by: MET Date: 18/04/01

Location: On Panorama access track, unknown kilometres from Marble Bar Road.

Photo: 22 on roll PANR1

AMG Zone: 50 740199mE, 7676900mN 740153mE, 7676877mN 740125mE, 7676919mN

Habitat: Crest of a low rise that slopes very gently to the north and moderately to the south.

Soil: Orange-brown very gravelly, pebbly loam.

Vegetation: *Acacia synchronicia* (*Corymbia hamersleyana*) scattered tall shrubs to low trees over *Acacia ancistrocarpa*, *Acacia bivenosa* scattered tall shrubs over *Cassia stricta*, *Cassia glutinosa* scattered shrubs over *Triodia epactia*, *Triodia lanigera* hummock grassland.

Vegetation Condition: Excellent - no weeds



Fire Age: >15 years

Notes: Contains some open areas, appear to be natural. Some rubbish (fence materials and windmill bits) in one small area. Areas to east much more open.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	1.5-2 m	P19-7	
Acacia ancistrocarpa	+ <1 %	1.5 m		
Acacia bivenosa	+ <1 %	2 m		
Acacia synchronicia	≤1 <1 %	(1)2-5 m	P19-1	
Bulbostylis barbata	+ <1 %	15 cm		
Cassia glutinosa	+ <1 %	1.2-2 m		
Cassia notabilis	+ <1 %	30 cm		
Cassia oligophylla (Panorama form)	+ <1 %	1 m	P19-5	
Cassia 'symonii'	+ <1 %	1.5-1.9 m	P19-6	
Corymbia hamersleyana	+ <1 %	4-6 m		just out
Eriachne pulchella subsp. dominii	+ <1 %	10 cm		common
Heliotropium heteranthum	+ <1 %	1 cm	P19-4	
Mollugo molluginis	+ <1 %	15 cm		
Polycarpha holtzei	+ <1 %	2 cm	P19-9	
Polygala aff. isingii	+ <1 %	3 cm	P19-3	
Ptilotus astrolasius	+ <1 %	40 cm		
Ptilotus calostachyus var. calostachyus	+ <1 %	50 cm	P19-8	
Ptilotus exaltatus var. exaltatus	+ <1 %	5 cm		
Sporobolus australasicus	+ <1 %	10 cm		
Synaptantha tillaeacea var. tillaeacea	+ <1 %	5 cm		
Triodia epactia	20 10-25%	35-55 cm	P19-2	
Triodia lanigera	+/-5 1-5%	30-55 cm		

**PAN020**

Described by: BRM Date: 18/04/01

Location: Along access road 33.6km south of Marble Bar Road.

Photo: 21 on roll PANR2

AMG Zone: 50 740268mE, 7676508mN 740297mE, 7676468mN 740342mE, 7676499mN

Habitat: Gentle south and east facing slope and saddle with watercourse about 100-200m south.

Soil: Pebbly, cobbly, orange-brown loamy sand with white calcareous nodules present. Crusty in places (white calcareous clay crust?)

Vegetation: Corymbia hamersleyana scattered low trees over Acacia inaequilatera, Acacia bivenosa scattered tall shrubs over Triodia lanigera hummock grassland.

Vegetation Condition: Very good - Excellent

Fire Age: About 2-3 years - smallish Triodia clumps.

Notes: Burnt dead *Acacia bivenosa*. *Codonocarpus cotinifolius* just outside plot. *Cassia* on road verge. Also collected from other side of road which had been more recently burnt (<1-2 years). All species added to list.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia bivenosa</i>	+ <1 %	(0.5)2-3		bushy form
<i>Acacia inaequilatera</i>	+ <1 %	3-4 m		
<i>Bonamia rosea</i>	+ <1 %	30 cm	=P1-39	
<i>Bonamia</i> sp. (HD94-6)	+ <1 %	4 cm	P20-13	?=P1-17, creeper
<i>Cassia</i> aff. <i>oligophylla</i> (thinly sericeous)	+ <1 %	40 cm	P20-7	
<i>Cassytha capillaris</i>	+ <1 %	30-40 cm	P20-9	
<i>Corchorus parviflorus</i>	+ <1 %	40 cm	=P1-6	
<i>Corymbia hamersleyana</i>	+ <1 %	3-4 m	P20-5	=PAN1
Genus sp. Unnamed	+ <1 %	30-40 cm	P20-4	grey leaf
<i>Goodenia microptera</i>	+ <1 %	40 cm	P20-12	
<i>Goodenia stobbsiana</i>	+ <1 %	30 cm	=P1-11	
<i>Haloragis gossei</i>	+ <1 %	10 cm	P20-8	Small, green
<i>Heliotropium chrysocarpum</i>	+ <1 %	20 cm	P20-10	succulent green
<i>Hibiscus</i> aff. <i>platyklamys</i> (site 1139)	+ <1 %	35 cm	P20-3	
<i>Indigofera monophylla</i> (PAN20-2)	+ <1 %	50 cm	P20-2	grey leaflet
<i>Oldenlandia crouchiana</i>	+ <1 %	20 cm	P20-11	dead
<i>Ptilotus astrolasius</i>	+ <1 %	40 cm		
<i>Scaevola amblyanthera</i> var. <i>centralis</i>	+ <1 %	20 cm	P20-6	Goodeniaceae
<i>Triodia epactia</i>	+ <1 %			
<i>Triodia lanigera</i>	40-50 <1 %	P20-1		

**PAN021**

Described by: MJH Date: 18/04/01

Location: 34.7km from Marble Bar Road, east side of track.

AMG Zone: 50 741069mE, 7675759mN 741105mE, 7675723mN 741140mE, 7675756mN

Habitat: Slope east from rise above creek.

Soil: Dull orange-brown calcareous loam, setting surface. gravel and pebbles mostly calcareous.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* open shrubland over *Triodia wiseana* hummock grassland.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia bivenosa</i>	10 5-10%	1-2 m		
<i>Acacia inaequilatera</i>	+ <1 %	4-5 m		
<i>Bonamia pannosa</i>	+ <1 %	5 cm		
<i>Carissa lanceolata</i>	+ <1 %	10 cm	P21-5	
<i>Cassytha capillaris</i>	+ <1 %	50 cm	=P15-4	

<i>Cenchrus ciliaris</i>	+	<1 %	60 cm		
<i>Corchorus parviflorus</i>	+	<1 %	15-50 cm	P21-6	=P1-6?
<i>Enneapogon caerulescens</i> var. <i>caerulescens</i>					
	+	<1 %	20 cm	P21-2	grass
<i>Heliotropium</i> sp.	+	<1 %	40 cm	P21-7	
<i>Indigofera monophylla</i> (PAN58-17)					
	+	<1 %	30-50 cm		grey
<i>Mukia</i> sp.	+	<1 %	20 cm	P21-3	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>					
	+	<1 %	30 cm	P21-1	
<i>Solanum horridum</i>	+	<1 %	15 cm	P21-4	
<i>Tephrosia supina</i>	+	<1 %			
<i>Triodia wiseana</i>		60-70 50-75%	50 cm		

**PAN022**

Described by: MET Date: 18/04/01 40x65m

Location: 35.4km from Marble Bar Road on Panorama Access Road.

Photo: 21 on roll PANR1

AMG Zone: 50 740904mE, 7675164mN 740935mE, 7675184mN 740961mE, 7675123mN

Habitat: Sloping crest of a moderately sloping (to north) colluvial spur.

Soil: Very gravelly, pebbly orange-brown loam with gravel-pebble surface.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

Notes: A few *Corymbia hamersleyana* on slopes of spur. Plot narrowed to fit crest and avoid burnt areas. One individual of *Grevillea* at north edge of plot (rooted out).

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	1.2 m	=P19-7	=P19-7
<i>Acacia inaequilatera</i>	+ <1 %			
<i>Bonamia</i> sp. (HD94-6)	+ <1 %	5 cm	P22-2	
<i>Bulbostylis barbata</i>	+ <1 %	10 cm		
<i>Cleome viscosa</i>	+ <1 %	30 cm		
<i>Corchorus parviflorus</i>	+ <1 %	1 m	P22-4	one plant, =P1-6?
<i>Eriachne pulchella</i> subsp. <i>dominii</i>				
	+ <1 %	15 cm		
<i>Goodenia microptera</i>	+ <1 %	35 cm		
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>				
	+ <1 %	2.1 m		
<i>Heliotropium heteranthum</i>				
	+ <1 %	1 cm		
<i>Mollugo molluginis</i>	+ <1 %	10 cm		at edge
<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>				
	+ <1 %			
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>				
	+ <1 %	5 cm		
<i>Tephrosia</i> aff. <i>clementii</i> (11)				
	+ <1 %	10 cm	P22-3	

Triodia epactia 40-50 <1 % 0.3-1 m P22-1

### PAN023

Described by: MET Date: 18/04/01

Location: 36.25km from Marble Bar Road.

AMG Zone: 50 740190mE, 7674898mN 740179mE, 7674891mN 740144mE, 7674919mN

Habitat: Small creek between two north-south running colluvial spurs (near lower end).

Soil: Orange-brown gravelly, pebbly sandy loam.

Vegetation: Scattered low trees of *Acacia inaequilatera*, *Corymbia hamersleyana* over *Acacia tumida* high shrubland over *Petalostylis labicheoides* open scrub over *Indigofera monophylla* (PAN20-2) shrubland over *Bonamia rosea* scattered low shrubs to low shrubland over *Triodia epactia* open hummock grassland.

Vegetation Condition: Very good (would be excellent except for burnt around 5+ years ago)

Fire Age: >5 years

Notes: (Co-recorded by MST). Plot reduced to size of unburnt area of the stand. (Length 44.5m)

#### Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia inaequilatera</i>	+ <1 %	6-7 m		
<i>Acacia orthocarpa</i>	+ <1 %	1-1.1 m	P23-8	???
<i>Acacia tumida</i>	15-20 <1 %	(1.8)2-4	P23-1	
<i>Aristida holathera</i> var. <i>holathera</i>				
	+ <1 %	40 cm	=P1-40	
<i>Bonamia rosea</i>	+ <1 %	50 cm		
<i>Cenchrus ciliaris</i>	+ <1 %	75 cm		
<i>Corchorus parviflorus</i>	+ <1 %	0.2-1 m	=P1-6	
<i>Corymbia hamersleyana</i>	+ <1 %	5 m		
<i>Dampiera candicans</i>	+ <1 %	50 cm		
<i>Eragrostis eriopoda</i>	+ <1 %	25 cm	P23-11	
<i>Eriachne mucronata</i> (typical form)				
	+ <1 %	50 cm	P23-5	
<i>Euphorbia</i> sp. (site 1089)	+ <1 %	20 cm	P23-7	
<i>Goodenia stobbsiana</i>	+ <1 %	60 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>				
	+ <1 %	1-2.5 m		spreading
<i>Hibiscus leptocladus</i>	+ <1 %	40 cm	P23-4	=P1-4
<i>Hybanthus aurantiacus</i>	+ <1 %	15 cm		
<i>Indigofera monophylla</i> (PAN20-2)				
	15-20 <1 %	0.5-1 m	P23-2	grey leaflet form
<i>Keraudrenia nephrosperma</i>				
	+ <1 %	60 cm	P23-10	
<i>Paraneurachne muelleri</i>	+ <1 %	50 cm		
<i>Petalostylis labicheoides</i>	35-40 <1 %	(1)		
<i>Polymeria</i> aff. <i>calycina</i>	+ <1 %	55 cm	=P1-22	

<i>Sida cardiophylla</i>	+	<1 %	90 cm	=P1-23
<i>Solanum horridum</i>	+	<1 %	20 cm	P23-6
<i>Tephrosia aff. clementii</i> (11)				
	+	<1 %	20 cm	P23-9
<i>Tephrosia simplicifolia</i>	+	<1 %		
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>				
	+	<1 %	35 cm	
<i>Triodia epactia</i>	15-20	<1 %	40-60 cm	P23-3

**PAN024**Described by: BRM Date: 18/04/01Location: 37.0Photo: 20 on roll PAN2RAMG Zone: 50 739629mE, 7674430mN 739693mE, 7674453mNHabitat: Narrow creekline between 2 colluvial spurs.Soil: Orange-brown loamy sand.Vegetation: *Acacia tumida*, *Acacia inaequilatera*, *Grevillea wickhamii* ssp *aprica*, *Acacia ancistrocarpa* open scrub over *Corchorus parviflorus*, *Indigofera monophylla* (PAN20-2) low open shrubland over *Triodia epactia* hummock grassland.Vegetation Condition: Very goodFire Age: >5-10 years - large *Triodia* hummocks 1m acrossNotes: *Grevillea wickhamii* ssp. *aprica* 4m+, *Acacia inaequilatera* 4m+. *Acacia tumida* was mainly at east end of creekline. *Acacia ancistrocarpa* at west end and *Grevillea wickhamii* ssp. *aprica* near middle to west end.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ancistrocarpa</i>	15-20 10-25%	1.5-2.5 m		Also P24-9
<i>Acacia inaequilatera</i>	+ <1 %	4 m		
<i>Acacia tumida</i>	10-15 10-25%	4-5 m	P24-2	=P1-2?
<i>Bonamia rosea</i>	+ <1 %	40 cm	=P1-39	
<i>Corchorus parviflorus</i>	2-5 1-5%	60 cm	=P1-6	
<i>Corymbia hamersleyana</i>	+ <1 %	3 m	P24-7	=PAN1
<i>Cymbopogon ambiguus</i>	+ <1 %	60 cm	P24-8	
<i>Euphorbia</i> sp. (site 1089)	+ <1 %	15 cm	P24-6	
<i>Fimbristylis simulans</i>	+ <1 %	10 cm	P24-1	
<i>Goodenia stobbsiana</i>	+ <1 %	60 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>				
	5-10 5-10%	4 m		
<i>Hibiscus leptocladus</i>	+ <1 %	10 cm	P24-10	Malvaceae
<i>Hybanthus aurantiacus</i>	+ <1 %	10-30 cm	P24-11,12	
<i>Indigofera monophylla</i> (PAN20-2)				
	2-3 1-5%	0.4-1.2 m	P24-4	
<i>Mukia</i> sp.	+ <1 %	6 m	P24-3	
<i>Paraneurachne muelleri</i>	+ <1 %	40 cm	=P1-27	
<i>Pterocaulon sphacelatum</i>				
	+ <1 %	30 cm	=P1-32	
<i>Solanum diversiflorum</i>	+ <1 %	40 cm		
<i>Solanum phlomoides</i>	+ <1 %	40 cm	P24-5	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>				

	+	<1 %	30 cm
Triodia epactia	40-50	33.3-50%	40-60 cm

**PAN025**

Described by: MJH Date: 18/04/01

Location: 37.05km from Marble Bar Road, east of track.

Photo: 22 on roll PANR3

AMG Zone: 50 739620mE, 7674407mN 739618mE, 7674389mN 739658mE, 7674328mN

Habitat: Crest and upper slopes of colluvial spur between two creek lines (one creekline has site PAN024)

Soil: Dark brown-orange fine sand with silt and surface of large gravel.

Vegetation: Acacia inaequilatera scattered low trees over Triodia epactia grassland.

Vegetation Condition: Excellent

Fire Age: >10 years?

Notes: Very exposed site.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia inaequilatera	+ <1 %	4-5 m		
Bonamia pannosa	+ <1 %	30 cm		
Bulbostylis barbata	+ <1 %	10 cm		
Eriachne pulchella subsp. dominii	+ <1 %	10 cm		
Fimbristylis simulans	+ <1 %	10 cm	P25-2	
Goodenia stobbsiana	+ <1 %	40-60 cm	=P1-11	
Heliotropium skeleton	+ <1 %	10 cm	=P1-19, specimen	
Indigofera monophylla (PAN20-2)	+ <1 %	50 cm		grey
Mollugo molluginis	+ <1 %	15 cm		
Triodia epactia	60 50-75%	50 cm		

**PAN026**

Described by: BRM Date: 18/04/01

Location: 38.5km south from Marble Bar Road on Access Road.

Photo: 19 on roll PANR2

AMG Zone: 50 738634mE, 7673626mN

Habitat: Peak of very gentle rise in very gently undulating plain near foot (1km) of hill range.

Soil: Gravelly, pebbly, cobbly orange-brown loamy sand.

Rock Type: Ironstone pebbles-cobbles and quartz

Vegetation: Acacia inaequilatera, Acacia acradenia, Grevillea wickhamii ssp aprica scattered tall shrubs over Triodia sp. panorama hummock grassland.

Vegetation Condition: Very good - Excellent condition. Long time since burnt.

Fire Age: >10 years since burnt.

Notes: (Co-recorded by Melinda). Enneapogon, Euphorbia, Aristida and tall and small grasses and Mukia collected in small shallow "depression". Appears slightly moister area around group of Acacia inaequilatera and Acacia acradenia. Triodia wiseana area about 40m across to north of plot (about 100m long) (area of white

calcareous "peds" on soil surface). *Triodia brizoides* on edge of burnt watercourse. Burnt area west of plot- collections. Had lot of *Corchorus* (burnt area along gentle water course depressions).

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+	<1 %	2 m	P26-3	
<i>Acacia ancistrocarpa</i>	+	<1 %	2 m		
<i>Acacia inaequilatera</i>	+	<1 %	(1.2) 4-6	P26-9	
<i>Aristida holathera</i> var. <i>holathera</i>	+	<1 %	40 cm	P26-13	=P1-40
<i>Bonamia media</i> var. <i>villosa</i>	+	<1 %	5 cm		
<i>Bonamia rosea</i>	+	<1 %	40 cm		=P1-39
<i>Bonamia</i> sp.	+	<1 %	40 cm	P26-7	
<i>Cassia</i> 'symonii'	+	<1 %	2 m	P26-8	
<i>Cassytha capillaris</i>	+	<1 %	80 cm	P26-6	straggly
<i>Cleome uncifera</i>	+	<1 %	40 cm		=P1-10
<i>Corchorus parviflorus</i>	+	<1 %	30 cm		=P1-6
<i>Cymbopogon ambiguus</i>	+	<1 %	40 cm	P26-14	grass
<i>Enneapogon caeruleus</i> var. <i>caeruleus</i>	+	<1 %	20 cm	P26-3	
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	<1 %			
<i>Euphorbia clementii</i>	+	<1 %	10 cm	P26-2	
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i> (Panorama form)	+	<1 %	80 cm	P26-11	=P18-2
<i>Goodenia microptera</i>	+	<1 %			
<i>Goodenia stobbsiana</i>	+	<1 %	40-60 cm	P26-12	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+	<1 %	3-4 m		
<i>Indigofera monophylla</i> (PAN20-2)	+	<1 %	1 m	P26-4	grey leaflet form
<i>Mollugo molluginis</i>	+	<1 %	10 cm		
<i>Mukia</i> sp.	+	<1 %	50 cm	P26-10	
<i>Ptilotus axillaris</i>	+	<1 %			in T wiseana area
<i>Sporobolus australasicus</i>	+	<1 %	10-20 cm	P26-15;16	small heads
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	+	<1 %	1 m	P26-23	
<i>Triodia</i> sp. Panorama	40-50	<1 %		P26-1	
<i>Triodia wiseana</i>	+	<1 %	40 cm	P26-5	

**PAN027**

Described by: MJH Date: 19/04/01

Location: 0.55km from PAN 26. 20.7km from camp.

Photo: 21 on roll PANR3

Photo Notes: 8 MH1

AMG Zone: 50 738180mE, 7673374mN 738303mE, 7673327mN 738163mE, 7673296mN

Habitat: Flat crest and upper south facing slope on colluvial fan (?)

Soil: Calcareous orange-brown fine sand and silt with quartz and darker gravel. Some outcrop, one small patch fine silt, little gravel.

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia sp. panorama, Triodia wiseana closed hummock grassland.

Vegetation Condition: Excellent

Fire Age: >10 years?

Notes: Triodia sp. panorama and Triodia wiseana mix across the plot, not on the boundary between two vegetation types. There are a couple of "sump" areas, small patches where water collects (Triodia is dying) that contain most of the diversity in the plot.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ancistrocarpa	+ <1 %	(1.5)3 m		2 of
Acacia inaequilatera	+ <1 %	4-5 m		
Bonamia pannosa	+ <1 %	40 cm		
Bonamia rosea	+ <1 %	40 cm		
Cassia notabilis	+ <1 %	80 cm		
Cassytha capillaris	+ <1 %	40-50 cm	P27-2	
Cleome uncifera	+ <1 %	30 cm	=P1-10	
Corchorus parviflorus	+ <1 %	80 cm	=P1-6	
Eriachne pulchella subsp. dominii	+ <1 %	20 cm		
Goodenia stobbsiana	+ <1 %	80 cm	=P1-11	
Indigofera monophylla (PAN20-2)	+ <1 %	90 cm		grey
Mollugo molluginis	+ <1 %	15 cm		
Mukia sp.	+ <1 %	1 m	P27-3	
Pterocaulon sp. (PAN1-47)	+ <1 %	(P27-1)		Added in
Pterocaulon sphacelatum	+ <1 %	25-60-70	P27-4	
Ptilotus astrolasius	+ <1 %	70 cm		
Stemodia grossa	+ <1 %	50 cm	P27-1	
Tephrosia supina	+ <1 %	40 cm	P27-6	
Triodia epactia	+ <1 %	80 cm	P27-5	
Triodia sp. Panorama	40 33.3-50%	1 m		
Triodia wiseana	40 33.3-50%	80 cm		
Triumfetta clementii	+ <1 %		P27-6B	

**PAN028**

Described by: MET Date: 19/04/01

Location: 40.2km down access track.

Photo: 19 on roll PANR1

AMG Zone: 50 737531mE, 7672496mN 737508mE, 7672476mN 737503mE, 7672413mN

Habitat: Open flow line with no defined channel, between gently sloping colluvial spurs.



Soil: Orange-brown fine to medium grained sand gravelly to pebbly in places (and probably below surface)

Rock Type: Granite.

Vegetation: *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp *aprica* high open shrubland over *Acacia acradenia* open scrub over *Tephrosia* sp. Bungaroo Creek(M.E.Trudgen 11601) low shrubland over *Polymeria* aff. *calycina* scattered low shrubs and *Triodia epactia* open hummock grassland.

Vegetation Condition: Very good - Excellent (would be excellent except for fairly recently burnt).

Fire Age: >5<10 years

Notes: (Co-recorded by MST). The amount of *Tephrosia* sp Bungaroo Creek(M.E.Trudgen 11601) probably reflects the time of the last fire (it would probably largely die out if the site was unburnt). Truncated quadrat to avoid open patch.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	35 33.3-50%	1.5		
<i>Acacia ancistrocarpa</i>	<1 <1 %	1.8-2m		
<i>Acacia inaequilatera</i>	+ <1 %	3.5 m		at edge
<i>Aristida holathera</i> var. <i>holathera</i>	+ <1 %	40 cm	=P1-40	
<i>Boerhavia gardneri</i>	+ <1 %	10 cm	P28-4	
<i>Bonamia linearis</i>	+ <1 %	25 cm	=P1-8	
<i>Bonamia rosea</i>	+ <1 %	30-50 cm		
<i>Cassia notabilis</i>	+ <1 %	35 cm		
<i>Cassytha capillaris</i>	+ <1 %	40 cm	=P2-9	
<i>Chrysopogon fallax</i>	+ <1 %	60 cm	P28-6	large tussocks
<i>Corchorus parviflorus</i>	+ <1 %	45 c m	=P1-6	
<i>Corymbia hamersleyana</i>	+ <1 %	3-5.5 m		
<i>Dampiera candidans</i>	+ <1 %	20-65 cm		
<i>Eriachne mucronata</i> (typical form)	+ <1 %	55 cm	P28-3	
<i>Goodenia microptera</i>	+ <1 %	20 cm		
<i>Goodenia stobbsiana</i>	+ <1 %	20-70 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	<2 1-5%	2-2.5 m		
<i>Indigofera monophylla</i> (PAN20-2)	+ <1 %	0.5-1 m		grey leaflet form
<i>Mollugo molluginis</i>	+ <1 %	10 cm		
<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>	+ <1 %	15 cm	=P1-50	
<i>Polymeria</i> aff. <i>calycina</i>	+ <1 %	15-35 cm	=P1-22	
<i>Ptilotus astrolasius</i>	+ <1 %	50 cm		
<i>Rhynchosia</i> cf. <i>minima</i>	+ <1 %	80 cm	P28-8	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>	+ <1 %	10-40 cm	P28-5	
<i>Sida cardiophylla</i>	+ <1 %	70 cm	=P1-23	
<i>Tephrosia</i> sp. Bungaroo Creek(M.E.Trudgen 11601)				

	+	<1 %	40 cm	
Trichodesma zeylanicum var. zeylanicum				
	+	<1 %	35 cm	
Triodia epactia	10-15	10-25%	30-70	P28-1
Triumfetta clementii	+	<1 %	45 cm	P28-2
Triumfetta propinqua	+	<1 %	65 cm	P28-7

**PAN029**

Described by: BRM Date: 19/04/01

Location: 41.1km from Marble Bar Road

Photo: 18, 17 on roll PANR2

AMG Zone: 50 736982mE, 7671741mN 737030mE, 7671751mN 737005mE, 7671794mN

Habitat: Low rise, gently rounded, between escarpment and a low ridge.

Soil: Light brown gravelly silty sand with gravel, pebbles.

Rock Type: Outcropping of grey "sedimentary" rock. Basalt boulders and rocks southern half.

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia wiseana, Triodia sp. panorama hummock grassland.

Vegetation Condition: Excellent

Fire Age: >15 years

Notes: Old pebble mound in site (not recent but not antique). Mixed Triodia wiseana and Triodia sp. panorama.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	60 cm	P29-2	
Acacia bivenosa	+ <1 %	1 m		bushy form
Acacia inaequilatera	+ <1 %	2.5-3 m		
Boerhavia gardneri	+ <1 %	40 cm	P29-8	
Bonamia pannosa	+ <1 %	20 cm	=P1-17	
Cassia oligophylla	+ <1 %	1 m		
Cleome viscosa	+ <1 %	20-30 cm	P29-9	
Corchorus parviflorus	+ <1 %	1 m	=P1-6	
Eriachne pulchella subsp. dominii	+ <1 %			
Euphorbia aff. australis (B191)	+ <1 %	10 cm	P29-6	?=P1-15
Euphorbia tannensis ssp. eremophila (Panorama form)	+ <1 %	10 cm	=P18-2	
Indigofera monophylla (PAN20-2)	+ <1 %	1.2 m		grey leaflet form
Pterocaulon serrulatum	+ <1 %	50 cm	P29-3	=P4-10
Ptilotus calostachyus var. calostachyus	+ <1 %	40 cm		
Scaevola amblyanthera var. centralis	+ <1 %	15 cm	P29-7	=P20-6?
Solanum diversiflorum	+ <1 %	10 cm	=P1-25	
Solanum phlomoides	+ <1 %	15 cm		

<i>Sporobolus australasicus</i>	+	<1 %	20 cm		
<i>Tephrosia supina</i>	+	<1 %	40 cm	P29-1	straggly
<i>Triodia</i> sp. Panorama	30-40	33.3-50%	60 cm		
<i>Triodia wiseana</i>	25-30	25-33.3%	50 cm		
<i>Triumfetta clementii</i>	+	<1 %	20 cm	P29-4	
<i>Yakirra australiensis</i> var. <i>australiensis</i>	+	<1 %	10 cm	P29-5	

**PAN030**Described by: MJH Date: 19/04/01

35x65m

Location: 41.8km from Marble Bar RoadPhoto: 20 on roll PANR3AMG Zone: 50 736616mE, 7671274mN 736592mE, 7671300mN 736540mE, 7671259mNHabitat: Gentle lower slopes of a low rise.Soil: Calcareous, chocolate brown at surface, orange-brown at depth (shallow), fine-medium sand with silt. Quartz and darker pebbles. Same outcrop.Vegetation: *Acacia inaequilatera* scattered low trees over *Indigofera monophylla* (PAN 20-2), *Corchorus parviflorus* low open shrubland over *Triodia epactia* (*Triodia* sp. panorama) grassland.Vegetation Condition: ExcellentFire Age: 5-10 yearsNotes: *Triodia epactia* and *Triodia* sp. panorama mix, with the *Triodia epactia* dominant and *Triodia* sp. panorama growing in barer areas where water possibly sits.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Genus sp. Unnamed	+ <1 %	15 cm	P30-10	Specimen missing
<i>Acacia bivenosa</i>	+ <1 %	1 m		
<i>Acacia inaequilatera</i>	+ <1 %	4 m		
<i>Acacia synchronicia</i>	+ <1 %	30 cm	P30-5	??
<i>Boerhavia gardneri</i>	+ <1 %	20 cm	P30-4	
<i>Bonamia pannosa</i>	+ <1 %	25 cm		
<i>Cleome viscosa</i>	+ <1 %	60 cm		
<i>Corchorus parviflorus</i>	+ <1 %	0.9-1 m	P30-3	=P1-6
<i>Cullen martinii</i>	+ <1 %			
<i>Euphorbia</i> aff. <i>australis</i> (B191)	+ <1 %	5 cm	P30-8	
<i>Heliotropium cunninghamii</i>	+ <1 %		P30-2B	bis
<i>Indigofera monophylla</i> (PAN20-2)	+ <1 %	70-90 cm		grey
<i>Pluchea rubelliflora</i>	+ <1 %	30 cm	P30-6	
<i>Porana commixta</i>	+ <1 %	10 cm	P30-9	??
<i>Pterocaulon sphacelatum</i>	+ <1 %	80 cm		
<i>Ptilotus axillaris</i>	+ <1 %	10-60 cm		

<i>Salsola tragus</i>	+	<1 %	40 cm	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>				
	+	<1 %	30 cm	P30-7
<i>Solanum phlomoides</i>	+	<1 %	30 cm	
<i>Stemodia grossa</i>	+	<1 %	30 cm	
<i>Swainsona formosa</i>	+	<1 %	40 cm	
<i>Tephrosia</i> sp. B Kimberley Flora(C.A. Gardner 7300)				
	+	<1 %	1.5 m	P30-11 ??
<i>Tephrosia supina</i>	+	<1 %	20-30 cm	P30-1
<i>Triodia epactia</i>	50	33.3-50%	50-70 cm	
<i>Triodia</i> sp. Panorama	10	5-10%	50 cm	P30-2 ??

**PAN031**Described by: MET Date: 19/04/01

31x38.5m

Location: 41.85km from Marble Bar RoadPhoto: 18 on roll PANR1AMG Zone: 50 736514mE, 7671338mN 736535mE, 7671306mN 736509mE, 7671288mN 736463mE, 7671310mNHabitat: Upper slopes (to 15m below crest) of a low rise, south facing slopes.Soil: Orange-brown gravelly pebbly loam with gravel and pebble surface (including a lot of quartz).Rock Type: Ultramafic?Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 20-2) (*Corchorus parviflorus*) low shrubland over *Triodia epactia* hummock grassland.Vegetation Condition: ExcellentFire Age: >10 yearsNotes: (Co-recorded by MST). *Triodia epactia* is near outcrop. The *Indigofera* has lost much of leaves. Plot shape changed to avoid outcrop area with *T epactia*. A small quartz dyke in plot also. Some calcretisation. Crest mix of *Triodia wiseana* and *Triodia epactia*, more *Indigofera* and scattered *Cassia glutinosa*.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon</i> aff. <i>lepidum</i> (1) (MET 15 352)				
	+	<1 %	65 cm	P31-5
<i>Acacia inaequilatera</i>	+	<1 %	(1)2-3+ m	
<i>Acacia orthocarpa</i>	+	<1 %	50-80 cm	P31-2
<i>Bonamia</i> sp. (HD94-6)	+	<1 %	2 cm	P31-7
<i>Cassia luerssenii</i>	+	<1 %	50 cm	P31-6
<i>Corchorus parviflorus</i>	+/-2	1-5%	40-75 cm	=P1-6
<i>Goodenia microptera</i>	+	<1 %	15 cm	P31-4
<i>Indigofera monophylla</i> (PAN20-2)				
	>20	10-25%	50-90 cm	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>				
	+	<1 %	20 cm +	=P29
<i>Solanum phlomoides</i>	+	<1 %	20 cm	
<i>Tephrosia supina</i>	+	<1 %	20 cm	P31-3
<i>Triodia epactia</i>	1	1-5%	30-45 cm	P31-1
<i>Triodia wiseana</i>	+/-25	25-33.3%	20-35(50) cm	Mix up in specimen

Triumfetta maconochieana  
+ <1 %

### PAN032

Described by: MET Date: 19/04/01

Location: 42.85km from Marble Bar Road on Panorama access track.

Photo: 17 on roll PANR1

AMG Zone: 50 735797mE, 7670662mN 735826mE, 735814mE, 7670755mN  
735789mE, 7670749mN

Habitat: Medium sized creek.

Soil: Orange-brown loamy fine sand.

Vegetation: Eucalyptus victrix scattered trees over Corymbia hamersleyana scattered low trees over Acacia trachycarpa, Acacia acradenia scattered tall shrubs over Cullen leucanthum tall shrubland to shrubland over \*Cenchrus ciliaris grassland to closed grassland.

Vegetation Condition: Poor - bad \*Cenchrus ciliaris invasion.

Fire Age: <5 years

Notes: (Co-recorded by MST). Triodia at edges of \*Cenchrus stand. Sorghum scattered large individuals. Could add scattered native tussock grasses.

#### Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	1 m		??
Acacia inaequilatera	+ <1 %	0.5-2 m		
Acacia trachycarpa	+ <1 %			
Acacia tumida	+ <1 %	2.2 m	P32-26	
Alternanthera nana	+ <1 %	15 cm	P32-19	
Alternanthera nodiflora	+ <1 %	25 cm		
Amaranthus aff. pallidiflorus (WAS1127)	+ <1 %	20 cm	P32-7	
Ammannia baccifera	+ <1 %	35-40 cm	P32-12;15	
Bothriochloa sp.	+ <1 %	30 cm	P32-18	
Carissa lanceolata	+ <1 %	1 m		
Cenchrus ciliaris	>65% 50-75%	40-90 cm		
Centipeda minima	+ <1 %	10 cm	P32-30	dense, 1 m across
Chrysopogon fallax tussocks	+ <1 %	50 cm		large green
Corchorus parviflorus	+ <1 %	70 cm	=P1-6	
Corymbia hamersleyana	+ <1 %	4-7 m		
Crotalaria cunninghamii	+ <1 %	1.2 m	P32-25	Birdflower
Crotalaria medicaginea (Burrup form; B65-11)	+ <1 %	45-60 cm	P32-28	
Cullen leucanthum	15-20 20-30%	1.5-2.5 m	P32-1	
Cullen stipulaceum	+ <1 %	1-2 m	P32-27	green pustulate, +3
Cymbopogon procerus	+ <1 %		P32-18B	
Cyperus iria	+ <1 %	30 cm	P32-13	
Dichanthium fecundum	+ <1 %	1.3+ m	P32-8	
Ehretia saligna var. saligna	+ <1 %	1.5 m	P32-3	

<i>Eragrostis cumingii</i>	+	<1 %	15 cm	P32-11	
<i>Eragrostis tenellula</i>	+	<1 %	10-15 cm	P32-20	
<i>Eriachne obtusa</i>	+	<1 %	40 cm	P32-35	
<i>Eucalyptus victrix</i>	+	<1 %	7-10+ m	P32-5	
<i>Euphorbia biconvexa</i>	+	<1 %	70 cm	P32-34	
<i>Euphorbia coghlanii</i>	+	<1 %		P32-c	
<i>Fimbristylis microcarya</i>	+	<1 %	10-25	P32-17	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>					
	+	<1 %	3.2 m	P32-33	rockpiles
<i>Goodenia lamprosperma</i>	+	<1 %	15 cm		creek perennial
<i>Heteropogon contortus</i>	+	<1 %	75 cm	P32-37	
<i>Hibiscus panduriformis</i>	+	<1 %	45 cm	P32-6	
<i>Lipocarpha microcephala</i>					
	+	<1 %	10-20 cm	P32-21	
<i>Ludwigia perennis</i>	+	<1 %		P32-c	
<i>Mukia</i> sp.	+	<1 %	35-40 cm	P32-31	
<i>Petalostylis labicheoides</i>	+	<1 %	50 cm		
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>					
	+	<1 %	60 cm		
<i>Pluchea dentex</i>	+	<1 %	25 cm	P32-24	
<i>Pluchea dunlopii</i>	+	<1 %	80 cm	P32-23	
<i>Pluchea rubelliflora</i>	+	<1 %	10 cm		
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	15 cm	=P1-22	
<i>Pterocaulon sphaeranthoides</i> x <i>sphacelatum</i>					
	+	<1 %	40 cm	P32-16	
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %		P32-c	
<i>Sesbania cannabina</i>	+	<1 %	40 cm	P32-14	
<i>Sida clementii</i>	+	<1 %	50 cm	P32-38	
<i>Solanum diversiflorum</i>	+	<1 %	35 cm		
<i>Sorghum plumosum</i>	+	<1 %	1.4 m	P32-9	perennial?
<i>Stemodia grossa</i>	+	<1 %	60 cm		
<i>Stemodia viscosa</i>	+	<1 %	35 cm	P32-32	
<i>Swainsona formosa</i>	+	<1 %	20 cm		
<i>Tephrosia</i> aff. <i>clementii</i> (11)					
	+	<1 %			
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)					
	+/-2	1-5%	80 cm	P32-4	??
<i>Tephrosia</i> aff. <i>supina</i> (HD237-23)					
	+	<1 %	50 cm	P32-29	aff.
<i>Tephrosia bidwillii</i>	+	<1 %	1 m	=P30-?	
<i>Themeda avenacea</i>	+	<1 %	1.3 m	P32-10	
<i>Themeda triandra</i>	+	<1 %	80 cm	P32-36	
<i>Trianthera</i> sp.	+	<1 %	15 cm	P32-22	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>					
	+	<1 %	40-90 cm		
<i>Triodia epactia</i>	+	<1 %	35 cm		
<i>Vigna lanceolata</i> var. <i>lanceolata</i>					
	+	<1 %	30 cm	P32-2	

**PAN033**

Described by: BRM Date: 18/04/01 39x61m

Location: Access Road, 46.8km south of Marble Bar Road

AMG Zone: 50 733451mE, 7668049mN 733421mE, 7668024mN 733477mE, 7667996mN

Habitat: Lower slopes beneath hill ranges, west facing slope, with small watercourse near south boundary.

Soil: Gravelly, cobbly, orange-brown sandy loam.

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia sp. panorama hummock grassland to closed hummock grassland.

Vegetation Condition: Very good - Excellent

Fire Age: >10 years

Notes: (Co-recorded by Martin Henson).. Water course crosses NE corner of plot.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	1 m		??
Acacia inaequilatera	+ <1 %	2.5 m		
Boerhavia gardneri	+ <1 %	20 cm	=P30	
Bonamia linearis	+ <1 %	10 cm	=P1-8	
Bonamia rosea	+ <1 %	15 cm		
Bulbostylis barbata	+ <1 %	10 cm		
Cassia glutinosa	+ <1 %	2 m		
Cassia notabilis	+ <1 %	4 cm		
Cleome uncifera	+ <1 %	40 cm	=P1-10	
Corchorus parviflorus	+ <1 %	1 m	=P1-6	
Dampiera candicans	+ <1 %	60 cm	P33-6	
Eriachne pulchella subsp. dominii	+ <1 %	8 cm		
Goodenia stobbsiana	+ <1 %	50 cm	=P1-11	
Indigofera monophylla (PAN20-2)	+ <1 %	40 cm		
Mollugo molluginis	+ <1 %	2-10 cm	P33-7	specimen missing
Mukia sp.	+ <1 %	1.3 m	P33-3	
Polycarpaea longiflora (White form, M13-7)	+ <1 %	15 cm	P33-5	
Pterocaulon sphacelatum	+ <1 %	20 cm		
Ptilotus astrolasius	+ <1 %	35 cm		
Solanum phlomoides	+ <1 %	60 cm		
Tephrosia aff. clementii (11)	+ <1 %	8 cm	P33-4	
Tephrosia aff. supina (HD205-10)	+ <1 %	35 cm	P33-1	
Triodia sp. Panorama	60-80 50-75%	80 cm		
Triumfetta clementii	+ <1 %	30 cm	P33-2	

**PAN034**

Described by: BRM Date: 19/04/01

Location: Access Road, 47.8km south of Marble Bar Road.

Photo: 15 on roll PANR2

AMG Zone: 50 732775mE, 7667761mN 732773mE, 7667785mN 732813mE, 7667807mN 732810mE, 7667777mN

Habitat: Mid-slope of small (~40m high) rocky ridge.

Soil: Pebbly, cobbly loamy silty sand. Areas of calcrete on surface.

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia wiseana hummock grassland.

Vegetation Condition: Very good - Excellent

Fire Age: ≥10 years since burnt.

Notes: Plot smaller to avoid flowlines and veg change from Triodia wiseana to Triodia epactia.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia inaequilatera	+ <1 %	1.8-2.5 m		
Acacia orthocarpa	+ <1 %	5 cm	P34-5	
Boerhavia gardneri	+ <1 %	30 cm	=P33	
Cassia luerssenii	+ <1 %	1 m	P34-10	
Cleome viscosa	+ <1 %	10 cm		
Corchorus parviflorus	+ <1 %	2 cm	=P1-6	
Enneapogon caerulescens var. caerulescens	+ <1 %	20 cm	P34-9	
Genus sp. Unnamed	+ <1 %	15 cm	P34-13	
Indigastrum parviflorum (Whim Creek form; W138-3)	+ <1 %	20 cm	P34-3	
Indigofera colutea	+ <1 %		P34-15	
Indigofera linifolia	+ <1 %	20 cm		
Indigofera monophylla (PAN20-2)	+ <1 %	60 cm		
Mollugo molluginis	+ <1 %	15 cm		
Mukia sp.	+ <1 %	40 cm	P34-12	
Oldenlandia crouchiana	+ <1 %	4 cm	P34-11	mauve flower
Polycarpaea longiflora (Whim Creek form, WC147-7)	+ <1 %	(4cm) 30	P34-4;34-8	
Polycarpaea longiflora (White form, M13-7)	+ <1 %	30 cm	P34-8B	
Polygala aff. isingii	+ <1 %	1 cm	P34-1	
Pterocaulon sphacelatum	+ <1 %	50 cm		
Rhynchosia cf. minima	+ <1 %	40 cm	P34-6	
Solanum phlomoides	+ <1 %	1 m		dead
Synaptantha tillaeacea var. tillaeacea	+ <1 %	10 cm	P34-7	
Tephrosia aff. supina (HD205-10)	+ <1 %	30 cm	P34-2	
Triodia epactia	+ <1 %	40 cm		
Triodia wiseana	60-70 50-75%	50-60 cm		



**PAN035**Described by: MET Date: 19/04/01

100 mX?

Location: 47.8km from Marble Bar Road on Panorama Access TrackPhoto: 16 on roll PANR1AMG Zone: 50Habitat: Low ridge of outcropping rock forming rockpile and outcrop.Soil: Dull red-brown gravelly, pebbly loam amongst boulders and outcrop.Rock Type: Dark ?volcanic (mafic)Vegetation: Tephrosia sp. B Kimberley Flora(C.A. Gardner 7300) open shrubland over *Triumfetta propinqua* low open shrubland over *Cymbopogon ambiguus*, *Triodia epactia* tussock, hummock open grassland.Vegetation Condition: ExcellentFire Age: >10 years (?>15 years)Notes: (Co-recorded by MST)Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon</i> aff. <i>lepidum</i> (4)	+ <1 %	45 cm	P35-18	
<i>Acacia inaequilatera</i>	+ <1 %	2.3 m		
<i>Aerva javanica</i>	+ <1 %	15-30 cm		
<i>Boerhavia gardneri</i>	+ <1 %	3-60 cm	P35-17	
<i>Cenchrus ciliaris</i>	+ <1 %	50 cm		
<i>Cleome viscosa</i>	+ <1 %	0.4-1 m		
<i>Cymbopogon ambiguus</i>	+ <1 %	60 cm	P35-8	
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+ <1 %	15 cm	P35-10	
<i>Enneapogon oblongus</i>	+ <1 %	45 cm	P35-9	
<i>Eriachne mucronata</i> (typical form)	+ <1 %	30-50 cm	P35-2	
<i>Euphorbia</i> aff. <i>drummondii</i> (MET 15,030)	≤1 <1 %	20-55 cm	P35-3	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	+ <1 %			
<i>Oldenlandia</i>	+ <1 %	6 cm	P35-20	
Genus sp. Unnamed				
<i>Gomphrena cunninghamii</i>	+ <1 %	12 cm		
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>	+ <1 %	0.9-1.3 m		
<i>Heliotropium</i> sp.	+ <1 %	10 cm	P35-16	
<i>Hybanthus aurantiacus</i>	+ <1 %	20 cm		
<i>Indigastrum parviflorum</i> (Whim Creek form; W138-3)	+ <1 %	25 cm	P35-1	
<i>Indigofera monophylla</i> (PAN20-2)	+ <1 %	20 cm		
<i>Leptopus decaisnei</i> var. <i>decaisnei</i>	+ <1 %	15-35 cm	P35-13	
<i>Mukia</i> sp.	+ <1 %	60 cm	P35-7	

Nicotiana benthamiana	+	<1 %	3 cm	P35-14
Polycarpaea longiflora (White form, M13-7)				
	+	<1 %	15-35 cm	P35-12
Polymeria aff. calycina	+	<1 %	5 cm	P35-19
Solanum horridum	+	<1 %	10 cm	P35-15
Solanum phlomoides	+	<1 %	12 cm	
Tephrosia sp. B Kimberley Flora(C.A. Gardner 7300)				
	1-2	1-5%	0.6-1.4 m	P35-4
Tribulus suberosus	+	<1 %	1.1 m	P35-11
Triodia epactia	1-2	1-5%	30-60 cm	P35-6
Triodia wiseana	+	<1 %	40 cm	
Triumfetta clementii	+	<1 %	20 cm	
Triumfetta propinqua	2-3	1-5%	0.3-1 m	P35-5

**PAN036**Described by: MET Date: 19/04/01Location: 48.1km from Marble Bar Road.AMG Zone: 50 732628mE, 7667595mN 732718mE, 7667628mNHabitat: Medium sized creekline.Soil: Orange-brown fine sand. Cobbles in bed. Some loamy (wet) patches.Vegetation: Eucalyptus victrix scattered trees over Acacia tumida, Acacia inaequilatera, Petalostylis labicheoides scattered tall shrubs over Tephrosia aff. rosea (HD292-37) scattered shrubs over Sorghum plumosum, Triodia epactia tussock, hummock grassland.Vegetation Condition: Excellent - only one small patch of BuffelFire Age: >10 yearsNotes: (Co-recorded by MST). Only two pegs. Strip a few metres each side of channel recorded for 100m. Taken to edge of Sorghum plumosum in vegetation.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	0.5-1.5 m		
Acacia inaequilatera	+ <1 %	1 m		
Acacia tumida	+ <1 %	2-5 m	P36-24	
Alternanthera nana	+ <1 %	5-10 cm	P36-9	
Amaranthus aff. pallidiflorus (WAS1127)				
	+ <1 %	10-30 c m	P36-33	
Ammannia auriculata	+ <1 %	10-30 cm	P36-12;20	
Atalaya hemiglauca	+ <1 %	1.5 m	P36-3	Near 215
Boerhavia burbridgeana	+ <1 %	10 cm	P36-34	
Carissa lanceolata	+ <1 %	1.5-3.5 m		
Cenchrus ciliaris	+ <1 %	1 m		
Centipeda minima	+ <1 %	10 cm		
Cleome viscosa	+ <1 %	50 cm		
Corchorus parviflorus	+ <1 %	60-90 cm	=P1-6	
Cullen leucanthum	+ <1 %	0.6-1.3 m	=35-x	
Cymbopogon procerus	+ <1 %	35-60 cm	P36-25;28	leaves pruinose
Cyperus squarrosus	+ <1 %	10 cm	P36-10	
Cyperus viscidulus	+ <1 %	45 cm	P36-30	

<i>Dichanthium fecundum</i>	+	<1 %	0.9-1.2 m	P36-29
<i>Digitaria brownii</i>	+	<1 %	45 cm	P36-26
<i>Eleocharis atropurpurea</i>	+	<1 %	5 cm	P36-18
<i>Eragrostis cumingii</i>	+	<1 %	5-20 cm	P36-14
<i>Eragrostis tenellula</i>	+	<1 %	15 cm	P36-6
<i>Eriachne mucronata</i> (typical form)				
	+	<1 %	45 cm	P36-5
<i>Eriachne</i> sp. aff. <i>festucacea</i>				
	+	<1 %	75 cm	P36-4
<i>Eriachne tenuiculmis</i>	+	<1 %	40 cm	P36-2
<i>Eucalyptus victrix</i>	+	<1 %	7-10 m	
<i>Euphorbia coghlanii</i>	+	<1 %	35 cm	
<i>Euphorbia</i> sp. (site 1089)	+	<1 %	3 cm	P36-36
<i>Fimbristylis littoralis</i>	+	<1 %	10-15 cm	P36-16;17
<i>Fimbristylis microcarya</i>	+	<1 %	10-20 cm	P36-19
<i>Fimbristylis</i> sp.	+	<1 %	5-15 cm	P36-13
<i>Fimbristylis</i> sp.	+	<1 %	10-15 cm	P36-31
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>				
	+	<1 %	2.7 m	
<i>Fuirena ciliaris</i>	+	<1 %	10-30 cm	P36-11
<i>Gonocarpus ephemerus</i>	+	<1 %	5 cm	P36-8
<i>Goodenia lamprosperma</i>	+	<1 %	20 cm	P36-21
<i>Goodenia stobbsiana</i>	+	<1 %	60 cm	=P1-11
<i>Hybanthus aurantiacus</i>	+	<1 %	30 cm	
<i>Indigofera monophylla</i> (PAN20-2)				
	+	<1 %	0.5-1.8 m	
<i>Leptopus decaisnei</i> var. <i>decaisnei</i>				
	+	<1 %	15 cm	
<i>Lipocarpha microcephala</i>				
	+	<1 %	15cm	P36-21B Bis
<i>Ludwigia perennis</i>	+	<1 %	10-30 cm	P36-12B
<i>Oldenlandia galioides</i>	+	<1 %	10-15 cm	P36-15
<i>Petalostylis labicheoides</i>	+	<1 %	1.6-2.1 m	
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>				
	+	<1 %	50 cm	
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	10-15 cm	P36-35
<i>Pterocaulon sphacelatum</i>				
	+	<1 %	45 cm	
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %	25 cm	P36-27
<i>Rotala diandra</i>	+	<1 %	10 cm	P36-22
<i>Sorghum plumosum</i>	>15	10-25%	1.5-2 m	P36-1
<i>Stemodia grossa</i>	+	<1 %	30 cm	
<i>Stemodia viscosa</i>	+	<1 %	15-40 cm	P36-7
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)				
	+	<1 %	0.5-1.2 m	P36-23 var.?
<i>Terminalia canescens</i>	+	<1 %	2.7 m	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>				
	+	<1 %	10 cm	

<i>Triodia epactia</i>	>20	10-25%	30-70 cm	
<i>Triumfetta propinqua</i>	+	<1 %	80 cm	P36-32

**PAN037**

Described by: MJH Date: 19/04/01 45x35m

Location: 48.5km south along Access Road from Marble Bar Road.

Photo: 14 on roll PANR2

AMG Zone: 50 732458mE, 7667227mN 732458mE, 7667256mN 732383mE, 7667240mN

Habitat: Mid-slope (east facing) off gentle ridge.

Soil: Brown fine sand and silt with gravel, calcareous.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* (*Triodia* sp. panorama) hummock grassland with *Corchorus parviflorus* low open shrubland.

Notes: (Co-recorded by BRM)

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia inaequilatera</i>	+ <1 %	2-3 m		
<i>Acacia synchronicia</i>	+ <1 %	1.5 m	P37-3	
<i>Boerhavia</i> sp. (M92-7)	+ <1 %	10 cm	P37-9	
<i>Bonamia pannosa</i>	+ <1 %	30 cm		
<i>Bonamia rosea</i>	+ <1 %	20 cm		
<i>Corchorus parviflorus</i>	5 5-10%	1 m	=P1-6	
<i>Crotalaria medicaginea</i> (Burrup form; B65-11)	+ <1 %	10 cm	P37-10	
<i>Enneapogon caerulescens</i> var. <i>caerulescens</i>	+ <1 %	15 cm	P37-1,4,11	
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+ <1 %	10 cm		
<i>Euphorbia</i> aff. <i>australis</i> (B191)	+ <1 %	5 cm	P37-7	
<i>Fimbristylis dichotoma</i>	+ <1 %	15 cm	P37-12	
<i>Goodenia</i> sp.	+ <1 %	30 cm	P37-6	
<i>Goodenia stobbsiana</i>	+ <1 %	20 cm	=P1-11	
<i>Indigofera colutea</i>	+ <1 %	5 cm	P37-8	
<i>Indigofera monophylla</i> (PAN20-2)	+ <1 %	50 cm		
<i>Iseilema dolichotrichum</i>	+ <1 %		P37-c	
<i>Mukia</i> sp.	+ <1 %	1 m	P37-2	
<i>Pterocaulon sphacelatum</i>	+ <1 %	20 cm		
<i>Ptilotus astrolasius</i>	+ <1 %	50 cm		
<i>Solanum phlomoides</i>	+ <1 %			
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	+ <1 %	30 cm	P37-13	
<i>Tephrosia</i> aff. <i>supina</i> (HD205-10)	+ <1 %	20 cm	P37-5	
<i>Tribulopsis angustifolia</i>	10 5-10%	70-80 cm		
<i>Triodia epactia</i>	60 50-75%	50 cm		

**PAN038**

Described by: MJH Date: 21/04/01

Location: Near proposed camp.

Photo: 19 on roll PANR3

AMG Zone: 50 728600mE, 7660644mN 728544mE, 7660686mN 728568mE, 7660707mN 728606mE, 7660700mN

Habitat: Undulating midslope, NE aspect.

Soil: Fine brown sand and silt with gravel and cobbles, some outcrop. Calcretisation evident, some hardpan exposed.

Rock Type: Coarse grained mafic.

Vegetation: Acacia inaequilatera scattered tall shrubs over Corchorus parviflorus scattered low shrubs to low open shrubland and Triodia wiseana hummock grassland.

Vegetation Condition: Very good, probably fire juvenilised.

Fire Age: >5 years?

Notes: Corymbia hamersleyana just outside plot.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	20 cm	P38-5	
Acacia bivenosa	+ <1 %	90 cm		
Acacia inaequilatera	1 1-5%	1.5(5) m		
Acacia maitlandii	+ <1 %	50 cm	P38-8	spike
Acacia ptychophylla	+ <1 %	90 cm	P38-4	
Acacia spondylophylla	+ <1 %	60 cm	P38-2	
Cassia glutinosa	+ <1 %	1 m		
Cassia oligophylla (Panorama form)	+ <1 %	40 cm	P38-6	
Cleome uncifera	+ <1 %	30 cm	=P1-10	
Corchorus parviflorus	2 1-5%	50-80 cm	=P1-6	
Eriachne sp. Port Hedland	+ <1 %	20 cm	P38-3	
Euphorbia tannensis ssp. eremophila (Panorama form)	+ <1 %	50 cm	P38-11	
Goodenia microptera	+ <1 %	40 cm		
Goodenia stobbsiana	+ <1 %	10 cm	=P1-11	
Hakea lorea ssp. lorea	+ <1 %	1 m		
Heliotropium tenuifolium	+ <1 %	30 cm	P38-7	
Indigofera monophylla (PAN57-9)	+ <1 %	1 m		
Mollugo molluginis	+ <1 %	15 cm		
Solanum phlomoides	+ <1 %	80 cm		
Tephrosia aff. rosea (HD292-37)	+ <1 %	1 m	P38-1	
Triodia wiseana	30-50 33.3-50%	60-70 cm		

**PAN039**

Described by: BRM Date: 21/04/01

Location: Near proposed camp.

Photo: 13,12,11 on roll PANR2

AMG Zone: 50 728694mE, 7660691mN 728621mE, 7660758mN

Habitat: Alluvial flats to gentle slope immediately adjacent to a cobbly dry creek bed on southern side. Steep rocky Triodia slope on northern side.

Soil: Brown loamy sand with some rocks.

Vegetation: Pre-burnt description : Acacia tumida low woodland to low open forest (pre-fire) over Petalostylis labicheoides, Gossypium robinsonii high shrubland over Cajanus cinereus, Tephrosia aff. rosea (HD292-37) shrubland over Triodia epactia very open hummock grassland.

Vegetation Condition: Very good

Fire Age: <3-4 years

Notes: Plants not recorded from cobbly creek bed/bank; only records from alluvial soil area adjacent. A few live tall (~6m) remnant Acacia tumida, many dead (burnt). Thicket of regenerated Acacia tumida. Juvenile Acacia tumida occupies 25-30% in parts.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	2 m	P39-6	yellow trunk
Acacia bivenosa	5 5-10%	1-2 m		
Acacia maitlandii	+ <1 %		P39-15	
Acacia pyrifolia (slender, white)	+ <1 %	2 m	P39-5	
Acacia spondylophylla	+ <1 %	60 cm	P39-4	whole leaf
Acacia tumida	30-50 33.3-50%	2-6 m	P39-1	
Cajanus cinereus	5-10 5-10%	2 m	P39-9	
Cassia notabilis	+ <1 %	30 cm		
Cleome viscosa	+ <1 %	40 cm	=P1-41	
Corchorus parviflorus	+ <1 %	60 cm	=P1-6	
Corymbia hamersleyana	+ <1 %	3 m	=P1-1	
Corymbia sp. (PAN39-18)	+ <1 %	60 cm	P39-18	
Cymbopogon procerus	+ <1 %	1 m	P39-13	
Dampiera candidans	+ <1 %	30 cm	P39-12	
Ehretia saligna var. saligna	+ <1 %	30 cm	P39-18	
Goodenia stobbsiana	+ <1 %	30 cm	=P1-11	
Gossypium robinsonii	5 5-10%	3 m		
Grevillea wickhamii subsp. aprica	+ <1 %	1 m		
Hibiscus aff. platyklamys (site 1139)	+ <1 %	40 cm	P39-16	
Indigofera monophylla (PAN58-17)	+ <1 %	0.6-1.2 m	P39-7	
Petalostylis labicheoides	5-10 5-10%	3-4 m	P39-3	
Rhynchosia cf. minima	+ <1 %	5 cm	P39-14	
Santalum lanceolatum	+ <1 %	2 m	P39-17	
Solanum diversiflorum	+ <1 %	30 cm		

Templetonia hookeri	+	<1 %	1.5 m	P39-10	
Tephrosia aff. rosea (HD292-37)					
	5	5-10%	1 m	P39-11	
Triodia epactia	5	5-10%		P39-2	
Triodia longiceps	+	<1 %	70 cm		Just outside
Triumfetta propinqua	+	<1 %	40 cm	P39-8	

**PAN040**

Described by: MST Date: 21/04/01

18x82m

Location: Near proposed camp site.

Photo: 15 on roll PANR1

AMG Zone: 50 728571mE, 7660633mN 728498mE, 7660672mN 728492mE, 7660655mN 728561mE, 7660616mN

Habitat: Southerly facing slope of a low ridge (trends east-west) in valley between two larger ridges.

Soil: Dull light brown gravelly to pebbly (some cobbles) loam. About 2-3% of surface is outcrop. Thinly layered light brown with some thicker bands which are more silicious.

Vegetation: Corymbia hamersleyana, Eucalyptus leucophloia scattered low trees over Acacia ptychophylla low shrubland to low open heath over Triodia epactia hummock grassland.

Vegetation Condition: Very good (excellent except for recent fire).

Fire Age: <2 years

Notes: (Co-recorded by MET). Acacia ptychophylla had Cover/Cover class about 30%, it is likely to become much denser. A few older Triodia wiseana survived the fire. All the regeneration appears to be Triodia epactia. There may have been scattered larger shrubs of Acacia bivenosa, as there are some juveniles and what appear to be some fire killed larger plants. Triodia epactia has germinated and established profusely, all individuals being quite small.

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
Acacia bivenosa	+	<1 %	50 cm		bushy form
Acacia ptychophylla	30	25-33.3%	50-60 cm	P40-1	
Acacia spondylophylla	+	<1 %	35 cm	P40-3	leaves in whorls ~7
Corchorus parviflorus	+	<1 %	20-30 cm	=P1-6	
Corymbia hamersleyana	+	<1 %			
Eucalyptus leucophloia	<1	<1 %	4-5 m		
Goodenia stobbsiana	+	<1 %	30 cm	=P1-11	
Grevillea wickhamii subsp. aprica					
	+	<1 %	40 cm		
Mollugo molluginis		+ <1 %	15 cm		
Petalostylis labicheoides	+	<1 %	1.3 m		
Solanum phlomoides	+	<1 %	25 cm		
Tephrosia aff. supina (HD205-10)					
	+	<1 %	20 cm	P40-4	
Triodia epactia	40	33.3-50%	20 cm	P40-2	
Triodia wiseana	+	<1 %	90 cm		

**PAN041**Described by: MJH Date: 21/04/01Location: On hill overlooking track and downstream (North) from proposed Tailings dam.AMG Zone: 50 728695mE, 7660784mN 728692mE, 7660774mN 728640mE, 7660792mN 728649mE, 7660815mNHabitat: Mid to upper steep slope of hill above creek.Soil: Orange-brown fine sand and silt with gravel.Vegetation: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* high open shrubland over *Acacia sp ptychophylla*, *Indigofera monophylla* (PAN 57-9) scattered shrubs over *Triodia wiseana* (*Triodia brizoides*) closed hummock grassland with *Cassytha capillaris* closed lianes in places.Notes: *Acacia inaequilatera*- 5m tall, bark corky, branches spreading to ascending, younger branchlets pruinose, phyllodes pruinose, undulate.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	1.5-2 m		
<i>Acacia bivenosa</i>	+ <1 %	1 m		
<i>Acacia inaequilatera</i>	2 1-5%	5 m	P41-7	
<i>Acacia ptychophylla</i>	+ <1 %	1 m	=P38-4	
<i>Boerhavia gardneri</i>	+ <1 %	10 cm	P41-8	
<i>Cassia oligophylla</i> (Panorama form)				
	+ <1 %	1.5 m	P41-10	
<i>Cassytha capillaris</i>	+ <1 %	50 cm	P41-2	
<i>Corymbia hamersleyana</i>	+ <1 %	6 m	P41-11	
<i>Cymbopogon ambiguus</i>	+ <1 %	80 cm	P41-5	
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i> (Panorama form)				
	+ <1 %	1 m	P41-9	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+ <1 %	4-5 m		
<i>Indigofera monophylla</i> (PAN57-9)				
	+ <1 %	90 cm	P41-3	grey, but not usual
<i>Mollugo molluginis</i>	+ <1 %	10 cm		
<i>Oldenlandia crouchiana</i>	+ <1 %	5 cm		
<i>Polygala</i> aff. <i>isingii</i>	+ <1 %	2.5 cm	P41-4	
<i>Sida</i> sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)				
	+ <1 %	1 m	P41-6	
<i>Triodia brizoides</i>	+ <1 %	40 cm	P41-1	brizoides?
<i>Triodia wiseana</i>	80 >75%	0.5-1 m		

**PAN042**Described by: BRM Date: 21/04/01Photo: 10 on roll PANR2AMG Zone: 50 728655mE, 7660453mN 728676mE, 7660529mNHabitat: Alluvial deposit (above and between) two small cobbly creek beds (forms an island).Soil: Red-brown coarse sand to loamy sand.



Vegetation: *Acacia tumida* low open forest to open forest over *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia* hummock grassland.

Vegetation Condition: Excellent

Fire Age: >10-15 years. Very tall old stand of *Acacia*.

Notes: Area dominated by old *Acacia tumida*. Not burnt long time. Cf. burnt *Acacia tumida* area 200m downstream (PAN39). Small sparse crowns on the *Acacia tumida*, but quite dense stand of trunks.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia tumida</i>	50 33.3-50%	10-12 m	=P39-1	
<i>Cymbopogon ambiguus</i>	+ <1 %	20-40 cm	P42-2;42-5	
<i>Eriachne mucronata</i> (typical form)	+ <1 %	30 cm	P42-3	
<i>Goodenia stobbsiana</i>	+ <1 %	30 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+ <1 %	3 m		
<i>Hibiscus</i> aff. <i>platyklamys</i> (site 1139)	+ <1 %	1 m	P42-4	
<i>Petalostylis labicheoides</i>	1-2 1-5%	3 m	=P39-3	
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	+ <1 %	10 cm	P42-6	
<i>Tephrosia spechtii</i>	+ <1 %	1 m	P42-1	
<i>Triodia epactia</i>	30-40 25-33.3%	30 cm		

**PAN043**

Described by: MST Date: 21/04/01

Location: Near proposed Mill site, Panorama project.

Photo: 14 on roll PANR1

AMG Zone: 50 729663mE, 7660135mN 729696mE, 7660160mN 729660mE, 7660208mN

Habitat: Upper slopes of a low rise in a valley between two tall ridgelines.

Soil: Orange-brown, gravelly, pebbly (some cobbles) loam.

Rock Type: Outcropping quartzite (maybe floaters). A lot of gravel in brownish chert.

Vegetation: *Triodia* sp. panorama (*Triodia epactia*) open hummock grassland.

Vegetation Condition: Very good

Fire Age: >5 (?>10 years).

Notes: (Co-recorded by MET)

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia bivenosa</i>	+ <1 %	1.3 m		
<i>Acacia ptychophylla</i>	+ <1 %	25 cm	=P40-1	
<i>Bulbostylis barbata</i>	+ <1 %	10 cm		
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+ <1 %	10 cm	=P1-12	
<i>Fimbristylis simulans</i>	+ <1 %	15 cm	P43-3	
<i>Mollugo molluginis</i>	+ <1 %	10 cm		
<i>Polycarpaea holtzei</i>	+ <1 %	3 cm	P43-4	

<i>Polygala</i> aff. <i>isingii</i>	+	<1 %	<2 cm	
<i>Triodia epactia</i>	+	<1 %	40 cm	P43-2
<i>Triodia</i> sp. Panorama	20-30	25-33.3%	45 cm	P43-1

**PAN044**

Described by: MJH Date: 21/04/01 15x50x31

Location: Slope above PAN41, just below crest.

Photo: 15 on roll PANR3

AMG Zone: 50 728662mE, 7660837mN 728658mE, 7660823mN 728707mE, 7660814mN 728697mE, 7660826mN

Habitat: Upper south facing slope, moderate to steep, just below crest of hill.

Soil: Orange-brown fine sand and silt with gravel and some outcrop.

Rock Type: Upthrust layered sedimentary.

Vegetation: *Acacia ptychophylla* open shrubland over *Triodia wiseana* hummock grassland to closed hummock grassland.

Notes: Plot a small one, cut to fit vegetation unit. There is a rapid change in *Triodia* at the west end, from *Triodia wiseana* to *Triodia brizoides* and *Acacia acradenia* becomes denser at the east end.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia inaequilatera</i>	+ <1 %	1 m	=P41-7	
<i>Acacia ptychophylla</i>	5 5-10%	+/-1 m	=P38-4	
<i>Acacia spondylophylla</i>	+ <1 %	1-1.5 m	P44-3	shrub
<i>Boerhavia gardneri</i>	+ <1 %	10 cm	P44-6	
<i>Bonamia media</i> var. <i>villosa</i>	+ <1 %	30 cm	P44-9	
<i>Cassia luerssenii</i>	+ <1 %	1.5 m	P44-1	
<i>Cassia oligophylla</i> (Panorama form)	+ <1 %	80cm;1.5	P44-2;44-5	
<i>Cassytha capillaris</i>	+ <1 %		P44-12	
<i>Corchorus parviflorus</i>	+ <1 %	60 cm	=P1-6	
<i>Goodenia stobbsiana</i>	+ <1 %	20 cm	=P1-11	
<i>Mollugo molluginis</i>	+ <1 %	10 cm		
<i>Oldenlandia crouchiana</i>	+ <1 %	5 cm	P44-8	
<i>Polygala</i> aff. <i>isingii</i>	+ <1 %	5 cm	P44-7	
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	+ <1 %	30 cm	P44-4	
<i>Triodia brizoides</i>	+ <1 %	20 cm	=P41-1	
<i>Triodia wiseana</i>	60-80 50-75%	50-80 cm		

**PAN045**

Described by: BRM Date: 21/04/01

Location: Near proposed mill and tailings dam.

Photo: 9 on roll PANR2

AMG Zone: 50 729592mE, 7660055mN 729572mE, 7660019mN 729620mE, 7659983mN

Habitat: Steep rocky midslope of steep hill below steep rock top. North, northeast facing slope.

Soil: Gravelly, cobbly, rocky brown loamy sand. Surface cover >90% rock.

Vegetation: *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* open hummock grassland to hummock grassland.

Fire Age: >5 years

Notes: Occasional *Eucalyptus leucophloia* (outside plot, 1 inside). *Cassia glutinosa* just outside plot. *Acacia bivenosa* on lower part of midslope.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	1 1-5%	2-3 m	P45-2	
<i>Acacia bivenosa</i>	1 1-5%	1-1.5 m	P45-4	bushy form
<i>Acacia inaequilatera</i>	+ <1 %	3-4 m	P45-1	
<i>Bonamia media</i> var. <i>villosa</i>				
	+ <1 %	10 cm	P45-8	
<i>Bulbostylis barbata</i>	+ <1 %	10 cm		
<i>Corchorus parviflorus</i>	+ <1 %	40 cm	=P1-6	
<i>Dampiera candicans</i>	+ <1 %	40 cm	P45-3	
<i>Eucalyptus leucophloia</i>	+ <1 %	2 m		
<i>Fimbristylis simulans</i>	+ <1 %	10 cm	P45-5	
<i>Solanum phlomoides</i>	+ <1 %	40 cm		
<i>Triodia brizoides</i>	25-30 25-33.3%	60 cm	P45-7	
<i>Triodia wiseana</i>	10-15 10-25%	50 cm	P45-6	

**PAN046**

Described by: MET Date: 21/04/01

Photo: (too dark)

AMG Zone: 50 729741mE, 7659911mN 729838mE, 7659923mN

Habitat: A small flow line (creek) between two lower spurs of a ridgeline, runs south/east.

Soil: Gravelly to cobbly, orange-brown loam.

Vegetation: *Corymbia hamersleyana* over *Grevillea wickhamii* ssp *aprica* high shrubland over *Petalostylis labicheoides*, *Acacia acradenia* high open shrubland over *Acacia spondylophylla* open shrubland over *Triodia epactia* hummock grassland.

Vegetation Condition: Very good - Excellent

Fire Age: 10 years, possibly more.

Notes: (Co-recorded by MST). 100m transect. Area recorded is a strip about 3-5m wide along both sides of a narrow channel. There is more *Acacia acradenia* at the outer edges and the *Petalostylis* and *Acacia spondylophylla* are mostly on the banks of the creek.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	≥2 1-5%	1-2.3		
<i>Acacia spondylophylla</i>	≥2 1-5%	1-1.5 m	P46-3	
<i>Acacia tumida</i>	+ <1 %	3-4 m	P46-2	
<i>Cassytha capillaris</i>	+ <1 %	30 cm		In creek bed only
<i>Corymbia hamersleyana</i>	+ <1 %	3.5-5 m		
<i>Dampiera candicans</i>	+ <1 %	35 cm		
<i>Eriachne tenuiculmis</i>	+ <1 %	35 cm	P46-4	In creek bed only

Eucalyptus leucophloia	+	<1 %	4 m	In creek bed only
Grevillea wickhamii subsp. aprica				
		≤20	10-25% (1)2-3.5	
Petalostylis labicheoides	>2	1-5%	1-2.5m	
Templetonia hookeri	+	<1 %	2.4 m	P46-1
Triodia epactia	45	33.3-50%	30-60 cm	
Triodia longiceps	+	<1 %	30 cm	
Triumfetta maconochieana				
	+	<1 %	30 cm	P46-5

**PAN047**Described by: BRM Date: 22/04/01

23x77m

Location: Proposed tailings dam.Photo: 8 on roll PANR2AMG Zone: 50 730650mE, 7659947mN 730639mE, 7659969mN 730689mE, 7660015mNHabitat: Top of gently sloping colluvial spur forming part of lower slopes of valley floor at base of hill range to south-west. North-east facing slope with shallow gullies either side, drains 100m to NE.Soil: Gravelly pebbly cobbly orange-brown loamy sand. Pebbles to cobbles cover >90% soil surface.Vegetation: Acacia inaequilatera scattered tall shrubs over Acacia acradenia, Acacia spondylophylla scattered shrubs over Triodia wiseana hummock grassland.Vegetation Condition: ExcellentFire Age: >10 years -Large Triodia hummocksNotes: Tall old Acacia inaequilatera and Hakea lorea ssp. lorea. Tend to get more Acacia inaequilatera upslope on the valley floor spurs. Acacia acradenia tended to grow along gullies as did Corymbia. Did not collect in corner edge of gully.Species List:

Name	Cover/	Cover class	Height	Spec	Notes
Acacia acradenia	+	<1 %	1-2 m	P47-2	
Acacia inaequilatera	+	<1 %	3-4 m	P47-1	
Acacia spondylophylla	+	<1 %	1-1.2 m	P47-5	
Boerhavia gardneri	+	<1 %	10 cm	P47-4	
Cleome viscosa	+	<1 %	5 cm	=P1-41	
Corymbia hamersleyana	+	<1 %	50 cm	=P1	
Eriachne pulchella subsp. dominii					
	+	<1 %	10 cm		
Goodenia stobbsiana	+	<1 %	50 cm	=P1-11	
Hakea lorea ssp. lorea	+	<1 %	3 m		
Mollugo molluginis	+	<1 %	15 cm		
Polycarpha holtzei	+	<1 %	10 cm	P47-6	
Polygala aff. isingii	+	<1 %	4 cm	P47-3	
Ptilotus astrolasius	+	<1 %	50 cm		
Triodia wiseana	30-40	25-33.3%	60-80 cm		

**PAN048**Described by: MJH Date: 22/04/01

58x14x16

Location: Ridge on SW side of proposed Tailings dam.

Photo: 14 on roll PANR3

AMG Zone: 50 730587mE, 7659938mN 730574mE, 7659951mN 730538mE, 7659913mN 730547mE, 7659903mN

Habitat: Moderate to very steep slope from crest of colluvial spur towards gully/creek at bottom.

Soil: Reddish brown medium to fine sand with silt and gravel.

Rock Type: Shale.

Vegetation: Acacia inaequilatera scattered tall shrubs over Acacia spondylophylla shrubland over Triodia wiseana hummock grassland.

Vegetation Condition: Very good

Fire Age: >10 years

Notes: Triodia wiseana forms sizeable hummocks that haven't been burnt for a while. Grevillea wickhamii ssp aprica and Acacia acradenia are just outside the plot, downslope.

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
Acacia bivenosa	+	<1 %	80 cm		
Acacia inaequilatera	2	1-5%	2-3 m	P48-1	
Acacia ptychophylla	+	<1 %	30 cm	P48-8	
Acacia spondylophylla	15	10-25%	0.8-1 m	P48-2	
Bonamia media var. villosa					
	+	<1 %	7.5 cm	P48-5	
Cassia 'symonii'	+	<1 %	1.2 m	P48-4	
Cassytha capillaris	+	<1 %	50 cm	P48-9	
Goodenia cusackiana	+	<1 %	20 cm	P48-3	
Goodenia stobbsiana	+	<1 %	30 cm	=P1-11	
Indigofera monophylla (PAN57-9)					
	+	<1 %	1 m	P48-8	
Mollugo molluginis		+ <1 %	10 cm		
Polygala aff. isingii	+	<1 %	5 cm	P48-6	
Ptilotus astrolasius	+	<1 %	40 cm		
Triodia wiseana	50-60	50-75%	0.6-1 m		

#### PAN049

Described by: BRM Date: 22/04/01

Location: Proposed tailings dam.

Photo: 7 on roll PANR2

AMG Zone: 50 730640mE, 7660145mN 730562mE, 7660198mN

Habitat: Alluvial flat adjacent to narrow (2m wide) sandy cobbly creek.

Soil: Brown loamy sand.

Vegetation: Corymbia hamersleyana scattered low trees over Acacia tumida, Acacia acradenia, Petalostylis labicheoides open scrub over Cajanus cinereus, Indigofera monophylla (PAN57-9) open shrubland over Triodia wiseana hummock grassland.

Vegetation Condition: Excellent

Fire Age: >10 years. Very large Triodia and Acacias.

Notes: Vegetation stand dominated by Acacia acradenia open shrubland over Triodia. Deep loamy sands beside creek bed. Habitat intermittent along creek -

sometimes only *Triodia*, no overstorey. Extended plot by 50-100m because very narrow (5-10m) and intermittent.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	50-60 50-75%	(1.5)3-4	P49-1	
<i>Acacia inaequilatera</i>	+ <1 %	4 m	P49-7	
<i>Acacia tumida</i>	+ <1 %	4-5 m	P49-3	=P42, 39
<i>Boerhavia gardneri</i>	+ <1 %	20 cm	=P47-4	
<i>Cajanus cinereus</i>	1-2 1-5%	1-2 m	P49-2	
<i>Cassia glutinosa</i>	+ <1 %	1.5 m	P49-11	
<i>Cassytha capillaris</i>	+ <1 %	80 cm	P49-6	
<i>Corchorus aff laniflorus</i> (PAN 76)				
	+ <1 %	80 cm	P49-9	=P1-6?
<i>Corymbia hamersleyana</i>	+ <1 %	4-5 m		=P1
<i>Cymbopogon ambiguus</i>	+ <1 %	40 cm	P49-16	
<i>Euphorbia aff. australis</i> (B191)				
	+ <1 %	50 cm	P49-15	
<i>Euphorbia coghlanii</i>	+ <1 %	15 cm	P49-12	
<i>Euphorbia tannensis ssp. eremophila</i> (Panorama form)				
	+ <1 %	30 cm	=P18-2	
<i>Goodenia stobbsiana</i>	+ <1 %	50 cm	=P1-11	
<i>Indigofera monophylla</i> (PAN57-9)				
	+ <1 %	80 cm	P49-10	
<i>Mollugo molluginis</i>	+ <1 %	15 cm		
<i>Petalostylis labicheoides</i>	+ <1 %	2-4 m	P49-4	
<i>Phyllanthus maderaspatensis var. angustifolius</i>				
	+ <1 %	20 cm	P49-13	
<i>Polymeria aff. ambigua</i> (PAN 26B-20)				
	+ <1 %	10 cm	P49-14	
<i>Polymeria aff. calycina</i>	+ <1 %	320 cm	P49-17	
<i>Swainsona formosa</i>	+ <1 %	10 cm	P49-18	
<i>Tephrosia aff. rosea</i> (HD292-37)				
	+ <1 %	1 m	P49-5	
<i>Trichodesma zeylanicum var. zeylanicum</i>				
	+ <1 %	1.5 m	P49-11B	
<i>Triodia wiseana</i>	30-40 25-33.3%	80 cm		

**PAN050**

Described by: MJH Date: 22/04/01 26x54x40

Location: Valley floor towards north side of proposed Tailings Dam.

Photo: 13 on roll PANR3

AMG Zone: 50 730608mE, 7660140mN 730590mE, 7660124mN 730549mE, 7660157mN 730576mE, 7660180mN

Habitat: Plot at base of colluvial spur on moderate slope (flat at base near creek and site P49)

Soil: Gravelly orange-brown fine sandy silt. Some overcrop on slope.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Vegetation Condition: Very good

Fire Age: >10 years ?

Notes: *Triodia wiseana* hummocks up to 1.2m, long unburnt. Some exposed calcrete on slope. *Corymbia hamersleyana* in flowline outside plot.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	1.5 m		
<i>Acacia inaequilatera</i>	2 1-5%	3.5 m		
<i>Boerhavia gardneri</i>	+ <1 %	10 cm	P50-3	
<i>Eriachne pulchella</i> subsp. <i>dominii</i>				
	+ <1 %	10 cm		
<i>Goodenia stobbsiana</i>	+ <1 %	30 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>				
	+ <1 %	1.7 m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+ <1 %	1.5 m		
<i>Indigofera monophylla</i> (PAN57-9)				
	+ <1 %	1.2 m		
<i>Polygala</i> aff. <i>isingii</i>	+ <1 %	3 cm	P50-1	
<i>Ptilotus astrolasius</i>	+ <1 %	30 cm		
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)				
	+ <1 %	60 cm	P50-2	
<i>Triodia wiseana</i>	40-50 33.3-50%	0.8-1.2 m		

#### PAN051

Described by: MJH Date: 22/04/01

Location: Valley floor, east end of proposed tailings dam.

Photo: 12 on roll PANR3

AMG Zone: 50 730014mE, 7660554mN 730058mE, 7660590mN 730085mE, 7660560mN

Habitat: Gentle lower slope of undulating valley floor, keeping above lower flowline.

Soil: Rusty-brown fine sand and silt with gravel.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland in parts over *Triodia wiseana* hummock grassland.

Vegetation Condition: Very good

Fire Age: >10 years

Notes: *Triodia wiseana* hummocks big, unburnt for a long time. The *Triodia wiseana* grades into *Triodia brizoides* upslope, with some mixing downslope in the plot. The plot is bounded by flowlines with *Grevillea ?pyramidalis* (=PAN 51-4) at times reasonably dense (high shrubland).

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	3 1-5%	1.5-2 m		
<i>Acacia inaequilatera</i>	2 1-5%	3-4 m	P51-5	
<i>Boerhavia gardneri</i>	+ <1 %	15 cm	=P50-3	
<i>Cassia glutinosa</i>	+ <1 %	1.5 m		
<i>Corchorus parviflorus</i>	+ <1 %	60 cm	P51-2	
<i>Corymbia hamersleyana</i>	+ <1 %	3 m	51-3;51-1B	regrowth

<i>Eriachne pulchella</i> subsp. <i>dominii</i>			
	+	<1 %	10 cm
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>			
		10-30 10-25%	30cm)3-4 P51-4
<i>Indigofera monophylla</i> (PAN57-9)			
	+	<1 %	0.3-1 m =P48-8
<i>Mollugo molluginis</i>			
	+	<1 %	10 cm
<i>Polygala</i> aff. <i>isingii</i>			
	+	<1 %	3 cm P51-1
<i>Triodia brizoides</i>			
	+	<1 %	50 cm
<i>Triodia wiseana</i>			
		60-70 50-75%	1-1.5 m

**PAN052**

Described by: BRM Date: 22/04/01

Location: Near proposed mill.

Photo: 6 on roll PANR2

AMG Zone: 50 729798mE, 7660533mN 729804mE, 7660560mN 729838mE, 7660548mN 729831mE, 7660514mN

Habitat: Steep south - facing spur upper slope to crest. >80%.

Soil: Gravelly, cobbly, rocky, orange-brown loam sand. Almost scree slope with rock cover of surface >80%.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* shrubland over *Acacia spondylophylla* low open shrubland over *Triodia brizoides* hummock grassland.

Vegetation Condition: Excellent

Fire Age: >10 years since fire.

Notes: *Eucalyptus leucophloia* growing mainly in gullies on hill slope. *Corymbia hamersleyana* was overhanging plot, and was one of a few on slope. More *Eucalyptus leucophloia* than *Corymbia hamersleyana*, although *Eucalyptus leucophloia* was mainly in gullies.

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
<i>Acacia bivenosa</i>	15-20	10-25%	1-2 m	=P45-4	
<i>Acacia inaequilatera</i>	+	<1 %	2-3 m	=P1	
<i>Acacia orthocarpa</i>	+	<1 %	1 m	P52-4	
<i>Acacia ptychophylla</i>	+	<1 %	80 cm	P52-6	
<i>Acacia spondylophylla</i>	1	1-5%	80 cm	=P47-5	
<i>Bonamia media</i> var. <i>villosa</i>					
	+	<1 %	2 cm	P52-7	
<i>Cassia glutinosa</i>	+	<1 %	1 m	=P1-31	
<i>Corymbia hamersleyana</i>	+	<1 %	2 m	=P1	
<i>Dodonaea coriacea</i>	+	<1 %	1.5 m	P52-2	
<i>Eucalyptus leucophloia</i>	+	<1 %	2 m	P52-1	
<i>Goodenia cusackiana</i>	+	<1 %	30 cm	P52-3	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	80 cm		
<i>Hybanthus aurantiacus</i>	+	<1 %	8 cm	P52-5;52-9	
<i>Indigofera monophylla</i> (PAN57-9)					
	+	<1 %	15 cm	P52-9	
<i>Solanum phlomoides</i>	+	<1 %	50 cm	=P14-4	



*Triodia brizoides* 40-50 33.3-50% 40 cm

### PAN053

Described by: MJH Date: 22/04/01 20x75m

Location: On southern ridge of proposed Tailings Dam.

Photo: 11, 10 on roll PANR3

Photo Notes: Photo 10 has Tailing Dam valley in the background

AMG Zone: 50 730008mE, 7660526mN 730069mE, 7660484mN 730055mE, 7660471mN

Habitat: Steep mid upper slope, facing north.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia brizoides* closed hummock grassland.

Vegetation Condition: Very good

Fire Age: >15 years?

Notes: *Triodia* long unburnt. Plot shortened uphill to avoid vegetation change.

#### Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia ptychophylla</i>	4 1-5%	1-2 m	P53-1	
<i>Bonamia media</i> var. <i>villosa</i>	+ <1 %	2 cm		
<i>Dampiera candicans</i>	+ <1 %	55 cm		
<i>Goodenia cusackiana</i>	+ <1 %	30 cm	P53-3	
<i>Goodenia stobbsiana</i>	+ <1 %	20 cm	=P1-11	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+ <1 %			nearby
<i>Hybanthus aurantiacus</i>	+ <1 %	45 cm	P53-2	
<i>Indigofera monophylla</i> (PAN57-9)	+ <1 %			grey, =P48-8
<i>Mollugo molluginis</i>	+ <1 %	5 cm		
<i>Polycarpha holtzei</i>	+ <1 %	10 cm		
<i>Polygala</i> aff. <i>isingii</i>	+ <1 %	1.5 cm	P53-4	
<i>Ptilotus astrolasius</i>	+ <1 %	50 cm		
<i>Sida cardiophylla</i>	+ <1 %	50 cm	=P1-23	
<i>Solanum phlomoides</i>	+ <1 %	50 cm		
<i>Triodia brizoides</i>	75-80%			
<i>Triodia wiseana</i>	+ <1 %	75 cm		

### PAN054

Described by: BRM Date: 23/04/01 33x67m

Location: #2 Mining Area

Photo: 5 on roll PANR2

AMG Zone: 50 733048mE, 7654434mN 733041mE, 7654498mN 733012mE, 7654483mN

Habitat: Midslope of a colluvial spur, NE facing on a high hill. Deep gullies either side of spur.

Soil: Cobbly, rocky, orange-brown loamy sand. >50% covered by rock.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Vegetation Condition: Excellent.

Fire Age: >10 years since burnt. Triodia hummock to 1m .

Notes: Acacia inaequilatera very tall and single trunks (mature). Corymbia hamersleyana individuals growing just below plot. At base of steep slope were Acacia acradenia and Indigofera rugosa along gully walls.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia inaequilatera	+ <1 %	4-6 m		
Acacia spondylophylla	+ <1 %	15 cm	=P47-4	
Cleome viscosa	+ <1 %	5 cm	=P1-41	
Hakea lorea ssp. lorea	+ <1 %	2 m	=P1-52	
Indigofera monophylla (PAN57-9)				
	+ <1 %	50 cm	=P52	
Polygala aff. isingii	+ <1 %	5 cm	P54-1	
Triodia wiseana	35-40 33.3-50%	1 m		
Triumfetta propinqua	+ <1 %	1 m	P54-2	Tiliaceae, top dead

**PAN055**

Described by: MET Date: 23/04/01

75x25m

Photo: 13 on roll PANR1

AMG Zone: 50 733256mE, 7654538mN 733316mE, 7654493mN 733328mE, 7654575mN 733274mE, 7654556mN

Habitat: Crest and upper slopes of a lower spur from a large ridge, trends NW to SE.

Rock Type: Basic, medium grained, ?volcanic.

Soil: Gravelly, pebbly (some cobbles) dull red, brown loam with gravel, pebble surface, small amount of outcrop.

Vegetation: Hakea lorea ssp. lorea, Corymbia hamersleyana scattered low trees over Triodia wiseana hummock grassland.

Vegetation Condition: Very good to excellent

Fire Age: >10 years.

Notes: Some Indigofera rugosa nearby. Occasional Acacia acradenia. Plot 75x25m to fit habitat area and avoid tracks.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	1.5-2 m		
Boerhavia gardneri	+ <1 %	15 cm	P55-1	No. =P55-1?
Bulbostylis barbata	+ <1 %	6 cm		
Corymbia hamersleyana	+ <1 %	4 m		
Hakea lorea ssp. lorea	+ <1 %	(0.3)1.5-		
Indigofera rugosa	+ <1 %	20 cm		Taller outside plot
Polygala aff. isingii	+ <1 %	2 cm		
Triodia wiseana	40-50			

**PAN056**

Described by: MJH Date: 23/04/01

40x60m

Location: At northern end of Number 2 mining area (Kangaroo caves) on ridge to west of road.

AMG Zone: 50 733118mE, 7654115mN 733125mE, 7654048mN 733157mE, 7654070mN

Habitat: Very steep upper-midslope, north facing.

Soil: Reddish brown medium fine sand with some silt and lots of gravel.

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia brizoides, Triodia wiseana closed hummock grassland.

Vegetation Condition: Very good

Fire Age: >10-15 years

Notes: Triodia wiseana and Triodia brizoides are mixed generally, although Triodia wiseana is more prevalent further up the slope. This is the opposite of PAN53 and 52, where the Triodia brizoides took over completely on the upper slope. Plot shortened up hill to avoid vegetation change just below crest. The Indigofera monophylla (PAN57-9) collection come from the same shrub, the green leaves are regrowth from the base.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	15 cm		
Acacia inaequilatera	1 1-5%	2-3 m		
Acacia spondylophylla	+ <1 %	1 m		
Boerhavia gardneri	+ <1 %	3 cm	=P50-3	
Bonamia media var. villosa	+ <1 %	3 cm		
Cassia 'symonii'	+ <1 %	1-2 m	=P48-4	
Corchorus parviflorus	+ <1 %	30 cm	=P1-6	
Cyperus cunninghamii subsp. cunninghamii	+ <1 %	10-15(30)	P56-3	
Dampiera candicans	+ <1 %	30 cm		
Goodenia cusackiana	+ <1 %	7.5 cm		
Indigofera monophylla (PAN57-9)	+ <1 %	80 cm	P56-6	
Mollugo molluginis	+ <1 %	10 cm		
Oldenlandia crouchiana	+ <1 %	2 cm	P56-5	
Polygala aff. isingii	+ <1 %	5 cm	=P53-4	
Ptilotus calostachyus var. calostachyus	+ <1 %	30 cm	P56-1	munched shrub
Solanum phlomoides	+ <1 %	60 cm		
Tribulus suberosus	+ <1 %	1.5 m	P56-2	
Triodia brizoides	50 33.3-50%	50-60 cm		
Triodia wiseana	35 33.3-50%	60-90 cm		
Triumfetta maconochieana	+ <1 %	25 cm	P56-4	

**PAN057**

Described by: MET Date: 23/04/01 100x5 m

Location: North east corner of second mine area.

Photo: 12 on roll PANR1

Photo Notes: Photo has PAN055 in left hand background

AMG Zone: 50 733235mE, 7654500mN 733300mE, 7654456mN

Habitat: Flowline between lower to mid parts of spurs.

Soil: Gravel to cobble mix with dull red-brown loam between rock fragments.

Vegetation: *Corymbia hamersleyana* scattered low trees over *Acacia tumida* scattered tall shrubs over *Petalostylis labicheoides*, *Acacia acradenia*, tall shrubland over *Acacia spondylophylla*, *Tephrosia* aff. *rosea* (HD292-37) open shrubland over *Triodia wiseana* hummock grassland and *Cassytha capillaris* low lianes.

Vegetation Condition: Excellent

Fire Age: >15 years

Notes: Strip along flowline about 5m wide by 100m long. *Grevillea pyramidalis* present in creek upstream.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	>5 5-10%	3 m		
<i>Acacia bivenosa</i>	+	2 m		
<i>Acacia orthocarpa</i>	+	3 m	P57-13	
<i>Acacia pyrifolia</i> (slender, white)	+ <1 %	3.5 m	P57-2	
<i>Acacia spondylophylla</i>	1-2		0.8-1.2 m	P57-12
<i>Acacia tumida</i>	+ <1 %	4.5 m	P57-1	
<i>Cassia glutinosa</i>	+	60 cm		
<i>Cassytha capillaris</i>	+	80 cm	P57-10	
<i>Clerodendrum tomentosum</i>	+	1.3 m	P57-11	
<i>Corchorus</i> aff. <i>laniflorus</i> (PAN 76)	+	60-75 cm	P57-14	
<i>Corymbia hamersleyana</i>	+ <1 %	4-5 m		
<i>Euphorbia</i> aff. <i>drummondii</i> (MET 15,030)	+	25 cm	P57-5	
<i>Goodenia cusackiana</i>	+	15 cm	P57-8	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+ <1 %	3-4		
<i>Hibiscus coatesii</i>	+	70 cm	P57-3	
<i>Hybanthus aurantiacus</i>	+	60 cm		
<i>Indigofera monophylla</i> (PAN57-9)	+	1 m	P57-9	
<i>Indigofera rugosa</i>	+	90 cm		
<i>Petalostylis labicheoides</i>	>15 10-25%	2-3.5 m		
<i>Templetonia hookeri</i>	+	3.2 m	P57-7	
<i>Tephrosia</i> aff. <i>clementii</i> (11)	+ <1 %			
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)	≤1	30-50 cm	P57-6	
<i>Triodia wiseana</i>	>30 25-33.3%	30-75 cm	P57-15	
<i>Triumfetta propinqua</i>	+	50 cm	P57-4	

**PAN058**

Described by: BRM Date: 23/04/01

Location: Near mining area #3

Photo: ? on roll PANR2

AMG Zone: 50 736587mE, 7650058mN 736638mE, 7650067mN 736627mE, 7650113mN

Habitat: Steep south facing slope of hill, with bottom of plot about 10m above the bottom of the slope. Slope base is on river flat of Shaw River tributary.

Soil: Gravelly, rocky, orange-brown sandy loam with surface calcrete.

Vegetation: Grevillea pyramidalis scattered tall shrubs over Corchorus parviflorus low open shrubland over Triodia wiseana hummock grassland.

Vegetation Condition: Very good (although burnt in recent years).

Fire Age: ≤3 years (T. wiseana hummocks ~40cm high)

Notes: Grevillea pyramidalis- many burnt, regenerated ~1m high. Southerly aspect may be important. Calcrete/rock massifs cast shade and probably create important microclimate in shade.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	80 cm	P58-5	grey ovate
Bonamia media var. villosa	+ <1 %	30 cm	P58-1	
Bonamia rosea	+ <1 %	30 cm	P58-14	
Bulbostylis barbata	+ <1 %	10 cm		
Corchorus parviflorus	2-3 1-5%	40-80 cm	=P1-6	
Cymbopogon ambiguus	+ <1 %	70 cm	P58-4	
Cyperus cunninghamii subsp. cunninghamii	+ <1 %	30 cm	P58-2	
Enneapogon caerulescens var. caerulescens	+ <1 %	20 cm	P58-12	
Eriachne mucronata (typical form)	+ <1 %	40 cm	P58-7	
Euphorbia aff. drummondii (MET 15,030)	+ <1 %	40 cm	P58-9	
Euphorbia tannensis ssp. eremophila (Panorama form)	+ <1 %	1.5 m	=P18-2	
Genus sp. Unnamed	+ <1 %	30 cm	P58-20	
Genus sp. Unnamed	+ <1 %	40 cm	P58-10	
Gomphrena cunninghamii	+ <1 %	15 cm	P58-19	
Grevillea pyramidalis subsp. pyramidalis	+ <1 %	(30cm)2m	P58-24	= Juvenile
Grevillea wickhamii subsp. aprica	+ <1 %	30 cm		
Indigofera monophylla (PAN58-17)	+ <1 %	80 cm	P58-17	
Marsdenia angustata	+ <1 %	40 cm	P58-13	
Oldenlandia crouchiana	+ <1 %	30 cm	P58-15	
Pentalepis trichodesmoides	+ <1 %	1 m	P58-25	
Phyllanthus maderaspatensis var. angustifolius	+ <1 %	30 cm	P58-22	

Polycarpaea longiflora (White form, M13-7)	+	<1 %	10-30 cm	58-3;58-21
Pterocaulon sphaeranthoides x sphacelatum	+	<1 %	40 cm	P58-16
Ptilotus incanus var. elongatus	+	<1 %	10 cm	P58-18
Solanum phlomoides	+	<1 %	40 cm	
Tephrosia sp. B Kimberley Flora(C.A. Gardner 7300)	+	<1 %	80 cm	P58-11
Tribulus platypterus	+	<1 %	20 cm	58-8;58-23
Triodia wiseana		30-40 25-33.3%	40 cm	
Triumfetta maconochieana	+	<1 %	50 cm	P58-6

**PAN059**Described by: MET Date: 23/04/01

75x10 m

Location: Panorama Mining area 3.Photo: not takenAMG Zone: 50 736462mE, 7650954mN 736399mE, 7650914mNHabitat: North-west facing rocky breakaway near top of a large ridge.Soil: Brown loam amongst outcrop, gravelly to pebbly.Rock Type: Chert-like (highly silicious) grey and white.Vegetation: Eucalyptus leucophloia scattered low trees over Acacia acradenia open shrubland over Triodia epactia hummock grassland.Vegetation Condition: Good - Very good (would be very good or better except for recently burnt)Fire Age: <2 yearsNotes: 75m by 10m strip recorded from just below breakaway top. Noted nearby the plot were Gomphrena cunninghamii, Dysphania rhadinostachya subsp. Rhadinostachya, Corymbia hamersleyana, Trichodesma zeylanicum var. zeylanicum.Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	10-30 cm		
Acacia inaequilatera	+ <1 %	1-3 m		
Bonamia media var. villosa	+ <1 %	3 cm	P59-10	
Cassia venusta	+ <1 %	1.4 m		
Cymbopogon ambiguus	+ <1 %	40 cm	P59-4	
Cyperus cunninghamii subsp. cunninghamii	+ <1 %	15 cm	P59-8	
Dampiera candicans	+ <1 %	60 cm		
Eucalyptus leucophloia	+ <1 %	2 m		
Goodenia stobbsiana	+ <1 %	8-35 cm	=1-11	
Grevillea wickhamii subsp. aprica	+ <1 %	10-45 cm		
Ptilotus gaudichaudii var. gaudichaudii	+ <1 %	35 cm	P59-2	

*Ptilotus incanus* var. *elongatus*

	+	<1 %	45 cm	P59-6	
<i>Sida</i> sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)					
	+	<1 %	1.7 m	P59-5	
<i>Solanum horridum</i>	+	<1 %	15 cm	P59-3	
<i>Solanum phlomoides</i>	+	<1 %	15-50 cm		
<i>Triodia epactia</i>	>25	25-33.3%	10-30 cm	P59-1	P60-1??
<i>Triumfetta</i> aff. <i>chaetocarpa</i> (Panorama form)					
	+	<1 %	30-45 cm	P59-7	
<i>Triumfetta maconochieana</i>					
	+	<1 %	30 cm	P59-9	smaller

**PAN060**

Described by: MJH Date: 23/04/01

Location: 400m north of Shaw River Junction with creek.

AMG Zone: 50 736384mE, 7650836mN 736359mE, 7650778mN 736373mE, 7650764mN 736387mE, 7650799mN

Habitat: Very steep mid-upper slope just below cliff.

Soil: Chocolate-brown fine sand and silt with large gravel.

Vegetation: *Eucalyptus leucophloia* sp scattered low trees over *Triodia brizoides* (*Triodia epactia*) closed hummock grassland.

Vegetation Condition: Good - was burnt in the last 1-2 years

Fire Age: <1-2 years

Notes: A burnt site. Judging from a small unburnt patch nearby, the *Triodia* would have been quite thick pre-fire and is recorded as such. There don't appear to be a lot of post-fire colonising species such as *Acacia* in the plot, or around it. Upper edge of plot stops 10-15m from cliff - avoids *Triodia epactia* grassland.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	30 cm		
<i>Acacia inaequilatera</i>	+ <1 %	30 cm		
<i>Bonamia media</i> var. <i>villosa</i>				
	+ <1 %	5 cm		
<i>Bulbostylis barbata</i>	+ <1 %	10 cm		
<i>Cassia venusta</i>	+ <1 %	25 cm	P60-11	?venusta
<i>Cheilanthes vellea</i>	+ <1 %	10 cm	P60-7	
<i>Corchorus parviflorus</i>	+ <1 %	30 cm	=P1-6	
<i>Cymbopogon ambiguus</i>	+ <1 %	15cm	P60-6	
<i>Dampiera candicans</i>	+ <1 %	25cm		
<i>Dodonaea coriacea</i>	+ <1 %	40 cm		
<i>Eucalyptus leucophloia</i>	1 1-5%	5-8 m	P60-1	
<i>Goodenia stobbsiana</i>	+ <1 %	25 cm	=P1-11	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>				
	+ <1 %	20 cm		
<i>Hibiscus</i> sp.	+ <1 %	20 cm	P60-10	
<i>Pterocaulon sphacelatum</i>				
	+ <1 %	3 cm		
<i>Ptilotus incanus</i> var. <i>elongatus</i>				

	+	<1 %	30 cm	P60-8	
<i>Sida cardiophylla</i>	+	<1 %	25 cm	=P1-23	
<i>Sida</i> sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)					
	+	<1 %	50 cm	P60-5	
<i>Solanum horridum</i>	+	<1 %	15 cm	P60-9	
<i>Solanum phlomoides</i>	+	<1 %	30 cm		
<i>Tephrosia</i> sp.	+	<1 %	5 cm		
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>					
	+	<1 %	50 cm		
<i>Triodia brizoides</i>	70	50-75%	50-60 cm		Pre-fire Cover
<i>Triodia epactia</i>	5	5-10%	50-60 cm		Pre-fire Cover
<i>Triumfetta</i> aff. <i>chaetocarpa</i> (Panorama form)					
	+	<1 %	40 cm	P60-2	
<i>Triumfetta maconochieana</i>					
	+	<1 %	50 cm	P60-3	

**PAN061**Described by: BRM Date: 23/04/01

76x24 m

Location: Mining area #3.Photo: 3 on roll PANR2AMG Zone: 50 736551mE, 7650071mN 736566mE, 7650087mN 736507mE, 7650127mNHabitat: South, south-west facing slope with convex surface across slope. Lower slope to middle of slope of hill. Eastern edge of plot about 50-100m west of Plot 58.Soil: Gravelly, pebbly, cobbly, rocky, brown loamy sand. Bare ground ~10-20% with ~70-80% rock cover on surface.Vegetation: *Grevillea pyramidalis*, *Cassia glutinosa* scattered tall shrubs over *Triodia wiseana* hummock grassland to closed hummock grassland.Vegetation Condition: ExcellentFire Age: Not burnt for >10 yearsNotes: (Co-recorded by Martin Henson). Only 1 *Corymbia* tree just inside upper slope plot boundary. Only 1 juvenile *Eucalyptus victrix* near lower plot boundary (*Eucalyptus victrix* growing along edge of river flat at ridge base). Burnt area upslope.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	2.5 m	P61-5	
<i>Atalaya hemiglauca</i>	+ <1 %	1.5 m	P61-9	
<i>Boerhavia gardneri</i>	+ <1 %	15 cm	P61-6	
<i>Cassia glutinosa</i>	+ <1 %	3 m		
<i>Cassytha capillaris</i>	+ <1 %	80 cm	P61-3	
<i>Corchorus parviflorus</i>	+ <1 %	40 cm(1.5 m)		=P1-6
<i>Corymbia hamersleyana</i>	+ <1 %	6 cm	=P1-3	
<i>Cymbopogon ambiguus</i>	+ <1 %	50 cm	P61-2	
<i>Eucalyptus victrix</i>	+ <1 %	1 m		juvenile., just inside
<i>Gomphrena cunninghamii</i>				
	+ <1 %	3 cm	P61-8	



<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>	+	<1 %	4 m	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+	<1 %	30 cm	juvenile
<i>Indigofera monophylla</i> (PAN58-17)	+	<1 %	1 m	=P58-17 Grey
<i>Mollugo molluginis</i>	+	<1 %	10 cm	
<i>Polygala</i> aff. <i>isingii</i>	+	<1 %	4 cm	P61-4
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %	1.2 m	P61-1 climber
<i>Solanum phlomoides</i>	+	<1 %	60 cm	
<i>Tephrosia</i> sp. B Kimberley Flora(C.A. Gardner 7300)	+	<1 %	1 m	P61-7
<i>Triodia wiseana</i>	60-75	50-75%	0.8-1 m	

**PAN062**

Described by: MET Date: 23/04/01 73x27m

Location: Shaw River bed (at south side area 3).

Photo: 11 on roll PANR1

AMG Zone: 50 736592mE, 7650036mN 736592mE, 7650011mN 736661mE, 7650011mN 736653mE, 7650037mN

Habitat: Bed of major river, on a low drift.

Soil: Light brown sandy loam.

Vegetation: *Eucalyptus camaldulensis* open forest over *Melaleuca glomerata*, *Atalaya hemiglauca* low forest over *Cyperus vaginatus* open sedgeland to sedgeland over *\*Cynodon dactylon*, *\*Cenchrus ciliaris* grassland.

Vegetation Condition: Poor to good

Fire Age: >10 years

Notes: Plot about 73x27m to suit habitat. Pools avoided. Probably some *Eucalyptus victrix* at edge.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon</i> sp.	+	<1 %	45 cm	P62-9
<i>Acacia ampliceps</i>	+	<1 %	1.5 m	
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	<1 %	3 m	
<i>Aerva javanica</i>	+	<1 %	20 cm	
<i>Amaranthus</i> aff. <i>pallidiflorus</i> (WAS1127)	+	<1 %	15-55 cm	P62-3
<i>Atalaya hemiglauca</i>	≤5	1-5%	4-7 m	P62-1
<i>Cenchrus ciliaris</i>	1	20cm		
<i>Cleome viscosa</i>	+	<1 %	40 cm	
<i>Corchorus</i> aff. <i>laniflorus</i> (PAN 76)	+	<1 %	20 cm	P62-15
<i>Cullen leucanthum</i>	+	<1 %	35 cm	P62-16
<i>Cynodon dactylon</i>	+/-5	1-5%	10-25 cm	P62-4
<i>Cyperus vaginatus</i>	>10	10-25%	0.5-1.4 m	
<i>Eucalyptus camaldulensis</i> var. <i>obtusata</i>	35	33.3-50%	10-20 m	

<i>Euphorbia coghlanii</i>	+	<1 %	30 cm	P62-5	
<i>Euphorbia</i> sp. (site 1089)	+	<1 %	25 cm	P62-4	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	+	<1 %	2 m		
<i>Gymnanthera cunninghamii</i>	+	<1 %	1.4 m	P62-2	
<i>Ipomoea muelleri</i>	+	<1 %	10 cm	P62-17	
<i>Lobelia quadrangularis</i>	+	<1 %	20 cm	P62-11	
<i>Melaleuca glomerata</i>	>35	33.3-50%	4-7 m	P62-3	
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>	+	<1 %	35 cm		
<i>Pluchea rubelliflora</i>	+	<1 %	15 cm	P62-13	sprawling, light
<i>Ricinus communis</i>	+	<1 %	70 cm	P62-6	
<i>Sesbania cannabina</i>	+	<1 %	30-90 cm	P62-8	2 E-photos
<i>Sesbania formosa</i>	+	<1 %	3 m		Juvenile. Dragon Tree
<i>Solanum diversiflorum</i>	+	<1 %	20 cm		
<i>Solanum nigrum</i>	+	<1 %	45 cm	P62-14	
<i>Stemodia grossa</i>	+	<1 %	60 cm		
<i>Tinospora smilacina</i>	+	<1 %	10 cm		
<i>Triodia longiceps</i>	+	<1 %	40 cm		
<i>Vigna lanceolata</i> var. <i>lanceolata</i>	+	<1 %	40 cm	P62-7	
<i>Wahlenbergia tumidifruca</i>	+	<1 %	30 cm	P62-10	

**PAN063**

Described by: BRMDate: 24/04/01

Location: Access road through Gorge to #1

Photo: 2 on roll PANR2

AMG Zone: 50 727692mE, 7664879mN 727707mE, 7664884mN 727753mE, 7664821mN 727726mE, 7664806mN

Habitat: Lower colluvial slopes (convex surface spurs) west facing. Dissected by small flowlines.

Soil: Gravelly, pebbly, cobbly, orange-brown (loamy) sand.

Vegetation: *Corymbia* (*hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white), *Acacia acradenia* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Vegetation Condition: Excellent

Fire Age: Not burnt since >5-7 years.

Notes: Two small flow lines running west crossed through the plot. Taxa observed only in these are listed in site P063F. Few individual *Petalostylis labicheoides* growing outside flowlines. *Acacia acradenia* mainly in flow lines. *Indigofera* tends to be concentrated around base of *Corymbia hamersleyana* as is *Corchorus* and number of other species (eg *Hybanthus*, *Solanum phlomoides*). Burnt *Acacia pyrifolia* regrowth about 2m high.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
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<i>Acacia acradenia</i>	+	<1 %	3 m	=P49-1	
<i>Acacia bivenosa</i>	+	<1 %	50 cm		
<i>Acacia pyrifolia</i> (slender, white)					
	+	<1 %	2-4 m		smooth bark
<i>Boerhavia gardneri</i>	+	<1 %	10 cm	P63-9	
<i>Bulbostylis barbata</i>	+	<1 %	10 cm	=P1-5	
<i>Cassia glutinosa</i>	+	<1 %	(0.3)1.8		
<i>Cassytha capillaris</i>	+	<1 %	20 cm	P63-17	
<i>Corchorus parviflorus</i>	+	<1 %	80 cm	=P1-6	
<i>Corymbia hamersleyana</i>	1	1-5%	6-8 m	P63-22	=P1-3
<i>Cymbopogon ambiguus</i>	+	<1 %	40 cm	P63-1	
<i>Euphorbia</i> aff. <i>drummondii</i> (MET 15,030)					
	+	<1 %	40 cm	=P58-9	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>					
	+	<1 %	20 cm	P63-20	
Genus sp. Unnamed	+	<1 %	30 cm		
<i>Goodenia microptera</i>	+	<1 %	30 cm		
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>					
	+	<1 %	2 m		
<i>Hibiscus</i> aff. <i>platyklamys</i> (site 1139)					
	+	<1 %	30 cm	P63-23	
<i>Hibiscus platyklamys</i>	+	<1 %	30-40 cm	P63-19;24	
<i>Hybanthus aurantiacus</i>	+	<1 %	4-10 cm	P63-21;25	grazed
<i>Indigofera monophylla</i> (PAN58-17)					
	+	<1 %	1 m	P63-2	grey leaf
<i>Mollugo molluginis</i>	+	<1 %	10 cm		
<i>Petalostylis labicheoides</i>	+	<1 %			=P49-4
<i>Polycarpaea holtzei</i>	+	<1 %	2 cm		
<i>Polygala</i> aff. <i>isingii</i>	+	<1 %	5 cm	P63-14	
<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>					
	+	<1 %	45 cm	P63-7	
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %	60 cm	P63-10	
<i>Solanum phlomoides</i>	+	<1 %	40-80 cm	P63-8	=P14-4
<i>Trachymene</i> aff. <i>oleracea</i> (B61)					
	+	<1 %	2 cm	P63-15	
<i>Tribulus suberosus</i>	+	<1 %	1 m	P63-18	
<i>Triodia wiseana</i>	50	33.3-50%	0.5-1 m		

**PAN064**

Described by: MJH Date: 24/04/01 50x25x60x22 m

Photo: 8 on roll PANR3

AMG Zone: 50 727692mE, 7665005mN 727751mE, 7665002mN 727757mE, 7664986mN 727701mE, 7664978mN

Habitat: Moderately steep upper slope on north facing hill.

Soil: Dark orange- brown medium to fine sand and silt with gravel.

Vegetation: *Triodia wiseana* hummock grassland.

Vegetation Condition: Very good

Fire Age: 10 years? No evidence of recent burning.

Notes: Plot an odd shape to fit vegetation unit.

Species List:

Name	Cover/	Cover class	Height	Spec	Notes
Acacia acradenia	+	<1 %	1-1.2 m		
Acacia inaequilatera	+	<1 %	5 m		corky bark
Amaranthus aff. pallidiflorus (WAS1127)					
	+	<1 %	8 cm	P64-10	
Boerhavia gardneri	+	<1 %	30 cm	=P50-3	
Bonamia media var. villosa					
	+	<1 %	30 cm		
Bonamia sp.	+	<1 %	15 cm	P64-5	
Bulbostylis barbata	+	<1 %	7.5 cm		
Corchorus parviflorus	+	<1 %	70 cm	=P1-6	
Cymbopogon ambiguus	+	<1 %	15-30 cm	P64-1	=P60-6
Cyperus cunninghamii subsp. cunninghamii					
	+	<1 %	20 cm	P64-4	
Eriachne pulchella subsp. dominii					
	+	<1 %	8 cm		
Fimbristylis dichotoma	+	<1 %	10 cm	P64-11	
Grevillea pyramidalis subsp. pyramidalis					
	+	<1 %	30 cm		
Indigofera trite	+	<1 %	5 cm	P64-7	
Mollugo molluginis	+	<1 %	15 cm		
Oldenlandia crouchiana	+	<1 %	3 cm	P64-2	
Polycarpha sp.	+	<1 %	8 cm	P64-9	
Polygala aff. isingii	+	<1 %	7 cm	P64-6	
Rhynchosia cf. minima	+	<1 %	40 cm	P64-3	
Solanum phlomoides	+	<1 %	1.5 m		
Tribulus suberosus	+	<1 %	1.2 m	P64-8	
Triodia wiseana		65-70 50-75%	50 cm		

**PAN065**

Described by: MET Date: 24/04/01

30x70m

Location: Lower part of gorge.

Photo: 10 on roll PANR1

AMG Zone: 50 727703mE, 7664762mN 727676mE, 7664754mN 727648mE, 7664817mN 727667mE, 7664820mN

Habitat: Drift of alluvial material between channels of a medium sized creek in the lower part of a gorge.

Soil: Sand to cobble mixture, with some silt, dull brown.

Vegetation: Eucalyptus camaldulensis var. obtusa, Eucalyptus victrix open woodland over Acacia coriacea subsp. pendens, Atalaya hemiglauca scattered low trees over Melaleuca glomerata, Melaleuca linophylla high shrubland over Tephrosia aff. rosea (HD292-37) scattered shrubs over Cymbopogon procerus, Triodia epactia, \*Cenchrus ciliaris tussock, hummock grassland.

Vegetation Condition: Very good - some areas nearby (with loamed soil) have a lot of Buffel grass.

Fire Age: >10 years

Notes: Pools and damp edges avoided, but have stands of *Typha domingensis*, *Lobelia quadrangularis*, *Schoenus falcatus*, *Chara* sp. Plot 30x70m to fit habitat area.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+ <1 %	5-7 m		
<i>Acacia pyrifolia</i> (slender, white)	+ <1 %	1-3.6	P65-1	
<i>Acacia trachycarpa</i>	+ <1 %	1.6-2 m		
<i>Amaranthus</i> aff. <i>pallidiflorus</i> (WAS1127)	+ <1 %	(10)40-60	P65-18	
<i>Atalaya hemiglauca</i>	+ <1 %	2-5	P62-1	
<i>Boerhavia gardneri</i>	+ <1 %	10 cm	P65-21	
<i>Cajanus cinereus</i>	+ <1 %	1.2 m	P65-6	
<i>Cenchrus ciliaris</i>	+/-1 <1 %	30-65		
<i>Cleome viscosa</i>	+ <1 %	50-90 cm		
<i>Corchorus parviflorus</i>	+ <1 %	45-80 cm	P65-9	
<i>Crotalaria cunninghamii</i>	+ <1 %	1.9 m	P65-15	
<i>Cullen leucanthum</i>	+ <1 %	2.1 m	P65-20	
<i>Cymbopogon procerus</i>	+/-5 1-5%	30-70 cm	P65-24	
<i>Cyperus vaginatus</i>	+ <1 %	60-90 cm		
<i>Enneapogon oblongus</i>	+ <1 %	30-50 cm	P65-8	
<i>Eragrostis tenellula</i>	+ <1 %	10-30 cm	P65-17	
<i>Eriachne tenuiculmis</i>	+>2 1-5%	30-45 cm	P65-2	
<i>Eucalyptus camaldulensis</i> var. <i>obtusa</i>	>2 1-5%	8-12 m		
<i>Eucalyptus victrix</i>	>2 1-5%	7-10 m		
<i>Euphorbia</i> aff. <i>drummondii</i> (MET 15,030)	+ <1 %	7 cm	P65-10	
<i>Euphorbia coghlanii</i>	+ <1 %	60 cm	P65-7	
<i>Euphorbia</i> sp. (site 1089)	+ <1 %	10-15 cm	P65-5	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	+ <1 %	(0.3)1-3		
<i>Heliotropium</i> aff. <i>cunninghamii</i> (P65-12)	+ <1 %	20 cm	P65-12	
<i>Hybanthus aurantiacus</i>	+ <1 %	15-50 cm		
<i>Indigofera monophylla</i> (PAN65-14)	+ <1 %	55 cm	P65-14	
<i>Melaleuca glomerata</i>	10-15 10-25%	2-4 m		
<i>Melaleuca linophylla</i>	10-15 10-25%	2-4 m		
<i>Mukia</i> sp.	+ <1 %	80 cm	P65-22	
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>	+ <1 %	25 cm		
<i>Polycarpaea longiflora</i> (White form, M13-7)	+ <1 %	(5)35 cm		
<i>Pterocaulon sphaeranthoides</i> x <i>sphacelatum</i>				

	+	<1 %	30 cm	P65-19
Rhynchosia cf. minima	+	<1 %	20 cm	P65-16
Sesbania cannabina	+	<1 %	1.5 m	P65-13
Stemodia grossa	+	<1 %	20-41 cm	
Swainsona formosa	+	<1 %	10 cm	
Templetonia hookeri	+	<1 %	2 m	P65-23
Tephrosia aff. rosea (HD292-37)				
	+/-1	<1 %	45-90 cm	P65-4
Tephrosia sp. B Kimberley Flora(C.A. Gardner 7300)				
	+	<1 %	0.6-1.4 m	P65-11
Trichodesma zeylanicum var. zeylanicum				
	+	<1 %	20 cm	
Triodia epactia	≤5	1-5%	30-65	P65-3
Triumfetta propinqua	+	<1 %		P65-25 collection?
Typha domingensis	+			P65-c

**PAN066**

Described by: BRM Date: 24/04/01 50x50m

Location: Access road in gorge on way to #1.

Photo: 1 on roll PANR2

AMG Zone: 50 727686mE, 7664563mN 727701mE, 7664518mN 727658mE, 7664492mN

Habitat: Lower gently sloping colluvial slopes at foot of hill range between hills to east and main watercourse to west.

Soil: Gravelly to cobbly orange-brown loamy sand. Rock covers about 60% soil surface.

Vegetation: (pre-burn) Corymbia hamersleyana scattered low trees over Acacia inaequilatera, Acacia acradenia high open shrubland over Triodia epactia hummock grassland.

Veg Condition:

Fire Age: <2-3 years since fire - Triodia only 30cm.

Notes: Acacia acradenia regrowth about 1.2m. Post fire Acacia acradenia regeneration is quite thick (about 30-40% Cover) and about 5% Corchorus.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	30-40 25-33.3%	1-1.2 m	P66-1	
Acacia bivenosa	+	<1 %	1 m	
Acacia inaequilatera	+	<1 %	4 m	corky bark
Acacia spondylophylla	+	<1 %	40 cm	=P47-4
Cassia glutinosa	+	<1 %	1.5 m	
Cassia notabilis	+	<1 %	30 cm	P66-3
Cleome uncifera	+	<1 %	40 cm	=P1-10
Corchorus parviflorus	5	5-10%	1 m	=P1-6
Corymbia hamersleyana	+	<1 %	6 m	=P63-22
Euphorbia tannensis ssp. eremophila (Panorama form)				
	+	<1 %	50 cm	=P18-2
Goodenia stobbsiana	+	<1 %	30 cm	=P1-11
Grevillea pyramidalis subsp. pyramidalis				

	+	<1 %	1.5 m	
Grevillea wickhamii subsp. aprica				
	+	<1 %	50 cm	
Indigofera monophylla (PAN58-17)				
	+	<1 %	80 cm	=P63-2
Isotropis atropurpurea	+	<1 %	40 cm	P66-5
Mollugo molluginis	+	<1 %	10 cm	
Ptilotus astrolasius	+	<1 %	50 cm	=P1-38
Sida cardiophylla	+	<1 %	50 cm	=P1-23
Solanum phlomoides	+	<1 %	80 cm	=P14-4
Tephrosia aff. supina (HD205-10)				
	+	<1 %	50 cm	P66-4
Triodia epactia	40-50	33.3-50%	30 cm	P66-2

**PAN067**

Described by: MJH Date: 24/04/01 70x19x70x15 m

Location: Just above track in gorge.

Photo: 7 on roll PANR3

AMG Zone: 50 727882mE, 7664180mN 727811mE, 7664170mN 727812mE, 7664150mN 727882mE, 7664160mN

Habitat: Mid to lower slope between cliff and flowline.

Soil: Orange-brown fine silty sand with gravel, cobbles and outcrop.

Vegetation: Acacia inaequilatera scattered tall shrubs over Indigofera monophylla (PAN 58-17), Corchorus parviflorus, low open heath over Triodia brizoides (Triodia epactia) closed hummock grassland.

Vegetation Condition: Good - was burnt reasonably recently.

Fire Age: <5 years?

Notes: Odd shaped plot to fit vegetation unit. Triodia epactia more in lower part of plot, but mixes well most of the way up the hill. The Triodia is dense even though recently burnt.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	0.8-1 m		
Acacia ancistrocarpa	+ <1 %	1.5 m		
Acacia inaequilatera	1 1-5%	3-4 m		corky
Acacia tumida	+ <1 %	1.5 m	P67-4	=P1-2
Bonamia media var. villosa				
	+ <1 %	5 cm		
Bulbostylis barbata	+ <1 %	5 cm		
Cassia glutinosa	+ <1 %	1.5 m		
Corchorus parviflorus	20 10-25%	40 cm	=P1-6	
Cymbopogon ambiguus	+ <1 %	20 cm	=P60-6	
Cyperus cunninghamii subsp. cunninghamii				
	+ <1 %	15 cm	=P64-4	
Dampiera candidans	+ <1 %	10-20 cm		
Euphorbia tannensis ssp. eremophila (Panorama form)				
	+ <1 %	1.5 m	P67-1	

Goodenia stobbsiana	+	<1 %	40 cm	=P1-11
Gossypium australe (Whim Creek form)				
	+	<1 %	20 cm	P67-7 ??
Grevillea wickhamii subsp. aprica				
	+	<1 %	30-50 cm	
Hakea lorea ssp. lorea	+	<1 %	1 m	
Heliotropium sp.	+	<1 %	40 cm	P67-2
Indigofera monophylla (PAN57-9)				
	40	33.3-50%	40-50 cm	grey, =P48-8
Mollugo molluginis	+	<1 %	10 cm	
Ptilotus calostachyus var. calostachyus				
	+	<1 %	1 m	
Sida sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)				
	+	<1 %	1.5 m	P67-3
Solanum phlomoides	+	<1 %	30 cm	
Tephrosia aff. supina (HD205-10)				
	+	<1 %	10 cm	P67-5
Trichodesma zeylanicum var. zeylanicum				
	+	<1 %	1 m	
Triodia brizoides	70	50-75%	20-30 cm	
Triodia epactia	15	10-25%	20 cm	
Triumfetta propinqua	+	<1 %	20 cm	P67-8

**PAN068**

Described by: MET Date: 24/04/01 85x25m

Location: Lower part of gorge.

Photo: 9 on roll PANR1

AMG Zone: 50 727977mE, 7664078mN 727952mE, 7664083mN 727988mE, 7664156mN 727967mE, 7664174mN

Habitat: Bed of a medium sized creek flowing through an open gorge area with seasonal flow, but no permanent pools.

Soil: Sand to cobble mix, very variable, some small particles of coarse brown sand.

Soil: Sand to cobble mix, very variable, some small particles of coarse brown sand.

Rock Type:

Vegetation: Eucalyptus victrix, Acacia coriacea var. pendens scattered low trees over Melaleuca linophylla, Melaleuca glomerata shrubland to high shrubland over Cymbopogon procerus scattered tussock grasses.

Vegetation Condition: Very good - Excellent

Fire Age: >10 years (?>15 years)

Notes: Denser vegetation on banks (especially western) avoided as structurally different. Site about 85m by 25m, fitted to habitat/vegetation type. Terminalia canescens on lower slopes of parts of gorge nearby.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ampliceps	+	<1 %	0.5-3.6 m	
Acacia coriacea subsp. pendens	<2	1-5%	4-6 m	P68-2
Acacia pyrifolia (slender, white)				



	+	<1 %	0.6-2.2 m	=P65-1	
<i>Cajanus cinereus</i>	+	<1 %	20-40 cm	=P65-6	
<i>Cassia notabilis</i>	+	<1 %	10 cm		
<i>Cenchrus ciliaris</i>	+	<1 %	80 cm		
<i>Cleome viscosa</i>	+	<1 %	70 cm		
<i>Corchorus parviflorus</i>	+	<1 %	10 cm	=P65-9	
<i>Crotalaria cunninghamii</i>	+	<1 %	1.4-2 m	c	
<i>Cullen leucanthum</i>	+	<1 %	15-70 cm	=P65-20	
<i>Cymbopogon procerus</i>	+	<1 %	60 cm	=P65-24	
<i>Cyperus vaginatus</i>	+	<1 %	40 cm		
<i>Eriachne tenuiculmis</i>	+	<1 %	35 cm		
<i>Eucalyptus victrix</i>	+	<1 %	0.4(2-8)		
<i>Euphorbia coghlanii</i>	+	<1 %	10-35 cm	=P65-7	
<i>Flaveria australasica</i>	+	<1 %	20-45 cm		
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>					
	+	<1 %	2.7 m		
<i>Melaleuca glomerata</i>	1	1-5%	1-3 m		
<i>Melaleuca linophylla</i>	5	10-25%	2-4 m		
<i>Mukia</i> sp.	+	<1 %	1.5 m	P68-3	green mesophyll(?)
<i>Petalostylis labicheoides</i>	+	<1 %	0.5-2.3 m		
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>					
	+	<1 %	55 cm		
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %	15 cm	=P65-16	
<i>Sesbania cannabina</i>	+	<1 %	40 cm	=P65-13	
<i>Setaria dielsii</i>	+	<1 %	40 cm	P68-1	
<i>Stemodia grossa</i>	+	<1 %	5-10 cm		
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)					
	+	<1 %	80 cm	=P65-4	

**PAN069**Described by: BRMDate: 24/04/01Location: Side gorge off main gorge to #1 area.Photo: 27 on roll PANR4AMG Zone: 50 727837mE, 7663885mN 727729mE, 7663808mNHabitat: Edge of wide creek banks Cover/Cover classed by Terminalia.Soil: Pebbly, cobbly, rocky, bouldery, brown coarse sand to loamy sand (banks of creek).Vegetation: Terminalia canescens open woodland over Flueggea virosa subsp. melanthesoides scattered tall shrubs over Eriachne tenuiculmis, Triodia epactia open tussock, hummock grassland to grassland.Vegetation Condition: Very good - ExcellentFire Age: >10 years (Triodia hummocks to 50cm)Notes: Terminalia canescens open woodland over Flueggea virosa subsp. melanthesoides scattered tall shrubs over Eriachne tenuiculmis, Triodia epactia open tussock, hummock grassland to grassland.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia coriacea</i> subsp. <i>pendens</i>				

	+	<1 %	(0.3)2.5	P69-7	
<i>Acacia inaequilatera</i>	+	<1 %	0.8-1.5 m		smooth bark
<i>Acacia tumida</i>	+	<1 %	15 cm	=P1-2	
<i>Atalaya hemiglauca</i>	+	<1 %	2 m	P69-14	
<i>Bonamia media</i> var. <i>villosa</i>					
	+	<1 %	10 cm	P69-5	
<i>Cajanus cinereus</i>	+	<1 %	(0.5)1.8	=P49-2	
<i>Cassia glutinosa</i>	+	<1 %	1.8 m		
<i>Corchorus parviflorus</i>	+	<1 %	30 cm	=P1-6	
<i>Cymbopogon ambiguus</i>	+	<1 %	80 cm	P69-4	
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>					
	+	<1 %	30 cm	P69-6	
<i>Cyperus vaginatus</i>	+	<1 %	60 cm	P69-18	
<i>Cyperus viscidulus</i>	+	<1 %	50 cm	P69-15	
<i>Ehretia saligna</i> var. <i>saligna</i>					
	+	<1 %	1 m	P69-19	
<i>Eriachne tenuiculmis</i>	5-10	5-10%	40 cm	P69-3	
<i>Euphorbia coghlanii</i>	+	<1 %	30 cm	P69-9	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>					
	1-2	1-5%	(0.5)3 m	P69-8	
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>					
	+	<1 %	20 cm		
<i>Hibiscus coatesii</i>	+	<1 %	80 cm	P69-16	*
<i>Indigofera monophylla</i> (PAN58-17)					
	+	<1 %	60 cm	=P63	
<i>Petalostylis labicheoides</i>	+	<1 %	10 cm	P69-12	*
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>					
	+	<1 %	40 cm		
<i>Sida</i> sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)					
	+	<1 %	60 cm	P69-13	
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)					
	+	<1 %	20-60 cm	P69-11	
<i>Terminalia canescens</i>	60	50-75%	10 cm	P69-1	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>					
	+	<1 %	10 cm	P69-17	
<i>Triodia epactia</i>	10-15	10-25%	40 cm	P69-2	
<i>Triumfetta propinqua</i>	+	<1 %	50 cm	P69-10	

**PAN070**

Described by: MJH Date: 24/04/01 30x70m

Location: Hill slope overlooking creek.

AMG Zone: 50 727941mE, 7663887mN 728006mE, 7663899mN 728026mE, 7663877mN

Habitat: Steep upper slope, facing north.

Soil: Orange-brown medium to fine sand with gravel and cobbles, outcrop upslope.

Vegetation: *Acacia tumida* low open forest to open forest over *Triodia epactia* hummock grassland.

Vegetation Condition: Very good - Excellent, unburnt for ages.

Fire Age: >15 years?

Notes: Plot odd shape, 70x30m. The *Acacia tumida* hugs the upper slope just below the cliff. Plot includes rock face. *Acacia*-bark striated, platey, deciduous. Single slender trunk up until 3-4m (usually) where it branches.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia tumida</i>	50 33.3-50%	8-12 m	P70-1	=P1-2?
<i>Bonamia media</i> var. <i>villosa</i>	+ <1 %	2 cm		
<i>Bulbostylis barbata</i>	+ <1 %	10 cm		
<i>Eriachne mucronata</i> (typical form)	+ <1 %	20 cm		
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	+ <1 %			
<i>Triodia epactia</i>	60-70 50-75%	50 cm		
<i>Triumfetta</i> aff. <i>chaetocarpa</i> (Panorama form)	+ <1 %	1 m	P70-2	

**PAN071**

Described by: MET Date: 24/04/01

Location: Gorge, lower half.

Photo: 8 on roll PANR1

Photo Notes: Photo taken from adjacent slope.

AMG Zone: 50 727891mE, 7663899mN 727907mE, 7663894mN 727975mE, 7663942mN 727939mE, 7663968mN

Habitat: Drift of loamy to pebbly alluvial between two channels of a medium sized creek.

Soil: Fine to medium grained light brown and with some gravel, loamy in places, pebbly in others.

Vegetation: *Eucalyptus victrix* scattered trees over *Acacia coriacea* ssp *pendens*, *Atalaya hemiglauca* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggia virosa* ssp *melanthesioides* open to closed scrub over *Triodia epactia*, *Cenchrus ciliaris*, *Cymbopogon procerus* open hummock, tussock grassland.

Vegetation Condition: Very good - Excellent (*Buffel* grass is present and stops it from being excellent).

Fire Age: >15 years

Notes: Includes some very small channels. *Operculina aequisejala* seen at edge of stand (outside plot).

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon</i> aff. <i>dioicum</i> (HD72-14)	+ <1 %	10 cm	P71-2	
<i>Acacia coriacea</i> subsp. <i>pendens</i>	≤5 1-5%	5-7.5 m		
<i>Acacia pyrifolia</i> (slender, white)	+ <1 %	1-3 m	=P65-?	
<i>Atalaya hemiglauca</i>	>1 <1 %	2-6 m	=P62-1;=P65-1	
<i>Boerhavia coccinea</i>	+ <1 %	10 cm	P71-5	
<i>Cajanus cinereus</i>	+ <1 %	15 cm	=P65-6	

<i>Cenchrus ciliaris</i>	1-2	1-5%	50-90 cm	
<i>Cleome viscosa</i>	+	<1 %	20-50 cm	
<i>Clerodendrum tomentosum</i>				
	+	<1 %	40 cm	P71-6
<i>Corchorus parviflorus</i>	+	<1 %	35-55 cm	=P65-9
<i>Crotalaria cunninghamii</i>	+	<1 %	0.5-1.2 m	=P65-15
<i>Cymbopogon procerus</i>	>1	<1 %	20-60 cm	=P65-24
<i>Cyperus vaginatus</i>	+	<1 %	1.2 m	
<i>Enneapogon oblongus</i>	+	<1 %	30 cm	=P65-8
<i>Eucalyptus victrix</i>	<2	1-5%	5-12+ m	
<i>Euphorbia coghlanii</i>	+	<1 %	45 cm	=P65-7
<i>Euphorbia</i> sp. (site 1089)	+	<1 %	10 cm	=P65-5
<i>Ficus opposita</i> var. <i>indecora</i>				
	+	<1 %	(0.6)3.5	P71-1 0.6 m =juvenile.
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>				
	≥5	5-10%	2-2 m	
<i>Gossypium robinsonii</i>	+	<1 %	80 cm	
<i>Hybanthus aurantiacus</i>	+	<1 %	10 cm	
<i>Mallotus ?dispersus</i>	+			P71-7 Added to field sheet
<i>Melaleuca glomerata</i>	60	50-75%	2-4 m	
<i>Melaleuca linophylla</i>	≥10	10-25%	2-5 m	
<i>Petalostylis labicheoides</i>	+	<1 %	3 m	
<i>Pterocaulon sphaeranthoides</i> x <i>sphacelatum</i>				
	+	<1 %	10 cm	=P65-19
<i>Rhynchosia</i> cf. <i>minima</i>	+	<1 %	10 cm	=P65-16
<i>Schoenus falcatus</i>	+	<1 %	95 cm	P71-4 In a damp spot, NW
<i>Setaria dielsii</i>	+	<1 %	35 cm	=P68-1
<i>Tephrosia</i> sp. B Kimberley Flora(C.A. Gardner 7300)				
	+	<1 %	50 cm	=P65-11
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>				
	+	<1 %	50 cm	
<i>Trichosanthes cucumerina</i>				
	+	<1 %	3.6 m	P71-3
<i>Triodia epactia</i>	≥1	1-5%	40-60 cm	=P65-3

**PAN073**Described by: BRMD Date: 24/04/01

72x28 m

Location: Gorge before #1Photo: 26 on roll PANR4AMG Zone: 50 728024mE, 7663327mN 728041mE, 7663330mN 728042mE, 7663347mNHabitat: Steep upper to mid slope of south facing slope below high ridge. Convex surface across slope.Soil: Soil is gravelly, cobbly, rocky, bouldery, orange-brown loamy sand.

Vegetation: Eucalyptus leucophloia scattered low trees over Acacia inaequilatera, Acacia acradenia scattered high shrubs over Cassia glutinosa scattered shrubs over Triodia brizoides closed hummock grassland.

Veg Condition:

Fire Age: >10 years since burnt (60cm Triodia).

Notes: Acacia inaequilatera 3-4m. Downslope of Triodia brizoides on medium-lower slope, Triodia wiseana dominates. Eucalyptus leucophloia grows in belt in Plot 73 habitat, Upslope (just below ridge top). Acacia tumida low woodland with scattered Eucalyptus leucophloia.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	2 m	=P66-1	
Acacia bivenosa	+ <1 %	20 cm		
Acacia inaequilatera	+ <1 %	2-4 m		corky bark
Bonamia pannosa	+ <1 %	2 cm	P1-17	juvenile.
Cassia glutinosa	<1 <1 %	1.5-2 m		
Corchorus parviflorus	+ <1 %	40 cm	=P1-6	
Eucalyptus leucophloia	1-2 1-5%	(0.1)8 m	P73-1	
Euphorbia tannensis ssp. eremophila (Panorama form)				
	+ <1 %	50 cm	=P18-2	
Hakea lorea ssp. lorea	+ <1 %	2 m	P73-2	
Indigofera monophylla (PAN58-17)				
	+ <1 %	30 cm	=P63-2	grey leaf
Mukia sp.	+ <1 %	40 cm	P73-4	
Sida sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)				
	+ <1 %	1.2 m	P73-5	
Solanum phlomoides	+ <1 %	20 cm		
Triodia brizoides	70-80 >75%	50 cm		
Triodia wiseana	<1 <1 %	60 cm		

#### PAN074

Described by: MJH Date: 24/04/01

Location: Hillside to SW of track in gorge.

Photo: 6 on roll PANR3

AMG Zone: 50 728051mE, 7663161mN 728099mE, 7663123mN 728080mE, 7663110mN 728041mE, 7663132mN

Habitat: Steep middle slope of north east facing hill.

Soil: Orange-brown fine sand and silt with gravel and cobbles.

Vegetation: Orange-brown fine sand and silt with gravel and cobbles.

Vegetation Condition: Good - burnt relatively recently.

Fire Age: 3-4 years? 5 years?

Notes: A burnt site, hence the layer of Corchorus and Indigofera. The Triodia is very dense now, but small and most of it probably will be crowded out by the bigger hummocks (regrowth versus germination). Judging by the density, it was probably quite dense before the fire. Plot odd shape to avoid a Triodia wiseana community upslope.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
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<i>Acacia acradenia</i>	+	<1 %	60 cm		
<i>Acacia bivenosa</i>	+	<1 %	60 cm		
<i>Acacia inaequilatera</i>	1-2	1-5%	2.5 m		
<i>Acacia orthocarpa</i>	+	<1 %	2 m	P74-1	'fine'
<i>Boerhavia gardneri</i>	+	<1 %	5 cm	=P50-3	
<i>Bonamia media</i> var. <i>villosa</i>					
	+	<1 %	3 cm		
<i>Cassia glutinosa</i>	+	<1 %	60 cm		
<i>Corchorus parviflorus</i>	15	10-25%	20-40 cm	=PAN1	
<i>Corymbia hamersleyana</i>	+	<1 %	7 cm	P74-6	
<i>Cymbopogon ambiguus</i>	+	<1 %	30 cm	=P60-6	
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i> (Panorama form)					
	+	<1 %	1.2 m	P74-3	
<i>Goodenia microptera</i>	+	<1 %	10 cm		
<i>Goodenia stobbsiana</i>	+	<1 %	4 cm	=P1-11	
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	2.5 m		
<i>Heliotropium skeleton</i>	+	<1 %	30 cm	=P1-19	
<i>Indigofera monophylla</i> (PAN57-9)					
	50	33.3-50%	40 cm	=P48-8	
<i>Mollugo molluginis</i>	+	<1 %	15 cm		
<i>Mukia</i> sp.	+	<1 %	1 m	P74-2	
<i>Ptilotus calostachyus</i> var. <i>calostachyus</i>					
	+	<1 %	80 cm		
<i>Sida cardiophylla</i>	+	<1 %	40 cm	=P1-23	
<i>Solanum phlomoides</i>	+	<1 %	30 cm		
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)					
	+	<1 %	70 cm	P74-5	
<i>Triodia brizoides</i>	80	>75%	10-30 cm		
<i>Triodia wiseana</i>	+	<1 %	50-60 cm		

**PAN075**Described by: MET Date: 24/04/01Location: Middle to upper part of gorge.Photo: 7 on roll PANR1AMG Zone: 50 728049mE, 7663217mN 727967mE, 7663267mNHabitat: Narrow strip along pools and flow area of a narrow channel of a medium sized creek in an open section of a gorge.Soil: Varies from loamy banks to gravelly to cobbly banks and bed.Vegetation: *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub.Vegetation Condition: ExcellentFire Age: >15 yearsNotes: Narrow strip along pools recorded to fit habitat type. Stayed within width with *Cyperus vaginatus*. Deepest pool may be permanent.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia coriacea</i> subsp. <i>pendens</i>				
	+	<1 %	3 m	
<i>Acacia pyrifolia</i> (slender, white)				

	+	<1 %	1-2.2 m	=P65-1	
<i>Ammannia baccifera</i>	+	<1 %	10-15 cm	P75-3	
<i>Atalaya hemiglauca</i>	+	<1 %	2.6 m	=P63-1	
<i>Cleome viscosa</i>	+	<1 %	50 cm		
<i>Cullen leucanthum</i>	+	<1 %	60 cm	=P65-20	
<i>Cymbopogon procerus</i>	+	<1 %	30-60 cm	=P65-24	
<i>Cyperus vaginatus</i>	15+	10-25%	0.4-1.2 m		
<i>Enneapogon oblongus</i>	+	<1 %	20-50 cm	=P65-8	
<i>Eragrostis tenellula</i>	+	<1 %	30-60 cm	P75-7	
<i>Eucalyptus victrix</i>	≤1	<1 %	(4.5)10 m		
<i>Euphorbia coghlanii</i>	+	<1 %	5 m	=P65-7	
<i>Ficus opposita</i> var. <i>indecora</i>					
	+	<1 %	3 m	=P71-1	
<i>Fimbristylis microcarya</i>	+			P75-	
<i>Flaveria australasica</i>	+	<1 %	10-55 cm		
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>					
	+	<1 %	1 m		
<i>Gossypium robinsonii</i>	+	<1 %	1-3 m		more adjacent
<i>Hybanthus aurantiacus</i>	+	<1 %	10 cm		
<i>Melaleuca glomerata</i>	<5	1-5%	1-4 m		
<i>Melaleuca linophylla</i>	>40	33.3-50%	2-3.5 m		
<i>Mukia</i> sp.	+	<1 %	30 cm	P75-1	
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>					
	+	<1 %	45 cm		
<i>Polymeria</i> aff. <i>calycina</i>	+	<1 %	7 cm	P75-2	
<i>Pterocaulon sphacelatum</i>					
	+	<1 %	25 cm	P75-4	
<i>Schoenus falcatus</i>	+	<1 %	75 cm		
<i>Sesbania cannabina</i>	+	<1 %	10-35 cm	=P65-13	
<i>Stemodia grossa</i>	+	<1 %	20-50 cm		
<i>Tephrosia</i> aff. <i>rosea</i> (HD292-37)					
	+	<1 %	40 cm	=P65-4	
<i>Themeda</i> aff. <i>triandra</i> (MET 16,046)					
	+	<1 %	70 cm	P75-5	
<i>Triodia epactia</i>	+	<1 %	60 cm	P75-6	

**PAN076**Described by: MET      Date 24/25/04/2001Location: Between Mine 1 and 2.AMG Zone: 50 732524mE, 7656342mN      732570mE, 7656254mNHabitat: Small creek between ridges.Soil: Very variable. Banks light brown fine to coarse sand. Bed cobbly to gravelly.Vegetation: *Eucalyptus victrix* scattered low trees to trees over *Acacia acradenia*, *Acacia pyrifolia* (slender, white) high open shrubland over *Cajanus cinereus* scattered shrubs to open shrubland over *Themeda* sp. Panorama, *Triodia wiseana* tussock, hummock grassland.Vegetation Condition: Excellent.Fire Age: >10 years.

Notes: 100 m strip along creek recorded, bed and edges (zone with *Themeda* sp. Panorama). Starts 25 m from track (south-east). The *Themeda* stand extends circa 50 m past the transect (permanent pool further down), then abruptly stops.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia acradenia</i>	+ <1 %	2.5 m		
<i>Acacia pyrifolia</i> (slender, white)	+ <1 %	3 m		
<i>Acacia tumida</i>	+ <1 %	4.5 m	P76-2	
<i>Ammannia auriculata</i>	+ <1 %	10 cm	P76-6	
<i>Ammannia baccifera</i>	+ <1 %	10-15 cm	P76-7	
<i>Cajanus cinereus</i>	<5 1-5%	0.5-1.8 m	=P65-?	
<i>Cassia glutinosa</i>	+ <1 %	70 cm		
<i>Cassia oligophylla</i> (Panorama form)	+ <1 %	60 cm	P76-5	
<i>Corchorus aff laniflorus</i> (PAN 76)	+ <1 %	1 m	P76-4	
<i>Cymbopogon procerus</i>	+ <1 %	70 cm	P76-9	
<i>Eragrostis tenellula</i>	+ <1 %	20 cm	P76-10	
<i>Eucalyptus victrix</i>	1 1-5%	7-10 m		
<i>Euphorbia coghlanii</i>	+ <1 %	50 cm	=P65-?	
<i>Euphorbia</i> sp. (site 1089)	+ <1 %	10-20 cm	76-3;76-11	grey
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	+ <1 %	40 cm		
<i>Indigofera monophylla</i> (PAN57-9)	+ <1 %	40 cm	P76-8	
<i>Mukia</i> sp.	+ <1 %	50 cm	=P65-?	
<i>Petalostylis labicheoides</i>	+ <1 %	2.5 m		
<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>	+ <1 %	20-50 cm		
<i>Pluchea tetranthera</i>	+ <1 %	30 cm	P76-12	
<i>Polymeria aff. calycina</i>	+ <1 %	10 cm	P76-13	
<i>Stemodia grossa</i>	+ <1 %	20-60 cm		
<i>Themeda</i> sp. Panorama	+/-15 10-25%	1.1-1.5 m	P76-1	
<i>Triodia wiseana</i>	<10 5-10%	30-50 cm		

**PAN077**

Described by: MET Date: 25/04/01

Location: Pass through ridge on proposed haul road between areas 1 and 2.

Photo: 6,5 on roll PANR1

AMG Zone: 50 731195mE, 7659863mN 731257mE, 7659931mN

Habitat: Edge of creek through a pass-through ridge, temporary pools, seasonal wetland.

Vegetation: *Eucalyptus victrix*, *Melaleuca argentea* open forest over *Acacia ampliceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia longiceps* sedgeland, hummock grassland.

Notes: Varies from mostly *Schoenus* to mostly *Cyperus vaginatus*. Old dead specimen suggests that *Acacia ampliceps* forms a lower (scattered) tree layer when older.



Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia ampliceps	+ <1 %	4 m		
Acacia pyrifolia (slender, white)	+ <1 %	2 m		
Cajanus cinereus	+ <1 %	55	=P65	
Cassia notabilis	+ <1 %	50 cm		
Corchorus parviflorus	+ <1 %	40 cm	=P65	
Cymbopogon procerus	+ <1 %	65 cm	=P65	
Cyperus vaginatus	<10 5-10%	0.6-1 m		
Eucalyptus camaldulensis var. obtusa	+ <1 %	15 m		
Eucalyptus victrix	>20 10-25%	8-15 m		
Ficus opposita var. indecora	+ <1 %	2.7 m	P77-3	
Gossypium robinsonii	+ <1 %	2-3 m		
Lobelia quadrangularis	+ <1 %	10 cm		
Melaleuca argentea	>5 5-10%	>12 m	P77-1	
Melaleuca glomerata	+ <1 %	2-3+ m		
Petalostylis labicheoides	+ <1 %	1.5-2.5		
Phyllanthus maderaspatensis var. angustifolius	+ <1 %	30-75 cm		
Schoenus falcatus	>20 10-25%	50-90 cm	P77-2	
Stemodia grossa	+ <1 %	35-50 cm		
Tephrosia aff. rosea (HD292-37)	+ <1 %	50 cm		
Triodia epactia	<5 1-5%	50-85 cm		
Triodia longiceps	+ <1 %	40-80 cm		

**PAN078**

Described by: MJH Date: 25/04/01

Location: In mining area 2, in adjacent valley to the track.

Photo: 5,4 on roll PANR3

Photo Notes: Photos 3, 2 of valley below PAN078.

AMG Zone: 50 733189mE, 7653514mN 733154mE, 7653545mN 733202mE, 7653568mN 733223mE, 7653528mN

Habitat: Upper-midslope, steep south facing.

Soil: Orange-brown fine-medium sand and silt with gravel, cobble and outcrop.

Vegetation: Acacia inaequilatera (Grevillea wickhamii ssp. aprica) scattered tall shrubs over Triodia wiseana (Triodia brizoides) hummock grassland.

Vegetation Condition: Very good - Excellent : long unburnt

Fire Age: >10 years?

Notes: Triodia brizoides intrudes in centre of plot on a central spur (see picture). This may be a discrete community of its own, as the Triodia wiseana is only sparsely mixed through here. Triodia brizoides takes over further upslope towards the ridge.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	0.5-1 m		

<i>Acacia inaequilatera</i>	1	1-5%	4-6 m		corky bark
<i>Bonamia media</i> var. <i>villosa</i>					
	+	<1 %	3-7.5 cm	P78-6	
<i>Cassia glutinosa</i>	+	<1 %	1.5 m		
<i>Corchorus parviflorus</i>	+	<1 %	20 cm	=P1-6	
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>					
	+	<1 %	20 cm	P78-4	
<i>Dampiera candicans</i>	+	<1 %	40 cm		only in <i>T. brizoides</i>
<i>Goodenia cusackiana</i>	+	<1 %	30 cm		
<i>Goodenia stobbsiana</i>	+	<1 %	40 cm	=P1-11	
<i>Gossypium australe</i> (Whim Creek form)					
	+	<1 %	2.5 m	P78-5	
<i>Grevillea pyramidalis</i> subsp. <i>pyramidalis</i>					
	+	<1 %	2.5 m		
<i>Grevillea wickhamii</i> subsp. <i>aprica</i>					
	+	<1 %	3 m		
<i>Hakea lorea</i> ssp. <i>lorea</i>	+	<1 %	20 cm		
<i>Indigofera monophylla</i> (PAN57-9)					
	+	<1 %	70-80 cm	=P48-8	grey
<i>Mollugo molluginis</i>	+	<1 %	8 cm		
<i>Polygala</i> aff. <i>isingii</i>	+	<1 %	3 cm	P78-3	
<i>Solanum horridum</i>	+	<1 %	30 cm	P78-2	
<i>Solanum phlomoides</i>	+	<1 %	50 cm		
<i>Tephrosia</i> sp. B Kimberley Flora (C.A. Gardner 7300)					
	+	<1 %	80 cm	P78-1	
<i>Triodia brizoides</i>	10	5-10%	40-50 cm		
<i>Triodia wiseana</i>	55	50-75%	50-60 cm		

**PAN079**Described by: MET Date: 25/04/01Location: Mining area 2.Photo: 2 on roll PANR1AMG Zone: 50 733279mE, 7653262mN 733278mE, 7653243mNHabitat: Gentle slope near to a small to medium sized creek.Soil: Red-brown sandy loam (pebbly in places).Vegetation: *Acacia pyrifolia* (slender, white) high open shrubland to high shrubland over *Indigofera monophylla* (PAN57-9), *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Corchorus parviflorus* open shrubland to shrubland over *Triodia wiseana* hummock grassland.Vegetation Condition: ExcellentFire Age: >15 years.Notes: This site is a fairly narrow strip paralleling the creek. Has some damper places with some species only in these. Some small patches with algal crust. The *Corchorus* does not appear to be a pyrosere species in this plot.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Abutilon</i> sp.	+	<1 %	70 cm	P79-13
<i>Acacia acradenia</i>	+	<1 %	(1)1.5-2	

Acacia bivenosa	+	<1 %	1.4 m		bushy
Acacia pyrifolia (slender, white)					
		10-20 10-25%	3-4.5 m	P79-1	
Amaranthus aff. pallidiflorus (WAS1127)					
	+	<1 %	15-35 cm	=P65-	
Atalaya hemiglauca	+	<1 %	90 cm	=P71-1	
Boerhavia burbridgeana	+	<1 %	20 cm	P79-19	
Boerhavia coccinea	+	<1 %	10 cm	P79-11	
Cassia glutinosa	+	<1 %	1.8 m		
Cassia notabilis	+	<1 %	30-50 cm		
Cassia oligophylla	+	<1 %	60 cm	P79-16	
Cassia oligophylla x helmsii					
	+	<1 %		P79-18	
Cleome viscosa	+	<1 %	50 cm		
Corchorus parviflorus	+	<1 %	0.4-1.3 m	P79-9	
Corymbia hamersleyana	+	<1 %	1.5 m		
Crotalaria medicaginea (Burrup form; B65-11)					
	+	<1 %	50 cm	P79-17	
Cullen leucanthum	+	<1 %	60 cm	=P65-	
Cymbopogon ambiguus	+	<1 %	50 cm	P79-8	
Cyperus cunninghamii subsp. cunninghamii					
	+	<1 %	50 cm	P79-6	
Euphorbia aff. drummondii (MET 15,030)					
	+	<1 %	10-25 cm	P79-10	grey
Euphorbia coghlanii	+	<1 %	0.4-1.1 m		
Euphorbia sp. (site 1089)	+	<1 %	35 cm	P79-20	green
Hakea lorea ssp. lorea	+	<1 %	2 m		
Hibiscus aff. platyklamys (site 1139)					
	+	<1 %	30-70 cm	P79-15	
Indigofera monophylla (PAN57-9)					
	>1	<1 %	0.8-1.2 m	P79-2	grey, var.?
Leptopus decaisnei var. decaisnei					
	+	<1 %	20 cm		
Melhania sp. Burrup	+	<1 %	1.2 m	P79-7	
Mollugo molluginis	+	<1 %	15 cm		
Mukia sp.	+	<1 %	1.4 cm	=P65-	
Petalostylis labicheoides	+	<1 %			
Phyllanthus maderaspatensis var. angustifolius					
	+	<1 %	65 cm		
Polycarpaea longiflora (White form, M13-7)					
	+	<1 %	25 cm	P79-14	
Polymeria aff. calycina	+	<1 %	5-30 cm	P79-3	
Pterocaulon sphaeranthoides x sphacelatum					
	+	<1 %	30-90 cm	P79-4	
Rhynchosia cf. minima	+	<1 %	75 cm	P79-5	
Sesbania cannabina	+	<1 %	2.3 m		
Solanum phlomoides	+	<1 %	1-1.4 m		

Stemodia grossa	+	<1 %	30-90 cm
Swainsona formosa	+	<1 %	45 cm
Tephrosia aff. clementii (11)			
	+	<1 %	
Tephrosia aff. rosea (HD292-37)			
	+	<1 %	0.65-1.36 P79-12
Trichodesma zeylanicum var. zeylanicum			
	+	<1 %	25 cm
Triodia wiseana	>30	25-33.3%	0.3-1.05

**PAN080**

Described by: BRM Date: 25/04/01

Location: #2 mining area, upslope of a (drill) pad.

Photo: 25, 24 on roll PANR2

AMG Zone: 50 732352mE, 7653465mN 732341mE, 7653504mN 732318mE, 7653477mN 732329mE, 7653446mN

Habitat: Steep mid slope, NNE facing slope. Slope surface is convex - gully on eastern border of plot. Slope of a very high hill.

Soil: Brown loamy sand, pebbly, rocky, cobbly, with rock buttresses exposed.

Soil: Brown loamy sand, pebbly, rocky, cobbly, with rock buttresses exposed.

Vegetation: Acacia inaequilatera, Grevillea wickhamii ssp aprica scattered tall shrubs over Triodia brizoides hummock grassland.

Veg Condition:

Fire Age: Burnt 3-5 years ago (medium hummocks).

Notes: Difficult positioning plot (areas of different Triodias). To east on slope is Tephrosia sp. (Panorama Gorge). Upslope is Acacia tumida on ridge and upper slopes and a different Corymbia (Corymbia candida ssp. candida). Site PAN80 area was part of slope on which Gossypium australe "Whim Creek" form occurred.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia acradenia	+ <1 %	60 cm		
Acacia inaequilatera	+ <1 %	4 m		corky bark
Acacia ptychophylla	+ <1 %	50 cm	P80-5	
Boerhavia gardneri	+ <1 %	15 cm	=P47-4	
Cassia glutinosa	+ <1 %	1.2 m		
Cassia oligophylla	+ <1 %	1 m	P80-15	
Cheilanthes vellea	+ <1 %	10 cm	P80-19	
Cleome uncifera	+ <1 %	30 cm	=P1-10	
Corchorus aff laniflorus (PAN 76)				
	1-2 1-5%	50 cm	P80-18	
Cymbopogon ambiguus	+ <1 %	50 cm	P80-11	
Cyperus cunninghamii subsp. cunninghamii				
	+ <1 %	30 cm	P80-10	
Eriachne ciliata	+ <1 %	30 cm	P80-17	
Euphorbia aff. drummondii (MET 15,030)				
	+ <1 %	30 cm	=P58-9	
Euphorbia coghlanii	+ <1 %	20 cm	P80-16	
Fimbristylis dichotoma	+ <1 %	10 cm	P80-7	no heads

Gossypium australe (Whim Creek form)	1	<1 %	1.5 m	P80-2	
Grevillea pyramidalis subsp. pyramidalis	+	<1 %	1.5 m		
Grevillea wickhamii subsp. aprica	+	<1 %	2.5 m		
Hybanthus aurantiacus	+	<1 %	10 cm		
Indigofera monophylla (PAN57-9)	+	<1 %	1 m	P80-3	grey
Polygala aff. isingii	+	<1 %	20 cm	P80-13	
Sida sp. A Kimberley Flora(P.A. Fryxell & L.A. Craven 3900)	+	<1 %	1 m	P80-14	
Solanum phlomoides	+	<1 %	30 cm		
Tephrosia spechtii	+	<1 %	1 m	P80-9	
Tribulus suberosus	+	<1 %	40 cm		
Triodia brizoides	30	25-33.3%	50 cm	P80-1	
Triodia epactia	+	<1 %	30 cm		
Triodia longiceps	+	<1 %	60 cm	P80-12	
Triumfetta maconochieana	+	<1 %	40 CM	P80-20	
Triumfetta propinqua	+	<1 %	40 cm	P80-6	

**PAN081**

Described by: MET      Date 25/04/2001

Location: North side of pass through ridge between areas 1 and 2.

Photo: 1 on roll PANR1

AMG Zone: 50 731232mE, 7659976mN    731240mE, 7659938mN

Habitat: East facing slope of a boulder rock pile.

Vegetation: Acacia coriacea subsp. pendens low woodland over Triodia wiseana hummock grassland.

Notes: One small vegetated area on slope, another on crest. No pegs used. The Acacia coriacea subsp. pendens had rough, very coarsely fibrous bark.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Acacia bivenosa	+ <1 %	1.7 m		
Acacia coriacea subsp. pendens	15-20 <1 %	6 m	P81-1	
Amaranthus aff. pallidiflorus (WAS1127)	+	30-70 cm	P81-4	
Boerhavia coccinea	+	60 cm	P81-2	
Cajanus cinereus	+	75 cm	=P68-	
Cleome viscosa	+	30 cm		
Clerodendrum tomentosum	+	1.2 m	P81-3	
Corchorus sp. A Kimberley Flora(K.F. Kenneally & B.P.M. Hyland 10421)	+	60 cm	P81-8	Lower edge
Cymbopogon ambiguus	+	30 cm	P81-6	Lower edge
Flueggea virosa subsp. melanthesoides	+	1.4 m		

*Paspalidium tabulatum* (Whim Creek form)

	+	<1 %	45 cm	P81-5	Lower edge
<i>Solanum phlomoides</i>	+	<1 %	30-40 cm		
<i>Tinospora smilacina</i>	+	<1 %	4-5 m		
<i>Triodia wiseana</i>	+	<1 %	30-50 cm		
<i>Triumfetta propinqua</i>	+	<1 %	1.3 m	P81-7	Lower edge

**PAN082**Described by: MJH Date: 25/04/01Location: Above PAN 77AMG Zone: 50 731248mE, 7659889mN 731276mE, 7659847mNHabitat: RockpileVegetation: *Clerodendrum floribundum* var. *angustifolium* scattered tall shrubs over *Triodia wiseana*, *Themeda* sp. Panorama very open hummock/tussock grassland.Notes: (Co-recorded by BRM). Vegetation in pockets.Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Amaranthus</i> aff. <i>pallidiflorus</i> (WAS1127)				
	+ <1 %	50 cm	P82-6	
<i>Boerhavia gardneri</i>	+ <1 %	20 cm	P82-15	
<i>Cajanus cinereus</i>	+ <1 %	1.5 m	P82-1	
<i>Cassia glutinosa</i>	+ <1 %	2 m		
<i>Cenchrus ciliaris</i>	+ <1 %	40 cm		
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>				
	+ <1 %	4 m	P82-12	
<i>Corchorus</i> aff. <i>laniflorus</i> (PAN 76)				
	+ <1 %	1-1.5 m	P82-8	
<i>Cymbopogon procerus</i>	+ <1 %	40 cm	P82-3	
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>				
	+ <1 %	25 cm	P82-14	
<i>Euphorbia coghlanii</i>	+ <1 %	40 cm	P82-5	
<i>Ficus opposita</i> var. <i>indecora</i>				
	+ <1 %	80 cm	P82-11	
<i>Gossypium robinsonii</i>	+ <1 %	4 m		
<i>Mukia</i> sp.	+ <1 %		P82-2	
<i>Solanum horridum</i>	+ <1 %	30 cm	P82-10	
<i>Solanum phlomoides</i>	+ <1 %	1 m		
<i>Themeda</i> sp. Panorama	3-5 5-10%	1.5 m	P82-4	'sp. nov'
<i>Tinospora smilacina</i>	+ <1 %	1.5 m	P82-7	Heart-leaf creeper
<i>Trichosanthes cucumerina</i>				
	+ <1 %	1 m	P82-9	Passionvine
<i>Triodia wiseana</i>	3-5 >75%	90 cm		

**PAN16B**Described by: MET Date: 18/04/01Fire Age: Burnt 1-2 years ago

Notes: General collection from burnt area adjoining and to west of PAN16 Much more Tephrosia sp. Bungaroo Creek(M.E.Trudgen 11601) in burnt area than in unburnt area.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Bonamia media var. villosa	+	7cm		
Bonamia pannosa	+	5cm		
Cassia notabilis	+	35cm		
Cleome viscosa	+	35cm		
Corchorus parviflorus	+	20-35cm		Patches; =PAN1
Goodenia stobbsiana	+			=1-11
Grevillea wickhamii subsp. aprica	+			
Heliotropium skeleton	+	10 cm	=1-19	
Heliotropium sp.	+	10cm		
Portulaca oleracea	+	5cm		
Ptilotus gaudichaudii var. gaudichaudii	+			
Streptoglossa odora	+		20cm	=4-12
Tribulus hirsutus	+	10cm		

**PAN20B**

Described by: BRM Date: 18/04/01

Location: 33.6 km from Marble Bar Road, along Panorama access track.

Habitat: Gentle south and east facing slope and saddle with watercourse about 100-200 m south.

Soil: Pebbly, cobbly orange-brown loamy sand with white calcareous nodules present. Calcrete crust in places.

Vegetation: Corymbia hamersleyana) scattered low trees over Acacia inaequilatera, Acacia bivenosa scattered tall shrubs over Triodia lanigera hummock grassland

Fire Age: <1-2 years

Notes: This plot is composed of species collected in a burnt area just across the road from PAN020. The vegetation type can be reasonably expected to be comparable to PAN020, although the species recorded represent a pyrosere community.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Cassia glutinosa	<1 %			
Cassia sp.	<1 %		20b	
Cleome viscosa	<1 %		20b	strange form
Enneapogon caerulescens var. caerulescens	<1 %		20b	
Goodenia sp.	<1 %		20b	
Haloragis gossei			20b	
Heliotropium cunninghamii	<1 %		20b	
Hybanthus aurantiacus	<1 %		20b	

Indigofera monophylla (PAN20-2)	<1 %	20b	grey leaflet
Ptilotus axillaris	<1 %	20b	
Scaevola amblyanthera var. centralis	<1 %	20b	
Tephrosia sp.	<1 %	<1 %	20b
Tribulus hirsutus	<1 %	20b	

**PAN22B**

Described by: MET Date: 18/04/01 65x40 m

Location: 35.4 km from Marble Bar Road, on Panorama access track.

Habitat: Sloping crest of a moderately sloping (to north) colluvial spur.

Soil: Very gravelly pebbly orange-brown loam with gravel-pebble surface

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia epactia hummock grassland.

Notes: Opportunistic collection from burnt area adjacent to site PAN22. Soil, vegetation etc can reasonably be expected to be the same, although the species recorded represent a pyrosere community. 'c' indicates collected, no collection numbers.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Abutilon trudgenii	+ <1 %	50 cm	c	
Cassia notabilis	+ <1 %	20 cm		
Hibiscus aff. platyklamys (site 1139)	+ <1 %	20 cm	c	B
Hibiscus sp.	+ <1 %	25 cm	c	A
Polycarpaea holtzei	+ <1 %	3 cm		
Sida cardiophylla	+ <1 %	12 cm	=P1-23	
Streptoglossa bubakii	+ <1 %	35 cm	c	
Tribulus hirsutus	+ <1 %		5 cm	c

**PAN23B**

Described by: MET Date: 18/04/01

Location: 36.25 km from Marble Bar road.

Habitat: Small creek between two N-S running colluvial spurs.

Soil: Orange-brown, gravelly pebbly loamy soil.

Vegetation: Scattered low trees of Acacia inaequilatera, Corymbia hamersleyana over Acacia tumida high shrubland over Petalostylis labicheoides open scrub over Indigofera monophylla (PAN 20-2) shrubland over Bonamia rosea scattered low shrubs to low shrubland over Triodia epactia open hummock grassland.

Veg Condition:

Notes: Opportunistic collection from burnt area across the track from PAN023. Habitat, soil and vegetation can be reasonably expected to be similar, although species recorded may represent a pyrosere community. Bonamia rosea comes up prolifically in the burnt section. Pisolithus tinctorus present

Species List:

Name	Cover/Cover class	Height	Spec	Notes
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Bonamia pannosa	+	<1 %	10 cm	
Cassia notabilis	+	<1 %	20 cm	
Fimbristylis simulans	+	<1 %	15 cm	P23-12
Isotropis atropurpurea	+	<1 %	65-90 cm	
Solanum diversiflorum	+	<1 %	30 cm	
Solanum phlomoides	+	<1 %	45 cm	
Tephrosia simplicifolia	+	<1 %	20-35 cm	P23-13

**PAN26B**

Described by: BRM Date: 18/04/01

Location: 38.5 km from Marble Bar road on access track.

Habitat: Peak of a very gentle rise in a very gently undulating plain near foot of hills.

Soil: Gravelly, pebbly, cobbly orange-brown loamy sand.

Vegetation: Acacia inaequilatera, Acacia acradenia, Grevillea wickhamii ssp. aprica scattered tall shrubs over Triodia sp. panorama hummock grassland.

Notes: Opportunistic collection in burnt area adjacent to PAN026. Habitat, soil and vegetation can be reasonably expected to similar, although species recorded may represent a pyrosere community.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Cleome viscosa	<1 %			
Corymbia hamersleyana	<1 %		=PAN1	
Cullen aff. lachnostachys (MET 15,154)	+ <1 %	60 cm	P26B-17	Malvaceae
Cullen stipulaceum	<1 %		P26B-19	shiny leaf
Polymeria aff. ambigua (PAN 26B-20)	<1 %		P26B-20	
Ptilotus clementii	+ <1 %	50 cm	P26B-18	
Scaevola amblyanthera var. centralis	<1 %		P26B-21	
Solanum diversiflorum	<1 %			
Solanum phlomoides	<1 %			
Tribulus hirsutus	<1 %		P26B-22	

**PAN27B**

Described by: MJH Date: 19/04/01

Location: 0.55 km from PAN026, 20.7 km from camp

Habitat: Flat crest and upper south facing slope on colluvial flat.

Soil: Calcareous orange-brown fine sand and silt with quartz and darker gravel. Some outcrop.`

Vegetation: Acacia inaequilatera scattered tall shrubs over Triodia sp. panorama, Triodia wiseana closed hummock grassland.

Notes: Opportunistic collection from burnt area across the track from PAN027. Habitat, soil and vegetation can be reasonably expected to be similar except that species recorded may represent a pyrosere community.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
Abutilon trudgenii	+ <1 %	80 cm	P27B-2	Hibiscus/Sida

<i>Acacia ancistrocarpa</i>	+	<1 %	80-90 cm	
<i>Acacia inaequilatera</i>	+	<1 %	5 m(3)	
<i>Bonamia pannosa</i>	+	<1 %	10 cm	
<i>Cassia notabilis</i>	+	<1 %	20 cm	
<i>Cassytha capillaris</i>	+	<1 %	40 cm	=P27
<i>Cleome uncifera</i>	+	<1 %	60 cm	=P1-10
<i>Cleome viscosa</i>	+	<1 %	30 cm	
<i>Corchorus parviflorus</i>	+	<1 %	30 cm	=P1-6
<i>Cullen stipulaceum</i>	+	<1 %	1 m	P27B-3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>				
	+	<1 %	15 cm	
Genus sp. Unnamed	+	<1 %	15 cm	P27B-6
<i>Goodenia stobbsiana</i>	+	<1 %	80 cm	=P1-11
<i>Indigofera monophylla</i> (PAN20-2)				
	+	<1 %	30 cm	
<i>Pterocaulon sphacelatum</i>				
	+	<1 %	30 cm	
<i>Ptilotus auriculifolius</i>	+	<1 %	40 cm	P27B-1
<i>Ptilotus clementii</i>	+			P27B-18?
<i>Sporobolus australasicus</i>	+	<1 %	10 cm	=PAN1
<i>Stemodia grossa</i>	+	<1 %	80 cm	P27B-5
<i>Trianthema pilosa</i>	+	<1 %	10 cm	=P1-30
<i>Tribulopsis angustifolia</i>	10	5-10%	10 cm	
<i>Tribulus hirsutus</i>	+	<1 %	10 cm	usual one
<i>Triodia wiseana</i>	10	5-10%	10 cm	

**PAN29B**

Described by: BRMDate: 19/04/01

Location: 41.1 km from Marble Bar road down Panorama access track.

Habitat: Low rise, gently rounded, between Chichester escarpment and a low ridge.

Soil: Light brown gravelly silty sand with cover of gravel and pebbles.

Vegetation: *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana*, *Triodia* sp. panorama hummock grassland.

Fire Age: ≤1yr

Notes: Opportunistic collection in burnt area adjacent to PAN029. Habitat, soil and vegetation can reasonably be expected to be similar, although species recorded may represent a pyrosere community.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Acacia</i> sp.	<1 %		P29B-4	
<i>Cassytha capillaris</i>	<1 %		P29B-3	
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i> (Panorama form)				
	<1 %		=P18-2	
<i>Mukia</i> sp.	<1 %		P29B-2	
<i>Oldenlandia crouchiana</i>	<1 %		P29B-6	
<i>Pterocaulon</i> sp. (PAN1-47)	<1 %		P29B-5	
<i>Pterocaulon sphacelatum</i>				
	<1 %		=P1-32	

<i>Ptilotus axillaris</i>	<1 %	
<i>Tephrosia</i> sp. B Kimberley Flora(C.A. Gardner 7300)		c
<i>Tephrosia supina</i>	<1 %	P29B-1 =P1-7

**PAN30B**

Described by: MJH Date: 19/04/01

Location: 41.8 km from Marble Bar road

Habitat: Gentle lower slopes of a lower rise.

Soil: Calcareous. Chocolate brown at surface, orange-brown at depth fine-medium sand with silt.

Rock Type: Quartz and darker pebbles, some outcrop.

Vegetation: *Acacia inaequilatera* scattered trees over *Indigofera monophylla* (PAN 20-2), *Corchorus parviflorus* low open shrubland over *Triodia epactia* (*Triodia* sp. panorama) grassland.

Notes: Opportunistic collection in burnt area adjacent to PAN030. Habitat, soil and vegetation can be reasonably expected to be similar although the species recorded may represent a pyrosere community. The burnt area has a pyrosere stand of *Corchorus parviflorus* low open heath. 'c' indicates collected, no collection numbers given.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Cassia notabilis</i>	+ <1 %	30 cm		
<i>Cymbopogon obtectus</i>	+ <1 %	30 cm		
<i>Enneapogon</i> sp.	+ <1 %	25 cm	c	
<i>Goodenia</i> sp.	+ <1 %	35 cm	c	
<i>Gossypium australe</i> (Burrup Peninsula form)	+ <1 %	35 cm	c	
<i>Heliotropium</i> sp.	+ <1 %	15 cm	c	
<i>Oldenlandia crouchiana</i>	+ <1 %	20 cm	c	
<i>Polymeria</i> sp.	+ <1 %	5 cm	c	
<i>Ptilotus auriculifolius</i>	+ <1 %	45 cm	c	
<i>Sida</i> sp.	+ <1 %	1 m	c	
<i>Solanum diversiflorum</i>	+ <1 %	50 cm		
<i>Tephrosia</i> sp.	+ <1 %	90 cm	c	
<i>Tribulus hirsutus</i>	<1 %			
<i>Triumfetta</i> sp.	+ <1 %	65 cm	c	

**PAN63F**

Described by: MET Date: 24/04/01

Location: See site P063

Habitat: Two narrow flowlines passing across site P063.

Notes: Taxa in site P063 only recorded from the flow lines.

Species List:

Name	Cover/Cover class	Height	Spec	Notes
<i>Bonamia linearis</i>	+	8cm	=P1-8	=1-8
<i>Bonamia media</i> var. <i>villosa</i>	+	4cm	63-5	(creeper)

Cassia notabilis	+	40cm	63-13	
Clerodendrum tomentosum				
	+	1m	63-6	Bright green leaf
Eriachne mucronata (typical form)				
	+	30cm	=P58-7	
Hybanthus aurantiacus	+	15cm		
Phyllanthus maderaspatensis var. angustifolius				
	+	30cm	63-11	
Pterocaulon serrulatum	+	10cm	63-12	juvenile
Tephrosia aff. rosea (HD292-37)				
	+	1-1.5m	63-3	Grey leaf
Tephrosia				
Triumfetta propinqua	+	60cm	63-4	

A  
FLORA  
AND  
VEGETATION SURVEY  
OF THE PROPOSED MINE AREAS  
AND ACCESS ROAD FOR THE PANORAMA  
PROJECT

prepared for

ASTRON ENVIROMENTAL

by

Malcolm Trudgen  
Consultant Botanist,

Brian Morgan  
Consultant Biologist

E.A. Griffin  
Consultant Botanist

M.E. Trudgen & Associates  
JANUARY 2002

Volume 3

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**Vegetation of the Shaw River**

**Al'**: *Acacia trachycarpa* high open shrubland to high shrubland over *Corchorus* sp. (MET 21247) low shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

**EcVahp**: *Eucalyptus camaldulensis* var. *obtusata*, *Eucalyptus victrix* open woodland to high open woodlands over *Atalaya hemiglauca* scattered low trees over *Petalostylis labicheoides*, *Cullen leucanthum* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

**EcAhMg**: *Eucalyptus camaldulensis* var. *obtusata* high open woodland to high woodland over scattered low trees of *Atalaya hemiglauca* over *Melaleuca glomerata* scattered tall shrubs over *Cyperus vaginatus*, \**Cenchrus ciliaris* scattered sedges and grasses.

**MnAt'Mg**: *Melaleuca argentea* low woodland to woodland over *Acacia trachycarpa*, *Melaleuca glomerata* scattered tall shrubs over \**Cenchrus ciliaris* tussock grassland.

**Vegetation of the sand plains**

**AsTie**: *Acacia stellaticeps* low shrubland to low open heath over *Triodia lanigera*, (*Triodia epactia*) hummock grassland.

**Ta**: *Triodia angusta* (Shaw River form) hummock grassland.

**CzAe**: *Corymbia zygophylla* scattered low trees over *Acacia elachantha*, high open shrubland to open shrubland over *Triodia lanigera* (*Triodia epactia*) hummock grassland.

**AiAs**: *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* open shrubland over *Triodia lanigera* hummock grassland.

**Aie**: *Acacia inaequilatera*, *Acacia elachantha* high open shrubland to high shrubland over *Acacia stellaticeps* low shrubland over *Triodia epactia*, *Triodia lanigera* hummock grassland.

**CP**: *Cullen lachnostachys* high open shrubland over *Cullen martinii* low shrubland over *Triodia lanigera* hummock grassland.

**CAStI**: *Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* high grassland.

**CTi**: *Corymbia hamersleyana*, *Corymbia zygophylla* scattered low trees over *Triodia lanigera* hummock grassland.

**AiTi**: *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* hummock grassland.

**ChAIGH**: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea pyramidalis*, *Hakea lorea* ssp. *lorea*, *Acacia ancistrocarpa* scattered tall shrubs over *Acacia stellaticeps* scattered low shrubs to low shrubland over *Triodia lanigera* hummock grassland.

**GwAs**: *Grevillea wickhamii* ssp. *aprica* high open shrubland to high shrubland over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* hummock grassland.

**AiTs**: *Acacia tumida* (*Acacia inaequilatera*) high open shrubland high shrubland over *Acacia ancistrocarpa* scattered tall shrubs over *Triodia schinzii* hummock grassland.

**GwTs**: *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* high shrubland to high open shrub over *Triodia schinzii* hummock grassland.

**AiTi**: *Corymbia hamersleyana* scattered low trees over *Acacia tumida* tall shrubland to open scrub over *Triodia lanigera* hummock grassland.

**GwAaTi**: *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia ancistrocarpa* (*Acacia inaequilatera*) high shrubland to open shrub over *Triodia lanigera* hummock grassland.

**ChAiaTe**: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

**AiaTw**: *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia wiseana* hummock grassland.

**Vegetation of the eroded edge of the sand plain**

**AabTi**: *Acacia inaequilatera*, *Acacia ancistrocarpa* scattered tall shrubs over *Triodia lanigera* hummock grassland.

**AaPGw**: *Petalostylis labicheoides*, *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera* scattered tall shrubs over *Acacia acrademia* closed shrubland to closed scrub over *Goodenia stobbsiana* scattered low shrubs over *Triodia brizoides* hummock grassland.

**AbTb**: (*Acacia inaequilatera* scattered tall shrubs over) *Acacia hivesiana* scattered tall shrubs over *Triodia brizoides* hummock grassland.

**Ta2**: *Triodia angusta* (Shaw River form) hummock grassland.

**Vegetation of the creeks on the edges (near the river) of the sand plains**

**ChA'**: Scattered low trees of *Corymbia hamersleyana* over *Acacia trachycarpa* scattered tall shrubs over *Crotalaria cunninghamii* scattered shrubs over \**Cenchrus ciliaris*, *Chrysopogon fallax* tussock grassland.

**ChTa**: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form), hummock grassland.

**EvCl**: *Eucalyptus victrix* low woodland over *Cullen leucanthum* (Pan form) high shrubland to open scrub over *Stemodia grossa* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

**EvAtCl**: *Eucalyptus victrix* low open woodland to low woodland over *Acacia tumida* scattered tall shrubs to open scrub over *Cullen leucanthum* scattered tall shrubs to open scrub over *Bothriochloa?*, *Triodia epactia*, *Chrysopogon fallax*, *Eriachne* sp. aff. *festucacea* grassland.

**EvAtP**: *Eucalyptus victrix* scattered trees over *Acacia tumida*, *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia*, (*Eriachne* sp. aff. *festucacea*) hummock grassland/grassland.

**Ca?H\*C**: *Corymbia aspera* scattered trees to open woodland over *Hakea lorea* ssp. *lorea* scattered low trees over \**Cenchrus ciliaris*, *Triodia lanigera*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera* grassland.

**Vegetation of a sand dune adjacent to the Shaw River**

**HTe(TI)**: *Hakea lorea* ssp. *lorea* scattered trees over \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera*, *Triodia epactia* grassland.

**Vegetation of cracking clay areas**

**EbCf**: *Eriachne benthamii*, *Chrysopogon fallax* tussock grassland.

**Ex:** *Eragrostis xerophila* tussock grassland.

**Ds:** *Dichanthum sericeum* ssp. *humilius* annual grassland.

**Eb:** *Eriachne benthamii* tussock grassland.

**Sb:** *Streptoglossa bubakii* open annual herbland over *Ptilotus murrayi* var. *murrayi*, *Fimbristylis* sp. annual herbland/sedgeland.

**Vegetation of the medium sized to large creeks in the foothills of the Gorge Ranges**

**AigTe:** *Acacia inaequilatera* scattered tall shrubs over *Acacia glaucocaesia* scattered shrubs over *Triodia epactia*, \**Cenchrus ciliaris* grassland.

**Ca?hAipa':** *Corymbia laspersa* low open woodland over *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia pyrifolia* (slender, white), *Acacia acradenia* high open shrubland over \**Cenchrus ciliaris* *Triodia epactia* (*Chrysopogon fallax*, *Bothriochloa* sp.) grassland.

**ChAITE:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Corchorus parviflorus* open heath (seral) over *Triodia epactia* hummock grassland.

**Aa'PFTe:** *Acacia acradenia* scattered tall shrubs over *Pluehea ferdinandi-muelleri* low shrubland with *Triodia epactia*, \**Cenchrus ciliaris* grassland.

**EvAtt':** *Eucalyptus victrix* scattered low trees over *Acacia tumida*, *Acacia trachycarpa* scattered tall shrubs over *Cullen leucanthum* scattered tall shrubs to open scrub over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs to open heath over *Corchorus parviflorus* low open shrubland over \**Cenchrus ciliaris* tussock grassland.

**ChAtpa':** *Corymbia hamersleyana* low open woodland over *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Acacia tumida* high open shrubland to high shrubland over *Corchorus parviflorus* low open heath (seral) over \**Cenchrus ciliaris*, *Triodia epactia* grassland.

**EvAt'n':** *Eucalyptus victrix* scattered trees over *Corymbia hamersleyana* scattered low trees over *Acacia trachycarpa*, *Acacia acradenia* scattered tall shrubs over *Cullen leucanthum* tall shrubland to shrubland over \**Cenchrus ciliaris* grassland to closed grassland.

**Vegetation of the low rises and slopes below the escarpment of the Gorge Range**

**(Ch)AITw:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

**AITwp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana*, *Triodia* sp. Panorama hummock grassland.

**AoTe(h):** *Acacia orthocarpa* open shrubland over *Triodia epactia* hummock grassland.

**AITe:** *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland.

**Abt'Te:** *Acacia bivenosa*, *Acacia trachycarpa* scattered shrubs over *Triodia epactia* hummock grassland.

**EIAisTe:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered shrubs over *Acacia stellaticeps* low scattered shrubs to low open shrubland over *Triodia epactia* hummock grassland.

**EIAITp:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

**AITp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.

**AITpe:** *Acacia inaequilatera* occasional tall shrubs over *Triodia* sp. Panorama (*Triodia epactia*) hummock grassland.

**TTe:** *Tephrosia* sp. B (Kimberley Flora) scattered shrubs to open shrubland over *Triodia epactia* hummock grassland.

**AaTe:** *Acacia ancistrocarpa* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.

This unit was fairly extensive. It was recorded at releve M47 on a very gentle slope.

**Ataa'Te:** *Acacia tumida* (*Acacia inaequilatera*) scattered tall shrubs to high open shrublands over *Acacia ancistrocarpa*, *Acacia acradenia* high open shrubland over *Triodia epactia* hummock grassland.

**AgTe:** *Acacia glaucocaesia* scattered tall shrubs over *Triodia epactia* hummock grassland.

**AoTTb:** *Acacia orthocarpa* scattered shrubs over *Tephrosia* scattered shrubs over *Triodia angusta* (Panorama form), *Triodia* cf. *brizoides* open hummock grassland.

**AITb:** *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* (*Triodia wiseana*) hummock grassland.

**Aih':** *Acacia inaequilatera* scattered tall shrubs over *Acacia hilliana* low open heath and *Triodia brizoides* hummock grassland.

**AITbp:** *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides*, *Triodia* sp. Panorama hummock grassland.

**ChAiaTe2:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa* high open shrubland to open scrub over *Triodia epactia* hummock grassland.

**Aia'bTwb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia*, *Acacia synchronicia*, *Acacia bivenosa* scattered shrubs to open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland.

**AibTb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* hummock grassland.

**Aitha'Tb:** *Acacia inaequilatera* scattered tall shrubs over *Acacia tumida*, *Acacia bivenosa*, *Acacia acradenia* scattered shrubs (to small patches of open scrub) over *Triodia brizoides* hummock grassland.

**AsPt:** *Acacia stellaticeps*, *Pluehea tetranthera* (low) open heath with *Triodia epactia* hummock grassland.

**Vegetation of small to medium creeks on slopes of the escarpment of the Gorge Range**

**ChAa':** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland to open scrub over *Indigofera monophylla* (PAN 65-14) (low) open shrubland over *Triodia epactia* hummock grassland.

**ChAitPte:** *Corymbia hamersleyana*, *Acacia inaequilatera* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica* high shrubland over *Petalostylis labichenoides* open scrub over *Corchorus parviflorus*, *Indigofera monophylla* (PAN20-2) shrubland over *Bonania rosea* scattered low shrubs to low shrubland over *Triodia epactia* open hummock grassland.

**Aia'PTp:** *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Triodia* sp. Panorama hummock grassland.



**ChGwAa'Te:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia acradenia* open scrub over *Tephrosia* sp. Bungaroo Creek (M.E. Trudgen 11601) low shrubland over *Polymeria* aff. *calycina* scattered low shrubs and *Triodia epactia* open hummock grassland.

This unit was recorded at quadrat PAN028 on an open flow line with no defined channel, between gently sloping colluvial spurs.

**ChAia'TTe:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* high shrubland to open scrub over *Tephrosia* sp. B (Kimberley Flora) shrubland to open heath [seral] over *Corchorus parviflorus* low shrubland [seral] over *Triodia epactia* open hummock grassland to hummock grassland.

**TrTe:** *Tephrosia* aff. *rosea* low shrubland over *Triodia epactia* hummock grassland.

**ApCo:** *Acacia pyrifolia* (slender, white) (*Flueggia virosa* ssp. *melanthesoides*) scattered tall shrubs to high shrubland over *Cassia oligophylla*, (*Carissa lanceolata*) open shrubland over *Triodia epactia* open hummock grassland.

**Agf:** *Acacia glaucoococesia*, *Acacia farnesiana*, scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

**Aia'Te:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* (high shrubland to) open scrub over *Triodia epactia* hummock grassland.

**ChAa'ITr:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Acacia tumida* open scrub-scrub over *Tephrosia* aff. *rosea* (HD 292-37) open shrubland over *Corchorus parviflorus* low open shrubland over *Triodia epactia* open hummock grassland.

**TeCh:** *Terminalia canescens*, *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia tumida*, *Acacia acradenia* scattered shrubs to high open shrubland over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs over *Triodia epactia* open hummock grassland.

**ChTe:** *Corymbia hamersleyana* scattered low trees to low open woodland over *Triodia epactia* hummock grassland with various shrub layers: 1) Occasional *Acacia ancistrocarpa* high open shrubland to high shrubland. 2) Occasional *Acacia tumida* high open shrubland. 3) Occasional *Tephrosia* aff. *rosea* (HD 292-37) open heath. 4) (Mostly or no shrub layer) *Acacia acradenia* high shrubland to open scrub. 5) Occasional *Grevillea wickhamii* ssp. *aprica* high open shrubland.

#### Vegetation of the escarpment and Gorge Ranges near the gorge

**CPAio:** *Corymbia ferriticola* ssp. *ferriticola*, *Ficus platypoda* var. D scattered low trees/tall shrubs over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over patches of *Acacia orthocarpa* shrubs over *Triodia epactia* (*Eriachne mucronata* (typical form)) open grassland to grassland.

**AiGwTb:** *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Triodia brizoides* hummock grassland.

**GwAoTe:** *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia orthocarpa* open shrubland to open heath over *Triodia epactia* hummock grassland.

**GwAtoTe:** *Grevillea wickhamii* ssp. *aprica*, *Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia epactia* hummock grassland.

**EiChAiTb:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Hakea choridophylla* scattered tall shrubs over *Cassia glutinosa* scattered shrubs over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

**EiAt:** *Acacia tumida* low woodland with scattered *Eucalyptus leucophloia*.

**AtTe:** *Acacia tumida* low open forest to open forest over *Triodia epactia* hummock grassland.

**TeTe:** *Terminalia canescens* open woodland over *Flueggea virosa* subsp. *melanthesoides* scattered tall shrubs over *Eriachne tenuiculmis*, *Triodia epactia* open tussock, hummock grassland to grassland.

**Aio'GwTb:** *Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrub over *Indigofera muniphylla* [seral] low shrubland to low open heath over *Triodia brizoides* hummock grassland.

**\*AiTw:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.

**Aip'Tb:** *Acacia inaequilatera* tall scattered shrubs over *Acacia bivenosa* scattered shrubs over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland.

**ChAip':** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs to high open shrubland over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland.

**ChTp:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Acacia bivenosa* scattered shrubs over *Triodia* sp. Panorama hummock grassland.

**TcTb:** *Terminalia canescens* scattered low trees over *Triodia brizoides* scattered hummocks.

**ChApa'Tw:** *Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white), *Acacia acradenia* scattered tall shrubs over *Triodia wiseana* hummock grassland.

**#Tw:** *Triodia wiseana* hummock grassland.

**#ChAa'CeTb:** *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* shrubland over *Triodia brizoides* hummock grassland.

#### Vegetation of the large creek in the gorge through the escarpment

**EvAe:** *Eucalyptus camaldulensis* var. *obtusata*, *Eucalyptus victrix* open woodland over *Acacia coriacea* subsp. *pendens*, *Atalaya hemiglanca* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla* high shrubland over *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Cymbopogon procerus*, *Triodia epactia*, \**Cenchrus ciliaris* tussock, hummock grassland.

**EvAe:** *Eucalyptus victrix* scattered trees over *Acacia coriacea* ssp. *pendens* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggea virosa* ssp. *melanthesoides* open to closed scrub over (*Triodia epactia*), *Cenchrus ciliaris*, *Cymbopogon procerus* open hummock, tussock grassland.

**EvMlg:** *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub.

**Vegetation of hill slopes and crests****Vegetation of hill and ridge crests**

#PmTm: *Corchorus* aff. *laniflorus* (PAN 76), *Dampiera candidans*, *Ptilotus mollis* low shrubland over *Triodia melvillei*, *Eriachne mucronata* (typical form) very open to open hummock grassland/grassland

#AioTm: *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Triodia melvillei* hummock grassland

#AiaTm: *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera*, *Acacia bivenosa* high open shrubland over *Triodia melvillei* hummock grassland

#EIAaImTb: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland

#EIAIPmTb: *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides* hummock grassland

#AIPmTp: *Acacia inaequilatera*, *Petalostylis labicheoides* high open shrubland to high shrubland over *Corchorus* aff. *laniflorus* (PAN 76), *Euphorbia* aff. *drummondii* (HD195-16) low open shrubland over *Triodia* sp. Panorama, *Triodia brizoides* hummock grassland

#AthThTm: *Acacia tumida* high shrubland to open scrub over *Templetonia hookeri*, *Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides* scattered tall shrubs over *Acacia hilliana*, *Gossypium stobbsiana* low open shrubland over *Triodia melvillei* hummock grassland.

#EIAaTm: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* (*Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides* high shrubland to open scrub over *Triodia melvillei* hummock grassland.

#EIAadhTm: *Eucalyptus leucophloia* scattered low trees over *Acacia adoxa* var. *adoxo*, *Acacia hilliana* low open heath over *Triodia melvillei* hummock grassland.

#EIAihTm: *Eucalyptus leucophloia* scattered low trees over *Acacia tumida* scattered to high open shrubland over *Acacia hilliana* low shrubland over *Triodia melvillei* hummock grassland.

#EIAiTe: *Eucalyptus leucophloia* scattered low trees over *Acacia tumida* high open shrubland over *Triodia epactia* hummock grassland

#EIAaTe: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, (*Acacia tumida*) high open shrubland over *Triodia epactia* hummock grassland

#ACTe: *Acacia tumida* open high shrubland to high shrubland over *Triodia epactia* hummock grassland.

#GwTe: *Grevillea wickhamii* ssp. *aprica* high shrubland over *Triodia epactia* hummock grassland

**Vegetation of the upper slopes of ridges and hills**

#ACTm: *Acacia tumida* open high shrubland to high shrubland over *Triodia melvillei* hummock grassland.

#AiaCyTm: (*Corymbia hamersleyana*) scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs to high open shrubland over *Corchorus* aff. *laniflorus* (PAN 76), (*Indigofera monophylla* (PAN 57-9)) scattered shrubs over *Triodia melvillei* (*Triodia wiseana*) hummock grassland.

#GwAsTb: *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla*, *Waltheria virgata*, *Dampiera candidans*, *Gossypium cusackiana* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland.

#EIAhTb: *Eucalyptus leucophloia* scattered low trees over (*Acacia bivenosa* scattered shrubs over) *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia brizoides* (*Triodia epactia*) hummock grassland

#AtoTb: *Acacia tumida* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland.

#EIAa'dTb: *Eucalyptus leucophloia* scattered low trees over *Acacia orthocarpa* (wispy form) open high shrubland over *Acacia adoxa* var. *adoxo* low open shrubland over *Triodia brizoides*, (*Triodia epactia*) hummock grassland

#ChAa'CeTw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over (*Cajanus cinereus* scattered shrubs over) *Triodia wiseana* hummock grassland

#EIApTb: *Eucalyptus leucophloia* scattered trees over *Acacia psychophylla* low shrubland over *Triodia brizoides* hummock grassland

#EIAa'sTb: *Eucalyptus leucophloia* scattered trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia spondylophylla* open shrubland over *Triodia brizoides* hummock grassland.

#Aib'sTb: *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* shrubland over *Acacia spondylophylla* low open shrubland over *Triodia brizoides* hummock grassland.

#EITb: *Eucalyptus leucophloia* scattered low trees over *Triodia brizoides* hummock grassland

#EIAIGwTb: *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Triodia brizoides* hummock grassland.

#CgImAdTb: (*Acacia inaequilatera* scattered tall shrubs over) *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland over *Triodia brizoides* hummock grassland.

#EIAIGwTb: *Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* sp. low open shrubland to scattered low shrubs over *Triodia brizoides* open hummock grassland to hummock grassland.

#AioGaTb: *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* (wispy form) open high shrubland over *Gossypium australe* (Whim Creek form) open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland

#AoTb: *Acacia orthocarpa* (wispy form) over *Triodia brizoides* hummock grassland.

#AisImTb: *Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla*, *Indigofera monophylla* (PAN57-9) low shrubland over *Triodia brizoides* hummock grassland.

#EICgImTb: *Eucalyptus leucophloia* scattered low trees over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia brizoides* hummock grassland.

- #ChAa'Tb: *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* high shrubland over *Triodia brizoides* hummock grassland.
- #CFCa'Te: *Corymbia ferriticola*, *Eucalyptus leucophloia* low open woodland over *Triodia epactia*, (*Triodia brizoides*), *Cymbopogon ambiguus* grassland/hummock grassland
- #EIAa'Gw'Te: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia epactia* hummock grassland.
- #EIAa'Te: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* open shrubland over *Triodia epactia* hummock grassland
- #EITe: *Eucalyptus leucophloia* scattered low trees over *Triodia epactia* hummock grassland
- #EIGwAp'Te: *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia epactia* hummock grassland
- #Aio'Ts'Tw: *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), (*Gossypium australe* (Whim Creek form)) scattered tall shrubs over *Tephrosia spechtii*, *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland
- #Aio'ImTw: *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) scattered shrubs over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana*.
- #CI'ImTw: Scattered *Cullen leucochaites* shrubs to open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland
- #EIGwAs'Tw: *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana*, (*Triodia brizoides*) hummock grassland.
- Vegetation of the mid-slopes of hills and ridges**
- #Aio'Tw: *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland.
- #GwAis'Tb: *Grevillea wickhamii* ssp. *aprica*, *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low shrubland over *Triodia brizoides* hummock grassland
- #AimTb: *Acacia inaequilatera* high open shrubland over *Indigofera monophylla* (PAN 57-9) low shrubland to low open shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland
- #AibTb: Scattered *Acacia inaequilatera* over scattered *Acacia bivenosa* over *Triodia brizoides* hummock grassland.
- #AiTb: (*Acacia inaequilatera*) scattered tall shrub over *Triodia brizoides* hummock grassland
- #EIAa'Tb: *Eucalyptus leucophloia* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia brizoides* hummock grassland
- #Aios'Tb: *Acacia inaequilatera* (*Acacia bivenosa*) scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Acacia spondylophylla* open low shrubland to shrubland over *Triodia brizoides* hummock grassland
- #ChAioTb: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia brizoides* hummock grassland
- #ChAoImTb: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* high shrubland to open scrub over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia brizoides* hummock grassland
- #Aih'sTb: *Acacia inaequilatera* scattered tall shrubs over *Acacia hilliana* (*Acacia spondylophylla*) low shrubland over *Triodia brizoides* hummock grassland
- #Aa'h'As'Tb: *Acacia inaequilatera* scattered low trees over *Acacia acradenia* high open shrubland over *Acacia bivenosa* open shrubland over *Acacia hilliana*, *Acacia spondylophylla* scattered low shrublands over *Triodia brizoides* hummock grassland
- #EIAiCgTb: *Eucalyptus leucophloia* (*Corymbia hamersleyana*) scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.
- #Abp'CGTb: *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa*, *Cassia glutinosa* open shrubland to shrubland over *Corchorus* sp. Panorama scattered low shrubs over *Triodia brizoides* hummock grassland.
- #Aio'Tb: *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form) high open shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia brizoides* hummock grassland.
- #Aio'Ts'Tb: *Acacia inaequilatera*, *Acacia orthocarpa* (wispy form), *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Indigofera monophylla* (PAN 58-17), *Tephrosia spechtii* low shrubland over *Triodia brizoides* hummock grassland.
- #Ao'AdTb: *Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* open high shrubland over *Indigofera monophylla* (PAN 58-17), *Acacia adoxa* var. *adoxo* low shrubland to low open shrubland over *Triodia brizoides* hummock grassland.
- #GaTs'Tb: *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Gossypium australe* (Whim Creek form) scattered shrubs over *Corchorus* aff. *laniflorus* (PAN 76), *Tephrosia spechtii*, *Euphorbia* aff. *drummondii* (MET 15,030) over *Triodia brizoides*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii* hummock grassland/grassland/sedgeland
- #AhdTb: (*Corymbia hamersleyana* scattered low trees) over *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia hilliana*, *Acacia adoxa* var. *adoxo*, (*Indigofera monophylla* (PAN 58-17)) low open shrubland over *Triodia brizoides* hummock grassland
- #Ap'Te: *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* closed hummock grassland
- #EIAp'Te: *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia epactia* (*Triodia brizoides*) hummock grassland
- #Ts'ImTe: (*Eucalyptus leucophloia* scattered low trees over) *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Tephrosia spechtii*, *Indigofera monophylla* (PAN 58-17) low open heath over *Triodia epactia*, *Triodia brizoides* hummock grassland.



- #GwTw: *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Triodia wiseana* hummock grassland
- #ChGwTw: *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia acradenia*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland
- #Aia'Tw: *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* shrubland over *Triodia wiseana* hummock grassland.
- #AiTw: *Acacia inaequilatera* scattered tall shrubs to open high shrubland over *Triodia wiseana* hummock grassland.
- #AiImRmTw: *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 65-14) shrubland to open heath over *Triodia wiseana* hummock grassland.
- #ImTw: *Indigofera monophylla* (PAN 65-14) scattered low shrubs to low open shrubland over *Triodia wiseana* hummock grassland.
- #AITS'Tw: *Acacia inaequilatera* scattered tall shrub over *Tephrosia spechtii* scattered shrubs to open shrubland over *Triodia wiseana* hummock grassland.
- #EITw: *Eucalyptus leucophloia* scattered low trees over *Triodia wiseana* hummock grassland.
- #GCpTw: *Grevillea pyramidalis* scattered tall shrubs over *Corchorus parviflorus* low open shrubland over *Triodia wiseana* hummock grassland
- #ElAbTw: *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia wiseana* hummock grassland.
- Vegetation of the lower to mid- slopes of hills and ridges**
- #Aos'Tw: *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland to shrubland over *Acacia spondylophylla* low open shrubland to shrubland over *Triodia wiseana* hummock grassland.
- #ChAos'Tw: *Corymbia hamersleyana* scattered low trees over *Acacia orthocarpa* high open shrubland over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland
- #Ais'Tw: *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland.
- #Cp'TTI: *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Corchorus* sp. Panorama, *Tephrosia* sp. B (Kimberley Flora), *Tephrosia spechtii* open shrubland to scattered shrubs over *Triodia longiceps*, (*Triodia epactia*) open hummock grassland
- #Aa'bTb: *Acacia acradenia*, *Acacia bivenosa*, *Acacia inaequilatera* scattered shrubs to high open shrubland over *Triodia brizoides* hummock grassland
- #Ap'Tb: *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia brizoides* closed hummock grassland.
- #GwAdTb: *Eucalyptus leucophloia* scattered low trees over *Grevillea wickhamii* subsp. *aprica*, *Acacia acradenia* high shrubland over *Acacia uloxa* var. *uloxa* scattered low shrubs to low open shrubland over *Triodia brizoides* hummock grassland
- #Aa'AdTb: *Acacia inaequilatera*, *Acacia acradenia*, *Grevillea wickhamii* ssp. *aprica* high open shrubland over *Acacia uloxa* var. *uloxa* low shrubland over *Triodia brizoides*, (*Triodia wiseana*) hummock grassland
- #ChAbTb: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* tall shrubs over *Acacia hilliana* low open shrubland to low shrubland over *Triodia brizoides* hummock grassland
- #As'Tb: *Acacia inaequilatera* scattered tall shrubs over *Acacia spondylophylla* low open shrubland to low shrubland over *Triodia brizoides*, *Triodia wiseana* hummock grassland
- #Ab'Tb: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *aprica*, *Acacia bivenosa* scattered high shrubs over *Acacia hilliana* shrubland over *Triodia brizoides* hummock grassland
- #ImAp'Tb: *Acacia inaequilatera* scattered tall shrub over *Cassia glutinosa* scattered shrubs over *Indigofera monophylla* (PAN57-9) *Acacia ptychophylla* low open shrubland to scattered low shrubs over *Triodia brizoides* hummock grassland
- #ElAbTe: *Eucalyptus leucophloia* low scattered trees over *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland
- #Aip'Te: *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland
- #Ah'Te: *Acacia inaequilatera*, *Acacia bivenosa* scattered tall shrubs over *Acacia hilliana* low shrubland to open heath over *Triodia epactia* hummock grassland.
- #Aib'Tw: Scattered *Acacia inaequilatera* over *Acacia bivenosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.
- #ChAa'bTw: *Corymbia hamersleyana* low scattered trees over scattered *Acacia inaequilatera*, *Acacia acradenia* over *Acacia bivenosa* open shrubland to shrubland over *Triodia wiseana* (*Triodia brizoides*) hummock grassland.
- #ChHcGTw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla*, *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland.
- #Ap'As'Tw: *Acacia inaequilatera*, scattered tall shrubs over *Acacia ptychophylla*, (*Acacia spondylophylla*) low shrubland to low open shrubland over *Triodia wiseana*, *Triodia brizoides* hummock grassland
- #Tw: *Triodia wiseana* hummock grassland.
- #CgImTw: Scattered *Cassia pruinosa*, *Cassia glutinosa* shrubs over *Indigofera monophylla* (PAN 58-17) low open heath over *Triodia wiseana* hummock grassland.
- #ITw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Hakea chordophylla* scattered tall shrubs over *Indigofera rugosa* open shrubland to shrubland over *Triodia wiseana* hummock grassland.
- #AiGwAoTw: *Acacia inaequilatera* scattered tall shrubs over *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland
- #ChAITw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*) scattered tall shrubs to high open shrubland over *Triodia wiseana* hummock grassland.
- #ChAiImTw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN57-9) low open shrubland over *Triodia wiseana* hummock grassland.

- #EIAITw: *Eucalyptus leucophloia* scattered low trees over (*Acacia inaequilatera* scattered tall shrubs over) *Triodia wiseana* hummock grassland.
- #ChImTw: *Corymbia hamersleyana* scattered low trees over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland
- #AbImTw: *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland.
- #Aa'ImTw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland to shrubland over *Indigofera monophylla* (PAN 58-17) low shrubland over *Triodia wiseana* hummock grassland.

#### Vegetation of the valley floor

- #AbTp: *Acacia bivenosa* scattered shrubs over *Triodia* sp. Panorama hummock grassland.
- #Tp: *Triodia* sp. Panorama (*Triodia epactia*) open hummock grassland.
- #ChAITa: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland
- #AITa: *Acacia inaequilatera* scattered tall shrubs over *Triodia angusta* (Shaw River form) hummock grassland
- #Ta: *Triodia angusta* (Shaw River form) hummock grassland.
- #AICpTw: *Acacia inaequilatera* scattered tall shrubs over *Corchorus parviflorus* scattered low shrubs to low open shrubland and *Triodia wiseana* hummock grassland.
- #ChAa'Tw: *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* high open shrubland (in parts) over *Triodia wiseana* hummock grassland.
- #Aa'GwTw: *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland.
- #GHcTw: *Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis*, *Hakea chordophylla* scattered tall shrubs over *Triodia wiseana* hummock grassland
- #Aa'TwTm: *Acacia acradenia*, (*Acacia inaequilatera*, *Hakea chordophylla*) high shrubland to high open shrubland over *Triodia wiseana* (*Triodia melvillei*) hummock grassland
- #ChAbTw: *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia bivenosa* scattered tall shrubs over *Triodia wiseana* hummock grassland.
- #GCgTw: *Grevillea pyramidalis*, *Cassia glutinosa* scattered tall shrubs over *Triodia wiseana* hummock grassland to closed hummock grassland.
- #ChGTw: *Corymbia hamersleyana* scattered low trees over *Grevillea pyramidalis* scattered tall shrubs over *Triodia wiseana* hummock grassland
- #ChAp'Tw: *Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland over *Triodia wiseana* hummock grassland.
- #ChTw: *Corymbia hamersleyana* scattered low trees over *Triodia wiseana* hummock grassland.
- #ChGwHcTw: *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Hakea chordophylla*, *Acacia acradenia* tall shrubs over *Triodia wiseana* hummock grassland
- #CIAa'Tw: *Acacia inaequilatera* scattered tall shrubs over *Cullen leucanthum*, (*Grevillea wickhamii* ssp. *aprica*) high open shrubland over *Acacia acradenia* open heath to closed heath over *Indigofera monophylla* (PAN 58-17) low shrubland to low open heath over *Triodia wiseana* hummock grassland
- #ChAp'Te: *Corymbia hamersleyana*, *Eucalyptus leucophloia* scattered low trees over *Acacia ptychophylla* low shrubland to low open heath over *Triodia epactia* hummock grassland.
- #Aa'HcTe: *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Hakea chordophylla*, *Acacia bivenosa* high open shrubland over *Triodia epactia* hummock grassland.
- #ChAa'Te: *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland.
- #GwAp'Te: *Grevillea wickhamii* ssp. *aprica* scattered tall shrub to high open shrubland over *Acacia ptychophylla* low open shrubland over *Triodia epactia* hummock grassland.
- #ChAp'Tm: *Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia melvillei* hummock grassland

#### Vegetation of creeks, rivers and gorges

##### Vegetation of small flowlines and creeks

- #EIAIPTe: *Eucalyptus leucophloia* scattered low trees over *Acacia tumida*, *Grevillea wickhamii* ssp. *aprica*, *Petalostylis labicheoides*, *Acacia bivenosa* high open shrubland to high shrubland over *Acacia ptychophylla*, *Acacia spondylophylla* scattered low shrubs over *Triodia epactia*, (*Triodia angusta* (Shaw River form)) closed hummock grassland.
- #AIPGrTe: *Acacia tumida* low woodland to low open forest (pre-fire) to high shrubland over *Corymbia hamersleyana* scattered low trees over *Petalostylis labicheoides*, *Gossypium robinsonii* high shrubland over *Cajanus cinereus*, *Tephrosia* aff. *rosea* (HD292-37) shrubland over *Triodia epactia*, *Triodia wiseana* very open hummock grassland
- #AICeTw: *Acacia tumida* low open forest over *Acacia acradenia*, *Cajanus cinereus*, *Acacia pyrifolia* (slender, white), *Cassia glutinosa* closed scrub over *Indigofera monophylla* (PAN 65-14) low shrubland over *Triodia wiseana* hummock grassland.
- #AIPTe: *Acacia tumida* low open forest to open forest over *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia* hummock grassland.
- #ApCn: *Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* (slender, white) open scrub over *Carissa lanceolata*, *Cajanus cinereus*, *Cassia oligophylla*, *Cassia glutinosa* closed scrub.
- #ApCpTw: *Acacia pyrifolia* (slender, white) high open shrubland to high shrubland over *Indigofera monophylla* (PAN57-9), *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Corchorus parviflorus* open shrubland to shrubland over *Triodia wiseana* hummock grassland.

#Aa'PTe: *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, (*Grevillea wickhamii* ssp. *aprica*) open scrub over *Petalostylis labicheoides* high open shrubland over *Triodia epactia*, *Triodia wiseana* hummock grassland

#Aa'CeTa: *Corymbia hamersleyana* scattered low trees over *Acacia acradenia*, *Cajanus cinereus*, *Grevillea wickhamii* subsp. *aprica*, *Acacia pyrifolia* (slender, white) *Petalostylis labicheoides* open shrub over *Triodia angusta* (Shaw River form) hummock grassland

#### Vegetation of medium sized Creeks

#EvMlgTe: *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub over, *Petalostylis labicheoides*, *Cajanus cinereus* (*Acacia tumida*) high shrubland over *Triodia epactia*, (*Triodia* sp. Panorama, *Triodia wiseana*)

#EvAtPTe: *Eucalyptus victrix* scattered trees to open woodland over *Acacia tumida*, *Acacia acradenia*, *Acacia pyrifolia* (slender, white), *Gnypsum robinsonii* high shrubland over *Petalostylis labicheoides*, *Cajanus cinereus*, *Cassia glutinosa*, *Tephrosia* aff. *rosea* (IID 292-37) open shrubland to shrubland over *Triodia epactia* hummock grassland.

#EvTp'Tw: *Eucalyptus victrix* scattered low trees to trees over *Acacia acradenia*, *Acacia pyrifolia* (slender, white) high open shrubland over *Cajanus cinereus* scattered shrubs to open shrubland over *Themeda* sp. Panorama, *Triodia wiseana*, *Cyperus vaginatus* tussock, hummock grassland/sedgeland and *Stemodia grossa* herbland.

#### Vegetation of creeks with permanent or semi-permanent water

#EveTl: *Eucalyptus victrix*, *Eucalyptus camaldulensis*, *Melaleuca argentea* open forest over *Acacia ampliceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia longiceps* sedgeland, hummock grassland.

#### River vegetation

#EcMgCv: *Eucalyptus camaldulensis* open forest over *Melaleuca glomerata*, *Atalaya hemiglauca* low forest over *Cyperus vaginatus* open sedgeland to sedgeland over \**Cynodon dactylon*, \**Cenchrus ciliaris* grassland.

#EaMaCv: *Eucalyptus camaldulensis* var. *obtusata*, *Melaleuca argentea* open to closed forest over *Acacia ampliceps*, *Acacia coriacea* var. *pendens*, *Atalaya hemiglauca* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggea virosa* ssp. *melanthesoides* scattered tall shrubs over *Cyperus vaginatus* \**Cenchrus ciliaris*, *Cynodon dactylon*, \**Argemone ochroleuca* very open sedgeland and herbland, grassland

#### Vegetation of gorge walls, steep gully slopes and rocky creek lines

#AbEsFp: *Atalaya hemiglauca*, *Acacia pruinocarpa*, *Ehretia saligna* var. *saligna*, *Acacia tumida*, *Ficus platypoda* high open shrubland over *Cassia glutinosa*, *Cassia vestita* scattered shrubs over *Triodia epactia* (*Cymbopogon ambiguus*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Eriachne mucronata* (typical form)) open hummock grassland/grassland/sedgeland

#ElAtTe: *Eucalyptus leucophylla* (*Corymbia hamersleyana*) scattered low trees over *Acacia tumida* low open forest over *Acacia orthocarpa*, *Petalostylis labicheoides*, *Cassia glutinosa* high open shrubland over (*Tephrosia spechtii*), *Corchoris parviflorus* scattered low shrubs to shrubland over *Triodia epactia* hummock grassland

#CcImTw: *Cajanus cinereus* open to closed heath over *Indigofera monophylla* (PAN 58-17) low open shrubland over *Triodia wiseana* hummock grassland

#TcAhSg: *Terminalia canescens* low woodland over *Atalaya hemiglauca*, *Acacia collei*, *Acacia acradenia*, *Cajanus cinereus* open shrubland over *Stemodia grossa*

#TcMgITp: *Terminalia canescens* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla*, *Flueggea virosa* subsp. *melanthesoides*, *Acacia pyrifolia* (slender, white) open scrub over *Triodia* sp. Panorama, *Cyperus vaginatus* sedgeland/grassland and *Flaveria australasica*, *Stemodia grossa* herbland

#### Rockpile vegetation

#CrFvFo: *Acacia coriacea* subsp. *pendens* scattered low trees over *Clerodendrum floribundum* var. *angustifolium*, *Clerodendrum tomentosum*, *Cajanus cinereus*, *Flueggea virosa* subsp. *melanthesoides*, *Ficus opposita* scattered tall shrubs over *Triodia wiseana*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii* very open hummock/tussock grassland/sedgeland.

**APPENDIX 12 Photographs of selected quadrats and relevés recorded for the  
Panorama vegetation and flora survey**





**Photograph 1:** *Grevillea wickhamii* subsp. *aprica* open heath to open scrub over *Acacia ancistrocarpa* scattered shrubs over *Acacia stellaticeps* low shrubland to shrubland and *Triodia lanigera* hummock grassland. Access track from Marble Bar road to Sulphur Springs. Quadrat PAN003.



**Photograph 2:** *Acacia stellaticeps* scattered low shrubs over *Triodia epactia*, *Triodia lanigera* hummock grassland. Quadrat PAN005 Access track from the Marble Bar road to Sulphur Springs.





**Photograph 3:** *Acacia stellaticeps* low open heath over *Pluchea tetranthera* scattered low shrubs over *Triodia lanigera* hummock grassland over *Eragrostis eriopoda* scattered hummock grasses. Quadrat PAN007. Access track from Marble Bar road to Sulphur Springs.



**Photograph 4:** *Acacia coriacea* subsp. *coriacea*, *Acacia tumida*, *Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Acacia stellaticeps* scattered shrubs over *Corchorus elachocarpus*, *Cullen martinii* low shrubland over *Triodia lanigera* hummock grassland. Quadrat PAN008. Access track from the Marble Bar road to Sulphur Springs.





**Photograph 5:** *Corymbia zygomphyla* scattered trees over *Acacia tumida*, *Grevillea wickhamii* subsp. *aprica*, *Acacia inaequilatera* open scrub over *Acacia ancistrocarpa* shrubland over *Triodia schinzii* closed hummock grassland. Quadrat PAN012. Access track from the Marble Bar road to Sulphur Springs.



**Photograph 6:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp *aprica* over *Acacia ancistrocarpa* high shrubland over *Indigofera monophylla* (small calyx form), *Tephrosia* sp Bungaroo Creek (MET 11601) scattered low shrubs over *Triodia lanigera* hummock grassland and *Bonamia linearis*, *Polymeria* aff. *calycina* low open lianes. Quadrat PAN013. Access track from the Marble Bar road to Sulphur Springs.





**Photograph 7:** *Grevillea wickhamii* subsp *aprica* (*Acacia inaequilatera*) scattered tall shrubs over *Acacia ancistrocarpa* high shrubland over *Acacia bivenosa* shrubland over *Goodenia stobbsiana*, *Corchorus parviflorus* low shrubland and *Triodia lanigera* hummock grassland. Quadrat PAN015. Access track from the Marble Bar road to Sulphur Springs.



**Photograph 8:** *Acacia synchronicia* (*Corymbia hamersleyana*) scattered tall shrubs to low trees over *Acacia ancistrocarpa*, *Acacia bivenosa* scattered tall shrubs over *Cassia stricta*, *Cassia glutinosa* scattered shrubs over *Triodia epactia*, *Triodia lanigera* hummock grassland. Quadrat PAN019. Access track from the Marble Bar road to Sulphur Springs.





**Photograph 9:** *Acacia inaequilatera* scattered tall shrubs over *Triodia epactia* hummock grassland. Quadrat PAN022. Access track from the Marble Bar road to Sulphur Springs.



**Photograph 10:** Scattered low trees of *Acacia inaequilatera*, *Corymbia hamersleyana* over *Acacia tumida* high shrubland over *Petalostylis labicheoides* open scrub over *Indigofera monophylla* (PAN20-2) shrubland over *Bonamia rosea* scattered low shrubs to low shrubland over *Triodia epactia* open hummock grassland. Quadrat PAN023. Access track from the Marble Bar road to Sulphur Springs.





**Photograph 11:** *Acacia tumida*, *Acacia inaequilatera*, *Grevillea wickhamii* ssp *aprica*, *Acacia ancistrocarpa* open scrub over *Corchorus parviflorus*, *Indigofera monophylla* (PAN20-2) low open shrubland over *Triodia epactia* hummock grassland. Quadrat PAN024 Access track from the Marble Bar road to Sulphur Springs area.



**Photograph 12:** *Acacia inaequilatera* scattered tall shrubs over *Triodia* sp. panorama, *Triodia wiseana* closed hummock grassland. Quadrat PAN027. Access track from the Marble Bar road to Sulphur Springs area).





**Photograph 13:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp *aprica* high open shrubland over *Acacia acradenia* open scrub over *Tephrosia* sp. Bungaroo Creek (M.E. Trudgen 11601) low shrubland over *Triodia epactia* open hummock grassland. Quadrat PAN028. Access track to Sulphur Springs.



**Photograph 14:** *Eucalyptus victrix* scattered trees over *Corymbia hamersleyana* scattered low trees over *Acacia trachycarpa*, *Acacia acradenia* scattered tall shrubs over *Cullen leucanthum* tall shrubland to shrubland over *Cenchrus ciliaris* grassland to closed grassland. Quadrat PAN032. Access track to Sulphur Springs.





**Photograph 15:** *Tephrosia* sp. B Kimberley Flora (C.A. Gardner 7300) open shrubland over *Triumfetta propinqua* low open shrubland over *Cymbopogon ambiguus*, *Triodia epactia* tussock, hummock open grassland. Quadrat PAN035. Access track to Sulphur Springs.



**Photograph 16:** Regrowth 3 to 4 years after fire of *Acacia tumida* low woodland to low open forest over *Petalostylis labicheoides*, *Gossypium robinsonii* high shrubland over *Cajanus cinereus*, *Tephrosia* aff. *rosea* (HD292-37) shrubland over *Triodia epactia* very open hummock grassland. Quadrat PAN039. Sulphur Springs survey area.





**Photograph 17:** *Corymbia hamersleyana*, *Eucalyptus leucophloia* scattered low trees over *Acacia ptychophylla* low shrubland to low open heath over *Triodia epactia* hummock grassland. Quadrat PAN040, Sulphur Springs area.



**Photograph 18:** *Acacia tumida* low open forest to open forest over *Petalostylis labicheoides* scattered tall shrubs over *Triodia epactia* hummock grassland. Quadrat PAN042, Sulphur Springs area.





**Photograph 19:** *Triodia* sp. Panorama (*Triodia epactia*) open hummock grassland. Quadrat PAN043, Sulphur Springs area.



**Photograph 20:** *Acacia inaequilatera*, *Acacia acradenia* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* open hummock grassland to hummock grassland. Quadrat PAN045, Sulphur Springs area.





**Photograph 21:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia*, *Acacia spondylophylla* scattered shrubs over *Triodia wiseana* hummock grassland. Quadrat PAN047, proposed tailings dam site, Sulphur Springs area. PAN048 was located on the slopes in the background.



**Photograph 22:** *Corymbia hamersleyana* scattered low trees over *Acacia tumida*, *Acacia acradenia*, *Petalostylis labicheoides* open scrub over *Cajanus cinereus*, *Indigofera monophylla* (PAN57-9) open shrubland over *Triodia wiseana* hummock grassland. Quadrat PAN049, proposed tailings dam site, Sulphur Springs area.





**Photograph 23:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland. Quadrat PAN050, proposed tailings dam site, Sulphur Springs area.



**Photograph 24:** *Acacia inaequilatera* scattered tall shrubs over *Acacia acradenia* open shrubland in parts over *Triodia wiseana* hummock grassland. Quadrat PAN051, proposed tailings dam site, Sulphur Springs area.





**Photograph 25:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* shrubland over *Acacia spondylophylla* low open shrubland over *Triodia brizoides* hummock grassland. Quadrat PAN052, slopes adjacent to proposed mill site, Sulphur Springs area.



**Photograph 26:** *Acacia inaequilatera* scattered tall shrubs over *Acacia ptychophylla* open shrubland over *Triodia brizoides* closed hummock grassland. Quadrat PAN053, edge of proposed tailings dam site, Sulphur Springs area.





**Photograph 27:** *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland. Quadrat PAN054, Kangaroo Caves area.



**Photograph 28:** *Hakea lorea* ssp. *lorea*, *Corymbia hamersleyana* scattered low trees over *Triodia wiseana* hummock grassland. Quadrat PAN055, Kangaroo Caves survey area.





**Photograph 29:** *Acacia inaequilatera* scattered tall shrubs over *Triodia brizoides*, *Triodia wiseana* closed hummock grassland. Quadrat PAN056, Kangaroo Caves area.



**Photograph 30:** *Corymbia hamersleyana* scattered low trees over *Acacia tumida* scattered tall shrubs over *Petalostylis labicheoides*, *Acacia acradenia*, tall shrubland over *Acacia spondylophylla*, *Tephrosia* aff. *rosea* (HD292-37) open shrubland over *Triodia wiseana* hummock grassland and *Cassytha capillaris* low lianes. Quadrat PAN057, Kangaroo Caves area.



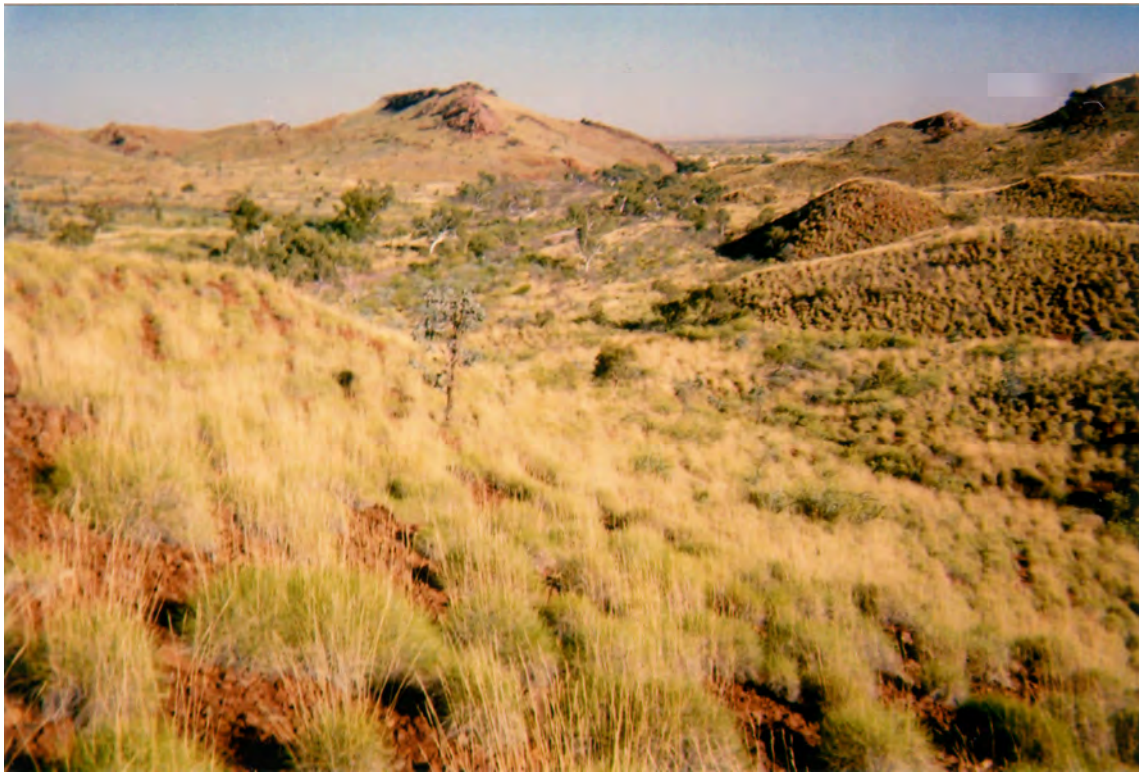


**Photograph 31:** *Grevillea pyramidalis* scattered tall shrubs over *Corchorus parviflorus* low open shrubland over *Triodia wiseana* hummock grassland. Quadrat PAN058, Bernts survey area.



**Photograph 32:** *Eucalyptus camaldulensis* open forest over *Melaleuca glomerata*, *Atalaya hemiglauca* low forest over *Cyperus vaginatus* open sedgeland to sedgeland over \**Cynodon dactylon*, \**Cenchrus ciliaris* grassland. Quadrat PAN062, Bernts area.





**Photograph 33:** *Triodia wiseana* hummock grassland. Quadrat PAN064 (foreground), looking north in an open section of the gorge on the access track to Sulphur Springs).



**Photograph 34:** *Eucalyptus camaldulensis* var. *obtus*a, *Eucalyptus victrix* open woodland over *Acacia coriacea* subsp. *pendens*, *Atalaya hemiglauca* scattered low trees over *Melaleuca glomerata*, *Melaleuca linophylla* high shrubland over *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Cymbopogon procerus*, *Triodia epactia*, \**Cenchrus ciliaris* tussock, hummock grassland. Quadrat PAN065, access track to Sulphur Springs.





**Photograph 35:** *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla* (PAN 58-17), *Corchorus parviflorus*, low open heath over *Triodia brizoides* (*Triodia epactia*) closed hummock grassland. Quadrat PAN067, in the gorge, access track to Sulphur Springs.



**Photograph 36:** *Eucalyptus victrix*, *Acacia coriacea* var. *pendens* scattered low trees over *Melaleuca linophylla*, *Melaleuca glomerata* shrubland to high shrubland over *Cymbopogon procerus* scattered tussock grasses. Quadrat PAN068, in the gorge, access track to Sulphur Springs).





**Photograph 37:** *Terminalia canescens* open woodland over *Flueggea virosa* subsp. *melanthesoides* scattered tall shrubs over *Eriachne tenuiculmis*, *Triodia epactia* open tussock, hummock grassland to grassland. Quadrat PAN069, side creek in gorge, access track to Sulphur Springs.



**Photograph 38:** *Eucalyptus victrix* scattered trees over *Acacia coriacea* ssp *pendens*, *Atalaya hemiglauca* low open woodland over *Melaleuca glomerata*, *Melaleuca linophylla* open to closed scrub over *Triodia epactia*, *Cenchrus ciliaris*, *Cymbopogon procerus* open hummock, tussock grassland. Quadrat PAN071, in the gorge, access track to sulphur Springs.





**Photograph 39:** *Eucalyptus leucophloia* scattered low trees over *Acacia inaequilatera*, *Acacia acradenia* scattered high shrubs over *Cassia glutinosa* scattered shrubs over *Triodia brizoides* closed hummock grassland. Quadrat PAN073, in the gorge, access track to Sulphur Springs.



**Photograph 40:** *Eucalyptus victrix* scattered trees over *Melaleuca linophylla*, *Melaleuca glomerata* open scrub. Quadrat PAN075, in the gorge, access track to Sulphur Springs).





**Photograph 41:** *Eucalyptus victrix*, *Melaleuca argentea* open forest over *Acacia ampliceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia longiceps* sedgeland, hummock grassland. Quadrat PAN077, Sulphur Springs survey area, on the access track to Kangaroo Caves.



**Photograph 42:** Detail showing the *Schoenus falcatus* sedgeland understory in Quadrat PAN077, Sulphur Springs survey area, on access track to Kangaroo Caves (also see the photograph above).





**Photograph 43:** *Acacia inaequilatera* (*Grevillea wickhamii* ssp. *aprica*) scattered tall shrubs over *Triodia wiseana* (*Triodia brizoides*) hummock grassland. Quadrat PAN078, Kangaroo Caves survey area.



**Photograph 44:** *Acacia pyrifolia* (slender, white) high open shrubland to high shrubland over *Indigofera monophylla* (PAN57-9), *Tephrosia* aff. *rosea* (HD292-37) scattered shrubs over *Corchorus parviflorus* open shrubland to shrubland over *Triodia wiseana* hummock grassland. Quadrat PAN079, Kangaroo Caves survey area.





**Photograph 45:** *Acacia inaequilatera*, *Grevillea wickhamii* ssp *aprica* scattered tall shrubs over *Triodia brizoides* hummock grassland. Quadrat PAN080, Kangaroo Caves survey area.



**Photograph 46:** Small patch of *Acacia coriacea* subsp. *pendens* low woodland over *Triodia wiseana* hummock grassland on a rockpile. Quadrat PAN081, Sulphur Springs survey area, along access track to Kangaroo Caves. This site is next to the creek where PAN 077 was recorded





**Photograph 47:** *Melaleuca argentea* low woodland to woodland over *Acacia trachycarpa*, *Melaleuca glomerata* scattered tall shrubs over \**Cenchrus ciliaris* tussock grassland. Releve M14, bed of Shaw River, adjacent to access track from Marble Bar road to Sulphur Springs.



**Photograph 48:** *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* hummock grassland. Releve M16, access track from Marble Bar road to Sulphur Springs.





**Photograph 49:** *Hakea lorea* scattered trees over \**Cenchrus ciliaris*, *Aristida holathera* var. *holathera*, *Triodia epactia* grassland. Releve M19, sand dune adjacent to Shaw River and access track from Marble Bar road to Sulphur Springs. This was one of the few locations in the Panorama survey areas where a weed (in this case \**Cenchrus ciliaris*) was abundant.



**Photograph 50:** *Eucalyptus victrix* low woodland over *Cullen leucanthum* (Panorama form) high shrubland to open scrub over *Stemodia grossa* low open shrubland over \**Cenchrus ciliaris* tussock grassland. Releve M20, along access track from Marble Bar road to Sulphur Springs area).





**Photograph 51:** *Corymbia flavescens* scattered trees to open woodland over *Hakea lorea* ssp. *lorea* scattered low trees over \**Cenchrus ciliaris*, *Triodia lanigera*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera* grassland. Releve M21, access track from Marble Bar road to Sulphur Springs area).



**Photograph 52:** *Grevillea wickhamii* ssp. *aprica* high open shrubland to high shrubland over *Acacia stellaticeps* scattered low shrubs over *Triodia lanigera* hummock grassland. Releve M22, access track from Marble Bar road to Sulphur Springs.





**Photograph 53:** *Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* ssp. *aprica*, *Acacia ancistrocarpa* (*Acacia inaequilatera*) high shrubland to open shrub over *Triodia lanigera* hummock grassland. Releve M25, access track from Marble Bar road to Sulphur Springs.



**Photograph 54:** *Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* scattered (tall) shrubs over *Triodia wiseana* hummock grassland. Releve M34, access track from Marble Bar road to Sulphur Springs.





**Photograph 55:** *Acacia acradenia* scattered tall shrubs over *Pluchea ferdinandi-muelleri* low shrubland with *Triodia epactia*, \**Cenchrus ciliaris* grassland. Releve M57, access track from Marble Bar road to Sulphur Springs area).



**Photograph 56:** *Acacia stellaticeps*, *Pluchea tetranthera* (low) open heath with *Triodia epactia* hummock grassland. Releve M69, access track from Marble Bar road to Sulphur Springs.





**Photograph 57:** *Acacia pyrifolia* (slender, white), (*Flueggia virosa* ssp. *melanthesoides*) scattered tall shrubs to high shrubland over *Cassia oligophylla*, (*Carissa lanceolata*) open shrubland over *Triodia epactia* open hummock grassland. Releve M82, access track from Marble Bar road to Sulphur Springs.



**Photograph 58:** Small creek with *Terminalia canescens*, *Corymbia hamersleyana* scattered low trees to low open woodland over *Acacia tumida*, *Acacia acradenia* scattered shrubs to high open shrubland over *Tephrosia* aff. *rosea* (HD 292-37) scattered shrubs over *Triodia epactia* open hummock grassland. Releve M8, access track from Marble Bar road to SSprings.





**Photograph 59:** *Acacia orthocarpa* (wispy form), *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrub over *Indigofera monophylla* [seral] low shrubland to low open heath over *Triodia brizoides* hummock grassland. Releve M92, near entrance to gorge, access track from Marble Bar road to Sulphur Springs.



**Photograph 60:** *Acacia inaequilatera* scattered tall shrubs over *Acacia bivenosa* scattered shrubs over *Triodia brizoides* hummock grassland. Releve M95, access track from Marble Bar road to Sulphur Springs.





**Photograph 61:** *Acacia inaequilatera* tall scattered shrubs over *Acacia bivenosa* scattered shrubs over *Acacia ptychophylla* low shrubland over *Triodia brizoides* hummock grassland. Releve M99, access track from Marble Bar road to Sulphur Springs.



**Photograph 62:** *Eucalyptus leucophloia*, *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera*, *Grevillea wickhamii* ssp. *aprica*, *Acacia orthocarpa* (spindly form), *Hakea chordophylla* scattered tall shrubs over *Cassia glutinosa* scattered shrubs over *Triodia brizoides* hummock grassland. Releve M102, in the gorge, access track from Marble Bar road to Sulphur Springs.





**Photograph 63:** *Acacia tumida* open high shrubland to high shrubland over *Triodia epactia* hummock grassland. Releve B5, Sulphur Springs survey area.



**Photograph 64:** *Ptilotus mollis* low open shrubland over *Triodia melvillei*, (*Triodia wiseana*), *Eriachne mucronata* (typical form) very open to open hummock grassland/grassland. Releve B31, Sulphur Springs survey area.





**Photograph 65:** *Acacia tumida* high shrubland to open scrub over *Templetonia hookeri*, *Grevillea wickhamii* ssp. *aprica* scattered tall shrubs over *Acacia hilliana*, *Goodenia stobbsiana* low open shrubland over *Triodia melvillei* hummock grassland. Releve B37, Sulphur Springs survey area, regrowth after fire.



**Photograph 66:** *Atalaya hemiglauca*, *Acacia pruinocarpa*, *Ehretia saligna* var. *saligna*, *Acacia tumida*, *Ficus platypoda* high open shrubland over *Cassia glutinosa*, *Cassia venusta* scattered shrubs over *Triodia epactia* (*Cymbopogon ambiguus*, *Cyperus cunninghamii* ssp. *cunninghamii*, *Eriachne mucronata* (typical form) open hummock, tussock grassland/ sedgeland. Releve B43, creekline with vegetation unit #AhEsFp, Sulphur Springs survey area.





**Photograph 67:** *Eucalyptus leucophloia* scattered low trees over *Acacia orthocarpa* (wispy form) open high shrubland over *Acacia adoxa* var. *adoxo* low open shrubland over *Triodia brizoides*, (*Triodia epactia*) hummock grassland. Releve B54, Sulphur Springs survey area.



**Photograph 68:** *Corymbia ferriticola* ssp. *ferriticola*, *Eucalyptus leucophloia* low open woodland over *Triodia epactia*, (*Triodia brizoides*), *Cymbopogon ambiguus* grassland/hummock grassland. Releve B55, Sulphur Springs survey ar).





**Photograph 69:** *Corymbia hamersleyana* scattered low trees over *Acacia ptychophylla* low open shrubland to low shrubland over *Triodia melvillei* hummock grassland. Releve B93, access track between Kangaroo Caves survey area and Bernts survey area. Most stands of *Triodia melvillei* were on uplands, rather than valley floors



**Photograph 70:** *Acacia inaequilatera*, *Petalostylis labicheoides* high open shrubland to high shrubland over *Corchorus* aff. *laniflorus* (PAN 76), *Euphorbia* aff. *drummondii* (HD195-16) low open shrubland over *Triodia* sp. Panorama, *Triodia brizoides* hummock grassland. Releve B119, Sulphur Springs survey area.





**Photograph 71:** *Eucalyptus camaldulensis* var. *obtusa*, *Eucalyptus victrix*, *Melaleuca argentea* open forest over *Acacia ampliceps*, *Melaleuca glomerata* scattered tall shrubs over *Schoenus falcatus*, *Cyperus vaginatus*, *Triodia* sp. Panorama sedgeland, hummock grassland. Releve B141, Sulphur Springs survey area, 200 to 300 metres downstream from PAN077.



**Photograph 72:** Pools and creek bed immediately downstream of releve B141, Sulphur Springs survey area (200 to 300 metres downstream from PAN077).





**Photograph 73:** View of the tailings dam valley (centre left) beyond the treed creek line, looking south of west in the Sulphur Springs survey area. The creekline includes quadrat site PAN077, which can be seen in front and to the left of a small rockpile.



**Photograph 74:** The northern most valley in the Sulphur Springs survey area, viewed looking north of west. Vegetation units on the valley floor include #GHcTw and #Aa'PTe (flowlines). The far hill slopes are predominantly unit #ChGwTw.





**Photograph 75:** Vegetation unit #PmTm (releve B31) on the crest of a high shale ridge top in the Kangaroo Caves survey area.



**Photograph 76:** A small population of *Pityrodia* sp. Panorama (erect, grey-leafed shrub) in the Sulphur Springs survey area near releve B54.





**Photograph 77:** Southern most valley in the Sulphur Springs survey area (looking to the south-east), with a medium sized creek (unit #EvMlgTe) on the centre right. The greener areas around the creeks consist of a mosaic of vegetation units #ClAa"Tw and #AbImTw (releve B36) nearest the creeklines, with unit #ChImTw (releve B60) further from the creek.



**Photograph 78:** Looking north across the main valley on the eastern side of the Kangaroo Caves survey area, with creekline vegetation #ApCpTw (quadrat PAN079) in the foreground and the unit #ChAbTw (releve B78) forming the green surrounds of the creekline on the eastern side of the valley.





**Photograph 79:** *Themeda* sp. Panorama growing on a rockpile upslope of the creek quadrat PAN076, adjacent to the access track between Sulphur Springs survey area and Kangaroo Caves survey area.



**Photograph 80:** Vegetation along the access track between Sulphur Springs and Kangaroo Caves survey areas, where the access track follows the creekline. This location is 100 to 200 metres downstream of quadrat PAN076 and near the site of releve B111. *Themeda* sp. Panorama can be seen growing along the edge of the creek bed.









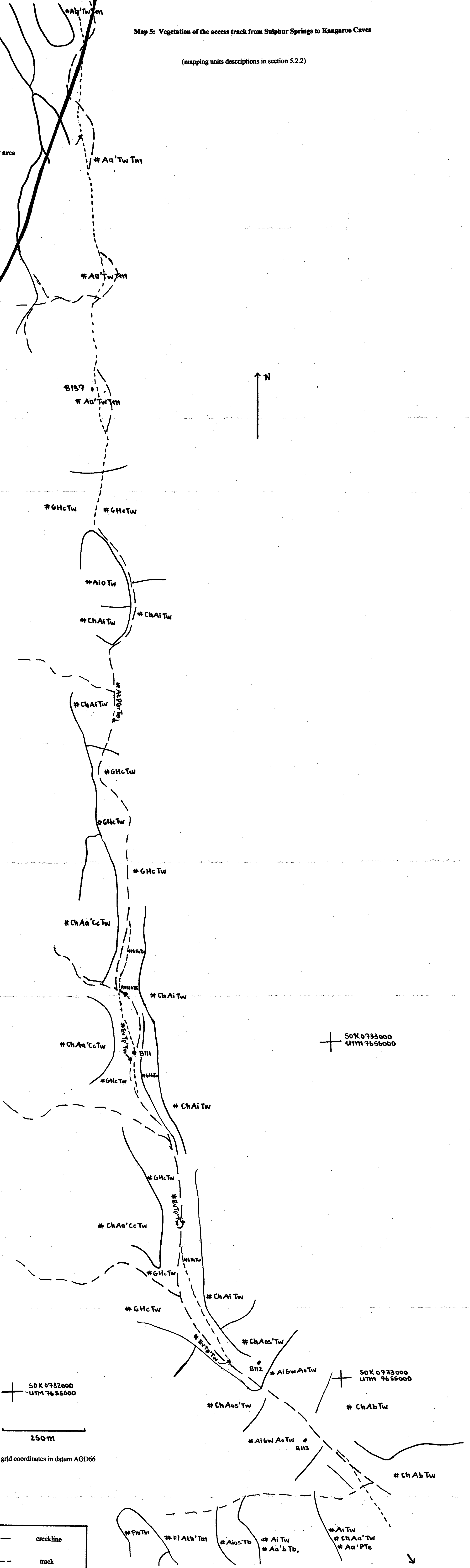


Map 5: Vegetation of the access track from Sulphur Springs to Kangaroo Caves

(mapping units descriptions in section 5.2.2)

Sulphur Springs survey area

Boundary of Sulphur Springs survey area



50K 0732000  
UTM 76 55000

250m  
Map grid coordinates in datum AGD66

50K 0733000  
UTM 76 55000

50K 0733000  
UTM 76 55000

	creekline
	track
	releve/quadrat location (descriptions Appendices 9, 10 and 11)
(NB: releve/quadrat coordinates shown in Appendices 9, 10 and 11 are in datum WGS84)	

To Kangaroo Caves survey area

Map 6: Vegetation of the access track from Kangaroo Caves to Bernts

(mapping units descriptions in section 5.2.2)

