



BEAGLE BAY *Big Tree Country* TIMBER PLANTATION

Groundwater Dependent Ecosystems Flora Assessment

September 2004

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EXECUTIVE SUMMARY

In 2000, Beagle Bay Community Inc. and Capricorn Timber Pty Ltd entered into an agreement to establish a tropical timber plantation of Teak (*Tectona grandis*), Indian Rosewood (*Dalbergia latifolia*), Indian Sandalwood (*Santalum album*), and African Mahogany (*Khaya senegalensis*) within the Beagle Bay Aboriginal Reserve. The Proponents therefore now propose the development of a 1,500 ha plantation.

This report details the results of a flora and vegetation survey of potentially occurring groundwater dependent ecosystems north of the plantation site that may be impacted by water use for the plantation.

Two hundred and sixty seven taxa from 69 families and 170 genera were recorded during the survey. Six of these species listed as Priority under the WA *Wildlife Conservation Act* 1950 were recorded within the survey area. The most numerous families were Poaceae (47 taxa), Cyperaceae (39 taxa) and Papilionaceae (24 taxa), while the most common genera were *Fimbristylis* (14 taxa) and *Cyperus* (12 taxa). Twelve weed species were recorded during the survey; two of which are listed as Declared Weeds under the *Agriculture and Related Resources Protection* 1976.

Current data suggest that four of the six Priority species recorded are restricted to the Kimberley region, whilst two of these species are believed to be restricted to the Dampier Peninsula (*Nymphoides beaglensis* and *Aphyllodium glossocarpum*). Two species are restricted to wetland/ dampland areas (*N. beaglensis* and *Stylidium costulatum*).

The vegetation of the survey area is broadly categorised into three units: wetland, terrestrial and Pindan vegetation. Wetland vegetation typically included a *Melaleuca* (typically *Melaleuca cajuputi*) open to closed forest over sedges and grasses associated with a wet habitat or sedgeland and sedgeland/ grasslands, including fringing vegetation around (probably) seasonal damplands. Vegetation in the area was classified as terrestrial if it was likely to have at least seasonal dependency on ground water, indicated by the presence of *Melaleuca* scattered trees to woodlands over floodplains of grasses such as *Chrysopogon* sp. and by the absence of sedgelands. Vegetation that occurred on the 'islands' of elevated low sandy rises on the Bobby's Creek floodplain and that did not have the likely groundwater dependent species such as *Melaleuca* tree species and sedges were classified as Pindan-related.

The assemblages of the Lolly Well Springs wetland complex, which occur within the Bobby's Creek wetland system, have been listed as Priority 4 on the CALM Priority Ecological Communities list, which functions as a reserve list for CALM recognised Threatened Ecological Communities. The vegetation communities of Lolly Well Springs are relatively undisturbed and cover an area of < 50 ha (CALM 2004). There are few communities of similar structure to the Bobby's Creek wetland system within the Dampier Peninsula, with the most similar (but still distinct) communities occurring at Yarp Lakes east of Pender Bay. The wetland communities of Bobby's Creek have high local significance as they are one of the few areas of permanent freshwater on the Peninsula (Kenneally *et al.* 1996).

1.0 INTRODUCTION

Tropical Timber Plantations Pty Ltd (TTP), a joint venture between the Beagle Bay Aboriginal Community (BBC) and Capricorn Timber Pty Ltd, proposes to establish a 1,500 ha plantation to grow high value tropical timbers (Teak, Indian Sandalwood, Indian Rosewood and African Mahogany), known as “Beagle Bay *Big Tree Country* Plantation Project.” The proposed plantation is on 5,000 ha of land to be leased from the BBC.

The proposed area for development is located approximately 20 km SE from the Beagle Bay Community, on the Dampier Peninsula. The Dampier Peninsula covers about 14,000 square kilometres. The Project site represents approximately 0.1 % of the Dampier Peninsula and 0.01 % of the Dampier Botanical District. Beagle Bay lies 120 km by road north of Broome, Western Australia (Figure 1.1).

Development of the existing site is proposed to commence in 2005, with annual plantings of 300 ha to be undertaken over a five year period. The life span of the project is estimated to be up to 25 years based on current scheduling and planning. Ultimately, a groundwater supply of 4.5 GL/a over 20 years from the underlying Broome aquifer is required for irrigation. The project is located in the Kimberley-Canning Groundwater Management Area for which a groundwater management plan has not been prepared.

The Water and Rivers Commission (WRC) has implemented a comprehensive system of water allocation planning and licensing of water use to determine how much water needs to be set aside for the environment and how the remaining water should be shared for industrial, agricultural and public water supply areas. The identification of Ecological Water Requirements (EWRs) and Social Water Requirements (SWRs) form a basis for decisions concerning the water allocation process and are required as input to the WRC water allocation assessment process.

EWRs and SWRs are defined as the water regimes (spatial and temporal) needed to sustain the ecological and social values of water dependent ecosystems at a low level of risk (SKM 2001). EWRs and SWRs provide the information necessary to develop environmental water provisions (EWPs) for a specific area by developing a process for groundwater allocation that balances water requirements to sustain key ecological values of dependent ecosystems and broader social and economic objectives for the resource (SKM 2001).

The vegetation of the plantation site is characterised as savannah woodlands (Pindan); *Eucalypt tectifera-Corymbia dampieri* dominated woodlands over open mixed tall shrubs over hummock and tussock grasslands (ecologia 2004). To the north of the plantation, a number of groundwater dependent ecosystems (GDEs) occur (Figure 1.2). This report details the flora and vegetation of the GDEs.

The objectives of the survey were to provide:

- an inventory of vascular plant species;
- a description and mapping of plant communities;

- a review of plant species considered to be rare and endangered, or geographically restricted that are known to, or may occur, within the project area;
- an inventory of exotic plants including declared weeds; and
- a review of the significance of the plant communities within a Local, Regional and State context.

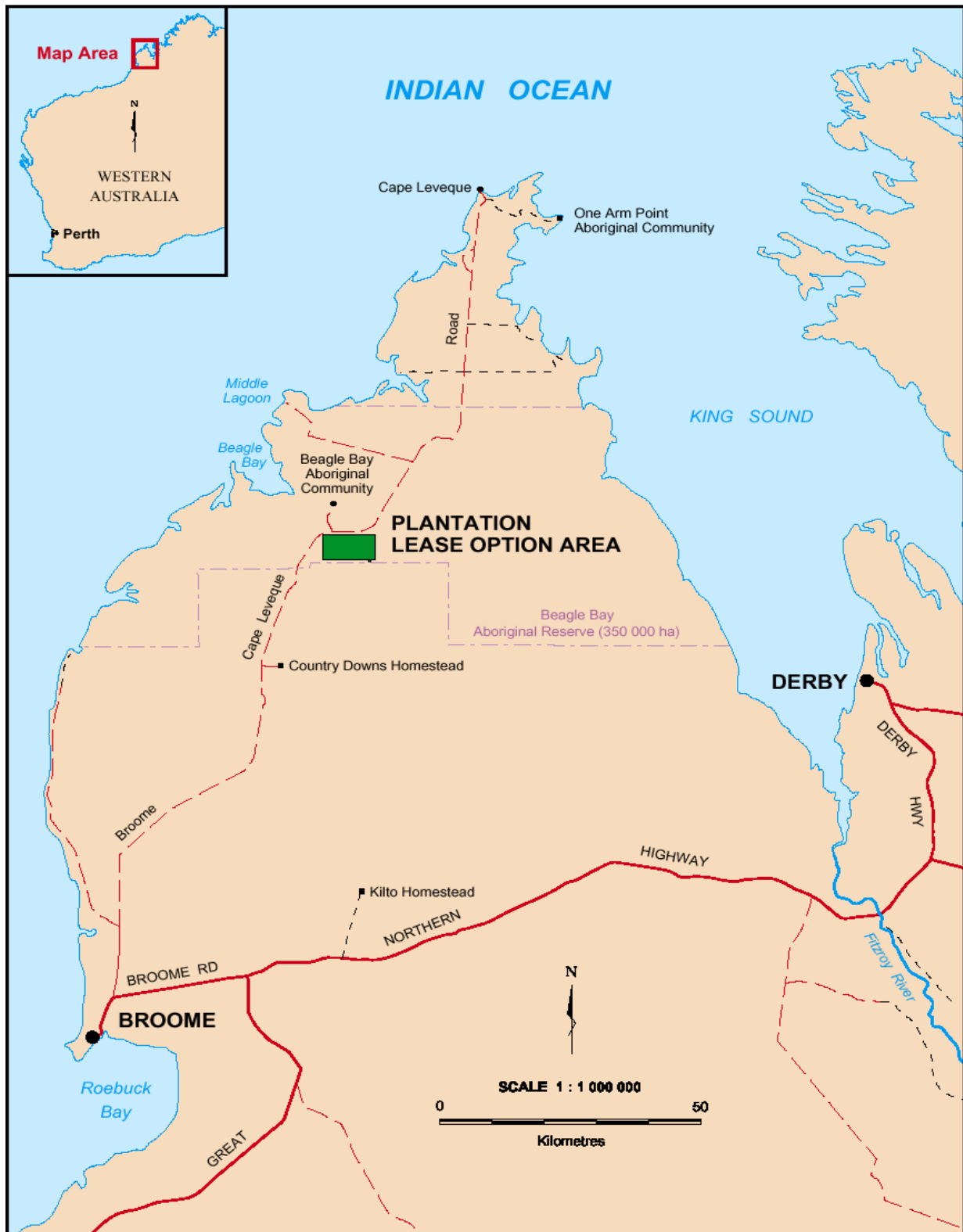


Figure 1.1 Location of the Plantation Lease Area within the Dampier Peninsula

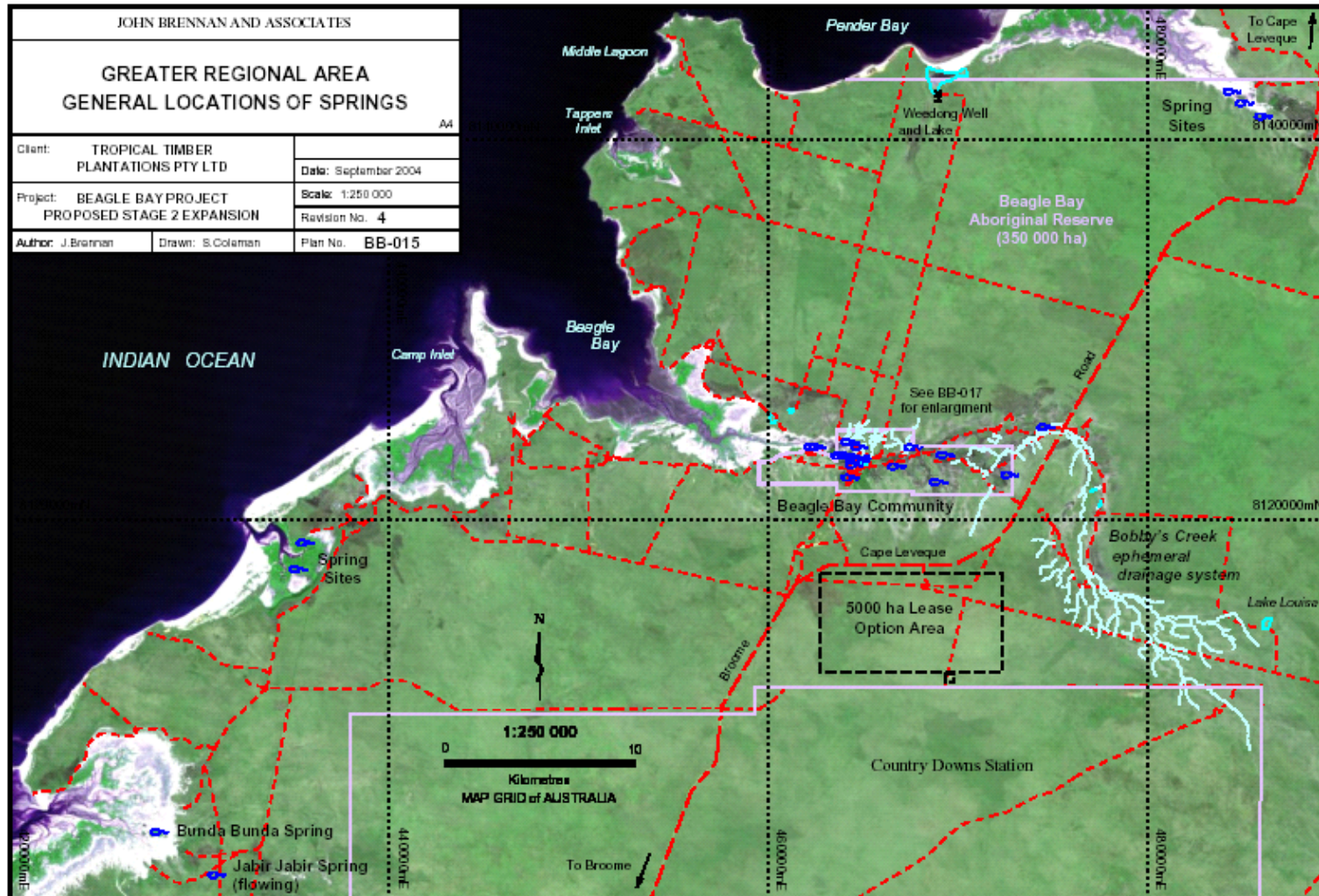


Figure 1.2 Location of the study area

2.0 SURVEY METHODOLOGY

The survey was conducted by one botanist between the 9th and 23rd June 2004. The survey combined the following two basic methodological approaches:

- (i) detailed site/association assessments; and
- (ii) broad-scale vegetation mapping.

In addition, opportunistic collections and transects were carried out to confirm plant community boundaries and to search for additional species.

The survey area was centred around Bobby's Creek, north of the plantation lease area adjacent to the Beagle Bay Community. The western most point was the Beagle Bay causeway and the eastern most point was located approximately 11 km along Bobby's Creek on the east side of Bobby's Crossing on the Broome-Cape Leveque Road. In total the survey area was approximately 23 km long and 2 to 4 km wide.

2.1 FLORA SURVEY

An inventory of all vascular plant species was made by recording all flora species within the vegetation survey quadrats (see Section 2.2) and by opportunistic collection when traversing between sites. Where the plant species were not well known, flora specimens were collected and allocated a specimen number. Collected specimens were pressed and subsequently dried. They were then sorted and identified by comparison to specimens in the reference and research collections of the Western Australian Herbarium and by the use of current taxonomic keys.

Flora collections were cross referenced with the current CALM Declared Rare and Priority Flora List (Atkins 2004) and the *Agriculture and Related Resources Protection Act 1976* to determine the conservation status of all flora species recorded.

2.2 VEGETATION SURVEY

Twenty seven sites were located within the survey area (Figure 2.1). Sites were a combination of bounded quadrats and relevés (unbounded quadrats). Sites locations were chosen to ensure that all variations in vegetation and habitat types were represented. In particular, quadrats were located in vegetation associations that were likely to be groundwater dependent.

Six permanent quadrats (sites BB1, BB2, BB8, BB11, BB16 & BB22; see Figure 2.1) were permanently marked using fence droppers placed at each corner. These quadrats will be used as long-term monitoring sites.

The standard quadrat size was 50 m by 50 m, but the quadrat dimensions were varied depending on the terrain. Where quadrat dimensions varied from the standard, the particular plot dimensions were recorded or drawn on the field sheets. The quadrat

dimensions of 50 m by 50 m is the Conservation and Land Management standard for the Pilbara Botanical Province and was the quadrat size used in the Beagle Bay plantation site flora and vegetation survey (*ecologia* 2003).

The location of each quadrat was recorded using a GPS unit and photographed (see Appendix C). The following parameters were recorded for each site:

- description of vegetation (following Muir 1977);
- surface soil texture and colour;
- topography;
- time since last fire;
- vegetation condition (see Appendix C for definitions); and
- dominant flora species in each strata level.

In addition to the six permanent quadrats recorded in the survey area, twenty one releves (unbounded quadrats) were recorded. The releves were not pegged, but the coordinate of a central point of the releve was recorded. Releve descriptions were recorded over approximately the same area and the same site details were recorded as described above for the permanent quadrats.

2.3 VEGETATION MAPPING

Vegetation mapping is the delineation of plant communities into groups or associations. The distinctive characteristics that these groups or associations share include features such as species dominance, stratum structure and species composition.

Aerial photography was not available at the time of the field trip, and the vegetation mapping was conducted with the aid of a 1:20,000 topographical map and a 1:100,000 satellite image of the survey area.

Coordinates of vegetation unit boundaries and boundary vertices were recorded using a Garmin Etrex hand held GPS unit. Vegetation units were referenced using the quadrat and releve site numbers and location notes taken. Field maps were drawn showing the vegetation unit polygons that were being recorded. Where the vegetation had not previously been described, a releve or quadrat site description was prepared or an outline vegetation description was recorded under the GPS way point number of the vegetation unit. Transects were made through inaccessible parts of the survey area to record vegetation mapping notes.

As part of a ground truthing element to the vegetation mapping, particular points of interest on the satellite image were marked and the coordinates estimated. These locations were then visited by vehicle or on foot to determine the vegetation type. This aspect of the vegetation mapping was limited due to the scale of the satellite image.

Following identification of flora voucher collections, the quadrat, releve and other vegetation unit records were reviewed and appropriate vegetation mapping units finalised. These were grouped into three broad classes, two of which were classes of vegetation considered to be groundwater dependent.

The field notes and maps were used to locate vegetation units onto the aerial photograph base maps and unit boundaries were estimated using the image. Where access and mapping notes in the survey area were limited, the image characteristics were used to estimate the vegetation type. Vegetation maps of the survey area were produced using ArcView GIS software.

2.4 SURVEY LIMITATIONS AND CONSTRAINTS

2.4.1 FLORA SURVEY

The major limitation of any flora survey is that sampling is undertaken in a dynamic environment with plant populations at various stages of growth habit, life span and flowering season. Some species, including annuals, are only available for collection at certain times of the year. Consequently, to locate all species within an area, repeat collections are required over an extended period of time. As such, it is likely that there are species present in the survey area that were not recorded because they have low abundance or were senescent at the time of the survey. Furthermore, some taxa collected during the survey had finished flowering and shed seed and only sterile specimens could be collected. For these collections, identification to species level was not always possible.

This survey was limited to vascular plant species. Fungi, mosses, liverworts, lichens and algae are not generally surveyed systematically for environmental impact assessment in Western Australia. Surveying these groups (which form a small part of the biomass of the vegetation) is a specialist task and the level of information available against which to assess them is quite poor.

Given the above limitations, it is likely that this survey recorded more than 80 % of the vascular flora in the survey area. That is, while the flora survey is relatively thorough, it is possible that some species occurring on the subject land have not been recorded.

2.4.2 VEGETATION SURVEY

There is a limit to the accuracy of the assignment of the different strata in the vegetation descriptions to structural units (e.g., low open woodland, low woodland, low open forest, open shrubland, shrubland etc.). Referral of a stratum to a structural category depends on assessment of its cover and such estimation is imprecise. However, descriptive exercises such as that carried out for this report require only a moderate level of accuracy, sufficient to determine which of a few cover categories a species or stratum falls into.

For this report, vegetation cover was estimated for each plant species recorded in the quadrats by estimating each species canopy cover. The assumption was made that for most species, canopy cover and projected foliar cover are reasonably similar.

2.4.3 GOVERNMENT GUIDELINES

According to the EPA Guidance Statement for Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004), flora and vegetation surveys may be limited by the following:

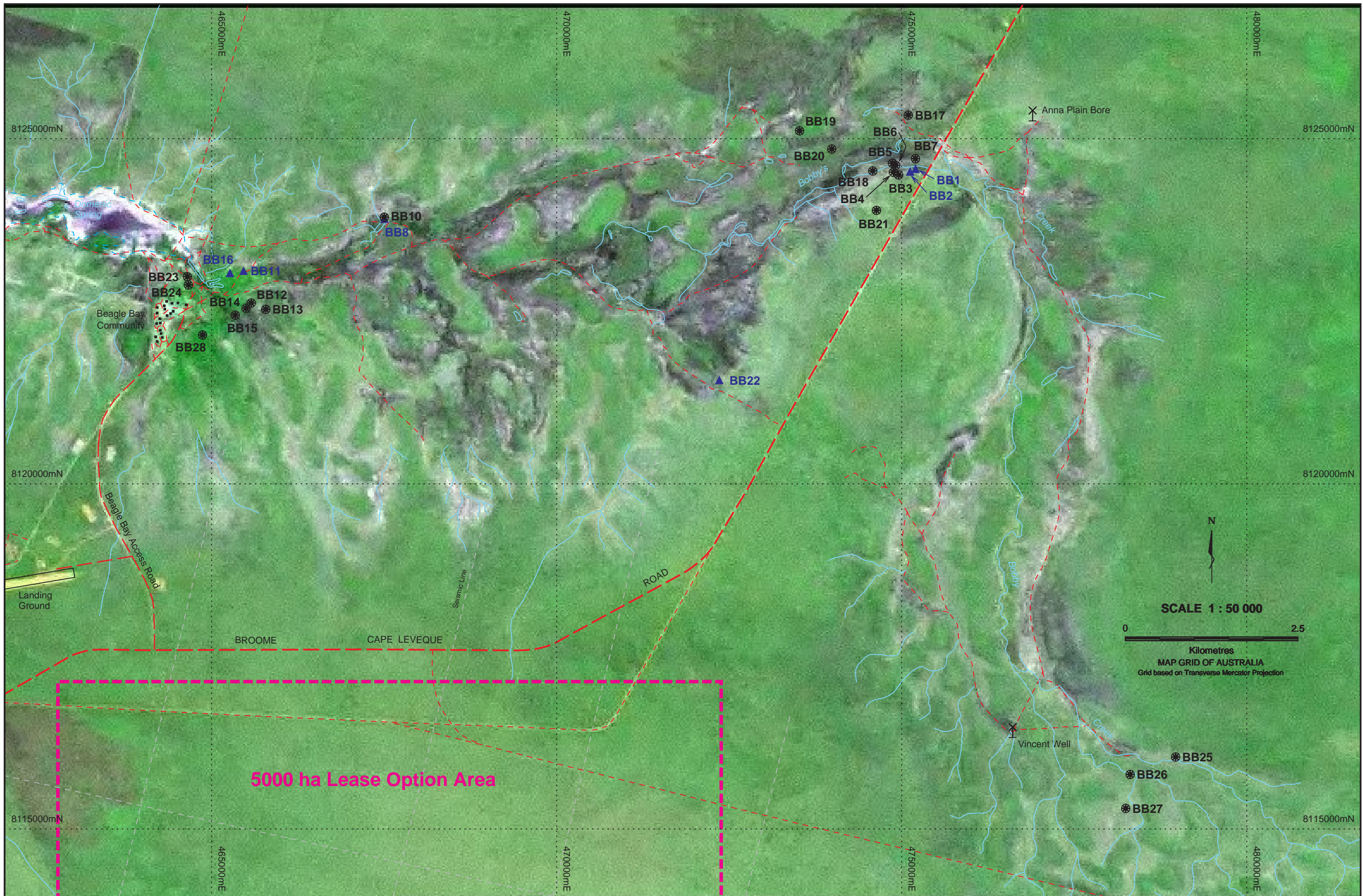
- Scope (*i.e.* the influence in terms of reference, such as what life forms *etc.* were sampled);
- Proportion of flora collected and identified (based on sampling, timing and intensity);
- Sources of information (*i.e.* pre-existing background versus new material);
- The proportion of the task achieved and further work which might be needed;
- Timing/weather/season/cycle;
- Disturbances (*e.g.* fire, flood, accidental human intervention *etc.*);
- Intensity (in retrospect was the intensity adequate?);
- Completeness (*e.g.* was the relevant area fully surveyed);
- Resources (*e.g.* degree of expertise available in plant identification to taxon level);
- Access problems;
- Availability of contextual information; and
- Experience levels.

Table 2.1 Flora survey constraints

Aspect	Constraint (yes/no); Significant, moderate or negligible	Comment
Scope	No	The scope was broad and covered all potential areas of GDEs.
Proportion of flora identified, recorded and/or collected	No	267 taxa were recorded in the survey area. This is likely to be around 80 % of total species.
Sources of information	Yes - negligible	Kimberley is a relatively poorly studied area; however there are a number of recent studies of the area.
Proportion of tasks achieved	No	The objectives of the survey were achieved.
Timing/weather/season/cycle	No	Survey undertaken during the dry season.
Disturbances which affected	No	N/A

Aspect	Constraint (yes/no); Significant, moderate or negligible	Comment
results of survey		
Intensity	No	The intensity of the survey was adequate with 15 person field days invested in survey work.
Completeness	No	Monitoring will be undertaken of six of the survey sites, but this is beyond the scope of the current survey.
Resources	No	N/A
Access problems	No	Tracks occur on the north and south sides of Bobby's Creek. Access to the areas between these two tracks was undertaken on foot.
Availability of contextual information	Yes-negligible	There is limited botanical information for this area.
Experience levels	No	Mr Brian Morgan is an experience botanist with over 10 years experience. Identifications were carried out by Matthew and Russell Barrett; both specialists in Kimberley flora.

Significant = greater than 60 % of potential flora not sampled
 Moderate = 20-60 % of potential flora not sampled
 Negligible = less than 20 % of potential flora not sampled



Legend	
●	Releve Site
▲	Monitoring Site

JOHN BRENNAN AND ASSOCIATES Project Managers	
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Client:	TROPICAL TIMBER PLANTATIONS PTY LTD
Project:	BEAGLE BAY PROJECT

BOBBY'S CREEK WETLANDS FLORA SURVEY SITE LOCATIONS	
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3.0 FLORA

Two hundred and sixty seven taxa from 69 families and 170 genera were recorded during the survey (Appendix A). One hundred and ninety nine taxa were recorded within the survey quadrats and 69 taxa were recorded opportunistically. Seventeen taxa could not be identified beyond genus level due to the lack of reproductive material.

The most numerous represented families were Poaceae (47 taxa), Cyperaceae (39 taxa) and Papilionaceae (24 taxa), while the most common genera were *Fimbristylis* (14 taxa) and *Cyperus* (12 taxa). Thirty three families were represented by a single taxon.

The number of sedges (Cyperaceae) is particularly high and is attributed to the specific habitat types surveyed (damplands). In fact the number of species from the Cyperaceae family is greater than that listed by Kenneally *et al.* (1996) as occurring on the Dampier Peninsula (Table 3.1).

Table 3.1 Comparison of number of species and genera in the most numerous families recorded in the current survey with previous recordings for the Dampier Peninsula

Family	Current Survey		Dampier Peninsula*	
	Species	Genera	Species	Genera
Poaceae	47	32	84	43
Cyperaceae	39	8	36	9
Papilionaceae	24	13	50	25

* From Kenneally *et al.* 1996.

3.1 FLORA OF CONSERVATION SIGNIFICANCE

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of certain flora species. The Act references a list of species that are considered to be Critically Endangered, Endangered, Vulnerable, Conservation Dependent, Extinct or Extinct in the Wild (Appendix E).

Declared Rare Flora (DRF) are also protected under the *Western Australian Wildlife Conservation (Rare Flora) Notice 2004* of the *Wildlife Conservation Act 1950*. The notice lists flora taxa that are extant and considered likely to become extinct or rare. These taxa are legally protected and removal or impact to their surroundings cannot be conducted without ministerial approval obtained specifically on each occasion for each population. CALM also maintains a list of taxa which are considered to be poorly known, uncommon, or under threat, but for which there is insufficient justification on the basis of known distribution and population sizes for inclusion on the DRF schedule. Priority Flora are assigned to one of four Priority categories (Atkins, 2004) definitions of which are provided in Appendix E.

No flora listed under the EPBC Act or the WA *Wildlife Conservation Act* were recorded during the survey.

3.1.1 PRIORITY FLORA PREVIOUSLY RECORDED IN AREA

Five species of Priority status have previously been collected in the vicinity of Beagle Bay (Table 3.2).

Table 3.2 Priority taxa previously recorded in the vicinity of the Beagle Bay Community

Species	Priority	Location	Habitat
<i>Glycine pindanica</i>	P1	15 km NNE of Beagle Bay Community	Reddish brown sand in mixed pindan woodland.
<i>Nymphoides beaglensis</i>	P2	Bobby Creek near Beagle Bay	Floating aquatic or rooted in mud at the edge of pools.
<i>Aphyllodium glossocarpum</i>	P3	Beagle Bay	Pindan sand in <i>Eucalyptus polycarpa</i> - <i>Acacia tumida</i> woodland.
<i>Phyllanthus aridus</i>	P3	Adjacent to Beagle Bay proposed tropical timber plantation site.	Sandstone, gravel or red sand.
<i>Stylidium costulatum</i>	P3	4 km E of Beagle Bay Community	Seepage areas.

3.1.2 PRIORITY FLORA RECORDED DURING CURRENT SURVEY

During the current survey three of the five Priority taxa listed in Table 3.1 above were recorded. An additional three Priority species were recorded, all of which are discussed below. The locations of all Priority species recorded are included in Table 3.3 and Figure 3.1.

Aphyllodium parvifolium – Priority 1

Aphyllodium parvifolium (Papilionaceae) is a small spreading prostrate shrub growing to 10 cm in height (Pazckowska and Chapman 2000). It produces mauve flowers during April and favours sandy substrates in sand dunes. This species has previously been collected from Barred Creek (approx. 30 km north of Broome), Broome and from the McLarty Hills in the Great Sandy Desert (Atkins 2004, Kenneally *et al.* 1996).

During the current survey it was recorded at one location (Table 3.3), occurring on grey sand. The vegetation at this site is described as *Corymbia polycarpa*, *Melaleuca viridiflora* open woodland over *Planchonia careya* scattered trees over *Acacia tumida*

var. *tumida* (burnt out) sparse low trees over *Chrysopogon* sp. and *Eriachne obtusa* moderate dense grassland. This location is probably quite similar to that at Barred Creek.

***Gomphrena pusilla* – Priority 2**

Gomphrena pusilla (Amaranthaceae) is a small annual herb which is semi-prostrate or sprawling and grows up to 20 cm high. It produces flower spikes between April and June that are very similar in appearance to *G. tenella* (Kenneally *et al.* 1996). This species has previously been recorded from Cable Beach and Barred Creek on the Dampier Peninsula and Port Hedland (Atkins 2004, Kenneally *et al.* 1996) and favours fine sands behind foredunes on limestone (Pazckowska and Chapman 2000). The type locality for this species is Foul Point in the Pilbara.

During the current survey it was recorded opportunistically from one location (Table 3.3). Other species present at this location include *Xerochloa imberbis*, *Eragrostis cumingii*, *Digitaria bicorni*, and *Crotalaria brevis*.

***Nymphoides beaglensis* – Priority 2**

Nymphoides beaglensis (Menyanthaceae), commonly called Beagle Bay Marshwort, is a floating aquatic plant that is commonly rooted in mud at the edge of pools (Kenneally *et al.* 1996). It produces white flowers with a pale mauve centre and white fringe between March and August. Current data suggest that this species is endemic to the Dampier Peninsula where it has been collected from Bunguaduk waterhole near Beagle Bay and claypans at Lake Champion and Yulleroo Well east of Broome (Atkins 2004, Kenneally *et al.* 1996).

This species was recorded from three locations during the current survey (Table 3.3), all of which were seasonal pools or wetlands on the floodplain on a dark brown to black clay based substrate. It was commonly associated with the sedge *Eleocharis sunsaica*.

***Aphyllodium glossocarpum* – Priority 3**

Aphyllodium glossocarpum (Papilionaceae) is an erect or spreading shrub which grows up to 2 m. It produces lilac pink to purple flowers between April and October and occurs on sand in Pindan vegetation. This species is believed to be restricted to the Dampier Peninsula with collections from Beagle Bay and Brunswick Bay (Atkins 2004, Kenneally *et al.* 1996).

During the current survey this species was recorded on white sand in riparian vegetation on a broad creek flood bank (Table 3.3). At this location it was observed to be one of the dominant species in the shrub layer. The vegetation at this site was described as *Melaleuca viridiflora*, *Corymbia polycarpa* and *C. flavescens* sparse low woodland over *Planchonia careya* scattered low trees over *Acacia tumida* var. *tumida* open high shrubland over *Waltheria indica* open shrubland over grasses *Chrysopogon* sp, *Eriachne obtusa* and *Eriachne melicacea* moderate dense grassland.

***Triodia acutispicula* – Priority 3**

Triodia acutispicula (Poaceae) is a tussock-forming resinous perennial grass that grows to heights of 0.5–1.5 m high. The lemma is bi-textured and glabrous with transverse demarcation, while the spikelets are terete. It produces cream to brown flowers between January and April. This species prefers sandy soils on river levees, pindan plains, rocky hillslopes and outcrops (Pazkowska and Chapman 2000). It is restricted to the Kimberley, but has a wide ranging distribution within this area having previously been recorded at Drysdale River, Cape Leveque, Derby, Prince Regent River, Beverley Springs Station and the Mitchell Plateau (Atkins 2004).

During the current survey it was recorded from three locations (Table 3.3). It was observed to occur on pale brown to brown sand-based soils on the drier sections of the flood plain. There was no evidence of previous fires at any of these sites. *Melaleuca viridiflora* was present at all three locations.

***Stylidium costulatum* – Priority 3**

Stylidium costulatum (Stylidiaceae) is a slender reddish plant growing to 30 cm in height (Kenneally *et al.* 1996). It produces yellow to orange flowers between May and June. This species is restricted to the Kimberley with records from Coulomb Point Nature Reserve, Wonganut Spring, Beagle Bay, Beverley Springs Station and Mt Barnett Station (Atkins 2004, Kenneally *et al.* 1996). It grows in sandy or clayey soils in creeks or seasonally wet areas (Pazkowska and Chapman 1996).

During the current survey it was recorded opportunistically from three locations (Table 3.3).

Table 3.3 Locations of Priority Flora

Species	Priority	Density*	Location (GDA 94)	
			Eastings	Northings
<i>Aphyllodium parvifolium</i>	1	<2 %	51K 4754643	8123963
<i>Gomphrena pusilla</i>	2	<10 %	51K 464621	8123191
<i>Nymphoides beaglensis</i>	2	<10 %	51K 474913	8124614
		<10 %	51K 467504	8123821
		<1 %	51K 465463	8123068
		<10 %	51K 474959	8124711
<i>Aphyllodium glossocarpum</i>	3	2-10 %	51K 475122	8124506
<i>Triodia acutispicula</i>	3	10-30 %	51K 474881	8124514
		2-10 %	51K 478311	8115790
		<2 %	51K 478969	8116043
		10-30 %	51K 473093	8124543
<i>Stylidium costulatum</i>	3	<10 %	51K 474732	8124427
		<1 %	51K 467212	8123543
		<10 %	51K 472570	8121801








* Density is percent coverage of a 50m x 50m quadrat.

Figure 3.1A

**BOBBY'S CREEK
WETLAND
PRIORITY SPECIES**

Colour

Legend

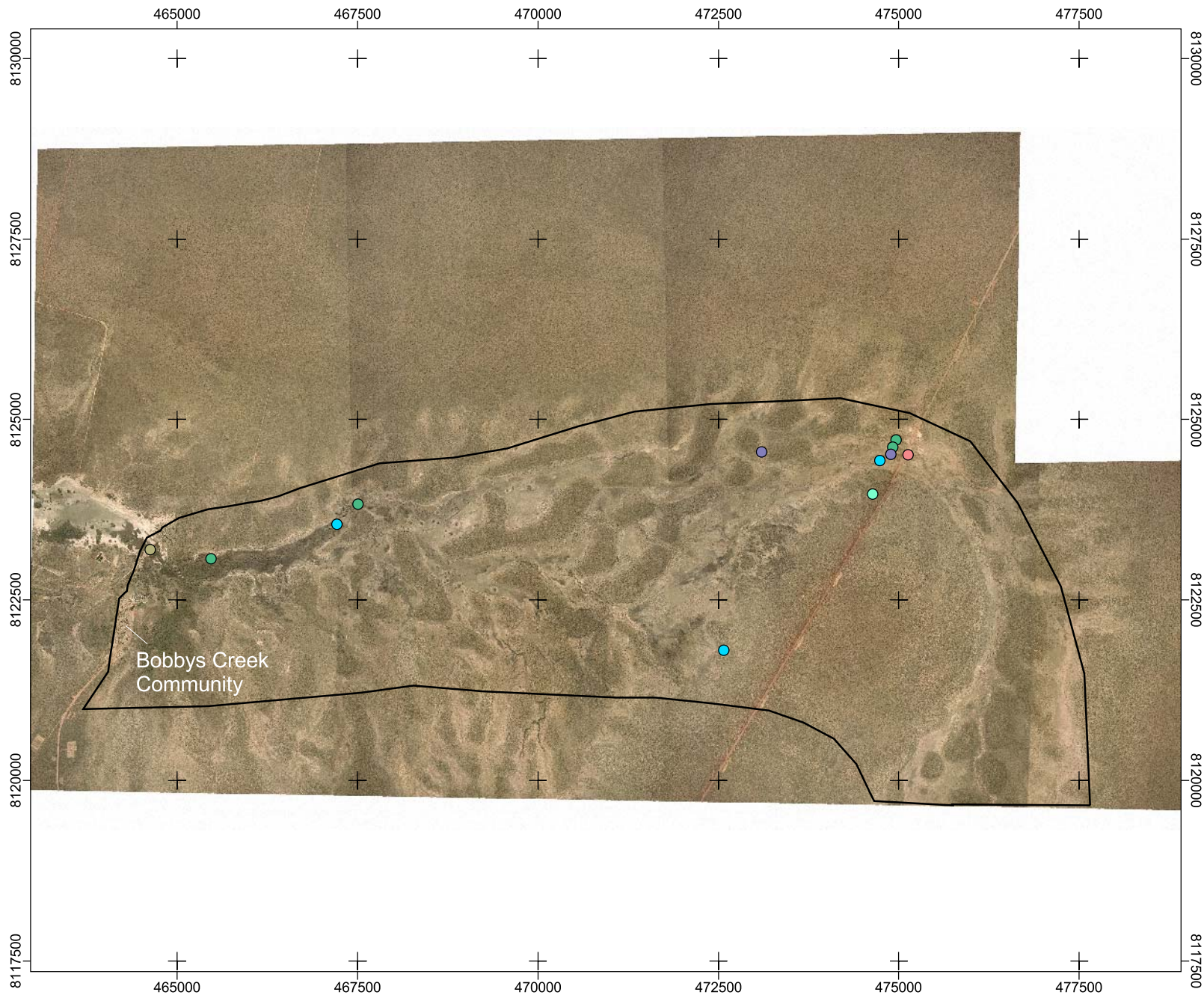
-  Study area boundary
-  *Aphyllodium glossocarpum*
-  *Aphyllodium parvifolium*
-  *Gomphrena pusilla*
-  *Nymphoides beaglensis*
-  *Stylidium costulatum*
-  *Triodia acutispicula*



600 0 600 1200 Meters

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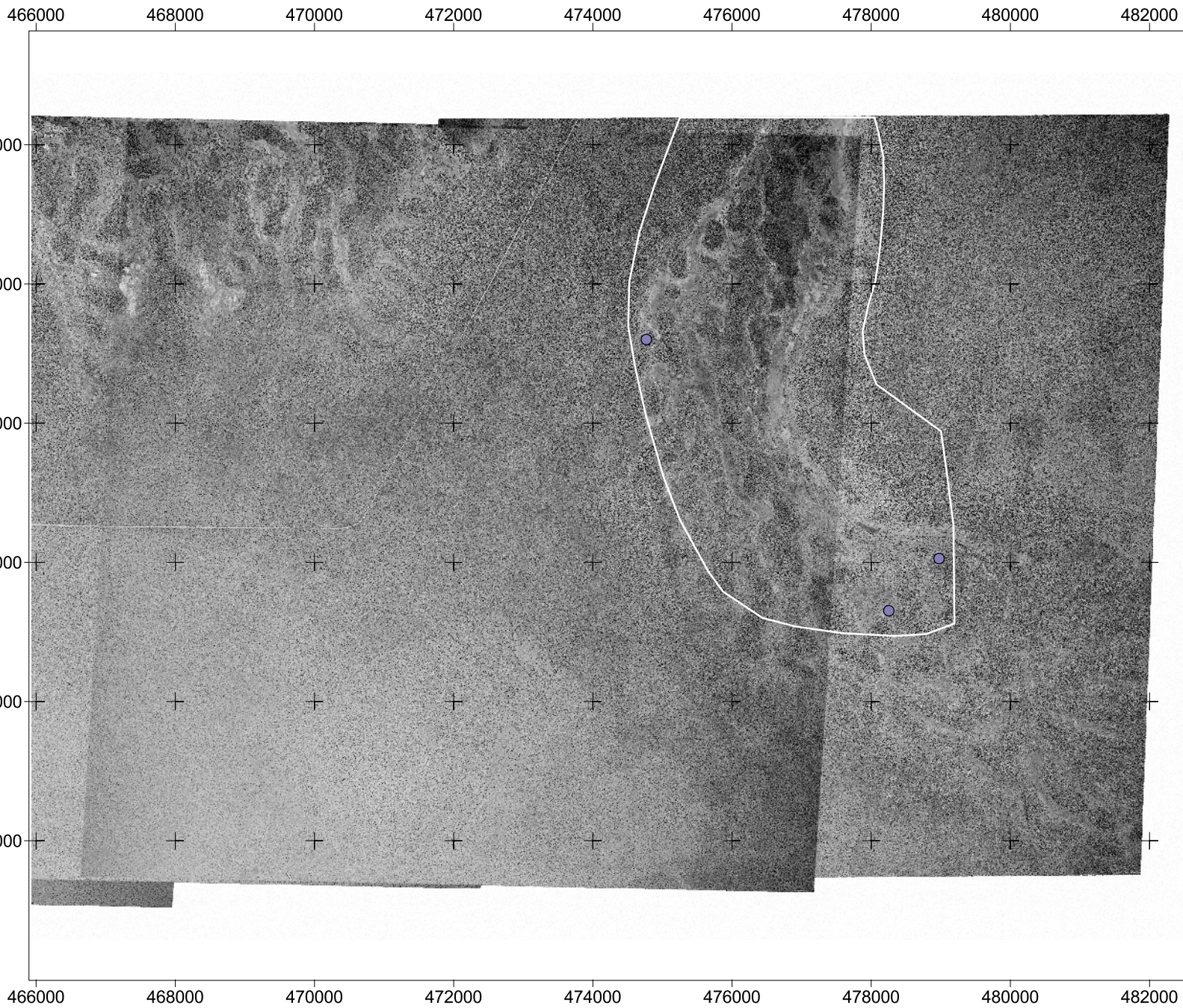









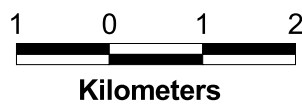
Figure 3.1B

**BOBBY'S CREEK
WETLAND
PRIORITY SPECIES**

Black and White

Legend

-  Study area boundary
-  *Aphyllodium glossocarpum*
-  *Aphyllodium parvifolium*
-  *Gomphrena pusilla*
-  *Nymphoides beaglensis*
-  *Stylium costulatum*
-  *Triodia acutispicula*



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3.2 INTRODUCED FLORA

Some high Priority weeds that are, or have the potential to become, pests to agriculture can be formally declared under the *Agriculture and Related Resources Protection Act, 1976 (ARRP Act)*. Weeds listed under the Act are listed with a coded definition of the requirements for control. There are five Priority groupings, and more than one Priority may be placed on a weed species. An explanation of the codes is included in Appendix E.

Twelve weed species were recorded during the survey. Two of these species are listed as Declared Weeds under the *ARRP Act*, and are discussed in further detail below. The locations of all weed species are included in Table 3.4 and Figure 3.2.

Table 3.4 Location of weed species

Species	Declared Weed (y/n)	Density	Location	
			Eastings	Northings
* <i>Clitoria ternatea</i>	n	<2%	51K 464472	8122575
		<2%	51K 465574	8122620
* <i>Cynodon dactylon</i>	n	30-70%	51K 464531	8122730
* <i>Cyperus brevifolius</i>	n	30-70%	51K 464869	8122156
		10-30%	51K 469147	8123996
* <i>Dactyloctenium aegyptium</i>	n	2-10%	51K 471532	8122444
* <i>Emilia sonchifolia</i>	n	<2%	51K 464491	8121966
		<2%	51K 465266	8123036
* <i>Gomphocarpus fruticosus</i>	n	<2%	51K 464168	8122593
* <i>Murdannia nudiflora</i>	n	<2%	51K 475122	8124506
* <i>Parkinsonia aculeata</i>	y	10-30%	51K 464855	8122490
* <i>Passiflora foetida</i>	n	<2%	51K 465498	8122544
		<2%	51K 465265	8123036
		<2%	51K 464662	8122881
		<2%	51K 464809	8122156
* <i>Sida acuta</i>	y	<2%	51K 464642	8123200
		<2%	51K 464505	8122997
* <i>Stylosanthes hamata</i>	n	<2%	51K 475085	8124707
		<2%	51K 464642	8123200
		<2%	51K 478969	8116043
		<2%	51K 474913	8124614
* <i>Trianthema portulacastrum</i>	n	<2%	51K 464531	8122730

* Density is percent coverage of a 50m x 50m quadrat.

****Parkinsonia aculeata***

**Parkinsonia aculeata* (Caesalpiniaceae), commonly referred to as Parkinsonia, is a native of tropical America. It is a perennial shrub or small tree growing up to 8 m high. It usually has only a single stem but it may form branches close to the base following mechanical damage. It produces bright yellow flowers predominantly during May and June. The flowers are 1 to 2 cm wide and rather flat and fragrant which are borne in loose bundles on long flower stalks hanging near the ends of the branches. Long seed pods, approximately 5 to 10 cm long with marked constrictions between each seed, are produced after the flowering period.

It was originally introduced into northern Australia as an ornamental plant, because of its attractive foliage and its drought tolerance. It has since become well established in tropical Queensland, the Northern Territory and parts of Western Australia.

Parkinsonia favour moist conditions along river flats, particularly in those areas where tropical black soils occur. However, once established it withstands heat and drought well. It forms dense thickets, particularly along water courses, which become virtually impenetrable. It shades out other vegetation and because it possesses sharp spines, hampers mustering, restricts grazing and blocks access to water points at dams and along rivers.

This species is listed as P1 and P4 for the municipal districts of Broome, Derby-West Kimberley, Halls Creek and Wyndham-East Kimberley. This declaration prohibits the movement of plants or seeds and aims to prevent the infestation spreading from within the existing boundaries.

****Sida acuta***

**Sida acuta* (Malvaceae) is a sparsely branched annual shrub up to 1.5 m tall with fibrous stems. It produces yellow inconspicuous flowers between February and April which are borne on short stalks (peduncles) in leaf axils. The fruit is dark brown and it splits into six to ten single seeds with two sharp awns at the top of each seed. This species is believed to have originated in America, but is now found throughout the warm regions of the world.

**Sida acuta* is a weed of tropical pastures and rapidly infests overgrazed areas near troughs and underneath shade trees. It is found on most soil types except some of those derived from limestone and seasonally flooded clays. It will survive for several years if slashed or highly disturbed so long as sufficient moisture is present.














This species is listed as P1 for all areas of Western Australia north of the 26th parallel. This declaration means that the movement of plants or their seeds is prohibited under the *ARRP Act*.

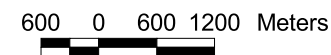
Figure 3.2A

**BOBBY'S CREEK
WETLAND
WEEDSPECIES**

Colour

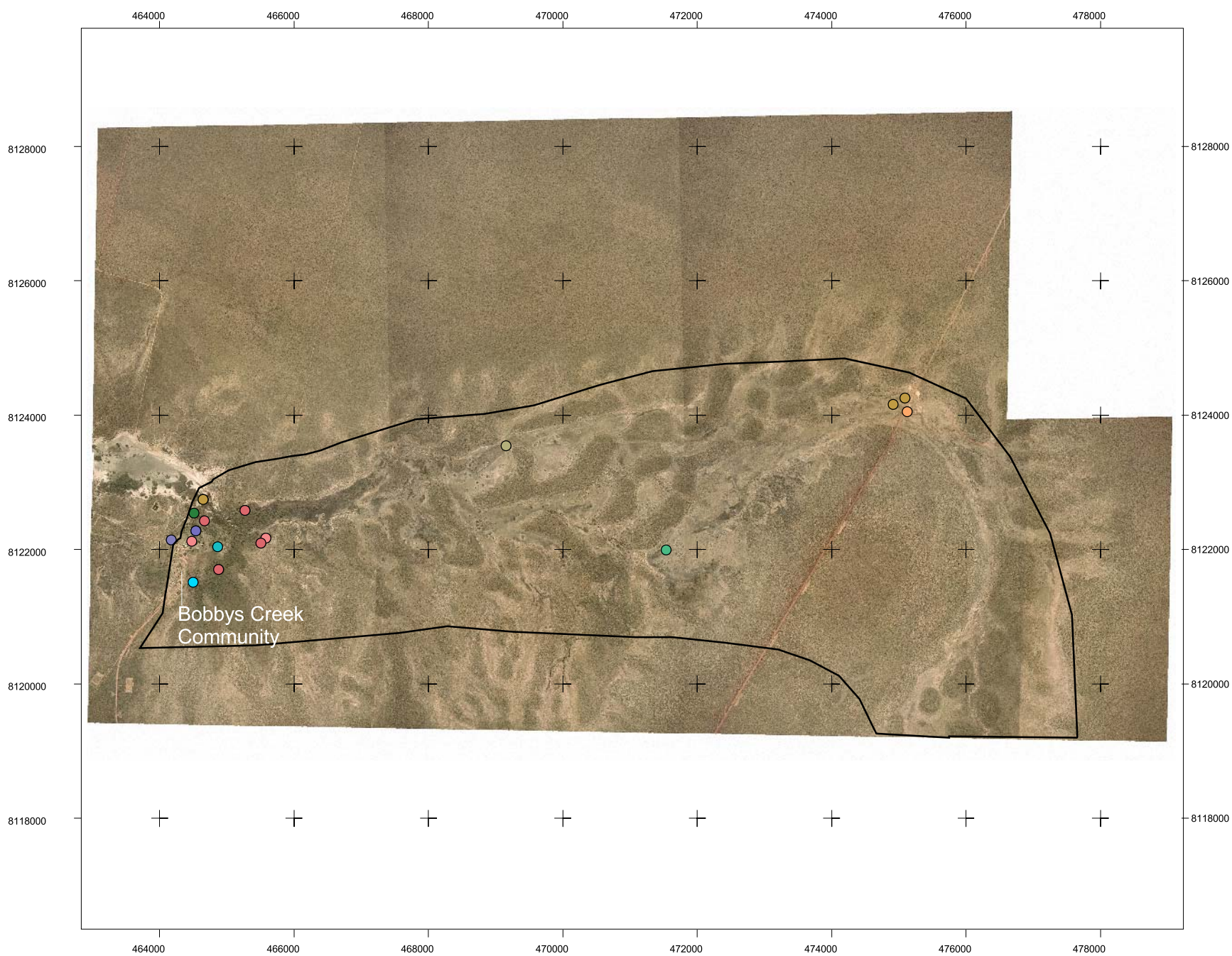
Legend

-  Study area boundary
-  **Clitoria ternatea*
-  **Cynodon dactylon*
-  **Cyperus brevifolius*
-  **Dactyloctenium aegyptium*
-  **Emilia sonchifolia*
-  **Gomphocarpus fruticosus*
-  **Murdannia nudiflora*
-  **Parkinsonia aculeata (DW)*
-  **Passiflora foetida*
-  **Sida acuta (DW)*
-  **Stylosanthes hamata*
-  **Trianthema portulacastrum*



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466000 468000 470000 472000 474000 476000 478000 480000 482000

Figure 3.2B

**BOBBY'S CREEK
WETLAND
WEED SPECIES**

Black and White

Legend

-  Study area boundary
-  **Clitoria ternatea*
-  **Cynodon dactylon*
-  **Cyperus brevifolius*
-  **Dactyloctenium aegyptium*
-  **Emilia sonchifolia*
-  **Gomphocarpus fruticosus*
-  **Murdannia nudiflora*
-  **Parkinsonia aculeata (DW)*
-  **Passiflora foetida*
-  **Sida acuta (DW)*
-  **Stylosanthes hamata*
-  **Trianthema portulacastrum*



600 0 600 1200 Meters

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8122000

8122000

8120000

8120000

8118000

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8116000

8116000

8114000

8114000

8112000

8112000

8110000

8110000

466000 468000 470000 472000 474000 476000 478000 480000 482000

4.0 VEGETATION

4.1 REGIONAL DESCRIPTION

The Beagle Bay study area falls within the Dampier Botanical District, which is broadly characterised by Pindan formation on sandplains (Beard, 1979; See Figure 5.1). The Dampier Botanical District comprises eight sub-districts, of which the relevant sub-district for the Beagle Bay Timber Plantation is the Dampier Peninsula. Within the Dampier Peninsula, ten terrestrial plant communities are recognised (Kenneally *et al.* 1996), of which, the plantation site occurs within a single type; Pindan vegetation. To the north of the plantation lies an area of sparse low tree savanna dominated by scattered *Melaleuca* spp. in the overstorey and *Chrysopogon* spp dominating the understorey (Beard 1979; See Figure 4.1). The vegetation in this area is primarily influenced by the presence of Bobby’s Creek.

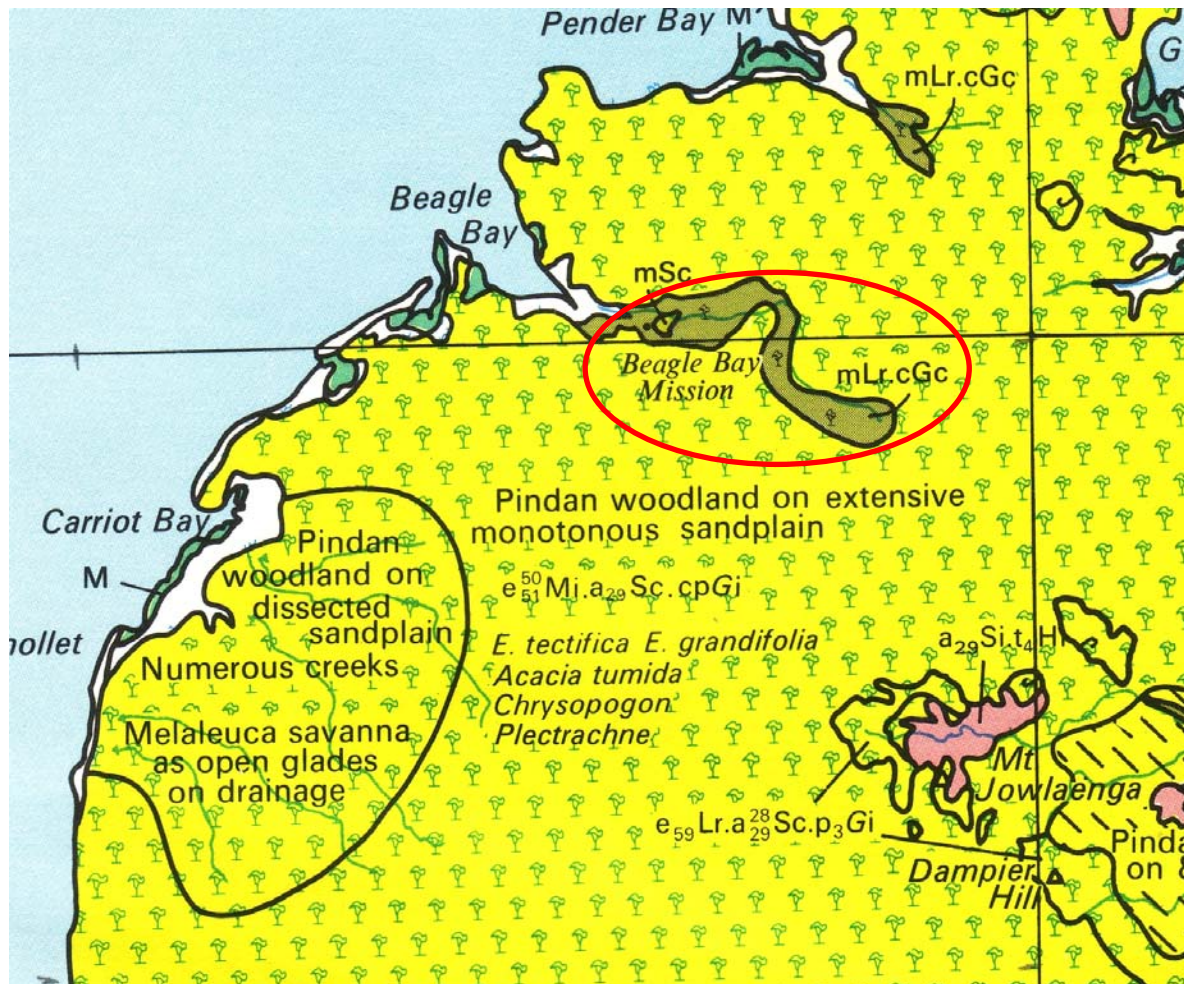


Figure 4.1 Beard Vegetation Descriptions (Reproduced from Beard 1979)

Note the study area is circled in red.

Low-lying sandplains occur in the northern section of the Peninsula, which are associated with broad sub-coastal drainage valleys and seasonally swampy areas. The following dampland areas occur within the vicinity of Beagle Bay:

- (i) Low sandplains – comprising dark alluvium over clay substrate supporting a grassplain of *Chrysopogon* spp. with scattered thickets of *Melaleuca alsophila* and sometimes *Verticordia verticillata*;
- (ii) Open pools of freshwater – supports large groves of *Melaleuca cajuputi* and *M. viridiflora* and aquatic species such as *Nymphaea violacea*, *Nymphoides indica* and *N. beaglensis*; and
- (iii) Mound springs – these may rise as much as two metres above the surrounding plains and typically support large fern colonies of *Cyclosorus interruptus* and *Lygodium microphyllum* (Kenneally *et al.* 1996).

4.2 VEGETATION OF THE STUDY AREA

The aim of this survey was to assess the vegetation of the survey area with regard to likely dependency on groundwater. As such, the following vegetation descriptions are described as “wetland” (perennial groundwater dependence), “terrestrial” (seasonal groundwater dependence) or “pindan” (minimal to no groundwater dependence).

Wetland vegetation typically included a *Melaleuca* (typically *Melaleuca cajuputi*) open to closed forest over sedges and grasses associated with a wet habitat or sedgeland and sedgeland/ grasslands, including fringing vegetation around (probably) seasonal damplands. Wetland vegetation was classified as 'mound spring' vegetation for the purposes of this survey where the wetland vegetation type occurred in typically small areas, often only 10 to 20 m in diameter, with a *Melaleuca* open forest over sedges and wetland grasses that typically grew around a central shallow pool of water. Sometimes a 'moat' was evident where the central area was elevated due to vegetation deposition. Discrete 'mound spring' units became difficult to differentiate in areas where expansive areas of apparently spring-fed closed to open *Melaleuca* forest over sedgeland and fernlands occurred (in the lower reaches of Bobby's Creek near Beagle Bay).

Vegetation in the area was classified as terrestrial if it was likely to have at least seasonal dependency on groundwater, indicated by the presence of *Melaleuca* scattered trees to woodlands over floodplains of grasses such as *Chrysopogon* sp. and by the absence of sedgelands. Other related floodplain vegetation types were also included in this unit as was neighbouring vegetation on low sandy rises or sand plains where *Melaleuca* tree species were present.

Vegetation that occurred on the 'islands' of elevated low sandy rises on the Bobby's Creek floodplain and that did not have the likely ground water dependent species such as *Melaleuca* tree species and sedges were classified as Pindan-related.

Bobby's creek consisted of a narrow creekline, sometimes cutting up to 1 metre in depth into the surrounding floodplain. The creek flows seasonally and was not flowing at the

time of the survey in June 2004. The creek meanders across the floodplain and often does not have a distinctive vegetation unit associated with it. In places, seasonal dampland vegetation (see above) occurs in the creek bed.

4.2.1 DESCRIPTION OF VEGETATION UNITS

The vegetation of the survey area is mapped in Figures 4.2a - h. Listed below are descriptions of the vegetation communities and sub-communities occurring within the survey area.

(1) WETLAND VEGETATION

Wetland vegetation units are classified as Mound Springs (MS) or wetland (W) units as described above.

(1A) *Mound Springs*

MS *Melaleuca cajuputi*, *Melaleuca viridiflora* moderately dense forest over *Timonius timon* sparse trees over *Pandanus spiralis* and *Acacia neurocarpa* scattered to sparse low trees over *Cyperus haspan*, *Fimbristylis nutans*, *Fimbristylis blakei* and *Fuirena ciliaris* closed sedgeland.

[† All collections of *Chrysopogon* sp. are the same species and are either *C. pallidus* or *C. fallax*; however at the time of survey all collections were sterile and therefore it was not possible to conclusively identify this species.]

MSa *Melaleuca viridiflora* closed low woodland over *Chrysopogon* sp. sparse grasses and *Fimbristylis cymosa* scattered sedges, surrounded by a 3 metre wide strip of *Melaleuca graminea* low woodland.

Locations of mound spring communities are listed in Table 4.1 below and illustrated in Figure 4.1.

(1B) *Melaleuca open to closed forest over sedgelands (fernlands)*

W1 *Melaleuca cajuputi* moderately dense forest over *Eleocharis sundaica* and *Cyperus haspan* closed sedgeland with scattered *Merremia hederacea*.

W1a *Melaleuca cajuputi* moderately dense forest over *Eleocharis sundaica* closed sedgeland.

W1b *Melaleuca cajuputi* closed forest over *Timonius timon* scattered low trees over *Cyclosorus interruptus* closed fernland, *Eleocharis ?sundaica*, (*Fuirena umbellata*) moderately dense sedgeland and *Philydrum lanuginosum* scattered herbs.

W1c *Melaleuca cajuputi* high closed forest over *Cyperus polystachyus*, *Fimbristylis ferruginea* moderately dense sedgelands with sparse *Gymnanthera oblonga*, *Cynanchum carnosum*.

Table 4.1 Locations of confirmed Mound spring communities

Community number	Location (GDA 94)	
	Eastings	Northings
MS01	51K 464441	8123008
MS02	51K 465519	8122856
MS03	51K 465481	8122868
MS04	51K 465342	8122548
MS05	51K 467770	8123844
MS06	51K 467866	8123831
MS07	51K 468316	8123626
MS08	51K 468178	8123533
MS09	51K 468287	8123548
MS10	51K 468530	8123277
MS11	51K 468757	8123240
MS12	51K 468952	8123113
MS13	51K 469147	8123996
MS14	51K 469553	8123051
MS15	51K 469763	8123163
MS16	51K 469951	8123183
MS17	51K 469558	8124323
MS18	51K 469875	8124215
MS19	51K 470130	8124218
MS20	51K 470652	8123197

(1C) Sedgeland

W2 *Eleocharis* sedgeland.

W2a *Melaleuca graminea* sparse low trees over sedge (BB10-2) moderately dense sedgeland.

(1D) Grasslands/ Sedgeland

W3 Low lying areas dominated by grass and sedge species.

W3a *Melaleuca cajuputi* moderately dense forest over *Imperata cylindrica*, *Themeda* sp. closed grassland with small areas of *Eleocharis sedgeland*.

W3b *Melaleuca cajuputi* scattered trees over *Eriachne pauciflora* closed grassland and *Eleocharis sunaica* closed sedgeland.

W3c *Melaleuca alsophila* scattered low trees over *Eriachne glauca*, *Bothriochloa bladhii* subsp. *bladhii* closed grassland/sedgeland.

W3d *Melaleuca cajuputi* scattered trees to open forest over *Sesbania cannabina* scattered shrubs over *Cyperus* sp. closed sedgeland.

W3e *Melaleuca cajuputi* moderately dense forest over *Melastoma affine* scattered low trees over *Acacia neurocarpa* scattered tall shrubs over closed grassland with *Cyperus polystachyus* scattered sedges.

W3f *Melaleuca alsophila* moderately dense low forest over *Fuirena umbellata*, *Eleocharis ochrostachyus* and *Fimbristylis blakei* closed sedgeland.

(1E) *Melaleuca* scattered trees over sedgeland fringing ephemeral fresh water pools

W4 *Melaleuca viridiflora*, *Melaleuca alsophila* scattered low trees over *Eleocharis sundaica*, *Cyperus bifax* closed sedgeland with *Nymphoides beaglensis*, *Rotala diandra* sparse herbs to open herbland and *Marsella hirsuta* sparse ferns.

W4a *Nymphaea violacea* sparse herbs and sedge *Schoenoplectus litoralis* moderately dense to closed sedgeland (near banks) fringed by *Melaleuca graminea* low open woodland over *Lumnitzera racemosa* moderately dense mangroves over *Fimbristylis ferruginea*, *Cyperus* sp. moderately dense sedgeland and *Xerochloa imberbis* sparse grasses.

(1F) *Seasonal damplands*

W5 *Chamaecrista mimosoides* scattered shrubs over *Eleocharis sundaica* sparse to open sedgeland over *Marsella hirsuta* sparse ferns to open fernland and *Rotala diandra*, *Nesaea striatiflora* and *Nymphoides beaglensis* low herbland and *Eriocaulon cinereum* and *Cyperus breviculmis* sparse sedges.

W5a *Melaleuca alsophila* sparse trees over *Xerochloa imberbis* moderately dense grassland.

(II) TERRESTRIAL VEGETATION

(2A) *Scattered Melaleuca alsophila over Chrysopogon sp. grasslands*

T1 *Melaleuca alsophila* scattered low trees over *Chrysopogon* sp. moderately dense grassland with *Calandrinia quadrivalvis*, *Gomphrena canescens* subsp. *canescens*, *Synaptantha scleranthoides* sparse herbs.

T1a *Melaleuca graminea* scattered low trees over *Xerochloa imberbis* and *Digitaria bicornis* closed grasslands.

(2B) *Melaleuca viridiflora moderately dense low woodlands over grasslands*

T2 *Melaleuca viridiflora* moderately dense woodland over *Chrysopogon* sp., *Aristida hygrometrica* and *Panicum seminudum* open grassland with *Gomphrena canescens* subsp. *canescens* open herbland.

(2C) *Corymbia/ Eucalyptus scattered to sparse trees over grasslands*

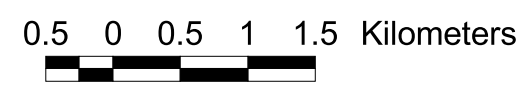
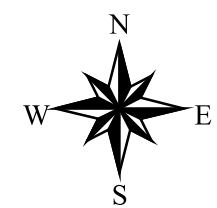
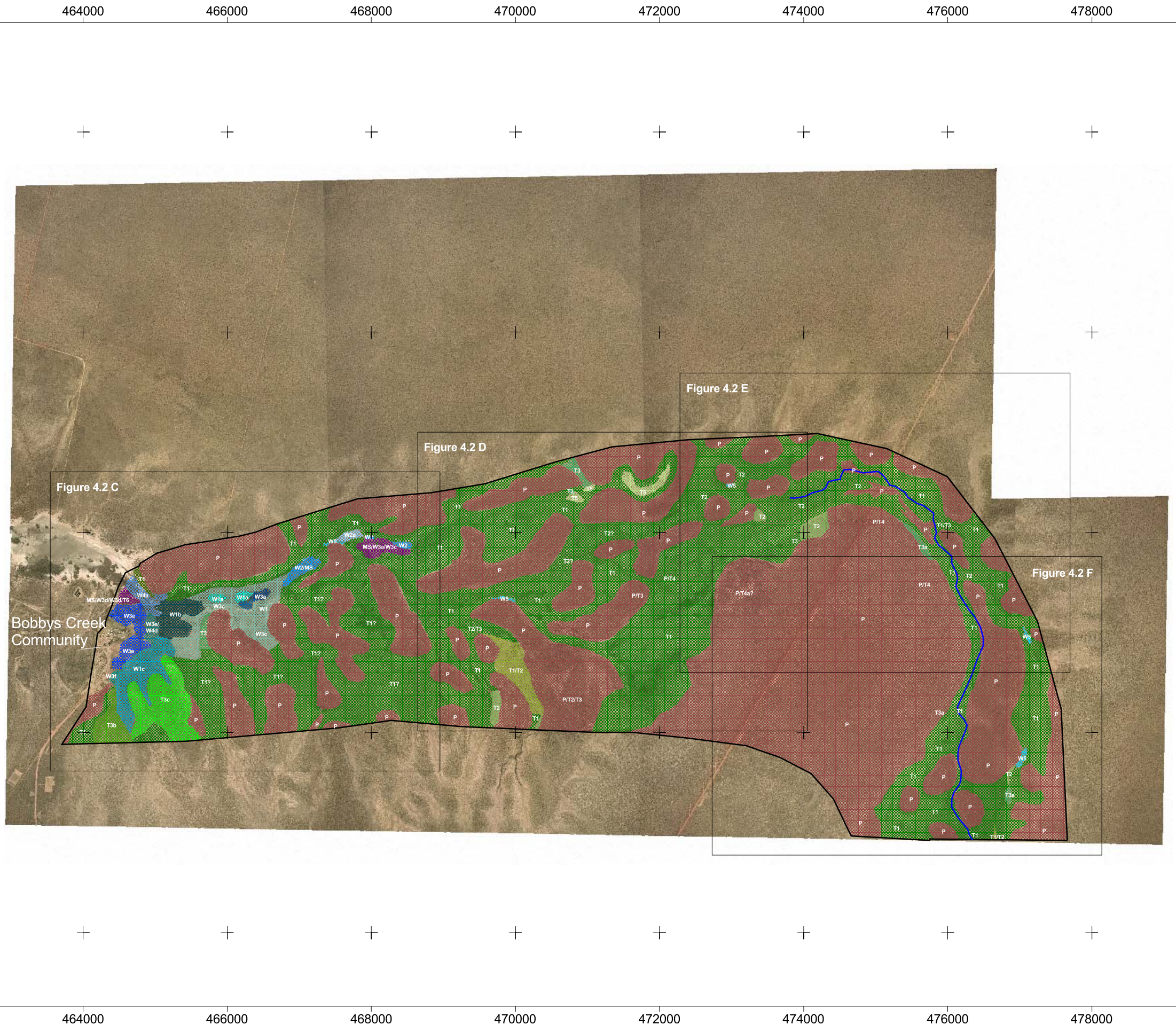
- T3** *Corymbia polycarpa*, *Corymbia bella* sparse open woodland over *Chrysopogon* sp. moderately dense grassland.
- T3a** *Eucalyptus tectifica* sparse low woodland over *Bauhinia cunninghamii* scattered low trees over *Chrysopogon* sp., *Eragrostis cumingii* and *Xerochloa imberbis* closed grassland.
- T3b** *Corymbia polycarpa*, *Corymbia flavescens* low open woodland over *Acacia neurocarpa* scattered trees over grass *Heteropogon contortus* closed grassland.
- T3c** *Corymbia polycarpa*, *Corymbia flavescens* sparse woodland over *Acacia neurocarpa* moderately dense low woodland over *Heteropogon contortus* sparse grasses.
- (2D) *Melaleuca* scattered trees to low open woodland on edge of sand plain adjacent to Bobby's Creek floodplain**
- T4** *Melaleuca viridiflora*, *Corymbia polycarpa* and *Corymbia flavescens* sparse low woodland over *Planchonia careya* scattered low trees over *Acacia tumida* var. *tumida* open high shrubland over *Waltheria indica* open shrubland over *Chrysopogon* sp. and *Eriachne obtusa* moderately dense grassland.
- T5** *Eriachne glauca*, *Xerochloa imberbis* grassland with *Polycarpha breviflora* sparse herbs and *Fimbristylis blakei*, *Fimbristylis acicularis* sparse sedges.
- T6** *Eriachne glauca*, **Cynodon dactylon* closed grassland.
- (2E) *Pandanus spiralis* sparse low trees on the edge of the floodplain**
- T7** *Corymbia flavescens* and *Acacia tumida* scattered low trees over *Melaleuca viridiflora* and *Verticordia verticillata* scattered low trees over *Pandanus spiralis* open high shrubland over *Chrysopogon* sp, *Triodia acutispicula* and *Schizachyrium fragile* grassland.
- (2F) *Creek bank vegetation***
- T8** *Melaleuca alsophila*, *Melaleuca viridiflora* and *Acacia tumida* moderately dense low forest over *Perotis rara* and *Eriachne salcata* moderately dense grassland and *Fuirena ciliaris* sparse sedges.
- (III) PINDAN TYPE VEGETATION**
- P** *Corymbia polycarpa*, *Corymbia flavescens* and *Acacia tumida* open woodland over *Waltheria indica* sparse shrubs over *Chrysopogon* sp. moderately dense grassland with *Gomphrena canescens* subsp. *canescens*, *Spermacoce auriculata* and *Ptilotus lanatus* var. *lanatus* sparse to open hermland.

Figure 4.2 A

BOBBY'S CREEK WETLAND VEGETATION MAPPING

Colour

- Unconfirmed Mound Spring
- Confirmed Mound Spring
- Bobby's Creek
- Study Area Boundary
- P
- MS
- Terrestrial Vegetation Units**
- T1
- T1/T1a
- T1/T2
- T2
- T3
- T3b
- T3c
- T5
- Wetland Vegetation Units**
- W1a
- W1b
- W1c
- W2
- W2a
- W3a
- W3b
- W3c
- W3e
- W3e/W3d
- W3f
- W4a
- W5



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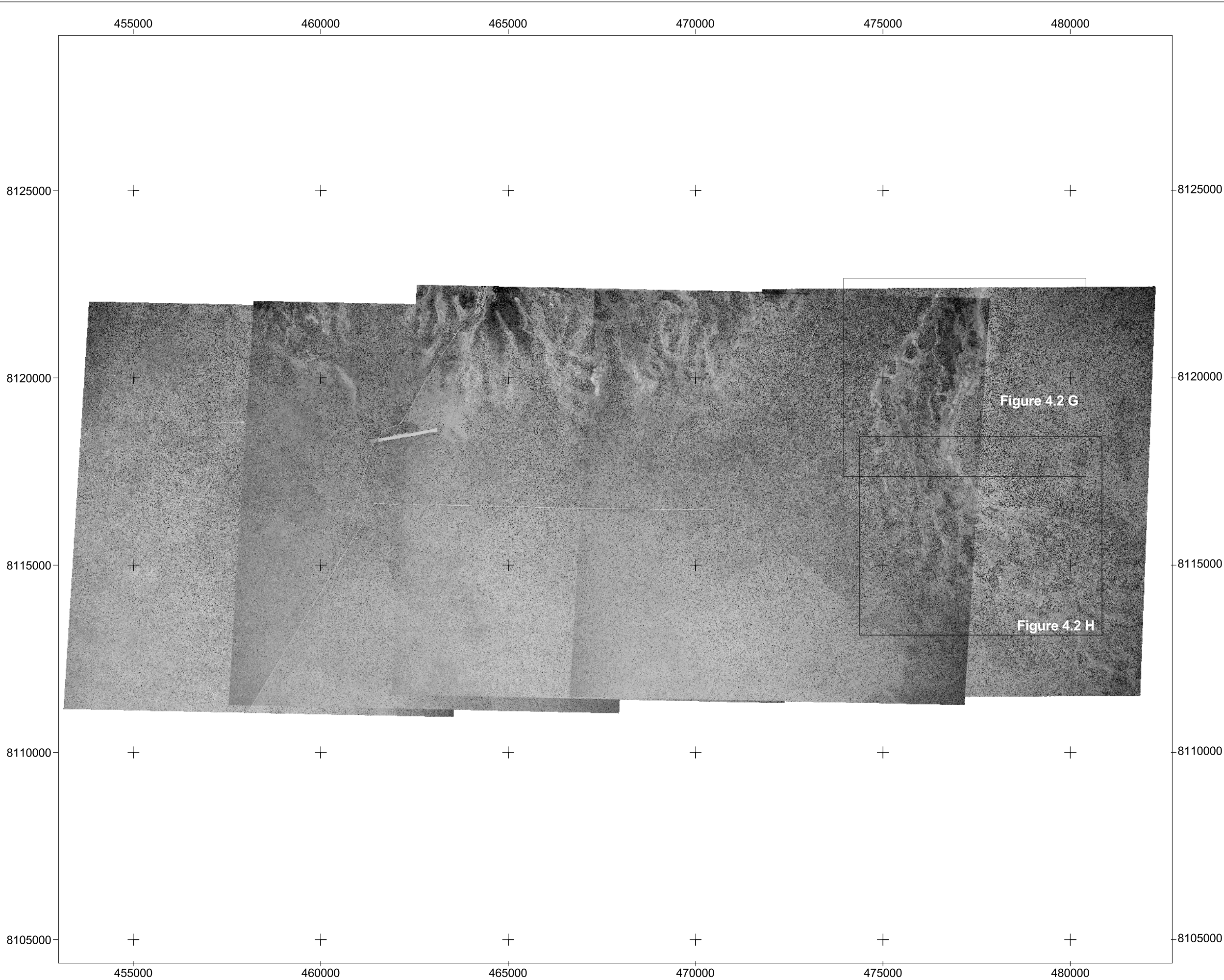
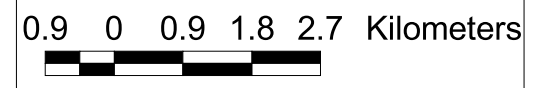
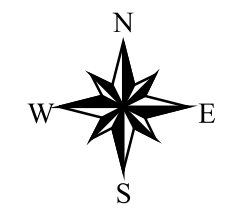


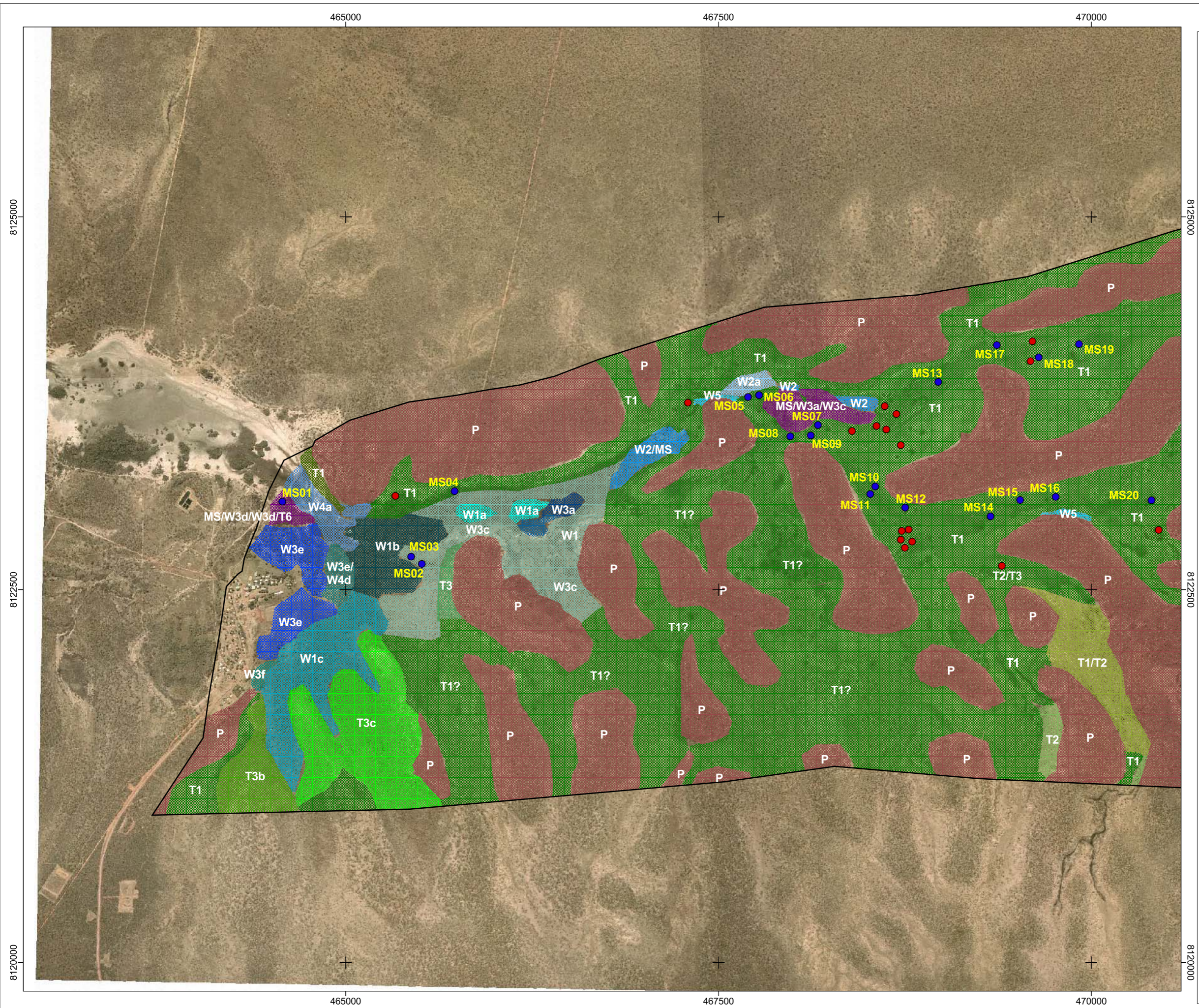
Figure 4.2 B
BOBBY'S CREEK
WETLAND
VEGETATION MAPPING
Black and White



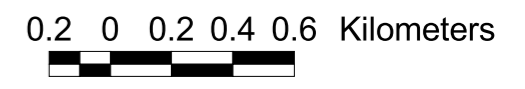
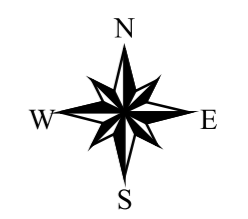
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Figure 4.2C
BOBBY'S CREEK
WETLAND
VEGETATION MAPPING



- Unconfirmed Mound Spring
- Confirmed Mound Spring
- Bobby's Creek
- Study Area Boundary
- P
- MS
- Terrestrial Vegetation Units**
- T1
- T1/T1a
- T1/T2
- T2
- T3
- T3b
- T3c
- T5
- Wetland Vegetation Units**
- W1a
- W1b
- W1c
- W2
- W2a
- W3a
- W3b
- W3c
- W3e
- W3e/W3d
- W3f
- W4a
- W5

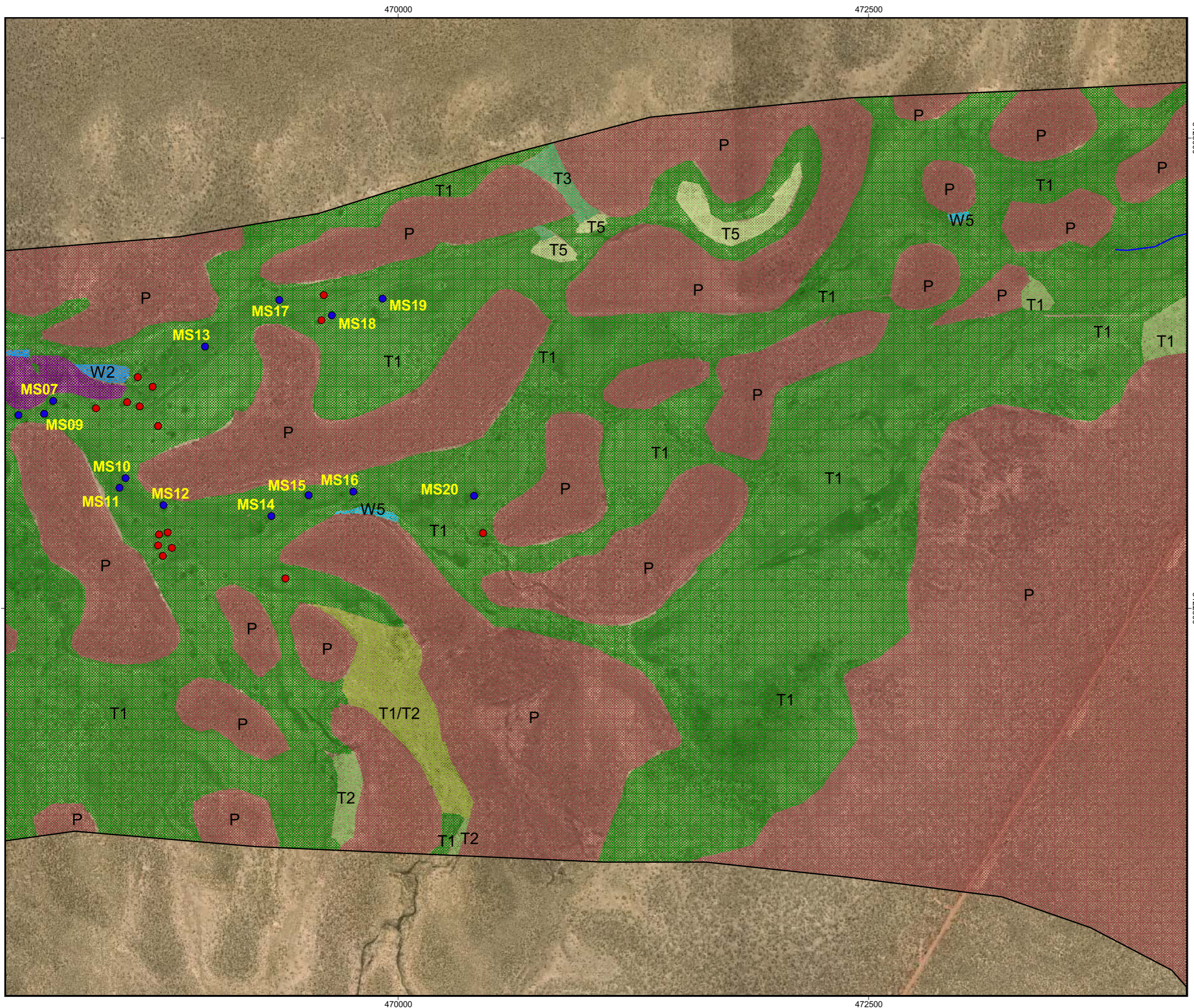


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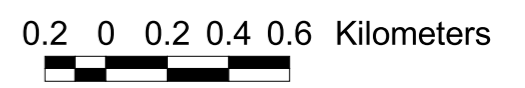
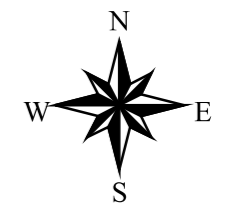
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Figure 4.2D

BOBBY'S CREEK WETLAND VEGETATION MAPPING



- Unconfirmed Mound Spring
- Confirmed Mound Spring
- ▲ Bobby's Creek
- ▭ Study Area Boundary
- P
- MS
- Terrestrial Vegetation Units**
- T1
- T1/T1a
- T1/T2
- T2
- T3
- T3b
- T3c
- T5
- Wetland Vegetation Units**
- W1a
- W1b
- W1c
- W2
- W2a
- W3a
- W3b
- W3c
- W3e
- W3e/W3d
- W3f
- W4a
- W5



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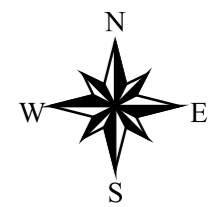
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Figure 4.2E

BOBBY'S CREEK WETLAND VEGETATION MAPPING

- Unconfirmed Mound Spring
- Confirmed Mound Spring
- Bobby's Creek
- Study Area Boundary
- P
- MS
- Terrestrial Vegetation Units**
- T1
- T1/T1a
- T1/T2
- T2
- T3
- T3b
- T3c
- T5
- Wetland Vegetation Units**
- W1a
- W1b
- W1c
- W2
- W2a
- W3a
- W3b
- W3c
- W3e
- W3e/W3d
- W3f
- W4a
- W5

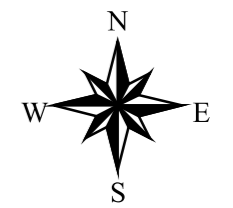
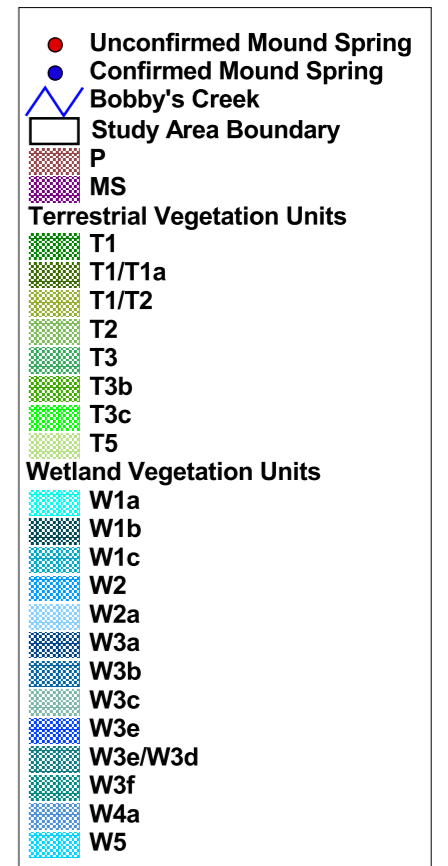


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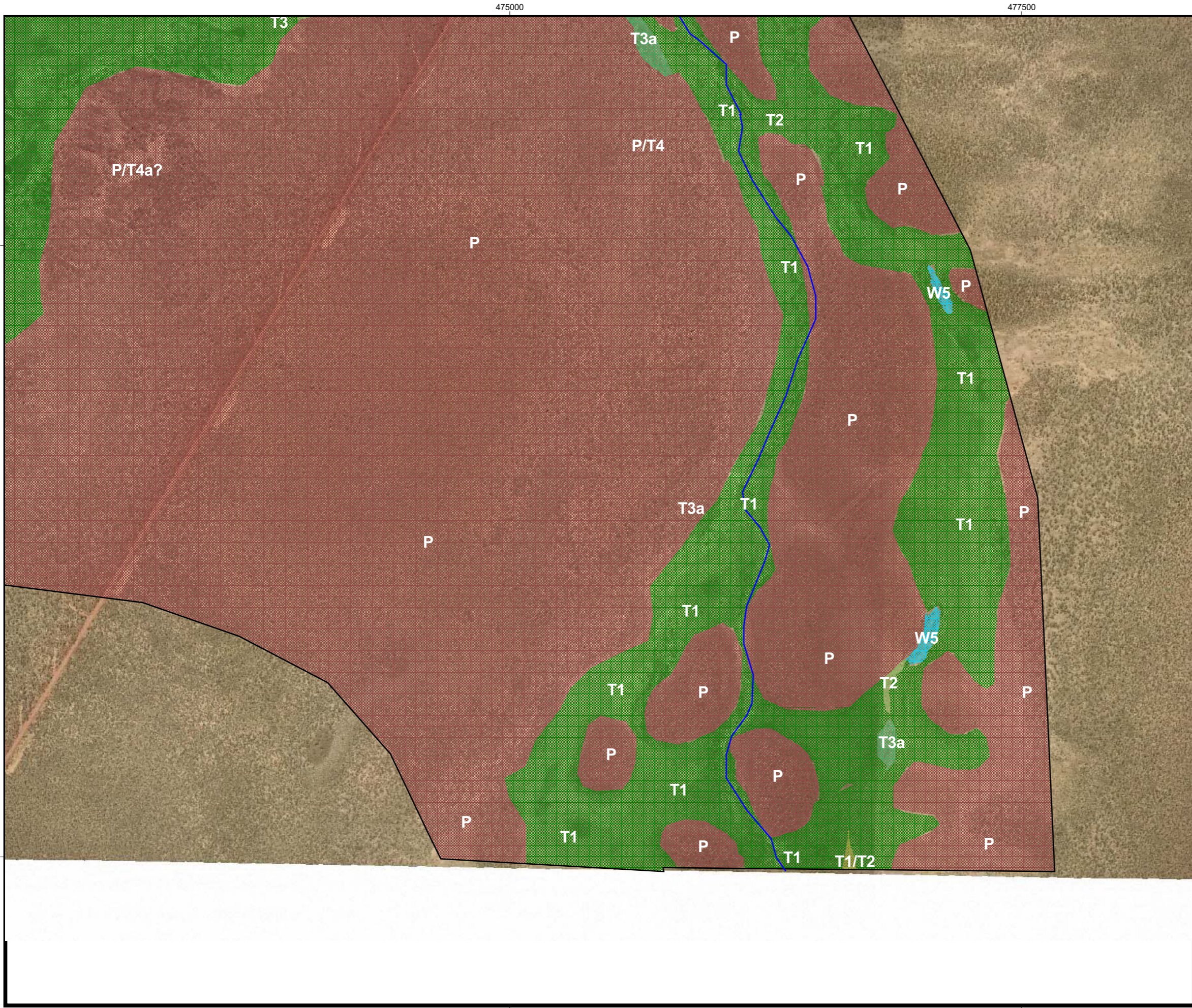
Figure 4.2F

BOBBY'S CREEK WETLAND VEGETATION MAPPING



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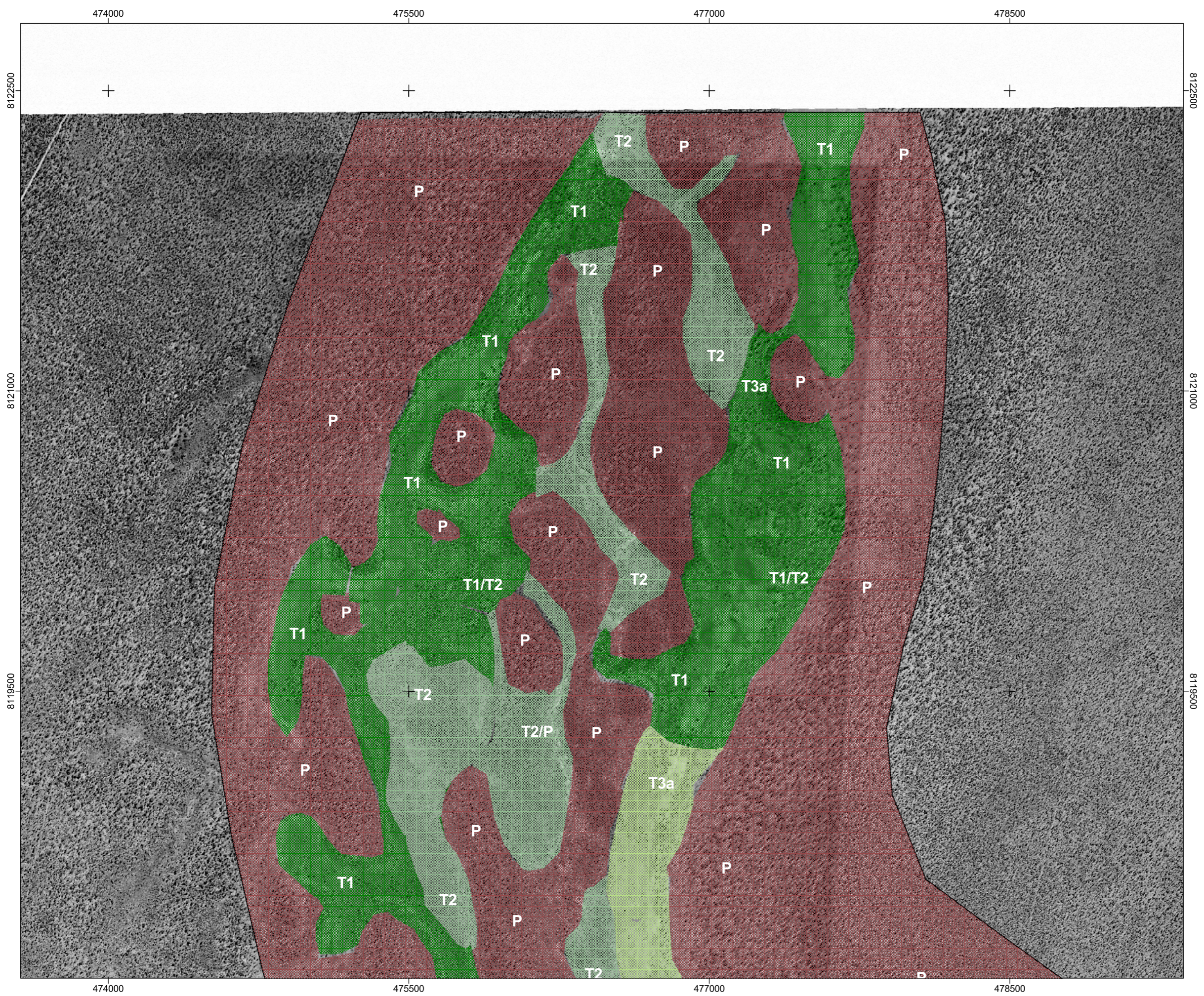
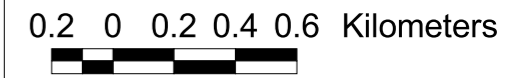
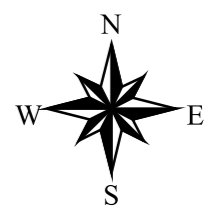
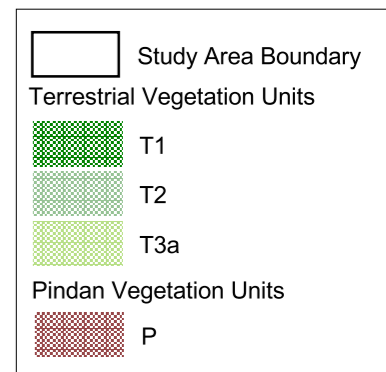


Figure 4.2G

**BOBBY'S CREEK
WETLAND
VEGETATION MAPPING**

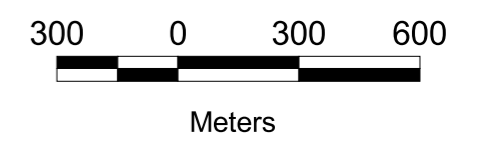
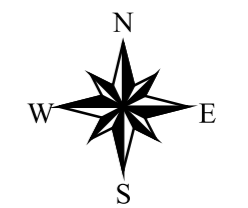
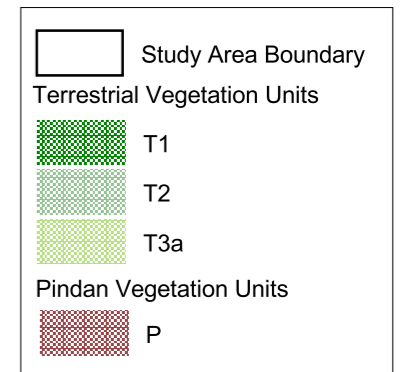


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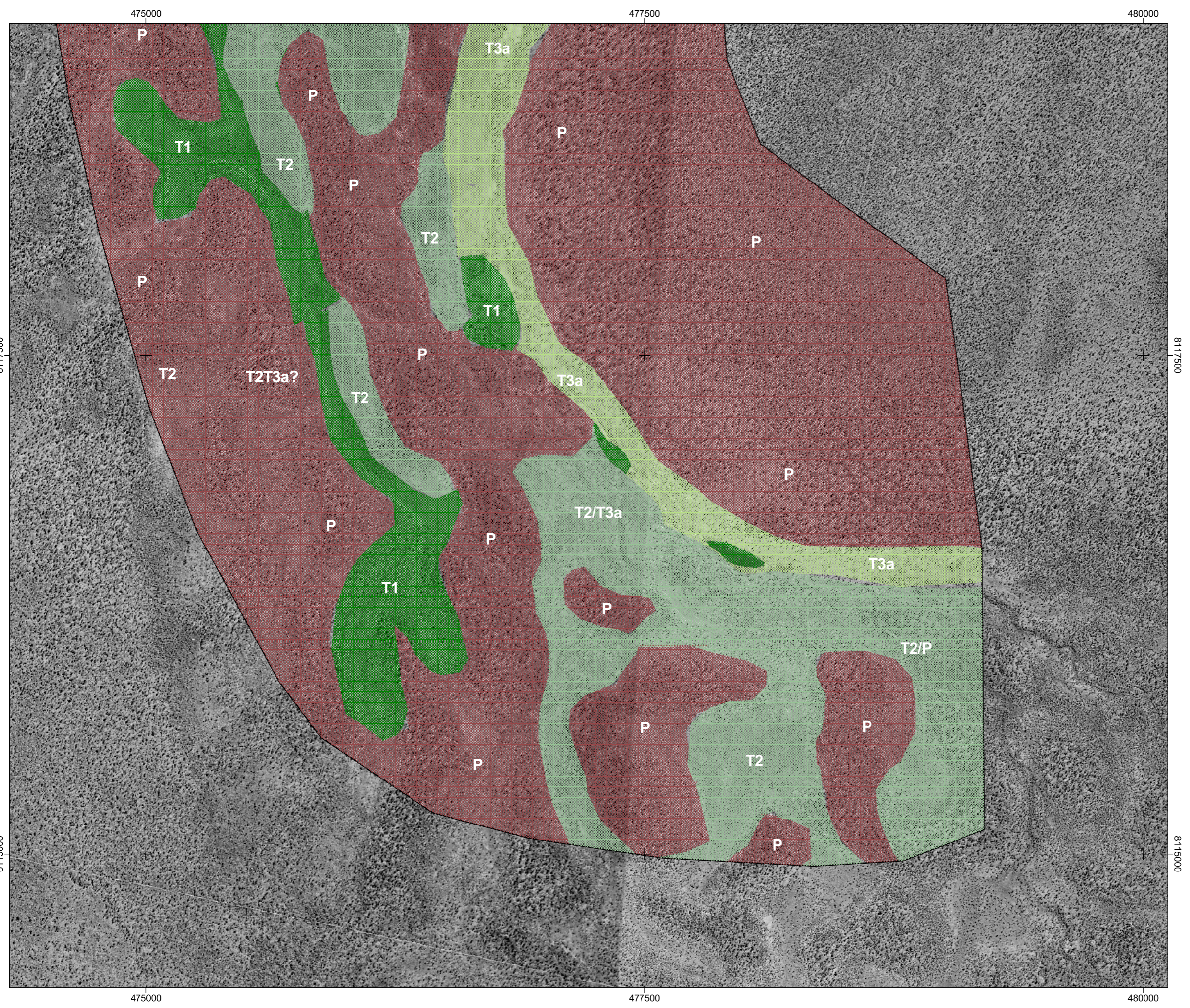
Figure 4.2H

BOBBY'S CREEK WETLAND VEGETATION MAPPING



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5.0 CONSERVATION SIGNIFICANCE

The significance of the flora and vegetation of the project area has been assessed at three spatial scales; State, Regional and Local.

5.1 STATE SIGNIFICANCE

State significance refers to those features of the environment that are recognised under State legislation as being of importance to the Western Australian community. It is based primarily on the presence of flora species protected under the WA *Wildlife Conservation Act 1950*.

Six species listed as Priority under the WA *Wildlife Conservation Act 1950* were recorded within the survey area. Given the relatively small survey area (approximately 46 km²) this area contains a high concentration of Priority flora. This is attributed to the dominance of wetland vegetation, which is poorly represented in the region (in comparison to areas such as savanna woodland that is widespread in the Kimberley). In addition, collections of flora from the Kimberley are relatively poor in comparison to other areas of the State (e.g. the Swan Coastal Plain). Hence a number of Kimberley flora are placed on the Priority listing because they are poorly collected rather than because they are genuinely uncommon (T. Willing, CALM, pers. comm.).

Current data suggest that four of the six species recorded are restricted to the Kimberley region, whilst two of these species are believed to be restricted to the Dampier Peninsula (*Nymphoides beaglensis* and *Aphyllodium glossocarpum*). Two species are restricted to wetland/ dampland areas (*N. beaglensis* and *Stylidium costulatum*).

The assemblages of the Lolly Well Springs wetland complex, which occur within the Bobby's Creek wetland system, have been listed as Priority 4 on the CALM Priority Ecological Communities list, which functions as a reserve list for CALM recognised Threatened Ecological Communities (see Appendix E for explanation of codes). The proposal to list this area on the CALM TEC listing was overturned by the Western Australian Threatened Ecological Communities Scientific Committee (WATECSC) due to the apparent absence of distinct communities within this area (T. Willing, CALM, pers. comm.).

5.2 REGIONAL SIGNIFICANCE

Regional significance refers to the importance of a site at a biogeographic regional level. The plantation site is located within the Dampier Botanical District, which is broadly characterised by Pindan formation on sandplains (Beard, 1979). The reservation status of the bioregion is less than five percent that is low in comparison to other regions within the State.

The Lolly Well Springs flow from the Broome Sandstone aquifer and are located within the Aboriginal Reserve approximately 1-2 km from the Beagle Bay Community township and approximately 21-22 km from the project site. The springs comprise wetland complexes and numerous low organic mound springs with moats. The vegetation communities of Lolly Well Springs are relatively undisturbed and cover an area of less than 50 ha (CALM 2004). There are few communities of similar structure to the Bobby's Creek wetland system within the Dampier Peninsula, with the most similar (but still distinct) communities occurring at Yarp Lakes east of Pender Bay (T. Willing, CALM, pers. comm.; and see Figure 4.1).

There is only one area vested within the conservation estate that occurs on the Dampier Peninsula, which is the Coulomb Point Nature Reserve. This reserve covers an area of 281.4 km² and lies on the west coast of the Peninsula approximately 50 km south-west of Beagle Bay. Coulomb Point Nature Reserve contains mound spring communities; however, they are very distinct to those occurring at Bobby's Creek. The proposed Dampierland National Park will include the Coulomb Point Nature Reserve.

5.3 LOCAL SIGNIFICANCE

Local significance refers to those species or vegetation associations that are poorly represented in the area, those with the capacity to support site-specific elements or those that are in better condition than other similar locations.

The wetland communities of Bobby's Creek have high local significance as they are one of the few areas of permanent freshwater on the Peninsula (Kenneally *et al.* 1996). In particular, this area is one of the few known locations of the locally endemic Priority 2 taxon *Nymphoides beaglensis*.

The vegetation of the survey area is generally in excellent to pristine condition; however, a large scale fire has passed through the Bobby's Creek wetland system since the conclusion of the field work, with approximately 75 % of vegetation affected (J. Brennan, Brennan & Associates, pers.comm). There is little evidence of cattle grazing or anthropogenic disturbances, and although there are a number of weed species present within the area, including two declared weed species, weed density is generally low and localised. The highly invasive Stinking Passion Flower (**Passiflora foetida*) was recorded at four locations and has the potential to spread throughout the area if conditions become suitable, i.e. there is degradation of the habitat. One quite dense (10 to 30 % cover) population of Parkinsonia (**Parkinsonia aculeata*) was recorded in a previously cleared area, and if possible, an eradication programme should be undertaken to remove all plants from the area.

6.0 CONCLUSIONS

Groundwater Dependent Ecosystems (GDE) are defined as a community of organisms for which groundwater is a key element required for consumptive use, biophysical processes or as habitat (SKM 2001). The role that groundwater has in controlling and maintaining ecosystems is poorly understood; however, consideration of water requirements of GDEs has become a recent addition to water allocations decisions.

The Water and Rivers Commission (WRC) has implemented a comprehensive system of water allocation planning and licensing of water use to determine how much water needs to be set aside for the environment and how the remaining water should be shared for industrial, agricultural and public water supply areas. Decisions pertaining to the water allocation are based on the identification of Ecological Water Requirements (EWRs) and Social Water Requirements (SWRs).

The “Beagle Bay *Big Tree Country* Plantation Project” will require irrigation of crops, for which the water will be sourced from the Broome aquifer underlying the plantation site. Due to the close proximity of the vegetation communities assessed in this survey to the plantation site, it is possible that water drawdown resulting from irrigation will impact these communities. Consequently an assessment of the EWRs of the GDEs identified in this survey is required.

The assessment will require the following:

1. Determination of the level of groundwater dependency;
2. Determination of the influence of surface water; and
3. Determination of tolerance of GDEs to groundwater drawdown, i.e. what level can the groundwater decrease to before the communities will be impacted.

7.0 STUDY TEAM

The Beagle Bay GDE Flora Assessment described in this document was planned, coordinated and executed by:

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Project Staff

Garry Connell	BSc (Hons) Zool	Project Manager
Brian Morgan	BSc (Hons) Bot	Botanist
Belinda Barnett	BSc (Hons) Zool	Biologist
Brad Palmer	BSc (Hons) Geog	GIS
Billie J Montes	BSc	Research Assistant

ACKNOWLEDGEMENTS

ecologia acknowledges Matthew and Russell Barrett who identified flora voucher collections. Tony Elliss assisted with the field work.

PERMITS

The Beagle Bay GDE Flora Assessment was conducted under the authorisation of the following licence issued by CALM to:

Brian Morgan, *ecologia* Environmental Consultants
Flora Survey: "Licence for Scientific or other Prescribed purposes,"
Licence No. SL006737, valid to 1 Feb 2005.

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APPENDICES



APPENDIX A

Flora species recorded during the survey

Appendix A List of flora species collected during the Beagle Bay GDE Flora Survey

Classification and nomenclature according to the Western Australian Herbarium and R.J. Hnatiuk (1990), Census of Australian Vascular Plants. Australian Government Publishing Service.

Key: * = introduced species
 ☞ = Priority taxa.

FAMILY	SPECIES
ACANTHACEAE	<i>Nelsonia campestris</i>
AIZOACEAE	<i>Trianthema patellitecta</i> * <i>Trianthema portulacastrum</i>
AMARANTHACEAE	<i>Achyranthes aspera</i> <i>Alternanthera angustifolia</i> <i>Gomphrena canescens</i> subsp. <i>canescens</i> ☞ <i>Gomphrena pusilla</i> – Priority 2 <i>Gomphrena tenella</i> <i>Ptilotus lanatus</i> var. <i>lanatus</i>
AMARYLLIDACEAE	<i>Crinum angustifolium</i>
ANTHERICACEAE	<i>Thysanotus chinensis</i>
APOCYNACEAE	<i>Wrightia saligna</i>
ASCLEPIADACEAE	<i>Cynanchum carnosum</i> * <i>Gomphocarpus fruticosus</i> <i>Gymnanthera oblonga</i> <i>Tylophora cinerascens</i>
ASTERACEAE	<i>Blumea integrifolia</i> <i>Cyanthillium cinereum</i> * <i>Emilia sonchifolia</i> ? <i>Epaltes australis</i> <i>Pluchea rubelliflora</i> <i>Pluchea tetranthera</i> <i>Pterocaulon serrulatum</i> ? <i>Pterocaulon</i> sp. A Kimberley Flora <i>Pterocaulon sphacelatum</i> <i>Thespidium basiflorum</i>
BIGNONIACEAE	<i>Dolichandrone heterophylla</i>
BORAGINACEAE	<i>Heliotropium cunninghamii</i> <i>Trichodesma zeylanicum</i> var. <i>latisepalum</i>

FAMILY	SPECIES
BYBLIDACEAE	<i>Byblis filifolia</i> <i>Byblis liniflora</i>
CAESALPINIACEAE	<i>Bauhinia cunninghamii</i> <i>Chamaecrista mimosoides</i> * <i>Parkinsonia aculeata</i>
CAPPARACEAE	<i>Cleome tetrandra</i> <i>Cleome viscosa</i>
CARYOPHYLLACEAE	<i>Polycarpaea breviflora</i>
CENTROLEPIDACEAE	<i>Centrolepis banksii</i> <i>Centrolepis exserta</i>
CHENOPODIACEAE	<i>Halosarcia</i> sp.
COMBRETACEAE	<i>Lumnitzera racemosa</i>
COMMELINACEAE	<i>Cartonema parviflorum</i> <i>Cyanotis axillaris</i> <i>Murdannia graminea</i> * <i>Murdannia nudiflora</i>
CONVOLVULACEAE	<i>Bonamia linearis</i> <i>Cressa australis</i> <i>Cressa cretica</i> <i>Ipomoea coptica</i> <i>Ipomoea polymorpha</i> * <i>Merremia dissecta</i> <i>Merremia hederacea</i>
CYPERACEAE	<i>Abildgaardia schoenoides</i> <i>Bulbostylis barbata</i> <i>Cyperus</i> sp. <i>Cyperus aquatilis</i> <i>Cyperus bifax</i> <i>Cyperus breviculmis</i> * <i>Cyperus brevifolius</i> <i>Cyperus castaneus</i> <i>Cyperus haspan</i> <i>Cyperus latzii</i> <i>Cyperus microcephalus</i> subsp. <i>microcephalus</i> <i>Cyperus nervulosus</i> <i>Cyperus polystachyos</i> <i>Cyperus pulchellus</i> <i>Eleocharis dulcis</i> <i>Eleocharis geniculata</i> <i>Eleocharis ochrostachys</i> <i>Eleocharis sundaica</i> <i>Fimbristylis</i> sp.

FAMILY	SPECIES
CYPERACEAE (cont)	<i>Fimbristylis acicularis</i> <i>Fimbristylis blakei</i> <i>Fimbristylis cymosa</i> <i>Fimbristylis dichotoma</i> <i>Fimbristylis ferruginea</i> <i>Fimbristylis miliacea</i> <i>Fimbristylis nutans</i> <i>Fimbristylis phaeoleuca</i> <i>Fimbristylis polytrichoides</i> <i>Fimbristylis rara</i> <i>Fimbristylis solidifolia</i> <i>Fimbristylis tetragona</i> <i>Fimbristylis trigastrocarya</i> <i>Fuirena ciliaris</i> <i>Fuirena umbellata</i> <i>Lipocarpa microcephala</i> <i>Rhynchospora affinis</i> <i>Schoenoplectus lateriflorus</i> <i>Schoenoplectus litoralis</i> <i>Schoenoplectus mucronatus</i>
DROSERACEAE	<i>Drosera broomensis</i> <i>Drosera indica</i> <i>Drosera indica</i> "Dampier Peninsular Form" <i>Drosera indica</i> sens. lat.
EBENACEAE	<i>Diospyros rugosula</i>
ERIOCAULACEAE	<i>Eriocaulon cinereum</i>
EUPHORBIACEAE	<i>Phyllanthus</i> sp. <i>Euphorbia myrtoides</i> <i>Euphorbia</i> sp. <i>Flueggea virosa</i> <i>Phyllanthus maderaspatensis</i> <i>Poranthera microphylla</i>
GLEICHENIACEAE	<i>Platyzoma microphyllum</i>
GOODENIACEAE	<i>Goodenia lamprosperma</i> <i>Goodenia sepalosa</i>
HALORAGACEAE	<i>Gonocarpus leptothecus</i>
JUNCAGINACEAE	<i>Triglochin dubia</i>
LAMIACEAE	<i>Premna acuminata</i>
LECYTHIDACEAE	<i>Planchonia careya</i>
LEMNACEAE	<i>Spirodela punctata</i>

FAMILY	SPECIES
LOGANIACEAE	<i>Mitrasacme ambigua</i> <i>Mitrasacme exserta</i> <i>Mitrasacme kenneallyi?</i> <i>Mitrasacme nummularia</i>
LYTHRACEAE	<i>Ammannia baccifera</i> <i>Ammannia multiflora</i> <i>Nesaea striatiflora</i> <i>Rotala diandra</i>
MALVACEAE	<i>Gossypium rotundifolium</i> * <i>Sida acuta</i>
MARSILEACEAE	<i>Marsilea hirsuta</i> <i>Marsilea mutica</i>
MELASTOMATACEAE	<i>Melastoma affine</i>
MENISPERMACEAE	<i>Tinospora smilacina</i>
MENYANTHACEAE	☞ <i>Nymphoides beaglensis</i> – Priority 2
MIMOSACEAE	<i>Acacia holosericea</i> <i>Acacia neurocarpa</i> <i>Acacia tumida</i> var. <i>tumida</i>
MORACEAE	<i>Ficus opposita</i> var. <i>indecora</i>
MYRTACEAE	<i>Calytrix exstipulata</i> <i>Corymbia bella</i> <i>Corymbia dampieri</i> <i>Corymbia flavescens</i> <i>Corymbia polycarpa</i> <i>Eucalyptus tectifera</i> <i>Melaleuca alsophila</i> <i>Melaleuca cajuputi</i> <i>Melaleuca nervosa</i> <i>Melaleuca nervosa</i> subsp. <i>crosslandiana</i> <i>Melaleuca viridiflora</i> <i>Verticordia verticillata</i>
NAJADACEAE	<i>Najas graminea</i>
NYMPHAEACEAE	<i>Nymphaea violacea</i> <i>Riccia ?duplex</i>
ONAGRACEAE	<i>Ludwigia octovalvis</i> <i>Ludwigia perennis</i>
ORCHIDACEAE	<i>Cymbidium canaliculatum</i>

FAMILY	SPECIES
PANDANACECE	<i>Pandanus spiralis</i>
PAPILIONACEAE	<i>Aeschynomene indica</i> <i>Alysicarpus</i> sp. <i>Alysicarpus muelleri</i> Phyllodium <i>Aphyllodium glossocarpum</i> – Priority 3 Phyllodium <i>Aphyllodium parvifolium</i> – Priority 1 <i>Cajanus marmoratus</i> <i>*Clitoria ternatea</i> <i>Crotalaria</i> sp <i>Crotalaria brevis</i> <i>Crotalaria crispata</i> <i>Crotalaria cunninghamii</i> subsp. <i>cunninghamii</i> <i>Desmodium filiforme</i> <i>Desmodium</i> sp. <i>Desmodium trichostachyum</i> <i>Indigofera colutea</i> <i>Indigofera linifolia</i> <i>Sesbania cannabina</i> <i>*Stylosanthes hamata</i> <i>Tephrosia crocea</i> <i>Tephrosia simplicifolia</i> <i>Vigna</i> sp. <i>Vigna lanceolata</i> var. <i>filiformis</i> <i>Vigna vexillata</i> var. <i>angustifolia</i> <i>Zornia muelleriana</i> subsp. <i>congesta</i>
PARKERIACEAE	<i>Ceratopteris thalictroides</i>
PASSIFLORACEAE	<i>*Passiflora foetida</i>
PHILYDRACEAE	<i>Philydrum lanuginosum</i>
PLATYZOMATACEAE	<i>Platyzoma microphyllum</i>
POACEAE	<i>Alloteropsis semialata</i> <i>?Aristida holathera</i> <i>Aristida hygrometrica</i> <i>Arundinella nepalensis</i> <i>Bothriochloa bladhii</i> subsp. <i>bladhii</i> <i>Chloris lobata</i> <i>Chloris pumilio</i> <i>Chrysopogon ?pallidus</i> <i>Chrysopogon</i> sp. <i>Cymbopogon</i> sp <i>Cymbopogon bombycinus</i> <i>*Cynodon dactylon</i> <i>*Dactyloctenium aegyptium</i> <i>Digitaria bicornis</i> <i>Ectrosia agrostoides</i>

FAMILY	SPECIES
POACEAE (cont)	<i>Elionurus citreus</i> <i>Elytrophorus spicatus</i> <i>Eragrostis cumingii</i> <i>Eragrostis fallax</i> <i>Eriachne ciliata</i> <i>Eriachne glauca</i> <i>Eriachne melicacea</i> <i>Eriachne obtusa</i> <i>Eriachne pauciflora</i> <i>Eriachne sulcata</i> ? <i>Eriachne</i> sp. <i>Heteropogon contortus</i> <i>Imperata cylindrica</i> <i>Panicum</i> sp. <i>Panicum seminudum</i> <i>Perotis rara</i> <i>Phragmites karka</i> <i>Pseudoraphis spinescens</i> <i>Sacciolepis indica</i> <i>Schizachyrium crinizonatum</i> <i>Schizachyrium fragile</i> <i>Setaria apiculata</i> <i>Sorghum timorense</i> <i>Sporobolus australasicus</i> <i>Thaumastochloa pubescens</i> <i>Themeda triandra</i> <i>Themeda</i> sp. Triodia acutispicula – Priority 3 <i>Triraphis mollis</i> * <i>Urochloa mutica</i> <i>Xerochloa imberbis</i>
POLYGACEAE	<i>Polygala tepperi</i>
POLYGONACEAE	<i>Persicaria attenuata</i>
PORTULACACEAE	<i>Calandrinia quadrivalvis</i> <i>Calandrinia strophiolata</i> <i>Portulaca bicolor</i>
PROTEACEAE	<i>Grevillea striata</i> <i>Hakea arborescens</i>
RUBIACEAE	<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i> <i>Oldenlandia galioides</i> <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i> <i>Spermacoce auriculata</i> <i>Synaptantha scleranthoides</i> <i>Timonius timon</i>

FAMILY	SPECIES
SAPINDACEAE	<i>Atalaya variifolia</i> <i>Distichostemon hispidulus</i>
SCROPHULARIACEAE	<i>Buchnera asperata</i> <i>Buchnera ramosissima</i> <i>Buchnera urticifolia</i> <i>Glossostigma drummondii</i> <i>Limnophila fragrans</i> <i>Lindernia aplectra</i> subsp. 'short-haired' <i>Lindernia chrysoplectra</i> <i>Lindernia clausa</i> <i>Lindernia tectanthera</i> <i>Microcarpaea minima</i> <i>Mimulus debilis</i> <i>Mimulus uvedaliae</i> <i>Stemodia lathraia</i> <i>Stemodia lythrifolia</i> <i>Striga curviflora</i>
SOLANACEAE	<i>Physalis minima</i> <i>Solanum</i> sp
STACKHOUSIACEAE	<i>Stackhousia intermedia</i>
STERCULIACEAE	<i>Brachychiton diversifolius</i> <i>Helicteres</i> sp. <i>Waltheria indica</i>
STYLIDIACEAE	Stylidium <i>Stylidium costulatum</i> – Priority 3 <i>Stylidium schizanthum</i>
TACCACEAE	<i>Tacca leontopetaloides</i>
THELYPTERIDACEAE	<i>Cyclosorus interruptus</i>
THYMELAEACEAE	<i>Thecanthes punicea</i>
TILIACEAE	<i>Corchorus pumilio</i> <i>Triumfetta breviaculeata</i>
XYRIDACEAE	<i>Xyris complanata</i>
ZYGOPHYLLACEAE	<i>Tribulus angustifolius</i>



APPENDIX B

Species by Site Matrix

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S12	S13	S14
* <i>Clitoria ternatea</i>											N		
* <i>Emilia sonchifolia</i>													
* <i>Murdannia nudiflora</i>		N											
* <i>Passiflora foetida</i>													1
* <i>Stylosanthes hamata</i>						N							
? <i>Epaltes australis</i>						T							
? <i>Eriachne</i>					2								
? <i>Themeda</i>													1
<i>Acacia holosericea</i>													
<i>Acacia neurocarpa</i>											N		1
<i>Acacia tumida</i> var. <i>tumida</i>			3	2	1			3					
<i>Alternanthera angustifolia</i>						N							
<i>Alysicarpus</i> sp												1	
<i>Ammannia multiflora</i>													
<i>Aphyllodium glossocarpum</i>			2	1									
<i>Aphyllodium parvifolium</i>													
<i>Aristida hygrometrica</i>		T										1	
<i>Arundinella nepalensis</i>													3
<i>Atalaya variifolia</i>													
<i>Bauhinia cunninghamii</i>													
<i>Blumea integrifolia</i>	T												
<i>Bonamia linearis</i>		N	1										
<i>Buchnera asperata</i>				N									
<i>Buchnera ramosissima</i>		N											
<i>Buchnera urticifolia</i>	T	N											
<i>Bulbostylis barbata</i>		N										2	
<i>Byblis filifolia</i>	N			N									
<i>Byblis</i> sp			N										
<i>Cajanus marmoratus</i>													
<i>Calandrinia quadrivalvis</i>	T								2				
<i>Calandrinia strophiolata</i>		N										1	
<i>Cartonema parviflorum</i>	T		1	1			1						
<i>Centrolepis banksii</i>								T					
<i>Centrolepis exserta</i>													
<i>Ceratopteris thalictroides</i>										1			
<i>Chamaecrista mimosoides</i>						1			1				
<i>Chloris lobata</i>													
<i>Chloris pumilio</i>													
<i>Chrysopogon</i> sp	4	3	2	2	3		3				1	2	
<i>Cleome tetrandra</i>			N										
<i>Cleome viscosa</i>												1	
<i>Corymbia bella</i>											1		1
<i>Corymbia flavescens</i>			1	1								3	
<i>Corymbia polycarpa</i>			1	1			1						
<i>Crinum angustifolium</i>	N												
<i>Crotalaria brevis</i>	N							1					
<i>Crotalaria crispata</i>			2	2	1			1				1	1
<i>Crotalaria</i> sp													
<i>Cyanotis axillaris</i>			N										
<i>Cyclosorus interruptus</i>										1			
<i>Cymbidium canaliculatum</i>													
<i>Cymbopogon</i> sp													
<i>Cynanchum carnosum</i>													1
<i>Cyperus aquatilis</i>						N							
<i>Cyperus bifax</i>									5				

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
* <i>Clitoria ternatea</i>														
* <i>Emilia sonchifolia</i>		N												
* <i>Murdannia nudiflora</i>														
* <i>Passiflora foetida</i>		1								1				N
* <i>Stylosanthes hamata</i>											1			
? <i>Epaltes australis</i>														
? <i>Eriachne</i>														
? <i>Themeda</i>														
<i>Acacia holosericea</i>		1												
<i>Acacia neurocarpa</i>		1								1				
<i>Acacia tumida</i> var. <i>tumida</i>						3	2					4		
<i>Alternanthera angustifolia</i>														
<i>Alysicarpus</i> sp														
<i>Ammannia multiflora</i>														1
<i>Aphyllodium glossocarpum</i>														
<i>Aphyllodium parvifolium</i>							1							
<i>Aristida hygrometrica</i>				2	1									
<i>Arundinella nepalensis</i>														
<i>Atalaya variifolia</i>		1	1			1								
<i>Bauhinia cunninghamii</i>											1	1		
<i>Blumea integrifolia</i>			T		T			T						
<i>Bonamia linearis</i>														
<i>Buchnera asperata</i>														
<i>Buchnera ramosissima</i>			T				1							
<i>Buchnera urticifolia</i>					T	T		T						
<i>Bulbostylis barbata</i>							1							
<i>Byblis filifolia</i>			T	T	T		T	T			N	T	T	
<i>Byblis</i> sp														
<i>Cajanus marmoratus</i>							1							
<i>Calandrinia quadrivalvis</i>											T		T	
<i>Calandrinia strophiolata</i>						T	T							
<i>Cartonema parviflorum</i>				T	T							T		
<i>Centrolepis banksii</i>														
<i>Centrolepis exserta</i>					T									
<i>Ceratopteris thalictroides</i>														
<i>Chamaecrista mimosoides</i>									1					
<i>Chloris lobata</i>									1					
<i>Chloris pumilio</i>									1					
<i>Chrysopogon</i> sp	3		4	3	2	4	3	5			5		3	
<i>Cleome tetrandra</i>						N								
<i>Cleome viscosa</i>														
<i>Corymbia bella</i>			N											
<i>Corymbia flavescens</i>						1		1		1				
<i>Corymbia polycarpa</i>			N			2	2							
<i>Crinum angustifolium</i>														
<i>Crotalaria brevis</i>					N			N				N	T	
<i>Crotalaria crispata</i>		N		N			1							
<i>Crotalaria</i> sp						T								
<i>Cyanotis axillaris</i>														
<i>Cyclosorus interruptus</i>														
<i>Cymbidium canaliculatum</i>											1			
<i>Cymbopogon</i> sp		2												
<i>Cynanchum carnosum</i>														1
<i>Cyperus aquatilis</i>														
<i>Cyperus bifax</i>														

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S12	S13	S14
<i>Cyperus breviculmis</i>						T							
<i>Cyperus castaneus</i>													
<i>Cyperus haspan</i>										1			3
<i>Cyperus latzii</i>									1				
<i>Cyperus microcephalus</i> subsp. <i>microcephalus</i>								2					
<i>Cyperus polystachyos</i>													
<i>Cyperus pulchellus</i>	N												
<i>Cyperus sp.</i>													
<i>Desmodium filiforme</i>													
<i>Desmodium sp.</i>												2	
<i>Desmodium trichostachyum</i>													
<i>Diospyros bundeyana</i>													
<i>Dolichandrone heterophylla</i>		N											
<i>Drosera broomensis</i>	N	N		1			N						
<i>Drosera indica</i> "Dampier Peninsular Form"								N					
<i>Ectrosia agrostoides</i>			1										
<i>Eleocharis geniculata</i>													
<i>Eleocharis ochrostachys</i>													
<i>Eleocharis sundaica</i>						3		5		5			
<i>Elytrophorus spicatus</i>						T							
<i>Eragrostis cumingii</i>	N												
<i>Eriachne ciliata</i>													
<i>Eriachne glauca</i>					4				T				
<i>Eriachne melicacea</i>		3	1				1					1	
<i>Eriachne obtusa</i>		3	1				2						
<i>Eriocaulon cinereum</i>						2							
<i>Eucalyptus tectifera</i>											3		
<i>Euphorbia myrtooides</i>											N		
<i>Euphorbia sp.</i>		N											
<i>Ficus opposita</i> var. <i>indecora</i>				1							5		
<i>Fimbristylis blakei</i>													
<i>Fimbristylis dichotoma</i>													
<i>Fimbristylis ferruginea</i>													
<i>Fimbristylis miliacea</i>													1
<i>Fimbristylis nutans</i>													
<i>Fimbristylis rara</i>	N												
<i>Fimbristylis solidifolia</i>						1		1					
<i>Fimbristylis sp.</i>	1												
<i>Fimbristylis squarulosus</i>				2			1						
<i>Fimbristylis trigastrocarya</i>	T												
<i>Flueggea virosa</i>													1
<i>Fuirena ciliaris</i>								2		1			
<i>Fuirena umbellata</i>										1			
<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>				1									
<i>Glossostigma drummondii</i>						N							
<i>Gomphrena canescens</i> subsp. <i>canescens</i>	N		N	2	1		N						
<i>Gomphrena tenella</i>	T												
<i>Gonocarpus leptothecus</i>		1											
<i>Goodenia lamprosperma</i>					N	T		2					
<i>Goodenia sepalosa</i>						N							
<i>Gymnanthera oblonga</i>													
<i>Helicteres sp.</i>													
<i>Heliotropium cunninghamii</i>		T	1				T					1	
<i>Heteropogon contortus</i>											5		
<i>Imperata cylindrica</i>													

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
<i>Cyperus breviculmis</i>														
<i>Cyperus castaneus</i>					T									
<i>Cyperus haspan</i>		2												
<i>Cyperus latzii</i>														
<i>Cyperus microcephalus</i> subsp. <i>microcephala</i>														
<i>Cyperus polystachyos</i>		1							3	2				4
<i>Cyperus pulchellus</i>					N			1						
<i>Cyperus</i> sp.	4													
<i>Desmodium filiforme</i>					N			T			1			
<i>Desmodium</i> sp.		N						N						
<i>Desmodium trichostachyum</i>								T						
<i>Diospyros bundeyana</i>														1
<i>Dolichandrone heterophylla</i>			1		1		1							
<i>Drosera broomensis</i>			T	T	T		T					T	N	
<i>Drosera indica</i> "Dampier Peninsular Form"			T		T									
<i>Ectrosia agrostoides</i>														
<i>Eleocharis geniculata</i>									N					2
<i>Eleocharis ochrostachys</i>		1												
<i>Eleocharis sunaica</i>														
<i>Elytrophorus spicatus</i>														
<i>Eragrostis cumingii</i>								1			2			
<i>Eriachne ciliata</i>					N									
<i>Eriachne glauca</i>														
<i>Eriachne melicacea</i>				2		1								
<i>Eriachne obtusa</i>								3						
<i>Eriocaulon cinereum</i>														
<i>Eucalyptus tectifera</i>											2	2		
<i>Euphorbia myrtooides</i>														
<i>Euphorbia</i> sp.														
<i>Ficus opposita</i> var. <i>indecora</i>														
<i>Fimbristylis blakei</i>		2												
<i>Fimbristylis dichotoma</i>		2												
<i>Fimbristylis ferruginea</i>		1							4					2
<i>Fimbristylis miliacea</i>														
<i>Fimbristylis nutans</i>		3												
<i>Fimbristylis rara</i>														
<i>Fimbristylis solidifolia</i>														
<i>Fimbristylis</i> sp.				1										
<i>Fimbristylis squarulosus</i>			1		T									
<i>Fimbristylis trigastrocarya</i>					T								2	
<i>Flueggea virosa</i>								1						
<i>Fuirena ciliaris</i>		3												1
<i>Fuirena umbellata</i>					N									
<i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>								1						
<i>Glossostigma drummondii</i>														
<i>Gomphrena canescens</i> subsp. <i>canescens</i>			2	4	2	2	1	1			1	1		
<i>Gomphrena tenella</i>											N			
<i>Gonocarpus leptothecus</i>				1		1								
<i>Goodenia lamprosperma</i>														
<i>Goodenia sepalosa</i>						T								
<i>Gymnanthera oblonga</i>										1				2
<i>Helicteres</i> sp.								1						
<i>Heliotropium cunninghamii</i>														
<i>Heteropogon contortus</i>		3				1	1	2			4	1	1	
<i>Imperata cylindrica</i>	4													

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S12	S13	S14
<i>Indigofera colutea</i>													
<i>Ipomoea coptica</i>	N												
<i>Limnophila fragrans</i>													
<i>Lindernia chrysoplectra</i>													
<i>Lindernia clausa</i>													
<i>Lindernia tectanthera</i>	T			T									
<i>Lipocarpa microcephala</i>						N							
<i>Ludwigia octovalvis</i>								N	T				1
<i>Lummitzera racemosa</i>													
<i>Marsilea hirsuta</i>						3		2					
<i>Marsilea mutica</i>										T			
<i>Melaleuca alsophila</i>	1							1					
<i>Melaleuca cajuputi</i>										4			
<i>Melaleuca graminea</i>									2				
<i>Melaleuca nervosa</i>	1												
<i>Melaleuca viridiflora</i>		2	2	2				1					1
<i>Melastoma affine</i>													
<i>Merremia hederacea</i>										1			
<i>Microcarpaea minima</i>						3							
<i>Mimulus debilis</i>								T					
<i>Mitrasacme ambigua</i>													
<i>Mitrasacme exserta</i>													
<i>Mitrasacme nummularia</i>				N									
<i>Murdannia graminea</i>					N								
<i>Najas graminea</i>								2					
<i>Nelsonia campestris</i>										T			
<i>Nesaea stratiflora</i>						2		2					
<i>Nymphaea violacea</i>								N					
<i>Nymphoides beaglensis</i>						T		T		N			
<i>Oldenlandia galioides</i>						N		T		N			
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitras</i>	N												
<i>Pandanus spiralis</i>				2			N						N
<i>Panicum sp</i>			1										
<i>Panicum seminudum</i>													
<i>Perotis rara</i>	1			1									
<i>Persicaria attenuata</i>										1			
<i>Philydrum lanuginosum</i>										1			N
<i>Phyllanthus maderaspatensis</i>	N					N							
<i>Phyllanthus sp.</i>	N												
<i>Planchonia careya</i>	1	1											
<i>Platyzoma microphyllum</i>							1						
<i>Poaceae sp</i>													
<i>Polycarpaea breviflora</i>	N												
<i>Polygala tepperi</i>													
<i>Poranthera microphylla</i>	N												
<i>Portulaca bicolor</i>		N											
<i>Premna acuminata</i>		1											
<i>Pseudoraphis spinescens</i>						N							
<i>Ptilotus lanatus</i> var. <i>lanatus</i>		1	1									1	
<i>Rhynchospora affinis</i>				2									
<i>Rotala diandra</i>						T		1					
<i>Sacciolepis indica</i>													
<i>Schizachyrium fragile</i>			1	3									
<i>Schoenoplectus lateriflorus</i>						N				T			

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
<i>Indigofera colutea</i>								1						
<i>Ipomoea coptica</i>								N						
<i>Limnophila fragrans</i>		T												
<i>Lindernia chrysoplectra</i>													T	
<i>Lindernia clausa</i>												N		
<i>Lindernia tectanthera</i>			T	T	T						N		T	
<i>Lipocarpa microcephala</i>														
<i>Ludwigia octovalvis</i>		N												
<i>Ludwigia perennis</i>	1													
<i>Lummitzera racemosa</i>									3					
<i>Marsilea hirsuta</i>														
<i>Marsilea mutica</i>														
<i>Melaleuca alsophila</i>														
<i>Melaleuca cajuputi</i>	2									4				5
<i>Melaleuca graminea</i>									3					
<i>Melaleuca nervosa</i>		3												
<i>Melaleuca viridiflora</i>	1	4		3	4		1	1			1	2	2	
<i>Melastoma affine</i>										1				
<i>Merremia hederacea</i>														1
<i>Microcarpaea minima</i>														
<i>Mimulus debilis</i>														
<i>Mitrasacme ambigua</i>													T	
<i>Mitrasacme exserta</i>												N		
<i>Mitrasacme nummularia</i>				T	T							T		
<i>Murdannia graminea</i>														
<i>Najas graminea</i>														
<i>Nelsonia campestris</i>														
<i>Nesaea stratiflora</i>														
<i>Nymphaea violacea</i>														
<i>Nymphoides beaglsensis</i>														
<i>Oldenlandia galioides</i>														
<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitras</i>				T				T	N				3	
<i>Pandanus spiralis</i>	N							1						
<i>Panicum sp</i>														
<i>Panicum seminudum</i>					1									
<i>Perotis rara</i>	1			T	T			1						
<i>Persicaria attenuata</i>														
<i>Philydrum lanuginosum</i>		1												
<i>Phyllanthus maderaspatensis</i>				T	T								N	
<i>Phyllanthus sp.</i>														
<i>Planchonia careya</i>		1					1	1						
<i>Platyzoma microphyllum</i>														
<i>Poaceae sp</i>										5				
<i>Polycarpaea breviflora</i>														
<i>Polygala tepperi</i>					N			1						
<i>Poranthera microphylla</i>					T							T		
<i>Portulaca bicolor</i>														
<i>Premna acuminata</i>														
<i>Pseudoraphis spinescens</i>	1													
<i>Ptilotus lanatus</i> var. <i>lanatus</i>							1							
<i>Rhynchospora affinis</i>								T					1	
<i>Rotala diandra</i>														
<i>Sacciolepis indica</i>					T									
<i>Schizachyrium fragile</i>					T									
<i>Schoenoplectus lateriflorus</i>														

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S12	S13	S14
<i>Schoenoplectus litoralis</i>													
<i>Sesbania cannabina</i>										1			
<i>Setaria apiculata</i>		N										1	
<i>Sorghum timorense</i>	N						N						4
<i>Spermacoce auriculata</i>		T	1								N		
<i>Spirodela punctata</i>													
<i>Sporobolus australasicus</i>													
<i>Stackhousia intermedia</i>													
<i>Stemodia lythrifolia</i>													
<i>Striga curviflora</i>	T												
<i>Stylidium schizanthum</i>				N									
<i>Synaptantha scleranthoides</i>	T			3			N						
<i>Tephrosia crocea</i>													
<i>Tephrosia simplicifolia</i>													
<i>Thaumastochloa pubescens</i>	N		1										
<i>Themeda sp</i>								2					
<i>Themeda triandra</i>													
<i>Thysanotus chinensis</i>													
<i>Timonius timon</i>													
<i>Tinospora smilacina</i>		1											
<i>Trianthema patellitecta</i>		T	T									T	
<i>Tribulus angustifolius</i>		T											1
<i>Trichodesma zeylanicum var. latisepalum</i>													
<i>Triglochin dubia</i>										1			
<i>Triodia acutispicula</i>				3									
<i>Triumfetta breviaculea</i>		1											
<i>Verticordia verticillata</i>			4	2			1						
<i>Vigna sp</i>													1
<i>Vigna vexillata var. angustifolia</i>													
<i>Waltheria indica</i>		3	T				2					2	
<i>Wrightia saligna</i>				1									
<i>Xerochloa imberbis</i>	1				1								
<i>Xyris complanata</i>				1									
<i>Zornia muelleriana subsp. congesta</i>	N		1										

APPENDIX B: SPECIES BY SITE MATRIX

Species/ Site	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
<i>Schoenoplectus litoralis</i>									4					
<i>Sesbania cannabina</i>														
<i>Setaria apiculata</i>						1					1			
<i>Sorghum timorense</i>												4		
<i>Spermacoce auriculata</i>						1	T							
<i>Spirodela punctata</i>														N
<i>Sporobolus australasicus</i>								1						
<i>Stackhousia intermedia</i>					T			N						
<i>Stemodia lythrifolia</i>						N								
<i>Striga curviflora</i>										N			T	
<i>Stylidium schizanthum</i>														
<i>Synaptantha scleranthoides</i>				1	T								T	
<i>Tephrosia crocea</i>						2								
<i>Tephrosia simplicifolia</i>													1	
<i>Thaumastochloa pubescens</i>			1		T									
<i>Themeda sp</i>														
<i>Themeda triandra</i>								1						
<i>Thysanotus chinensis</i>								N						
<i>Timonius timon</i>	2	1												
<i>Tinospora smilacina</i>								1						
<i>Trianthema patellitecta</i>														
<i>Tribulus angustifolius</i>														
<i>Trichodesma zeylanicum var. latisepalum</i>							N							
<i>Triglochin dubia</i>														
<i>Triodia acutispicula</i>												2	2	
<i>Triumfetta breviaculea</i>						1								
<i>Verticordia verticillata</i>				1			1							
<i>Vigna sp</i>														
<i>Vigna vexillata var. angustifolia</i>		T												
<i>Waltheria indica</i>						2		1						
<i>Wrightia saligna</i>														
<i>Xerochloa imberbis</i>									2		1			
<i>Xyris complanata</i>														
<i>Zornia muelleriana subsp. congesta</i>								1						



APPENDIX C

Description of Site Locations

- C1: Monitoring Sites
- C2: Releve Sites

Explanation of codes:

- * = Introduced species
- ☞ = Priority species
- subsp. = subspecies
- var. = variety

VEGETATION CONDITION

- Pristine:** Vegetation pristine; no disturbance evident at all.
- Excellent:** Strata essentially intact: some signs of human non native disturbance; *e.g.* feral scats, litter, minor tracks.
- Good:** One or more strata significantly impacted; *e.g.* grazing, some weeds, some vegetation removal.
- Poor:** One or more strata severely impacted; *e.g.* dense weed invasion, substantial logging or tracks.
- Degraded:** native vegetation largely or totally removed.

DENSITY (Vegetation, leaf litter, wood litter)

- Scattered 0-2% total cover
- Sparse 2-10%
- Open 10-30%
- Moderately dense 30-70%
- Dense 70-100%

FIRE HISTORY

- Recent:** 0-1 years (completely devoid of vegetation or vegetation re-seeding/re-shooting. Eucalypts and shrubs may have juvenile foliage from rootstock and/or branches. Shrubs, spinifex, herbs and grasses may evident as seedlings)
- Moderate:** 1-5 years (burn scars on shrubs and trees still obvious, shrubs and spinifex may not be fully mature but species composition resembles original vegetation)
- Old:** 5 years + (Vegetation mature but burn scars evident on trees, no evidence of fire damage on shrubs, grasses, herbs and spinifex)
- None evident:** No burn scars evident. Vegetation mature.

APPENDIX C1: MONITORING SITES

Location BB1: *Melaleuca alsophila* scattered low trees over *Chrysopogon* sp., moderate dense grassland with *Calandrinia quadrivalvis*, *Gomphrena canescens* subsp. *canescens*, *Synaptantha scleranthoides*, *Gomphrena tenella* and sparse mixed herbs.

Date: 10/06/2004
 Location: 51K 475201/ 8124545
 Topography: Broad sloping banks of very broad seasonal creek flood plain
 Slope: Gentle to North
 Soil texture: Sand
 Soil colour: Grey
 Surface layer: Loose soil
 Leaf litter: Negligible
 Wood litter: Negligible
 Condition: Pristine
 Disturbance details: None visible, 10m from an access track
 Fire History: Old

Vegetation Cover

Trees <5 m	<2 %	<i>Melaleuca alsophila</i>
Shrubs 1-2 m	<2 %	<i>Planchonia careya</i> , <i>Melaleuca nervosa</i>
Climbers	<2 %	<i>Ipomoea coptica</i>
Herbs	2-10 %	<i>Buchnera urticifolia</i> , <i>Byblis liniflora</i> , <i>Calandrinia quadrivalvis</i> , <i>Lindernia tectanthera</i> , <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i> , <i>Zornia muelleriana</i> subsp. <i>congesta</i> , <i>Byblis filifolia</i> , <i>Poranthera microphylla</i> , <i>Striga curviflora</i> , <i>Drosera broomensis</i> , <i>Polycarpaea breviflora</i> , <i>Phyllanthus</i> sp., <i>Crotalaria brevis</i> , <i>Blumea integrifolia</i> , <i>Cartonema parviflorum</i> , <i>Phyllanthus maderaspatensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Synaptantha scleranthoides</i> , <i>Gomphrena tenella</i> , <i>Crinum angustifolium</i> ,
Grasses	30-70 %	<i>Chrysopogon</i> sp., <i>Xerochloa imberbis</i> , <i>Perotis rara</i> , <i>Thaumastochloa pubescens</i> , <i>Eragrostis cumingii</i> , <i>Sorghum timorense</i>
Sedges	<2 %	<i>Fimbristylis trigastrocarya</i> , <i>Fimbristylis</i> sp., <i>Cyperus pulchellus</i> , <i>Fimbristylis rara</i>

**Figure C1****Monitoring Site BB1**

Location BB2: *Melaleuca viridiflora*, *Corymbia polycarpa*, *Corymbia flavescens*, sparse low woodland over *Planchonia careya* scattered low trees over *Acacia tumida* var. *tumida* open high shrubland over *Waltheria indica* open shrubland over grasses *Chrysopogon* sp, *Eriachne obtusa*, *Eriachne melicacea* moderate dense grassland.

Date: 10/06/2004
 Location: 51K 475122/ 8124506
 Topography: River bank, broad creek flood bank: riparian
 Slope: Gentle North slope
 Soil texture: Sand
 Soil colour: White
 Surface layer: Loose soil
 Rock type: Nil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Sparse
 Condition: Pristine
 Disturbance details:
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	2-10 %	<i>Corymbia polycarpa</i> , <i>Corymbia flavescens</i>
Trees <5 m	<2 %	<i>Dolichandrone heterophylla</i>
Shrubs >2 m	10-30 %	<i>Melaleuca viridiflora</i> , <i>Planchonia careya</i> , <i>Acacia tumida</i> var. <i>tumida</i>
Shrubs 1-2 m	10-30 %	<i>Aphyllodium glossocarpum</i> , <i>Premna acuminata</i> , <i>Waltheria indica</i>
Shrubs 0.5-1m	<2 %	<i>Triumfetta breviaculeata</i>
Shrubs 0-0.5 m	<2 %	<i>Gonocarpus leptothecus</i>
Climbers	<2 %	<i>Tinospora smilacina</i>
Herbs	<2 %	<i>Buchnera urticifolia</i> , <i>Calandrinia strophiolata</i> , <i>Tribulus angustifolius</i> , * <i>Murdannia nudiflora</i> , <i>Heliotropium cunninghamii</i> , <i>Calandrinia strophiolata</i> , <i>Euphorbia</i> sp., <i>Buchnera ramosissima</i> , <i>Spermacoce auriculata</i> , <i>Crotalaria crispata</i> , <i>Ptilotus lanatus</i> var. <i>lanatus</i> , <i>Trianthema patellitecta</i> , <i>Portulaca bicolor</i> , <i>Bonamia linearis</i> , <i>Drosera broomensis</i>
Grasses	30-70 %	<i>Aristida hygrometrica</i> , <i>Setaria apiculata</i> , <i>Chrysopogon</i> sp, <i>Eriachne obtusa</i> , <i>Eriachne melicacea</i>
Sedges	<2 %	<i>Bulbostylis barbata</i>

Location BB8: *Melaleuca viridiflora*, *Melaleuca alsophila* scattered low trees over *Eleocharis sunandaica*, *Cyperus bifax* closed sedgeland with *Nymphoides beaglensis*, *Rotala diandra*, *Marsilea hirsuta* sparse to open herbland.

Date: 12/06/2004
 Location: 51K 467504/ 8123821
 Topography: Edge of pool in flood plain
 Slope: Negligible
 Soil texture: Sandy clay
 Soil colour: Dark Brown
 Surface layer: Surface crust
 Leaf litter: Sparse
 Wood litter: Negligible
 Condition: Excellent
 Disturbance details: Track nearby marked by cattle hoof marks
 Fire History: Difficult to assess in sedgeland, none recently

Vegetation Cover

Shrubs >2 m	<2 %	<i>Melaleuca alsophila</i> , <i>Melaleuca viridiflora</i>
Herbs	<2 %	<i>Calandrinia quadrivalvis</i> , <i>Mimulus debilis</i> , <i>Calandrinia quadrivalvis</i> , <i>Nesaea striatiflora</i> , <i>Rotala diandra</i> , <i>Drosera indica</i> "Dampier Peninsular Form", <i>Marsilea hirsuta</i> , <i>Goodenia lamprosperma</i> , <i>Ludwigia perennis</i> , <i>Nymphoides beaglensis</i> , <i>Najas graminea</i> , <i>Nymphaea violacea</i> ,
Grasses	<2 %	<i>Themeda</i> sp,
Sedges	>70 %	<i>Cyperus bifax</i> , <i>Eleocharis sunandaica</i> , <i>Fimbristylis solidifolia</i> , <i>Cyperus bifax</i> , <i>Centrolepis banksii</i> , <i>Fuirena ciliaris</i> , <i>Cyperus microcephalus subsp. microcephalus</i> ,



Figure C2 **Monitoring Site BB8**

Location BB11: *Melaleuca cajuputi* moderate dense forest over *Eleocharis sunaica*, *Cyperus haspan* sedgeland with *Merremia hederacea* scattered.

Date: 13/06/2004
 Location: 51K 465463/ 8123068
 Topography: Flood plain wetland
 Slope: Negligible
 Soil texture: Clay loam
 Soil colour: Black
 Surface layer: Bare soil
 Leaf litter: Sparse
 Wood litter: Moderate
 Condition: Pristine
 Disturbance details: None evident

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Melaleuca cajuputi</i>
Climbers	2-10 %	<i>Merremia hederacea</i>
Herbs	<2 %	<i>Persicaria attenuata</i> , <i>Ceratopteris thalictroides</i> , <i>Cyclosorus interruptus</i> , <i>Oldenlandia galioides</i> , <i>Sesbania cannabina</i> , <i>Marsilea mutica</i> , <i>Nelsonia campestris</i> , <i>Nymphoides beaglensis</i> , <i>Philydrum lanuginosum</i> , <i>Triglochin dubia</i>
Sedges	<2 %	<i>Fuirena umbellata</i> , <i>Eleocharis sunaica</i> , <i>Cyperus haspan</i> , <i>Schoenoplectus lateriflorus</i> , <i>Fuirena ciliaris</i>



Figure C3 **Monitoring Site BB11**

Location BB16: *Melaleuca ?nervosa*, *Melaleuca viridiflora* forest over *Timonius timon* scattered low trees over *Pandanus spiralis* sparse to open tall shrubs over *Acacia neurocarpa* tall scattered shrubs over *Heteropogon contortus*, *Cymbopogon sp.*, over *Cyperus haspan* scattered sedges with *Fimbristylis nutans*, *Fimbristylis blakei* and *Fuirena ciliaris* closed sedgeland in shallow pools.

Date: 13/06/04
 Location: 51K 465413/ 8123197
 Topography: Pool edge vegetation (spring fed)
 Slope: Negligible
 Soil texture: Clay loam
 Soil colour: Black
 Surface layer: Firm soil
 Leaf litter: Moderate
 Wood litter: Moderate
 Condition: Pristine
 Disturbance details: None evident, but near track
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	10-30 %	<i>Melaleuca viridiflora</i> , <i>Timonius timon</i>
Shrubs >2 m	<2 %	<i>Acacia holosericea</i> , <i>Melaleuca ?nervosa</i> , <i>Atalaya variifolia</i> , <i>Acacia neurocarpa</i>
Shrubs 1-2 m	<2 %	<i>Planchonia careya</i>
Climbers	<2 %	<i>Vigna vexillata</i> var. <i>angustifolia</i> , <i>Passiflora foetida</i>
Herbs	<2 %	<i>Philydrum lanuginosum</i> , <i>Crotalaria crispata</i> , <i>Ludwigia octovalvis</i> , <i>Limnophila fragrans</i> , * <i>Emilia sonchifolia</i> , <i>Desmodium sp.</i> , <i>Crotalaria crispata</i>
Grasses	30-70 %	<i>Heteropogon contortus</i> , <i>Cymbopogon sp</i>
Sedges	>70 %	<i>Fimbristylis ferruginea</i> , <i>Cyperus polystachyos</i> , <i>Fimbristylis dichotoma</i> , <i>Fuirena ciliaris</i> , <i>Eleocharis ochrostachys</i> , <i>Cyperus haspan</i> , <i>Fimbristylis nutans</i> , <i>Fimbristylis blakei</i>



Figure C4 **Monitoring Site BB16**

Location BB22: *Melaleuca viridiflora* scattered low trees over *Chrysopogon* sp and *Heteropogon contortus* closed grassland.

Date: 16/06/2004
 Location: 51K 472483/ 8121633
 Topography: Plain
 Slope: Negligible
 Soil texture: Sand with small patches of clay loam
 Soil colour: Black
 Surface Layer: Firm soil
 Leaf litter: Negligible
 Wood litter: Negligible
 Condition: Pristine
 Disturbance: None evident
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	<2 %	<i>Corymbia flavescens</i>
Trees <5 m	<2 %	<i>Melaleuca viridiflora</i>
Shrubs 1-2 m	<2 %	<i>Helicteres</i> sp., <i>Flueggea virosa</i>
Shrubs 0.5-1m	<2 %	<i>Waltheria indica</i>
Climbers	<2 %	<i>Tinospora smilacina</i> , <i>Zornia muelleriana</i> subsp. <i>congesta</i> , <i>Ipomoea coptica</i>
Herbs	<2 %	<i>Blumea integrifolia</i> , <i>Buchnera urticifolia</i> , <i>Crotalaria brevis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Thysanotus chinensis</i> , <i>Stackhousia intermedia</i> , <i>Desmodium</i> sp., <i>Chamaecrista mimosoides</i> , <i>Indigofera colutea</i> , <i>Desmodium trichostachyum</i> , <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i> , <i>Byblis liniflora</i> , <i>Heliotropium cunninghamii</i> , <i>Desmodium filiforme</i>
Soft grasses	>70 %	<i>Heteropogon contortus</i> , <i>Sporobolus australasicus</i> , <i>Chloris lobata</i> , <i>Chloris pumilio</i> , <i>Perotis rara</i> , <i>Eragrostis cumingii</i> , <i>Chrysopogon</i> sp, <i>Themeda triandra</i>
Sedges	<2 %	<i>Cyperus pulchellus</i> , <i>Rhynchospora affinis</i>



Figure C5

Monitoring Site BB22

APPENDIX C2: RELEVÉ SITES

Location BB3: *Melaleuca viridiflora*, *Acacia tumida* var. *tumida*, *Corymbia polycarpa* low open woodland over *Verticordia verticillata* moderate dense high shrubland over *Gomphrena canescens* subsp. *canescens* moderate dense herbland with scattered *Chrysopogon* sp.

Date: 10/06/04
 Location: 51K 474956/ 8124475
 Topography: Broad slope on edge of wide seasonal flood plain/creek
 Slope: Gentle North facing
 Soil texture: Sand
 Soil colour: White to pale grey
 Surface layer: Loose soil
 Leaf litter: Negligible
 Wood litter: Moderate
 Condition: Pristine
 Disturbance details: None evident
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	10-30 %	<i>Corymbia polycarpa</i>
Shrubs >2 m	30-70 %	<i>Melaleuca viridiflora</i> , <i>Verticordia verticillata</i>
Shrubs 1-2 m	<2 %	<i>Aphyllodium glossocarpum</i> , <i>Waltheria indica</i>
Herbs	30-70 %	<i>Crotalaria crispata</i> , <i>Heliotropium cunninghamii</i> , <i>Ptilotus lanatus</i> var. <i>lanatus</i> , <i>Trianthema patellitecta</i> , <i>Byblis</i> sp, <i>Cleome tetrandra</i> , <i>Spermacoce auriculata</i> , <i>Cyanotis axillaris</i> , <i>Cartonema parviflorum</i> , <i>Zornia muelleriana</i> subsp. <i>congesta</i> , <i>Bonamia linearis</i>
Grasses	<2 %	<i>Eriachne melicacea</i> , <i>Eriachne obtusa</i> , <i>Ectrosia agrostoides</i> , <i>Schizachyrium fragile</i> , <i>Panicum</i> sp. <i>Thaumastochloa pubescens</i>

Location BB4: *Corymbia flavescens*, *Acacia tumida* var. *tumida* scattered low trees over *Melaleuca viridiflora*, *Verticordia verticillata* scattered low trees over *Pandanus spiralis* open shrubland over *Chrysopogon* sp, *Triodia acutispicula* and *Schizachyrium fragile* grassland.

Date: 11/06/2004
 Location: 51K 474881/ 8124514
 Topography: Slopes of flood plain
 Slope: Gentle North facing
 Soil texture: Sand
 Soil colour: Pale brown
 Surface layer: Loose soil
 Leaf litter: Negligible
 Wood litter: Negligible
 Condition: Pristine
 Disturbance details: None evident

Vegetation Cover

Trees 5-15 m	<2 %	<i>Corymbia flavescens</i>
Shrubs >2 m	<2 %	<i>Acacia tumida</i> var. <i>tumida</i> , <i>Verticordia verticillata</i> , <i>Pandanus spiralis</i> , <i>Melaleuca viridiflora</i> , <i>Gardenia pyrifolia</i> subsp. <i>keartlandii</i>
Shrubs 1-2 m	<2 %	<i>Ficus opposita</i> var. <i>indecora</i>
Shrubs 0-0.5 m	<2 %	<i>Wrightia saligna</i>
Herbs	<2 %	<i>Cartonema parviflorum</i> , <i>Crotalaria crispata</i> , <i>Drosera broomensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Synaptantha scleranthoides</i> , <i>Mitrasacme nummularia</i> , <i>Lindernia tectanthera</i> , <i>Stylidium schizanthum</i> , <i>Buchnera asperata</i> , <i>Xyris complanata</i> , <i>Byblis liniflora</i>
Grasses	30-70 %	<i>Chrysopogon</i> sp, <i>Perotis rara</i> , <i>Triodia acutispicula</i> , <i>Schizachyrium fragile</i>
Sedges	<2 %	<i>Fimbristylis squarrosus</i> , <i>Rhynchospora affinis</i>

Location BB5: *Eriachne glauca*, *Chrysopogon* sp, *Xerochloa imberbis* closed grassland over ?*Eriachne* sp with *Gomphrena canescens* subsp. *canescens* scattered herbs.

Date: 11/06/2004
 Location: 51K 474867/ 8124644
 Topography: Creek flood plain
 Slope: Negligible West facing
 Soil texture: Sandy loam
 Soil colour: Black
 Surface layer: Loose soil, thin crust
 Leaf litter: Negligible
 Wood litter: Negligible
 Condition: Pristine
 Fire History: Grassland (difficult to assess)

Vegetation Cover

Herbs	<2 %	<i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Goodenia lamprosperma</i> , <i>Murdannia graminea</i>
Grasses	>70 %	<i>Chrysopogon</i> sp, <i>Eriachne glauca</i> , <i>Xerochloa imberbis</i> , ? <i>Eriachne</i> sp

Location BB6: Scattered *Chamaecrista mimosoides* over *Eleocharis sunaica* sparse to open sedge over *Marsilea hirsuta*, *Rotala diandra*, *Nesaea striatiflora*, *Nymphoides beaglensis* low herbland and *Eriocaulon cinereum*, *Cyperus breviculmis* sparse sedges.

Date: 11/06/2004
 Location: 51K 474913/ 8124614
 Topography: Seasonal pool in flood plain
 Slope: Negligible
 Soil texture: Clay
 Soil colour: Dark brown
 Surface layer: Solid clayey surface
 Leaf litter: Negligible
 Wood litter: Negligible
 Condition: Pristine

Vegetation Cover

Shrubs 0.5-1m	<2 %	<i>Chamaecrista mimosoides</i> ,
Shrubs 0-0.5 m	<2 %	* <i>Stylosanthes hamata</i>
Herbs	30-70 %	<i>Rotala diandra</i> , <i>Nymphoides beaglensis</i> , <i>Marsilea hirsuta</i> , <i>Alternanthera angustifolia</i> , <i>Goodenia lamprosperma</i> , <i>Phyllanthus maderaspatensis</i> , <i>Marsilea hirsuta</i> , <i>Goodenia sepalosa</i> , <i>Glossostigma drummondii</i> , <i>Microcarpaea minima</i> , <i>Nesaea striatiflora</i> , <i>Oldenlandia galioides</i> , ? <i>Epaltes australis</i> , <i>Lipocarpha microcephala</i> ,
Grasses	<2 %	<i>Pseudoraphis spinescens</i> , <i>Elytrophorus spicatus</i>
Sedges	2-10 %	<i>Cyperus aquatilis</i> , <i>Fimbristylis solidifolia</i> , <i>Eleocharis sunaica</i> , <i>Eriocaulon cinereum</i> , <i>Schoenoplectus lateriflorus</i> , <i>Cyperus breviculmis</i>

Location BB7: *Corymbia polycarpa* scattered low trees over *Acacia tumida* var. *tumida* low open woodland over scattered *Pandanus spiralis* over *Waltheria indica* scattered shrubs over *Sorghum timorense* sparse grasses with *Gomphrena canescens* subsp. *canescens*, *Heliotropium cunninghamii* moderate dense herbland.

Date: 11/06/2004
 Location: 51K 475199/ 8124710
 Topography: Plain
 Soil texture: Sand
 Soil colour: Pale brown to white
 Surface Layer: Loose soil
 Rock type: Nil
 Leaf litter: Moderate
 Wood litter: Sparse
 Condition: Pristine
 Disturbance details: No signs of disturbance
 Fire History: Old

Vegetation Cover

Trees 5-15 m	<2 %	<i>Corymbia polycarpa</i>
Trees <5 m	10-30 %	<i>Verticordia verticillata</i> , <i>Pandanus spiralis</i> , <i>Acacia tumida</i> var. <i>tumida</i>
Shrubs 1-2 m	<2 %	<i>Waltheria indica</i>
Herbs	30-70 %	<i>Cartonema parviflorum</i> , <i>Crotalaria crispata</i> , <i>Drosera broomensis</i> , <i>Synaptantha scleranthoides</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Heliotropium cunninghamii</i> , <i>Platyzoma microphyllum</i> , <i>Crotalaria brevis</i>
Grasses	2-10 %	<i>Chrysopogon</i> sp, <i>Eriachne melicacea</i> , <i>Eriachne obtusa</i> , <i>Sorghum timorense</i>
Sedges	<2 %	<i>Fimbristylis squarrosus</i>

Location BB10: *Melaleuca graminea* sparse low trees over *Cyperus latzii* moderate dense sedgeland.

Date: 12/06/2004
Location: 51K 467502/ 8123863
Topography: Seasonal wetland on flood plain
Slope: Gentle West facing
Soil texture: Sandy Clay
Soil colour: Dark brown to black
Surface layer: Loose soil
Leaf litter: Negligible
Wood litter: Negligible
Condition: Pristine
Disturbance details: None evident
Fire History: Old

Vegetation Cover

Trees 5-15 m	2-10 %	<i>Melaleuca graminea</i>
Herbs	<2 %	<i>Chamaecrista mimosoides, Ludwigia perennis</i>
Grasses	<2 %	<i>Eriachne glauca</i>
Sedges	30-70 %	<i>Cyperus latzii</i>

Location BB12: *Eucalyptus tectifica*, *Corymbia bella* low open woodland over
Heteropogon contortus, *Chrysopogon* sp. closed grassland.

Date: 13/06/2004
 Location: 51K 465574/ 8122620
 Topography: Plain
 Slope: Negligible
 Soil texture: Loam
 Soil colour: Black
 Surface layer: Firm soil
 Leaf litter: Moderate
 Distribution: Mainly under trees
 Wood litter: Sparse
 Condition: Pristine
 Disturbance details: Track present
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	10-30 %	<i>Eucalyptus tectifica</i>
Shrubs >2 m	<2 %	<i>Acacia neurocarpa</i>
Shrubs 1-2 m	<2 %	<i>Ficus opposita</i> var. <i>indecora</i>
Climbers	<2 %	* <i>Clitoria ternatea</i>
Herbs	<2 %	<i>Alysicarpus</i> sp, <i>Euphorbia myrtoides</i> , <i>Spermacoce auriculata</i>
Grasses	30-70 %	<i>Chrysopogon</i> sp

Location BB13: *Corymbia flavescens* open forest over *Acacia tumida*, low open forest over *Waltheria indica* sparse shrubs over *Sorghum timorense*, *Chrysopogon* sp. moderately dense grassland *Ptilotus lanatus* var. *lanatus* and scattered herbs.

Date: 13/06/2004
 Location: 51K 465785/ 8122528
 Topography: Elevated low rise and broad flood plain
 Slope: Negligible North facing
 Soil texture: Sand
 Soil colour: Grey
 Surface layer: Loose soil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Moderate
 Condition: Pristine
 Disturbance details: None evident
 Fire History: Old

Vegetation Cover

Trees 5-15 m	10-30 %	<i>Corymbia flavescens</i>
Shrubs 1-2 m	2-10 %	<i>Waltheria indica</i>
Shrubs 0-0.5 m	<2 %	<i>Ptilotus lanatus</i> var. <i>lanatus</i>
Herbs	<2 %	<i>Crotalaria crispata</i> , <i>Trianthema patellitecta</i> , <i>Desmodium</i> sp., <i>Heliotropium cunnninghamii</i> , <i>Calandrinia strophiolata</i> , <i>Tribulus angustifolius</i> , <i>Cleome viscosa</i>
Grasses	30-70 %	<i>Eriachne melicacea</i> , <i>Setaria apiculata</i> , <i>Sorghum timorense</i> , <i>Aristida hygrometrica</i> , <i>Chrysopogon</i> sp.
Sedges	<2 %	<i>Bulbostylis barbata</i>

Location BB14: *Melaleuca viridiflora* closed forest over *Pandanus spiralis*, *Acacia neurocarpa* scattered tall shrubs over *Cyperus haspan* open sedgeland and herbland.

Date: 13/06/2004
 Location: 51K 465498/ 8122544
 Topography: Small springs over plains
 Slope: Negligible

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Corymbia bella</i>
Shrubs >2 m	<2 %	<i>Flueggea virosa</i> , <i>Pandanus spiralis</i> , <i>Melaleuca viridiflora</i>
Shrubs 1-2 m	<2 %	<i>Acacia neurocarpa</i> ,
Climbers	<2 %	<i>Vigna</i> sp, <i>Cynanchum carnosum</i> , <i>*Passiflora foetida</i>
Herbs	10-30 %	<i>Crotalaria crispata</i> , <i>Ludwigia perennis</i> , <i>Philydrum lanuginosum</i> ,
Grasses	30-70 %	? <i>Themeda</i> sp., <i>Arundinella nepalensis</i>
Sedges	10-30 %	<i>Fimbristylis miliacea</i> , <i>Cyperus haspan</i>

Location BB15: *Melaleuca viridiflora*, *Melaleuca cajuputi* moderate dense forest over *Timonius timon* sparse trees over *Pandanus spiralis* sparse tall shrubs over *Cyperus* sp. sparse to moderate sedgeland and *Imperata cylindrica* moderately dense grassland of grass *Chrysopogon* sp.

Date: 13/06/04
 Location: 51K 465342/ 8122444
 Topography: Pools, spring fed
 Slope: Negligible
 Soil texture: Clay loam
 Soil colour: Black
 Surface layer: Firm soil
 Leaf litter: Moderate
 Wood litter: Sparse
 Condition: Pristine

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Timonius timon</i> , <i>Melaleuca viridiflora</i>
Shrubs >2 m	<2 %	<i>Pandanus spiralis</i> , <i>Melaleuca cajuputi</i>
Herbs	<2 %	<i>Ludwigia perennis</i>
Grasses	30-70 %	<i>Pseudoraphis spinescens</i> , <i>Chrysopogon</i> sp., <i>Imperata cylindrica</i> , <i>Perotis rara</i>
Sedges	30-70 %	<i>Cyperus</i> sp.

Location BB17: *Corymbia polycarpa* and *Corymbia bella* sparse low woodland over *Chrysopogon* sp. moderately dense grassland.

Date: 14/06/2004
 Location: 51K 475095 8125342
 Topography: Plain
 Slope: Gentle West facing
 Soil texture: Sand
 Soil colour: Grey
 Surface layer: Loose soil
 Leaf litter: Sparse
 Distribution: Mainly under trees
 Wood litter: Sparse
 Condition: Pristine
 Disturbance details: Track nearby, some fire scars on trees
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	<2 %	<i>Corymbia polycarpa</i> , <i>Corymbia bella</i>
Trees <5 m	2-10 %	<i>Dolichandrone heterophylla</i>
Shrubs 1-2 m	<2 %	<i>Atalaya variifolia</i>
Herbs	<2 %	<i>Blumea integrifolia</i> , <i>Drosera broomensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Byblis liniflora</i> , <i>Lindernia tectanthera</i> , <i>Drosera indica</i> (Dampier Peninsula form), <i>Buchnera? ramosissima</i>
Soft grasses	30-70 %	<i>Chrysopogon</i> sp, <i>Thaumastochloa pubescens</i>
Sedges	<2 %	<i>Fimbristylis squarulosus</i>

Location BB18: *Acacia tumida* var. *tumida* scattered tall shrubs over *Melaleuca viridiflora* moderately dense low woodland over *Gomphrena canescens* moderate dense herbland over *Aristida hygrometrica*, *Eriachne melicacea*, *Chrysopogon* sp. moderate dense grassland.

Date: 14/06/2004
 Location: 51K 474580/ 8124533
 Topography: Plain
 Slope: Gentle North facing
 Soil texture: Sand
 Soil colour: White
 Surface layer: Firm soil
 Leaf litter: Moderate
 Distribution: Mainly under shrubs/trees
 Wood litter: Sparse
 Disturbance details: None evident
 Fire History: Moderate

Vegetation Cover

Trees <5 m	10-30 %	<i>Acacia tumida</i> var. <i>tumida</i> , <i>Verticordia verticillata</i> , <i>Melaleuca viridiflora</i>
Shrubs 0-0.5 m	<2 %	<i>Gonocarpus leptothecus</i>
Herbs	10-30 %	<i>Byblis liniflora</i> , <i>Cartonema parviflorum</i> , <i>Drosera broomensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Lindernia tectanthera</i> , <i>Synaptantha scleranthoides</i> , <i>Phyllanthus maderaspatensis</i> , <i>Mitrasacme nummularia</i> , <i>Crotalaria crispata</i> , <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>
Grasses	10-30 %	<i>Chrysopogon</i> sp, <i>Eriachne melicacea</i> , <i>Fimbristylis</i> sp, <i>Aristida hygrometrica</i> , <i>Perotis rara</i>

Location BB19: *Melaleuca viridiflora* moderate dense low woodland over *Chrysopogon* sp., *Aristida hygrometrica*, *Panicum seminudum* over grassland with *Gomphrena canescens* subsp. *canescens* open herbland.

Date: 15/06/2004
 Location: 51K 473520/ 8125115
 Topography: Plain
 Slope: Very Gentle South-west facing
 Soil texture: Sand
 Soil colour: Pale brown
 Surface layer: Loose soil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Sparse
 Condition: Pristine
 Disturbance: None evident
 Fire History: Moderate, young *Melaleuca* regeneration ~ 70cm tall

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Melaleuca viridiflora</i>
Trees <5 m	<2 %	<i>Dolichandrone heterophylla</i>
Shrubs 0-0.5 m	<2 %	<i>Polygala tepperi</i>
Herbs	2-10 %	<i>Blumea integrifolia</i> , <i>Byblis liniflora</i> , <i>Cartonema parviflorum</i> , <i>Drosera broomensis</i> , <i>Drosera indica</i> (Dampier Peninsula form), <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Lindernia tectanthera</i> , <i>Mitrasacme nummularia</i> , <i>Phyllanthus maderaspatensis</i> , <i>Synaptantha scleranthoides</i> , <i>Buchnera urticifolia</i> , <i>Desmodium filiforme</i> , <i>Crotalaria brevis</i> , <i>Stackhousia intermedia</i> , <i>Poranthera microphylla</i>
Grasses	10-30 %	<i>Aristida hygrometrica</i> , <i>Chrysopogon</i> sp, <i>Sacciolepis indica</i> , <i>Perotis rara</i> , <i>Panicum seminudum</i> , <i>Eriachne ciliata</i> , <i>Thaumastochloa pubescens</i> , <i>Schizachyrium fragile</i>
Sedges	<2 %	<i>Fimbristylis squarulosus</i> , <i>Fimbristylis trigastrocarya</i> , <i>Fuirena umbellate</i> , <i>Cyperus pulchellus</i> , <i>Centrolepis exserta</i> , <i>Cyperus castaneus</i>

Location BB20: *Corymbia polycarpa*, *Acacia tumida*, *Corymbia flavescens* open forest over *Waltheria indica* sparse shrubs over *Chrysopogon* sp. moderate dense grassland with *Gomphrena canescens* subsp. *canescens*, *Spermacoce auriculata*, *Ptilotus lanatus* var. *lanatus* sparse to open herbland.

Date: 15/06/2004
 Location: 51K 473987/ 8124851
 Topography: Low rise over flood plain
 Slope: Negligible
 Soil colour: Pale brown
 Surface layer: Loose soil
 Leaf litter: Moderate
 Distribution: Widespread
 Wood litter: Moderate
 Condition: Pristine
 Disturbance: None evident
 Fire History: Old

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Corymbia polycarpa</i> , <i>Corymbia flavescens</i>
Shrubs >2 m	<2 %	<i>Acacia tumida</i> var. <i>tumida</i> , <i>Atalaya variifolia</i>
Shrubs 1-2 m	2-10 %	<i>Planchonia careya</i> , <i>Premna acuminata</i> , <i>Waltheria indica</i>
Shrubs 0.5-1m	<2 %	<i>Triumfetta breviaculeata</i>
Shrubs 0-0.5 m	<2 %	<i>Gonocarpus leptothecus</i> , <i>Tephrosia crocea</i>
Herbs	10-30 %	<i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Ptilotus lanatus</i> var. <i>lanatus</i> , <i>Cleome tetrandra</i> , <i>Stemodia lythrifolia</i> , <i>Spermacoce auriculata</i> , <i>Buchnera urticifolia</i> , <i>Calandrinia strophiolata</i> , <i>Goodenia sepalosa</i>
Grasses	30-70 %	<i>Chrysopogon</i> sp, <i>Eriachne melicacea</i> , <i>Setaria apiculata</i> , <i>Heteropogon contortus</i>
Sedges	<2 %	<i>Bulbostylis barbata</i>

Location BB21: *Corymbia polycarpa*, *Melaleuca viridiflora* open woodland over scattered *Planchonia careya* and *Acacia tumida* var. *tumida* sparse low trees over *Chrysopogon* sp., *Eriachne obtusa* moderate dense grassland.

Date: 15/06/2004
 Location: 51K 474634 8123963
 Topography: Plain
 Slope: Negligible
 Soil texture: Sand
 Soil colour: Grey
 Surface layer: Loose soil
 Leaf litter: Negligible
 Wood litter: Sparse
 Condition: Excellent
 Disturbance: None evident
 Fire History: Moderate, probably significant fire damage

Vegetation Cover

Trees 5-15 m	10-30 %	<i>Corymbia polycarpa</i>
Trees <5 m	<2 %	<i>Pandanus spiralis</i> , <i>Verticordia verticillata</i> , <i>Dolichandrone heterophylla</i>
Shrubs >2 m	<2 %	<i>Acacia tumida</i> var. <i>tumida</i> , <i>Melaleuca viridiflora</i> , <i>Gardenia pyriformis</i> subsp. <i>keartlandii</i>
Shrubs 1-2 m	<2 %	<i>Planchonia careya</i> , <i>Trichodesma zeylanicum</i> var. <i>latisepalum</i>
Shrubs 0-0.5 m	<2 %	<i>Polygala tepperi</i> , <i>Gonocarpus leptothecus</i> , <i>Aphyllodium</i> <i>glossocarpum</i> , <i>Aphyllodium parvifolium</i>
Herbs	<2 %	<i>Byblis liniflora</i> , <i>Calandrinia strophiolata</i> , <i>Drosera</i> <i>broomensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Spermacoce auriculata</i> , <i>Cajanus marmoratus</i> , * <i>Murdannia nudiflora</i> , <i>Buchnera ramosissima</i> , <i>Crotalaria crispata</i> , <i>Heliotropium cunninghamii</i>
Grasses	30-70 %	<i>Chrysopogon</i> sp, <i>Eriachne obtusa</i> , <i>Heteropogon</i> <i>contortus</i>

Location BB23: Pool of sparse herbs and *Schoenoplectus litoralis* moderate dense to closed sedgeland (inner banks) fringed by strip of *Melaleuca graminea* open woodland over *Lumnitzera racemosa* moderate dense tall shrubland over *Fimbristylis ferruginea* moderate dense sedgeland.

Date: 17/06/2004
 Location: 51K 464648/ 8123001
 Topography: Estuary, fresh water pool
 Slope: Negligible
 Soil texture: Clay
 Soil colour: Brown
 Surface layer: Firm soil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Negligible
 Condition: Excellent
 Disturbance: Some tracks
 Fire History: Old

Vegetation Cover

Trees <5 m	10-30 %	<i>Melaleuca graminea</i>
Shrubs >2 m	30-70 %	<i>Lumnitzera racemosa</i>
Herbs	2-10 %	<i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i>
Grasses	<2 %	<i>Xerochloa imberbis</i>
Sedges	30-70 %	<i>Schoenoplectus litoralis</i> , <i>Fimbristylis ferruginea</i> , <i>Eleocharis geniculata</i> , <i>Cyperus polystachyos</i>

Location BB24: *Melaleuca cajuputi* moderate dense forest over *Melastoma affina* scattered low trees over *Acacia neurocarpa* scattered tall shrubs over Poaceae sp. and *Cyperus polystachyos* scattered sedges.

Date: 17/06/2004
 Location: 51K 464662/ 8122881
 Topography: Wetland
 Slope: Negligible
 Soil texture: Clay loam
 Soil colour: Black
 Surface layer: Firm soil
 Leaf litter: Moderate
 Distribution: Widespread
 Wood litter: Sparse
 Condition: Pristine
 Disturbance: None evident
 Fire History: Old

Vegetation Cover

Trees 5-15 m	30-70 %	<i>Melaleuca cajuputi</i>
Trees <5 m	<2 %	<i>Corymbia flavescens</i>
Shrubs >2 m	<2 %	<i>Melastoma affina</i>
Shrubs 1-2 m	<2 %	<i>Acacia neurocarpa</i>
Climbers	<2 %	* <i>Passiflora foetida</i> , <i>Gymnanthera oblonga</i>
Grasses	>70 %	Poaceae sp.
Sedges	<2 %	<i>Cyperus polystachyos</i>

Location BB25: *Eucalyptus tectifica* sparse low woodland over *Bauhinia cunninghamii* scattered low trees over *Chrysopogon* sp, *Eragrostis cumingii*, *Xerochloa imberbis* closed grassland.

Date: 19/06/2004
 Location: 51K 478969/ 8116043
 Topography: Plain
 Slope: Gentle South facing
 Soil texture: Silty fine sand
 Soil colour: Grey
 Surface layer: Firm soil
 Leaf litter: Sparse
 Distribution: Mainly under trees
 Wood litter: Sparse
 Condition: Pristine
 Disturbance: None evident
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	2-10 %	<i>Eucalyptus tectifica</i>
Trees <5 m	<2 %	<i>Bauhinia cunninghamii</i>
Shrubs 1-2 m	<2 %	<i>Melaleuca viridiflora</i>
Shrubs 0.5-1m	<2 %	* <i>Stylosanthes hamata</i>
Herbs	<2 %	<i>Byblis liniflora</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Lindernia tectanthera</i> , <i>Striga curviflora</i> , <i>Desmodium filiforma</i> , <i>Calandrinia quadrivalvis</i> , <i>Cymbidium canaliculatum</i> , <i>Gomphrena tenella</i>
Grasses	>70 %	<i>Heteropogon contortus</i> , <i>Chrysopogon</i> sp., <i>Eragrostis cumingii</i> , <i>Xerochloa imberbis</i> , <i>Setaria apiculata</i>

APPENDIX C2: RELEVÉ SITES

Location BB26: *Eucalyptus tectifica* scattered trees over *Acacia tumida* var. *tumida* sparse low trees over *Melaleuca viridiflora*, *Bauhinia cunninghamii* low open woodland over *Sorghum timorense*, *Triodia acutispicula*, *Heteropogon contortus* moderate dense grassland.

Date: 19/06/2004
 Location: 51K 478311/ 8115790
 Topography: Low rise over flood plain
 Slope: Negligible
 Soil texture: Sand
 Soil colour: Pale brown
 Surface layer: Loose soil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Sparse
 Condition: Pristine
 Disturbance: None evident
 Fire History: Moderate

Vegetation Cover

Trees 5-15 m	2-10 %	<i>Eucalyptus tectifica</i>
Trees <5 m	30-70 %	<i>Acacia tumida</i> var. <i>tumida</i> , <i>Bauhinia cunninghamii</i> , <i>Melaleuca viridiflora</i>
Herbs	<2 %	<i>Byblis liniflora</i> , <i>Cartonema parviflorum</i> , <i>Crotalaria brevis</i> , <i>Drosera broomensis</i> , <i>Gomphrena canescens</i> subsp. <i>canescens</i> , <i>Mitrasacme nummularia</i> , <i>Poranthera microphylla</i> , <i>Lindernia clausa</i> , <i>Mitrasacme exserta</i>
Grasses	30-70 %	<i>Heteropogon contortus</i> , <i>Sorghum timorense</i> , <i>Triodia acutispicula</i>

APPENDIX C2: RELEVÉ SITES

Location BB27: *Melaleuca viridiflora* low open woodland over *Chrysopogon* sp, *Triodia acutispicula* moderate dense grassland *Fimbristylis trigastrocarya* sparse sedges and open herbland.

Date: 20/06/04
 Location: 51K 478246/ 8115298
 Topography: Plain
 Slope: Negligible
 Soil texture: Loamy sand
 Soil colour: Brown
 Surface layer: Firm soil
 Leaf litter: Sparse
 Distribution: Widespread
 Wood litter: Sparse
 Condition: Pristine
 Disturbance: None evident

Vegetation Cover

Trees <5 m	10-30 %	<i>Melaleuca viridiflora</i>
Shrubs 1-2 m	<2 %	<i>Diospyros bundeyana</i>
Shrubs 0.5-1m	<2 %	<i>Tephrosia simplicifolia</i>
Shrubs 0-0.5 m	<2 %	<i>Diospyros bundeyana</i>
Herbs	10-30 %	<i>Byblis liniflora</i> , <i>Crotalaria brevis</i> , <i>Drosera broomensis</i> , <i>Lindernia tectanthera</i> , <i>Phyllanthus maderaspatensis</i> , <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i> , <i>Mitrasacme ambigua</i> , <i>Lindernia chrysoplectra</i> , <i>Calandrinia quadrivalvis</i> , <i>Synaptantha scleranthoides</i> , <i>Striga curviflora</i>
Grasses	30-70 %	<i>Heteropogon contortus</i> , <i>Chrysopogon</i> sp, <i>Triodia acutispicula</i>
Sedges	10-30 %	<i>Fimbristylis trigastrocarya</i> , <i>Rhynchospora affinis</i>

APPENDIX C2: RELEVE SITES

Location BB28: *Melaleuca cajuputi* high closed forest over *Cyperus polystachyos*, *Fimbristylis ferruginea* moderate dense sedgelands with *Gymnanthera oblonga*, *Cynanchum carnosum* sparse banks.

Date: 20/06/2004
 Location: 51K 0464869/ 8122156
 Topography: Sedge wetland
 Slope: Negligible
 Soil texture: Clay loam
 Soil colour: Black
 Surface layer: Firm soil
 Leaf litter: Moderate
 Distribution: Widespread
 Wood litter: Moderate
 Condition: Pristine
 Disturbance: Uncapped site bore

Vegetation Cover

Trees 5-15 m	>70 %	<i>Melaleuca cajuputi</i>
Climbers	2-10 %	<i>Merremia hederacea</i> , * <i>Passiflora foetida</i> , <i>Gymnanthera oblonga</i> , <i>Cynanchum carnosum</i>
Herbs	<2 %	<i>Ammannia multiflora</i> , <i>Spirodela punctata</i>
Sedges	>70 %	<i>Cyperus polystachyos</i> , <i>Fimbristylis ferruginea</i> , <i>Fuirena ciliaris</i> , <i>Eleocharis geniculata</i>



APPENDIX D

Rare Flora Report Forms Lodged with CALM

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Aphyllodium glossocarpum CALM POPULATION No.: _____
DRF Priority Species: P3 _____ Partial Survey Full Survey New Population
FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 475122 " S LONGITUDE: 8124506 " E Map Used: _____

G.P.S. USED: DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
State Forest VCL Other Shire Res. Rd. Verge MRD
Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
Outcrop Breakaway Low Plain Gully Riverbank
Ridge Sand Dune Flat Drainageline Lake Edge
Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluviatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Open woodland over open shrubland over moderately dense grassland

ASSOCIATED SPECIES: Melaleuca viridiflora, Corymbia polycarpa, Corymbia flavescens, Planchonia careya, Acacia tumida var. tumida, Waltheria indica, Chrysopogon sp, Eriachne obtusa, Eriachne melicacea

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~10 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM**



TAXON: Triodia acutispicula CALM POPULATION No.: _____
 DRF Priority Species: P3 _____ Partial Survey Full Survey New Population
 FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
 LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 478969 " S LONGITUDE: 8116043 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: Low rise over flood plain

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Low ope woodland over over moderately dense grassland

ASSOCIATED SPECIES: Eucalyptus tectifica, Acacia tumida var. tumida, Melaleuca viridiflora, Bauhinia cunninghamii, Sorghum timorense, Triodia acutispicula, Heteropogon contortus

No. of PLANTS: Mature: 10-30 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 25 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other _____

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Triodia acutispicula CALM POPULATION No.: _____
DRF Priority Species: P3 _____ Partial Survey Full Survey New Population
FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 474881 " S LONGITUDE: 8124514 " E Map Used: _____

G.P.S. USED: DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
State Forest VCL Other Shire Res. Rd. Verge MRD
Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
Outcrop Breakaway Low Plain Gully Riverbank
Ridge Sand Dune Flat Drainageline Lake Edge
Firebreak Other Specify: Slopes of flood plain

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Scattered low woodland over open shrubland over moderately dense grassland

ASSOCIATED SPECIES: Corymbia flavescens, Acacia tumida var. tumida, Melaleuca viridiflora, Verticordia verticillata Pandanus spiralis, Chrysopogon sp, Triodia acutispicula and Schizachyrium fragile

No. of PLANTS: Mature: 10-30 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 25 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: _____/_____/_____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Styliidium costulatum CALM POPULATION No.: _____
DRF Priority Species: P3 _____ Partial Survey Full Survey New Population
FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 472570 " S LONGITUDE: 8121801 " E Map Used: _____

G.P.S. USED: DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
State Forest VCL Other Shire Res. Rd. Verge MRD
Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
Outcrop Breakaway Low Plain Gully Riverbank
Ridge Sand Dune Flat Drainageline Lake Edge
Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: <10 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~2 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM**



TAXON: Styliidium costulatum CALM POPULATION No.: _____
 DRF Priority Species: P3____ Partial Survey Full Survey New Population

FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome

LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 467212 " S LONGITUDE: 8123543 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: <10 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 2 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other _____

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM**



TAXON: Styliidium costulatum CALM POPULATION No.: _____
 DRF Priority Species: P3____ Partial Survey Full Survey New Population
 FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
 LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 474732 " S LONGITUDE: 8124427 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 2 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other _____

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Nymphoides beaglensis CALM POPULATION No.: _____
 DRF Priority Species: P2____ Partial Survey Full Survey New Population

FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome

LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 465463" S LONGITUDE: 8123068" E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: Flood plain wetland

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Moderately dense Melaleuca forest over sedgeland

ASSOCIATED SPECIES: Melaleuca dealbata, Eleocharis sunaica, Cyperus haspan, Merremia hederacea

No. of PLANTS: Mature: ≤10 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~1 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Nymphoides beaglensis **CALM POPULATION No.:** _____
DRF **Priority Species:** P2___ **Partial Survey** **Full Survey** **New Population**
FROM: Brian Morgan **TITLE:** Mr **SURVEY DATE:** 10 / 06 / 04
REGION: Kimberley **DISTRICT:** Dampierland **SHIRE:** Broome
LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 467504 " S **LONGITUDE:** 8123821 " E **Map Used:** _____

G.P.S. USED : **DATUM (GPS/MAP):** AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: Edge of pool in flood plain

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluviatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Scattered Melaleuca over closed sedgeland with sparse to open herbland

ASSOCIATED SPECIES: Melaleuca viridiflora, Melaleuca acacioides, Eleocharis sunaica, Cyperus bifax, Rotala diandra, Marsilea hirsuta

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 5 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19___ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: _____ / _____ / _____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Nymphoides beaglesensis CALM POPULATION No.: _____
 DRF Priority Species: P2___ Partial Survey Full Survey New Population
 FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
 LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 474913 " S LONGITUDE: 8124614 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: seasonal dampland

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Scattered low shrubs over over low herbland and sparse sedges

ASSOCIATED SPECIES: Chamaecrista mimosoides, Eleocharis sunaica, Marsilea hirsuta, Rotala diandra, Nesaea stratiflora, Eriocaulon cinereum, Cyperus breviculmis

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 5 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19___ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: _____ / _____ / _____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM



TAXON: Gomphrena pusilla CALM POPULATION No.: _____
DRF Priority Species: P2____ Partial Survey Full Survey New Population
FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 464621 " S LONGITUDE: 8123191 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
State Forest VCL Other Shire Res. Rd. Verge MRD
Water Reserve Other Specify: _____ SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
Outcrop Breakaway Low Plain Gully Riverbank
Ridge Sand Dune Flat Drainageline Lake Edge
Firebreak Other Specify: tidal flat

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Scattered Melaleuca woodland over closed grassland on low rises on tidal flats

ASSOCIATED SPECIES: Xerochloa imberbis, Eragrostis cumingii, Digitaria bicornis, Crotalaria brevis

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 5 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds

Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: _____ / _____ / _____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM**



TAXON: Aphyllodium parvifolium CALM POPULATION No.: _____
 DRF Priority Species: P1 _____ Partial Survey Full Survey New Population
 FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
 LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: _51K 4754643_ " S LONGITUDE: _8123963_ " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluviatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Open woodland over moderately dense grassland

ASSOCIATED SPECIES: Corymbia polycarpa, Melaleuca viridiflora, Planchonia careya, Acacia tumida var. tumida, Chrysopogon sp., Eriachne obtusa

No. of PLANTS: Mature: 10 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 5 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
RARE FLORA REPORT FORM**



TAXON: Triodia acutispicula CALM POPULATION No.: _____
 DRF Priority Species: P3 _____ Partial Survey Full Survey New Population
 FROM: Brian Morgan TITLE: Mr SURVEY DATE: 10 / 06 / 04
 REGION: Kimberley DISTRICT: Dampierland SHIRE: Broome
 LOCATION: Bobbys creek wetlands adjacent to the Beagle Bay Aboriginal Community approximately 120 km north of Broome

Reserve No: _____

LATITUDE: 51K 478246 " S LONGITUDE: 8115298 " E Map Used: _____

G.P.S. USED : DATUM (GPS/MAP): AGD84 GDA94 GDA94-Compatible Unknown

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest VCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: Aboriginal Reserve SLK _____ to _____

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: Low rise over flood plain

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Low ope woodland over over moderately dense grassland over open herbland

ASSOCIATED SPECIES: Melaleuca viridiflora, Chrysopogon sp., Triodia acutispicula, Fimbristylis trigastrocarya

No. of PLANTS: Mature: 10-20 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: ~ 10 m²

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Water drawdown from agricultural activities

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other _____

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: _____ Date: ____/____/____

NOTE: More than one box, in any section may be ticked. Map or further information may be given on the back of this form.

Please return completed form to Executive Director, CALM, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, WILDLIFE BRANCH



APPENDIX E

Description of Conservation Codes

Table E.1 Definition of categories described under the EPBC Act.

Conservation Category	Description
Extinct	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A species is categorised as extinct in the wild if it is only known to survive in cultivation, in captivity or as a naturalized population well outside its past range; or if it has not been recorded in its known/expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	The species is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent	The species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Table E.2 Definition of Declared Rare and Priority Categories (From Atkins, 2003)

Conservation Category	Description
DRF	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.
1: Priority One	Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat.
2: 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.
3: 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.
4: 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.

Table E.3 Explanation of codes for Declared Weeds in Western Australia.

Priority	Requirements
<p>P1</p> <p>Prohibits movement</p>	<p>The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.</p>
<p>P2</p> <p>Aim is to eradicate infestation</p>	<p>Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.</p>
<p>P3</p> <p>Aims to control infestation by reducing area and/or density of infestation</p>	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set for all plants:-</p> <ul style="list-style-type: none"> • Within 100 metres inside of the boundaries of the infestation. • within 50 metres of roads and high-water mark on waterways. • within 50 metres of sheds, stock yards and houses. • Treatment must be done prior to seed set each year. <p>Of the remaining infested area:-</p> <ul style="list-style-type: none"> • Where plant density is 1-10 per hectare treat 100% of infestation. • Where plant density is 11-100 per hectare treat 50% of infestation. • Where plant density is 101-1000 per hectare treat 10% of infestation. <p>Properties with less than 2 hectares of infestation must treat the entire infestation.</p> <p>Additional areas may be ordered to be treated.</p>
<p>P4</p> <p>Aims to prevent infestation spreading beyond existing boundaries of infestation</p>	<p>The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.</p> <p>Treat to destroy and prevent seed set all plants:-</p> <ul style="list-style-type: none"> • within 100 metres inside of the boundaries of the infested property • within 50 metres of roads and high-water mark on waterways • within 50 metres of sheds, stock yards and houses • Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. <p>Additional areas may be ordered to be treated.</p> <p>Special considerations In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.</p>
<p>P5</p>	<p>Infestations on public lands must be controlled</p>

Table E4 Conservation Categories for Threatened Ecological Communities

Code	Definition
Critically Endangered (CR)	Subject to major contraction in area OR was already of limited distribution, and is in danger of severe modification or destruction in the immediate future.
Endangered (EN)	Subject to major contraction in area OR was already of limited distribution, and is in danger of significant modification or destruction in the immediate future.
Vulnerable (VU)	Declining or declined in distribution and/or condition and whose ultimate security has not been secured OR still widespread but will become CR, EN or PD in the near future if threatening processes continue or begin to operate.
Presumed Destroyed (PD)	No examples left OR has been extensively modified that it is unlikely to recover in the foreseeable future.
Priority Ecological Communities	<p>P 1 – Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation and for which current threats exist.</p> <p>P 2 – Communities that are known from few small occurrences, all or most of which are actively managed for conservation and not under imminent threat of destruction or degradation.</p> <p>P 3 – Poorly known ecological communities.</p> <p>P 4 - Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>P 5 - Conservation Dependent ecological communities.</p>