

III VEGETATION AND FLORA

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Vegetation

The structural formations have been described and mapped at a scale of 1 : 250 000 (Beard 1969, 1972). During the present survey 198 sites were sampled using the plotless releve technique. This technique, the selection of sites and the parameters recorded, are detailed by the Biological Surveys Committee (1984). The sites are broadly classified on vegetation structure and plant species composition of the upper stratum into 51 types, including four vegetation complexes (Breakaway, Banded Ironstone Formation, Granite and Greenstone). Vegetation complexes displayed marked changes in vegetation structure and species composition as a result of large changes in thickness of soil over distances of less than a metre. A typical site for each vegetation type is described in Appendix I, together with relevant data on geology, landforms and soils. Vegetation descriptions follow a slightly modified Muir (1977) format. Strata with less than 2% canopy cover are not listed in his format but are listed in this report.

Any nomenclatural changes since the first two Study Area reports (Newbey *et al.* 1984, Dell *et al.* 1985) are indicated by a double asterisk where the name first appears in the text. Comments on the name change are at the bottom of that page. A single asterisk denotes an introduced species.

Woodlands (15-20 m) were scattered on Broad Valleys, Salt Lake Features and Sandplains. Low woodlands (<15 m) dominated Undulating Plains (greenstone) and Broad Valleys. They were scattered on Hills (granite) and present on some of the larger Granite Exposures with substantial run-off. Mallees (3-6 m) were common on Sandplains and Broad Valleys, and scattered on Hills (granite), Salt Lake Features and larger Granite Exposures. Tall shrublands (>1 m) dominated on Hills (granite), were common on Sandplains, and scattered on Salt Lake Features and Hills (banded ironstone formation). Salt Lake Features were the main areas for low shrublands (<1 m) with scattered occurrences on Sandplains. Complexes were common on Breakaways, Granite Exposures, Hills (granite and banded ironstone formation) but rare on Undulating Plains (greenstone).

The relationships between geology, landforms, soils and vegetation, are shown in Table 2.

The occurrence of vegetation types, by landform units, is outlined below and summarised in Table 3; Table 3 also presents information on the representation of vegetation types in the three conservation areas within the Study Area.

The most common trees, mallees, tall shrubs, low shrubs, annuals, perennial grasses etc. are listed for each vegetation type. Not all the species listed for most vegetation types will be found at any one site. Where a vegetation type has a general distribution in the Study Area, common species restricted to particular broad sections are indicated by a comment following in brackets e.g. (north). Some species may occur as tall shrubs at one site and as low shrubs at another.

Table 3 Distribution of vegetation types by Landform Units, representation in reserved areas, and adequacy of fauna sampling.

LH No	F	Vegetation Type	Landform Unit									Cons.			
			B	G	HG	HI	L	S	UN	V	F	L	P		
BREAKAWAY (B)															
1	C	Breakaway	11	...	...	...	...	...	...	...	...	...	.	.	.
GRANITE EXPOSURE (G)															
2	L	<i>Acacia lasiocalyx</i>	...	21	...	...	...	...	...	...	...	...	P	.	.
3	L	<i>Allocasuarina huegeliana</i>	...	22	32X	...	...	...	...	...	...	...	.	.	A
4	M	<i>Eucalyptus grossa</i>	...	21	...	...	...	...	...	...	...	...	.	.	P
5	M	<i>Eucalyptus loxophleba</i>	...	32X	32	...	...	...	...	...	...	...	.	.	P
6	T	<i>Acacia acuminata</i>	...	11	22	...	...	...	...	...	...	...	.	.	P
7	T	<i>Acacia sessilispica</i>	...	22	...	...	...	...	...	...	...	...	P	.	.
8	T	<i>Allocasuarina campestris</i> ssp. <i>campestris</i>	...	32X	44X	22	...	22X	...	...	...	...	P	.	A
9	T	<i>Melaleuca uncinata</i>	...	21	...	...	32X	...	...	...	...	...	P	.	.
10	C	Granite	...	41X	31X	...	...	...	...	...	...	...	P	.	P
HILL, granite (HG)															
HILL, banded ironstone formation (HI)															
11	C	Banded Ironstone Formation	...	...	...	53X	...	...	...	...	...	...	.	P	.
SALT LAKE FEATURE (L)															
12	W	<i>Eucalyptus salmonophloia</i>	...	...	...	...	22	22	...	32X	...	...	P	P	P
13	L	<i>Eucalyptus</i> sp. (KRN 5603)	...	...	...	...	12	...	...	...	...	...	.	.	.
14	M	<i>Eucalyptus pileata</i>	...	...	...	...	32	...	...	32	...	...	A	P	A
15	S	<i>Atriplex vesicaria</i> ssp. <i>variabilis</i>	...	...	...	...	42	...	...	...	...	...	.	P	A
16	S	<i>Halosarcia</i>	...	...	...	...	42X	...	...	...	...	...	P	P	P
SANDPLAIN (S)															
17	L	<i>Eucalyptus georgei</i>	...	...	...	...	...	11	...	...	...	...	.	.	.
18	M	<i>Eucalyptus celastroides</i> var. <i>virella</i>	...	...	...	...	...	22	...	...	...	...	A	.	P
19	M	<i>Eucalyptus</i> aff. <i>decipiens</i>	...	...	...	...	...	12X	...	...	...	...	P	.	.
20	M	<i>Eucalyptus</i> aff. <i>occidentalis</i>	...	...	...	...	...	22	...	...	...	...	A	.	.
21	M	<i>Eucalyptus redunca</i>	...	...	...	...	...	32X	...	...	...	...	A	.	.
22	M	<i>Eucalyptus tetragona</i>	...	...	...	...	...	12	...	12X	...	...	.	.	P
23	M	<i>Eucalyptus transcontinentalis</i>	...	...	...	...	...	32	...	42X	...	...	A	.	P
24	T	<i>Acacia beauverdiana</i>	...	...	...	...	...	21	...	...	...	...	.	.	.
25	T	<i>Acacia signata</i>	...	...	...	...	...	21	...	...	...	...	.	.	.
26	T	<i>Allocasuarina acutivalvis</i>	...	...	...	...	...	32	...	...	...	...	P	.	.
27	T	<i>Callitris preissii</i> ssp. <i>verrucosa</i>	...	...	...	...	...	22	...	...	...	...	.	.	P
28	T	<i>Grevillea eriostachya</i> ssp. <i>excelsior</i>	...	...	...	...	...	23	...	...	...	...	.	.	P
29	S	<i>Hakea</i> cf. <i>falcata</i>	...	...	...	...	...	22X	...	...	...	...	P	.	.
UNDULATING PLAIN, greenstone (UN)															
30	L	<i>Eucalyptus flocktoniae</i>	...	...	...	...	...	...	42X	32	...	...	P	P	.
31	L	<i>Eucalyptus ovularis</i>	...	...	...	...	...	...	11	11	...	...	.	P	.
32	L	<i>Eucalyptus</i> sp. (KRN 5603)	...	...	...	...	...	...	11	...	...	...	.	.	.

Table 3 (Contd.)

LH No	F	Vegetation Type	Landform Unit								Cons.							
			B	G	HG	HI	L	S	UN	V	F	L	P					
33	C	Greenstone	...	...	...	...	...	...	...	11	...	.	P	.
BROAD VALLEY (V)																		
34	W	<i>Eucalyptus dundasii</i>	...	...	...	...	...	...	...	...	12	.	.	.
35	W	<i>Eucalyptus longicornis</i>	...	...	...	...	...	...	...	...	32X	A	P	P
36	L	<i>Eucalyptus diptera</i>	...	...	...	...	...	...	...	...	42	.	.	P
37	L	<i>Eucalyptus aff. foecunda</i>	...	...	...	...	...	...	...	...	11	.	.	.
38	L	<i>Eucalyptus longicornis</i>	...	...	...	...	...	...	...	...	32	.	P	A
39	L	<i>Eucalyptus salubris</i>	...	...	...	...	...	...	...	...	42X	.	P	.
40	L	<i>Eucalyptus sheathiana</i>	...	...	...	...	...	...	...	...	31	P	P	P
41	L	<i>Eucalyptus transcontinentalis</i>	...	...	...	...	...	...	...	...	32	P	.	.
42	M	<i>Eucalyptus cylindrocarpa</i>	...	...	...	...	...	...	...	...	22X	.	P	P
43	M	<i>Eucalyptus cylindriflora</i>	...	...	...	...	...	...	...	...	21	.	.	P
44	M	<i>Eucalyptus aff. occidentalis</i>	...	...	...	...	...	...	...	...	22	.	.	.
45	M	<i>Eucalyptus leptophylla</i>	...	...	...	...	...	...	...	...	42X	.	P	.
46	M	<i>Eucalyptus gracilis</i> var. <i>gracilis</i>	...	...	...	...	...	...	...	...	32	P	.	.
47	M	<i>Eucalyptus incrassata</i>	...	...	...	...	...	...	...	...	21	.	.	.
48	M	<i>Eucalyptus scyphocalyx</i>	...	...	...	...	...	...	...	...	22X	.	P	.
49	T	<i>Acacia jennerae</i>	...	...	...	...	...	...	...	...	11	.	P	.
50	T	<i>Melaleuca aff. preissiana</i>	12X	.	P	.				
51	S	<i>Muehlenbeckia cunninghamii</i>	12	.	.	.				
			Fauna surveys								.	A	A	M	M	M	M	M

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Vegetation types are listed in the order of their first reference in Appendix I.

F = Vegetation formation

C = complex, L = low woodland (<15 m), M = mallee, T = tall shrubland (>1 m), S = low shrubland (<1 m), W = woodland (>15 m).

Landform Unit

B = Breakaway, G = Granite Exposure, HG = Hill, granite, HI = Hill, banded ironstone formation, L = Salt Lake Feature, S = Sandplain, UN = Undulating Plain, greenstone, V = Broad Valley.

Three attributes are presented:

(1) Abundance - . = absent, 1 = rare, 2 = scattered, 3 = frequent, 4 = common

(2) Average size of individual areas - . = absent, 1 = <1 ha, 2 = 1-5 ha, 3 = 6-50 ha, 4 = >50 ha.

(3) Fauna sampled: no = ., yes = X.

Con. = Conservation areas

F = Frank Hann National Park, L = Lake Cronin Nature Reserve

P = Peak Charles National Park

Representation of vegetation type: . = absent, P = poor, A = adequate

Fauna surveys (adequacy): . = absent, M = moderate, A = adequate

They are denoted by being listed in tall shrubs, followed by "(also low shrub)". Where unnamed plant taxa in this report are the same taxa as in other reports for this survey (Newbey *et al.* 1984, Dell *et al.* 1985), the notation and KRN voucher numbers are consistent. One taxon (*Acacia poliochroa*) is complex and variable and requires detailed revision. The variability is treated by three notations — *Acacia poliochroa*, *Acacia* aff. *poliochroa* and the remainder as *Acacia poliochroa sens. lat.* Few of the plant species occurring in the Study Area have accepted common names. Where known they are listed where the species first occurs in the text.

Two other vegetation types were present as outliers. *Eucalyptus dundasi* Woodland (mainly Norseman general area) occurred near Mt Day. Near Ninety Mile Tank was the northern-most area of *Eucalyptus* aff. *decipiens* Mallee.

Some areas of particular landforms are unique in the Eastern Goldfields because of their vegetation patterns. Peak Charles and Peak Eleanor are the highest Hill (granite) above the surrounding landforms. The nearest Hill (granite) is Eryinia Hill near Zanthus supporting *Acacia quadrimarginea* Tall Shrubland (Newbey and Hnatiuk 1984). The three Ironcaps (South, Middle and North) vary in size and slightly in their fine-grained mosaic of vegetation structure, more so in species composition. This differs widely from the nearest other banded ironstone formation areas occurring outside of the Study Area. The nearest is the Koolyanobbing Range which also supports *A. quadrimarginea* Tall Shrubland, as well as *Eucalyptus oleosa* Mallee. Further north, the Aurora Range supports *Dryandra arborea* Tall Shrubland and *E. ebbanoensis* Mallee (Newbey and Hnatiuk 1985).

The other areas of banded ironstone formation within the Study Area are small hills within the Bremer Range. Their vegetation has fewer species and one area, Honman Ridge, is covered in part by material blown off both Lake Hope and Lake Johnston. Greenstone underlies the remainder of the Bremer Range. Time was not available during the survey to study the Range in detail.

Vegetation on the greenstone belt from Hatters Hill to Mt Holland is mainly *Eucalyptus flocktoniae* Low Woodland. This differs from the Parker Range and Highclere Hills to the north (Newbey and Hnatiuk 1988).

On some landform units, on the same soil type, some of the vegetation types changed from both west and south, towards the north-east e.g. on Broad Valleys, *Eucalyptus pileata* and *E. transcontinentalis* Mallees were replaced by *E. transcontinentalis* Low Woodland. These changes appeared to be related to decreasing rainfall.

Flora

The flora of the Study Area had not previously been documented. However, the vegetation and flora of Frank Hann National Park had been recorded (Monk *et al.* 1979). During the survey 6 species of fern, and 1076 species, 17 subspecies and 29 varieties of flowering plant were recorded, including 20 species of introduced plants. All taxa are listed in Appendix II with a subjective assessment of their frequency and cover/abundance on each landform unit. None of the in-

Table 4 Important plant collections from the Study Area

	Taxon	1st Coll.	Rarely Coll.	Ext. Range	Endemic	Gaz. Rare
	<i>Acacia diaphyllodinea</i>		X			
	<i>Acacia flavopila</i>		X			
	<i>Acacia jibberdingensis</i>			X		
	<i>Acacia kerryana</i>		X	X		
	<i>Acacia rendlei</i>		X			
	<i>Acacia sedifolia</i>		X			
	<i>Acacia</i> aff. <i>cyclops</i>		X			
	<i>Acacia</i> aff. <i>pycnocephala</i>		X		X	
	<i>Acacia</i> sp. (KRN 6338)		X		X	
	<i>Adenanthos glabrescens</i> ssp. <i>glabrescens</i>		X			
	<i>Adenanthos gracilipes</i>		X		X	
	<i>Allocasuarina</i> sp. (KRN 8318)		X	X		
	<i>Angianthus micropodioides</i>			X		
	Asteraceae genus indet. (KRN 10893)	X			X	
	<i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i>		X		X	X
	<i>Boronia coerulescens</i> ssp. <i>spicata</i>		X	X		
	<i>Boronia fabianoidea</i>		X	X		
21	<i>Boronia</i> sp. (KRN 6477)	X			X	
	<i>Brachyloma</i> sp. (KRN 5521)		X			
	<i>Calytrix</i> sp. (KRN 6494)		X			
	<i>Chenopodium ulicinum</i>		X			
	<i>Conostylis</i> sp. (KRN 6572)		X			
	<i>Darwinia</i> sp. (KRN 7848)		X			
	<i>Dicrastylis obovata</i>		X		X	
	<i>Dodonaea</i> sp. (KRN 9718)		X			
	<i>Drosera</i> sp. (KRN 5514)	X				
	<i>Drummondita hassellii</i> var. <i>longifolia</i>		X		X	X
	<i>Dryandra</i> sp. (KRN 5229)		X		X	
	<i>Eremophila biserrata</i>		X			
	<i>Eremophila racemosa</i>		X		X	
	<i>Eremophila viscida</i>		X			X
	<i>Eremophila</i> aff. <i>elachantha</i>		X			
	<i>Eremophila</i> sp. (KRN 6244)		X		X	
	<i>Eremophila</i> sp. (KRN 6430)		X		X	
	<i>Eriostemon fitzgeraldii</i>		X			
	<i>Eucalyptus cerasiformis</i>		X			
	<i>Eucalyptus deflexa</i>		X			
	<i>Eucalyptus georgei</i>		X			
	<i>Eucalyptus steedmanii</i>		X		X	

Table 4 (Contd.)

	Taxon	1st Coll.	Rarely Coll.	Ext. Range	Endemic	Gaz. Rare
	<i>Eucalyptus</i> aff. <i>formanii</i>		X			
	<i>Eucalyptus</i> aff. <i>lesouefii</i>	X			X	
	<i>Eucalyptus</i> aff. <i>micranthera</i>	X				
	<i>Eucalyptus</i> sp. (KRN 5603)	X			X	
	<i>Eucalyptus</i> sp. (KRN 9710)		X			
	<i>Eutaxia</i> sp. (KRN 6202)		X		X	
	<i>Eutaxia</i> sp. (KRN 9240)		X		X	
	<i>Frankenia</i> sp. (KRN 7839)	X			X	
	<i>Gnephosis intosa</i>	X				
	<i>Goodenia dyeri</i>		X			
	<i>Goodenia occidentalis</i>			X		
	<i>Goodenia</i> sp. (KRN 6525)		X		X	
	<i>Grevillea pilosa</i>		X			
	<i>Grevillea prostrata</i>		X			X
	<i>Grevillea</i> sp. (KRN 5808)	X			X	
	<i>Grevillea</i> sp. (KRN 8149)		X			
	<i>Halgania</i> sp. (KRN 6433)		X			
	<i>Halgania</i> sp. (KRN 8307)	X			X	
	<i>Haloragodendron glandulosum</i>		X			
	<i>Halosarcia entrichoma</i>		X		X	
	<i>Labichea stellata</i>		X			
	<i>Lasiopetalum</i> sp. (KRN 6375)	X			X	
	<i>Lawrenca diffusa</i>		X			
	<i>Lechenaultia brevifolia</i>		X			
	? <i>Lechenaultia</i> sp. (KRN 5530)	X			X	
	<i>Lepidosperma</i> sp. (KRN 5489)		X	X		
	<i>Lepidosperma</i> sp. (KRN 6358)	X			X	
	<i>Leucopogon</i> sp. (KRN 5545)	X			X	
	<i>Logania</i> sp. (KRN 7073)		X			
	<i>Melaleuca agathosmoides</i>		X		X	
	<i>Melaleuca crassifolia</i>		X			
	<i>Melaleuca sparsiflora</i>		X			
	<i>Melaleuca</i> sp. (KRN 6251)	X			X	
	<i>Melaleuca</i> sp. (KRN 9735)		X			
	<i>Microcorys</i> aff. <i>tenuifolia</i>		X			
	<i>Microcorys</i> sp. (KRN 10871)	X			X	
	<i>Microlepidium pilosulum</i>		X	X		
	<i>Myoporum beckeri</i>		X			

Table 4 (Contd.)

	Taxon	Ist Coll.	Rarely Coll.	Ext. Range	Endemic	Gaz. Rare
	<i>Myriocephalus nudus</i>		X			
	<i>Oxylobium</i> aff. <i>lanceolatum</i>		X		X	
	<i>Ozothamnus tephrodes</i>		X			
	<i>Persoonia scabra</i>		X			
	<i>Persoonia</i> aff. <i>dillwynioides</i>	X			X	
	<i>Persoonia</i> sp. (KRN 5627)		X	X		
	<i>Persoonia</i> sp. (KRN 6473)		X			
	<i>Phebalium</i> aff. <i>tuberculosum</i>	X			X	
	<i>Phlegmatospermum eremaeum</i>			X		
	<i>Phyllotia</i> sp. (KRN 10876)		X			
	<i>Pimelea</i> sp. (KRN 6527)		X			
	<i>Pityrodia chrysocalyx</i>		X			
	<i>Pityrodia exserta</i> var. <i>lanata</i>		X		X	
	<i>Pultenaea</i> sp. (KRN 6532)		X		X	
	<i>Pultenaea</i> sp. (KRN 10902)		X		X	
	<i>Pultenaea</i> sp. (KRN 10900)	X	X	X	X	
	<i>Restio</i> sp. (KRN 6575)	X			X	
28	<i>Rinzia rubra</i>		X			
	<i>Schoenus</i> sp. (KRN 5480)		X			
	<i>Stirlingia simplex</i>		X			
	<i>Tecticornia verrucosa</i>		X	X		
	<i>Templetonia battii</i>			X		
	<i>Tetragia</i> sp. (KRN 5380)	X			X	
	<i>Teucrium myriocladum</i>		X			
	<i>Trithuria bibracteata</i>			X		
	<i>Verticordia</i> sp. (KRN 6209)		X			
	<i>Wilsonia rotundifolia</i>		X			

troduced species appeared to be displacing native species. Most common were **Anagallis arvensis* and **Vulpes myuros*.

The families with the most taxa are Myrtaceae (173 spp. 1 ssp. 7 varieties), Leguminosae (151, 2, 6), Proteaceae (101, 4, 4) and Asteraceae (74, 1, 1). Genera with the most taxa are *Acacia* (88, 1, 3), *Melaleuca* (54, 0, 1), *Eucalyptus* (51, 1, 4) and *Lepidosperma* (18, 0, 0).

Based on specimens housed in the Western Australian Herbarium (PERTH), first collections (20 taxa), rarely collected (79), major extensions of range (14), endemic (38) and Gazetted Rare Flora (4) were collected during the survey (Table 4). Some taxa were scored under more than one classification. The gazetted rare taxa (Patrick and Hopper 1982) were *Banksia sphaerocarpa* var. *dolichostyla*, *Eremophila viscida*, *Grevillea prostrata*, and *Drummondita hasselli* var. *longifolia*.

Another 93 taxa (first collection, rarely collected, range extension or endemic) are considered sufficiently rare (Table 4) that detailed surveys should be carried out to assess if they meet the criteria of gazetted rare flora.

Breakaway (B): The single Breakaway seen during field work supported mallees of *Eucalyptus* aff. *wandoo*, tall shrubs of *Callitris canescens* and *Melaleuca uncinata*; low shrubs of *Acrotriche patula*, *Phebalium microphyllum* and *Westringia cephalantha*. Common geophytes were *Drosera bulbosa*, and sedges were *Lepidosperma* aff. *resinosum*.

Granite Exposure (G): Granite Complex occurred on skeletal soils on all exposures and their surrounding inner apron. Vegetation on the outer apron was more varied in southern and western sections of the Study Area. Some types were restricted to these sections but also occurred in the adjoining Wheatbelt: *Acacia lasiocalyx* and *Allocasuarina huegeliana* (Granite Sheoak) Low Woodlands, and *Acacia acuminata* (Jam) and *A. sessilispica* Tall Shrublands. *Eucalyptus grossa* (Coarse-leaved Mallee) mallee was rare and — occurred mainly in the eastern half *E. loxophleba* (York Gum) mallee and tall shrublands of *Allocasuarina campestris* ssp. *campestris* and *Melaleuca uncinata* occurred over the Study Area. Floristically, of special interest was *E. loxophleba* mallee growing on Meta-granitic Soils: “miscellaneous plants” were absent. Some of these plants were always present at all other Granite Exposure sites.

A number of plant species were common to almost all sites. They are listed below and not repeated for each vegetation type: (tall shrubs) *Leptospermum erubescens*; (low shrubs) *Borya constricta*, *Calothamnus quadrifidus*, *Calytrix lechenaultii* and *Isotoma petraea*; (annuals) *Actinobole uliginosum*, **Aira cupaniana*, *Calandrinia calypttrata*, *Chrysocoryne pusilla*, *Crassula exserta*, *Erodium cicutarium*, *Goodenia berardiana*, *Millotia tenuifolia* var. *tenuifolia*, *Microtis unifolia*, *Nicotiana rotundifolia*, *Podotheca angustifolia*, *Trachymene cyanopetala* var. *cyanopetala*, *Wahlenbergia gracilentata* and *Waitzia acuminata*; (perennial grasses) *Spartochloa scirpoidea* (south and west); and (sedges) *Lepidosperma drummondii*. Larger pools present on some exposures, containing ephemeral water, often supported **Crassula natans* var. *minus*, *C. peduncularis* and *Glossostigma drummondii*.

Damp areas associated with seepage usually supported *Centrolepis humillima*, *C. polygyna* and *Isolepis congrua*. Some annuals were almost confined to southern and western sites: *Caladenia flava*, *Ceratogyne obionoides*, *Drosera glanduligera*, *Levenhookia pusilla*, *L. spipitata*, *Podolepis lessonii*, *Quinetia urvillei*, *Rutidosis multiflora*, *Scyphocoronis major* and *Trachymene ornata* var. *ornata*. Two species had a northern distribution: *Gnephosis* aff. *pygmaea* and *Toxanthes perpusillus*.

Granite Complexes occasionally contained low trees of *Acacia lasiocalyx*. Common tall shrubs were *Dodonaea attenuata* and *Thryptomene australis*; low shrubs of *Acacia sessilispica*, *A. leptoneura*, *Stackhousia monogyna*, *Stypandra imbricata*, *Verticordia endlicheriana* (all south and west) and *Kunzea pulchella*; annuals of *Calandrinia granulifera*, *C. polyandra*, *C. prolifera*, **Pentaschistis airoides*, *Podotheca gnaphalioides* (west) and **Vulpia myuros*: geophytes of *Drosera stolonifera* ssp. *rupicola* (west); and sedges of *Lepidosperma pruinatum*, *L. resinatum*, *Lepidosperma* sp. (KRN 6488) and *Lepidosperma* sp. (KRN 5489) (south).

Growing in *Acacia lasiocalyx* Low Woodland were tall shrubs of *Allocasuarina campestris* ssp. *campestris* (also low shrub), *Melaleuca fulgens* and *Thryptomene australis*. On southern sites were *Dodonaea certaocarpa*, *Hakea scoparia* and *M. elliptica*. Low shrubs included *Goodenia pinifolia*, *M. uncinata* and *Platysace effusa*. Species recorded in southern and western areas included *Agrostocrinum scabrum*, *Goodenia scapigera*, *P. maxwelli* and *Verticordia enlicheriana*. Also present were the geophytes *Chamaescilla corymbosa* and *Drosera stolonifera* ssp. *rupicola* (north-west); parasitic climber of *Cassytha glabella*; and sedges of *Lepidosperma pruinatum*, *L. resinatum*, *L. viscidum* var. *viscidum* *Lepidosperma* sp. (KRN 5489), *Lepidosperma* sp. (KRN 7845) (south), *Mesomelaena stygia* ssp. *stygia* (south) and *Schoenus brevisetis* (west). Low trees of *Allocasuarina huegeliana* and mallees of *Eucalyptus eremophila* (Tall Sand Mallee) were sometimes present.

Growing with *Allocasuarina huegeliana* were occasional low trees of *Acacia lasiocalyx*; tall shrubs of *Acacia saligna* (south and west), *A. trigonophylla* (west), *Santalum acuminatum* and *Melaleuca fulgens*; low shrubs of *Dodonaea certaocarpa*; ferns of *Cheilanthes austrotenuifolia* and *C. distans*; and sedges of *Lepidosperma pruinatum* and *L. viscidum* var. *viscidum*.

Acacia acuminata dominated its tall shrubland with only a few other shrubs present. An additional annual was *Brachycome pusilla*.

Growing within *Acacia sessilispica* Tall Shrubland were other tall shrubs of *Allocasuarina campestris* ssp. *campestris*, *Kunzea pulchella*, *Melaleuca uncinata*, *Santalum acuminatum* (Quandong) and *Thryptomene australis* (also low shrub); low shrubs of *Acacia leptoneura*, *Baeckea crispiflora* and *Stypandra imbricata* and *Verticordia enlicheriana*; annuals of *Brachycome pusilla*; and sedges of *Lepidosperma pruinatum*, *Lepidosperma* sp. (KRN 5489), and *Lepidosperma* sp. (KRN 6488).

Eucalyptus grossa Mallee had associated tall shrubs of *Acacia saxatilis*, *Halgania andromedifolia*, *Melaleuca adnata*, *M. lateriflora*, *M. cf. cymbifolia* and

Trymalium aff. *ledifolium*; and low shrubs of *A. nodiflora* var. *ferox*, *A. sulcata* var. *platyphylla*, *Eremophila violacea* and *Grevillea acuaria*. Few "miscellaneous plants" were present. Most of the species listed above require a B horizon pH about 8.0

Eucalyptus loxophleba Mallee is treated in two groups: growing on (a) Granitic Soils or (b) Meta-granitic Soils. Group (1) had tall shrubs of *Acacia beauverdiana*, *Melaleuca eleuterostachya* and *M. hamulosa*; low shrubs of *Cassia nemophila* var. *nemophila* and *Prostanthera grylloana*; and the perennial grass *Triodia scariosa*. Group (b) included mallees of *Eucalyptus pileata* (Capped Mallee); tall shrubs of *Acacia camptoclada*, *Dodonaea stenozyga* and *Santalum acuminatum*; low shrubs of *A. erinacea*, *A. merrallii*, *Cassia nemophila* var. *nemophila*, *Eremophila decipiens*, *Scaevola spinescens* and *Westeringia cephalantha*.

Other tall shrubs growing with *Allocasuarina campestris* ssp. *campestris* were *Acacia beauverdiana*, *A. assimilis*, *Banksia elderiana*, *Melaleuca uncinata*, *Persoonia coriacea* and *Thryptomene australis*. Low shrubs included *Acacia sulcata* var. *platyphylla*, *Leucopogon* sp. (KRN 6954), *Micromyrtus obovata*, *Phebalium* aff. *microphyllum* and *Verticorida enlicheriana*; and the perennial grass *Amphipogon debilis*.

Melaleuca uncinata Tall Shrubland contained other tall shrubs of *Beyeria lechenaultii*, *Grevillea oncogyne*, *Hakea scoparia* (south and west), *M. lateriflora* and *M. aff. pungens*; and low shrubs included *Acacia saxatilis*, *Astartea ambigua*, *Daviesia benthamii* ssp. *benthamii*, *Dodonaea pinifolia*, *Hibbertia enervia*, *H. pungens* sens. lat., *Melaleuca glaberrima*, *M. spicigera*, *M. aff. pungens* and *Phebalium microphyllum*.

a. Hill (granite): The main vegetation types on Peak Charles and Peak Eleanora were *Allocasuarina campestris* ssp. *campestris* Tall Shrubland on shallow Granitic Soils and Granite Complex on skeletal Granitic Soils. Near the base of Peak Charles *Allocasuarina huegeliana* Low Woodland was common on shallow and skeletal soils. The vegetation's presence appeared to be related to the additional run-off from higher and often bare slopes. On colluvial deposits at the peak's base were *Eucalyptus loxophleba* Mallee on shallower soils and *Acacia acuminata* Tall Shrubland on deeper soils. All the general and southern species listed as common for Granite Exposure also occurred on this landform and they are not listed below.

Present in *Allocasuarina campestris* ssp. *campestris* Tall Shrubland were occasional low trees (*Acacia lasiocalyx* or *Allocasuarina huegeliana*) and mallees (*Eucalyptus* aff. *occidentalis* and *E. aff. micranthera*). Many species of tall shrubs were present: *Acacia assimilis*, *A. jibberdingensis*, *Acacia* sp. (KRN 6338), *Baeckea* aff. *behrii* (Peak Charles), *Calothamnus tuberosus*, *Labichea lanceolata* ssp. *brevifolia*, *Melaleuca elliptica*, *M. uncinata* and *Thryptomene australis*; low shrubs of *Allocasuarina humilis*, *Dodonaea ceratocarpa*, *Drummondita hassellii* var. *longifolia* (Peak Charles), *Leucopogon cuneifolius*, *Lhotskya ericifolia*, *Melaleuca fulgens* and *Opercularia vaginata*; and sedges of *Lepidosperma viscidum* var. *viscidum* and *Lepidosperma* sp. (KRN 6358).

Granite Complex consisted mainly of low shrubs of *Borya constricta*, additional annuals of *Brachycome perpusilla*, and ferns of *Cheilanthes austrotenuifolia* and *C. distans*.

Growing with *Allocasuarina huegeliana* were occasional low trees of *Acacia lasiocalyx* and mallees of *Eucalyptus loxophleba*; tall shrubs included *Acacia acuminata*, *A. saligna*, *Acacia* sp. (KRN 6338), *Dodonaea ptarmicaefolia*, *Labichea lanceolata* ssp. *brevifolia*, *Melaleuca fulgens*, *M. uncinata*, *Santalum acuminatum*, *S. spicatum* (Sandalwood) and *Thryptomene australis*; low shrubs of *Carpobrotus modestus*, *Dodonaea ceratocarpa*, *Drummondita hassellii* var. *longifolia* (Peak Charles) *Olearia revoluta* and *Thomasia angustifolia*; and sedges of *Lepidosperma viscidum* var. *viscidum* and *Lepidosperma* sp. (KRN 6452).

The other mallee associated with *Eucalyptus loxophleba* was an occasional *E. celastroides* var. *virella*. Also present were tall shrubs of *Alyxia buxifolia*, *Dodonaea ptarmicaefolia* and *Exocarpos aphyllus*; and low shrubs of *Carpobrotus modestus*, *Cassia nemophila* var. *nemophila*, *Rhagodia preissii* ssp. *preissii* and *Scaevola spinescens*.

Growing in *Acacia acuminata* Tall Shrubland was an occasional *Eucalyptus loxophleba* mallee. The main other tall shrubs were *A. assimilis*, *A. saligna*, *Allocasuarina campestris* ssp. *campestris*, *Dodonaea ptarmicaefolia*, *Grevillea* aff. *oligantha*, *Melaleuca acuminata* and *M. uncinata*; low shrubs of *Calytrix* sp. (KRN 6458) and *Guichenotia ledifolia*; and the annual *Chthonocephalus pseudevax*.

b. Hill (banded ironstone formation): Most of the vegetation covering the hills was a complex because of the fine-grained mosaic of skeletal and shallow soils. Underlying some of these soils was deep cracking of the bedrock. Exposures of bedrock were common adding run-off to soil deposits. One site (Honman Ridge), within a greenstone area and between two salt lakes, had a soil profile supplemented by aeolian calcareous and sub-saline material. This site is treated separately below. On sections of some hills were area (>0.5 ha) of *Allocasuarina campestris* ssp. *campestris* Tall Shrubland.

The complex vegetation on banded ironstone formation had a number of species dominant at different sites. Low trees (*Acacia lasiocalyx* and *Eucalyptus flocktoniae* [Merritt]) were rare. Mallees of *E.* aff. *wandoo* were usually present in small areas partially lateritized, while *E. eremophila* occurred rarely. Tall shrubs that were occasionally present included *Allocasuarina campestris* ssp. *campestris* (also low shrub), *A. corniculata*, *Banksia sphaerocarpa* var. *dolichostyla* (Ironcaps), *Calothamnus quadrifidus* (also low shrub), *Dryandra* aff. *cirsioides*, *Grevillea pterosperma*, *Hakea subsulcata*, *H. scoparia*, *Leptospermum erubescens*, *Melaleuca fulgens*, *M. uncinata*, *Santalum acuminatum* and *Trymalium* aff. *ledifolium*; low shrubs were *Acacia sulcata* var. *platyphylla*, *Acacia* sp. (KRN 5226), *Chamelaucium ciliatum* (south), *Cryptandra miliaris*, *Dodonaea adenophora*, *D. amblyophylla* (west), *Dryandra* sp. (KRN 5229), *Melaleuca cordata*, *Phebalium filifolium*, *P. microphyllum*, *P. tuberosum* ssp. *tuberosum*, *P.* aff. *tuber-*

culosum and *Platysace maxwellii* (west); perennial grasses of *Spartochloa scirpoidea*; and sedges of *Lepidosperma drummondii*, *L. viscidum* var. *viscidum*, *Lepidosperma* sp. (KRN 5232), *Lepidosperma* sp. (KRN 5233) and *Lepidosperma* sp. (KRN 6488). Annuals were not common but included *Cassula exserta*, *Daucus glochidiatus*, *Parietaria debilis*, **Pentaschistis airoides* and *Millotia tenuifolia* var. *tenuifolia*.

At the site with its soil profile supplemented with calcareous and sub-saline material, the main species present were tall shrubs of *Acacia acuminata*, and low shrubs of *Atriplex vesicaria* ssp. *variabilis*, *Dodonaea microzyga*, *Enchylaena tomentosa* var. *tomentosa*, *Ptilotus obovatus* var. *obovatus* and *Rhagodia drummondii*.

The main tall shrubs growing with *Allocasuarina campestris* ssp. *campestris* were *Acacia beauverdiana*, *Alyxia buxifolia*, *Calothamnus quadrifidus* and *Hakea subsulcata*; low shrubs were *Acacia sulcata* var. *platyphylla*, *Dampiera* aff. *trigona*, *Melaleuca cordata* and *M. uncinata*; perennial grasses of *Amphipogon debilis* and *Triodia scariosa*; and sedges of *Lepidosperma* sp. (KRN 5232). An occasional low tree of *Acacia lasiocalyx* was present.

Salt Lake Feature (L): Floors of large salt lakes were usually bare with a narrow margin of *Halosarcia* Low Shrubland (Samphire). The same vegetation type was present on floors of smaller lakes. Within larger lakes, between the lake floor and surrounding low lunette were small to extensive flats of sub-saline soils 30-90 cm above the lake floor. They supported *Atriplex vesicaria* ssp. *variabilis* Low Shrubland in most places. An exception was in the Peak Charles area where *Eucalyptus* sp. (KRN 9710) Low Woodland was sometimes present. In the general area was the only patch of *E. pileata* mallee seen on this landform unit. On flats between the salt lakes, *E. salmonophloia* (Salmon Gum) Woodland was present on flats more than a metre above lake floor level, and the soil profile contained aeolian sand.

Melaleuca uncinata Tall Shrubland occurred around the margins of some salt lakes upslope from *Halosarcia* Low Shrubland. Vegetation types frequently graded from one to another as the saline watertable was the major factor in determining the vegetation distribution. Even a few centimetres difference in vertical height resulted in a major change in vegetation. Two low shrub species were present at almost all sites (*Atriplex vesicaria* ssp. *variabilis* and *Disphyma crassifolium*) are not listed below. 'Miscellaneous plants' were mainly rare, scattered or sometimes absent.

Growing in *Halosarcia* Low Shrubland were other low shrubs of *Frankenia cinerea*, *Frankenia* sp. (KRN 6592), *H. halocnemoides* ssp. *halocnemoides*, *H. pergranulata* ssp. *pergranulata*, *H. syncarpa*, *Maireana amoena*, *M. glomerifolia* and *Zygophyllum compressum*. Occasionally, some of the following annuals were present: *Angianthus tomentosus*, *Crassula exserta*, *Helipterum pygmaeum*, **Mesembryanthemum nodiflorum*, *Senecio glossanthus*, *S. lautus* ssp. *dissectifolius*, *Pogonolepis strictus*, **Vulpia myuros* and *Zygophyllum ovatum*.

Atriplex vesicaria ssp. *variabilis* Low Shrubland included other low shrubs of *Frankenia cinerea*, *Lawrencia squamata* and *Maireana amoena*.

Eucalyptus sp. (KRN 9710) Low Woodland included the following tall shrubs: *Acacia enervia*, *Geijera linearifolia*, *Lycium australe*, *Melaleuca pauperiflora* and *M. aff. thyoides*; and low shrubs of *Bossiaea walkeri*, *Cratystylis conocephala*, *Enchylaena tomentosa* var. *tomentosa*, *Frankenia cinerea*, *F. pauciflora*, *Gunniopsis quadrifida*, *Maireana glomerifolia*, *Olearia revoluta*, *Scaevola spinescens* and *Westringia rigida*.

The single patch of *Eucalyptus pileata* Mallee had low shrubs of *Gunniopsis quadrifida* and *Rhagodia drummondii*; perennial grasses of *Stipa juncifolia*; and sedges of *Gahnia* aff. *australis* and *Lepidosperma brunonianum*.

Growing with *Eucalyptus salmonophloia* were occasional other tall trees of *E. gracilis* (Yorrel) and *E. longicornis* (Morrel). Low shrubs included *Cratystylis conocephala*, *Rhagodia drummondii* and *Sclerolaena diacantha*. When growing on soils with an important aeolian sand content, these species tended to be replaced by low shrubs of *Acacia hemiteles*, *Bossiaea leptacantha* and *Daviesia benthamii* ssp. *benthamii*. Additional species were the perennial grass *Triodia scariosa*; and sedges of *Gahnia ancistrophylla*, *Lepidosperma brunonianum* and *L. drummondii*.

Growing in *Melaleuca uncinata* Tall Shrubland were other tall shrubs of *Bossiaea walkeri*, *Hakea arida*, *Lycium australe*, *M. aff. cuticularis* and *M. aff. thyoides*; low shrubs of *Frankenia cinerea*, *F. tetrapetala*, *Gunniopsis quadrifida*, *Halosarcia halocnemoides* ssp. *halocnemoides*, *H. indica* ssp. *bidens*, *H. syncarpa* and *Maireana glomerifolia*; and annuals of *Brachycome pusilla* and *Calocephalus angianthoides* (north-east).

Sandplain (S): Vegetation types are grouped according to their position on the landform unit and the soil group supporting them. Shallow Sands and Gravelly Sands covered much of the Sandplains. On the former soil were *Eucalyptus redunca* Mallee, *Eucalyptus transcontinentalis* (Redwood) Mallee and *Melaleuca* spp. Tall Shrubland. The latter two vegetation types occurred on soils with slightly higher loam and clay content than the former. This was generally in lower places of the gentle undulating plain where some colluvium had accumulated. On Gravelly Sand was *Hakea* cf. *falcata* Low Shrubland. All vegetation types were common, apart from *Melaleuca* spp. Tall Shrubland (scattered to rare).

Deep Sands were less common than the above two soil types, and supported five vegetation types. *Eucalyptus eremophila* Mallee occurred where the A horizon thickness was 30-50 cm. Where the A horizon exceeded 50 cm, *Eucalyptus* aff. *decipiens* Mallee and *Eucalyptus tetragona* (Tallerack) Mallee occurred on white sands, and *Acacia beauverdiana* Tall Shrubland and *Grevillea eriostachya* ssp. *excelsior* Tall Shrubland on yellow sands. *E. tetragona* Mallee and *A. beauverdiana* Tall Shrubland were uncommon.

Occurring on the Gravelly Sands of slight rises were Tall Shrublands of *Acacia signata*, *Allocasuarina acutivalvis*, *A. campestris* ssp. *campestris* and *Callitris preissii* ssp. *verrucosa*. The A horizon supporting *A. campestris* ssp. *campestris* generally contained a thinner layer of loamy sand over the gravelly sand (2-12 cm vs 10-25 cm). Tall shrublands of *A. scutivalvis* and *A. campestris* ssp. *campestris* were more common than the other two tall shrublands.

Shallow Sandy Clays were present in two types of places on the plain. The first was belts up to 2 km long, possibly over dykes more mafic than the surrounding granite bedrock. On these belts *Eucalyptus salmonophloia* Woodland was the only vegetation type. The second was often in slightly lower places on the plain where some colluvium had accumulated, as well as the bedrock being similar to the belts. *Eucalyptus salubris* (Gimlet) Low Woodland and *E. celastroides* var. *virella* Mallee were present but both were scattered to rare.

On the few small depressions restricted to east of the Hatters Hill-Mt Holland greenstone belt, *Eucalyptus georgei* (George's Gum) Low Woodland was the only vegetation type present. Associated were tall shrubs of *Daviesia* sp. (KRN 9182) and sedges of *Lepidosperma drummondii* and *Lepidosperma* aff. *resinosum*.

Growing in *Eucalyptus redunca* Mallee were other mallees of *E.* aff. *occidentalis*, *E. leptophylla* (Narrow-leaved Red Mallee), *E. pileata*, *E. scyphocalyx* and *E. transcontinentalis*. Tall shrubs included *Astartea ambigua* (also low shrub), *Callitris preissii* ssp. *verrucosa*, *Dodonaea amblyophylla*, *Grevillea oncogyne*, *Hakea lissocarpa*, *H. cf. falcata*, *Leptospermum erubescens*, *Melaleuca laxiflora* and *M. uncinata* (also low shrub); low shrubs of *Acacia sulcata* var. *platyphylla*, *Baeckea fumana*, *Beaufortia micrantha* var. *micrantha*, *B. schaueri*, *Bossiaea leptacantha*, *Calytrix leschenaultii*, *Daviesia benthamii* ssp. *benthamii*, *Grevillea pauciflora* ssp. *pauciflora*, *Hakea marginata*, *Leucopogon fimbriatus*, *Melaleuca holosericea*, *M. pentagona* var. *pentagona*, *M. lateriflora*, *M. laxiflora*, *M. leptospermoides*, *M. scabra*, *Petrophile ericifolia*, *Petrophile* sp. (KRN 8756), *Phebalium microphyllum*, *Pultenaea verruculosa*, *Spyridium cordatum* and *Verticordia densiflora*; perennial grasses of *Neurachne alopecuroidea*; and sedges of *Gahnia ancistrophylla*, *Lepidosperma drummondii*, *L.* aff. *resinosum* and *Loxocarya myrioclada*.

Eucalyptus transcontinentalis Mallee contained other mallees of *E. pileata*; tall shrubs of *Astartea ambigua* (also low shrub), *Exocarpos aphyllus*, *Melaleuca adnata*, *M. holosericea* (also low shrub), *M. lanceolata*, *M. lateriflora*, *M.* aff. *cymbifolia*, *M. cf. cymbifolia*, *M. aff. pauperiflora*, *M. aff. pungens* and *M. uncinata*; and low shrubs of *Acacia lachnophylla*, *A. mackeyana*, *A. saxatilis*, *Daviesia benthamii* ssp. *benthamii*, *Grevillea haplantha*, *G. oncogyne*, *Logania micrantha*, *M. cardiophylla* var. *parviflora*, *M. eleuterostachya*, *M. lateralis*, *M.* sp. (KRN 6260), *Microcybe pauciflora*, *Olearia ramosissima* and *Platysace maxwellii*.

Melaleuca ssp. Tall Shrubland contained tall shrubs of *Grevillea oncogyne*, *M. holosericea*, *M. uncinata* and *M.* aff. *undulata*; and low shrubs of *Acacia* sp. (KRN 6268), *Astartea ambigua*, *Conostephium drummondii sens. lat.*, *Daviesia*

benthamii ssp. *benthamii*, *M. lateriflora*, *M. aff. cuticularis* and *M. aff. pungens*.

Occasional tall shrubs present in *Hakea* cf. *falcata* Low Shrubland included *Allocasuarina acutivalvis*, *A. campestris* ssp. *campestris*, *Callistris preissii* ssp. *verrucosa*, *Dryandra cirsioides*, *Grevillea cagiana* lat., *Hakea crassifolia*, *Leptospermum roei*; low shrubs of *Allocasuarina humilis*, *A. microstachya*, *Banksia audax*, *B. elderiana*, *Beaufortia bracteosa*, *B. micrantha* var. *micrantha*, *B. schaueri*, *Calytrix leschenaultii*, *Conospermum brownii*, *Daviesia longifolia*, *D. nudiflora*, *D. rhombifolia*, *D. unifolia*, *Dryandra conferta*, *D. erythrocephala*, *D. ferruginea*, *Dryandra* sp. (KRN 5491), *Grevillea eryngioides*, *Hakea incrassata*, *H. aff. falcata*, *Halgania integerrima*, *Leucopogon hamulosus*, *Logania tortuosa*, *Lysinema ciliatum*, *Melaleuca cordata*, *M. cuneata*, *M. scabra*, *Persoonia striata*, *Petrophile seminuda*, *P. sp* (KRN 8756), *Verticordia endlicheriana* and *V. roei*; perennial grasses of *Amphipogon turbinatus* and *Neurachne alopecuroidea*; sedges of *Loxocarya fasciculata*, *Lepidobolus preissianus*, *Lepidosperma carphoides*, *Lepidosperma* sp. (KRN 6488), *Mesomelaena preissii*, *M. stygia* ssp. *stygia*, *Schoenus armeria*, *S. brevisetis*, *S. pleiostemoneus*, *Tricostularia compressa*; and sedge-like plants of *Conostylis androstemma* ssp. *argentea* and *Lomandra micrantha* ssp. *micrantha*.

Eucalyptus aff. *occidentalis* Mallee included other mallees of *E. redunca*, *E. scyphocalyx* and *E. transcontinentalis*; and low shrubs of *Callistris canescens*, *Exocarpos aphyllus*, *Melaleuca acuminata*, *M. lateriflora*, *M. spicigera*, *M. uncinata*, *M. aff. pungens*.

Growing in *Eucalyptus* aff. *occidentalis* Mallee were other mallees of *E. leptophylla* and *E. tetragona*; tall shrubs of *Allocasuarina corniculata*, *Banksia elderiana*, *Grevillea concinna*, *Hakea* cf. *falcata*, *Isopogon polycephalus*, *Leptospermum erubescens*, *Petrophile ericifolia* var. *ericifolia*, *Petrophile* sp. (KRN 9598); low shrubs of *Allocasuarina humilis*, *Beaufortia micrantha* var. *micrantha*, *Calothamnus gracilis*, *Calytrix brevisetis*, *C. decandra*, *Eremaea pauciflora*, *Leptospermum spinescens*, *Logania nuda*, *Melaleuca cuneata*, *M. cf. scabra*, *Persoonia striata*, *P. trinervis*, *Verticordia mitchelliana*, *V. endlicheriana* and *V. insignis*; perennial grasses of *Amphipogon turbinatus*; and sedges of *Caustis dioica*, *Lepidosperma carphoides*, *Lepidosperma* sp. (KRN 6488), *Loxocarya cinerea*, *Mesomelaena preissii*, *M. stygia* ssp. *stygia*, *Schoenus brevisetis* and *Restio* sp. (KRN 6575).

Another mallee occurring in *Eucalyptus tetragona* Mallee was *E. aff. decipiens*; tall shrubs included *Grevillea cagiana*, *G. integrifolia* var. *incrassata*, *Leptospermum roei* and *Platysace maxwellii*; low shrubs of *Acacia sulcata* var. *platyphylla*, *Beaufortia micrantha* var. *micrantha*, *B. schaueri*, *Calytrix sapphirina*, *Calytrix* sp. (KRN 6458), *Cryptandra glabriflora*, *Melaleuca scabra*, *Petrophile ericifolia* var. *ericifolia*, *P. sp.* (KRN 8756), *Verticordia picta*, *V. endlicheriana* and *V. roei*; and sedges of *Lepidobolus preissianus*, *Lepidosperma drummondii*, *L. viscidum* var. *viscidum* and *Schoenus brevifolius*.

Acacia beauverdiana Tall Shrubland had few dominant species. They were tall shrubs of *Allocasuarina corniculata* and *Melaleuca uncinata*; and low shrubs of

Thryptomene kochii.

Growing in *Grevillea eriostachya* ssp. *excelsior* Tall Shrubland were other tall shrubs of *Banksia elderiana*, *Calothamnus quadrifidus*, *Grevillea pterosperma*, *Leptospermum roei* and *Santalum acuminatum*; low shrubs of *Acacia acutifolia*, *A. andrewsii*, *A. sulcata* var. *platyphylla*, *Allocasuarina acutivalvis*, *A. campestris* ssp. *campestris*, *A. microstachya*, *Beaufortia micrantha* var. *micrantha*, *Borya constricta*, *Burtonia hendersonii*, *Daviesia incrassata*, *Drummondita hassellii* var. *hassellii*, *Hakea platysperma*, *H. aff. falcata*, *H. cf. falcata*, *Logania* sp. (KRN 6211), *Melaleuca cordata*, *M. scabra*, *Petrophile ericifolia* var. *scabriuscula*, *Scaevola restiacea*, *Verticordia picta*, *V. plumosa*, *V. endlicheriana* and *V. roei*; and sedges of *Lepidobolus preissianus*, *Lepidosperma drummondii*, *L. viscidum* var. *viscidum*, *Lepidosperma* (KRN 6488), *Lepidosperma* sp. (KRN 8609), *Mesomelaena preissii*, *M. stygia* ssp. *stygia*, *Schoenus brevisetis* and *Schoenus* sp. (KRN 5480).

Acacia signata Tall Shrubland included other tall shrubs of *A. beauverdiana*, *A. assimilis* and *Hakea aff. falcata*; and low shrubs of *Thryptomene kochii*.

Growing in *Allocasuarina campestris* ssp. *campestris* Tall Shrubland were other tall shrubs of *Acacia assimilis*, *A. beauverdiana*, *A. scutifolia*, *Allocasuarina acutivalvis*, *A. corniculata*, *Banksia elderiana*, *Callitris preissii* ssp. *verrucosa*, *Hakea subsulcata* and *Melaleuca uncinata*; low shrubs of *Astartea heterophylla*, *Baeckea aff. crassifolia*, *Beaufortia schaueri*, *Beyeria lechenaultii*, *Coleanthera myrtooides*, *Cryptandra* sp. (KRN 10904), *Leptospermum roei*, *Melaleuca cordata*, *M. scabra*, *Micromyrtus racemosa*, *Phebalium ambiguum*, *P. filifolium*, *Thryptomene australis*; perennial grasses of *Amphipogon turbinatus* and *Triodia scariosa*; and sedges of *Lepidosperma drummondii*, *L. viscidum* var. *viscidum* and *Schoenus brevisetis*.

Species present in *Allocasuarina corniculata* included tall shrubs of *A. acutivalvis*, *Banksia elderiana*, *Hakea subsulcata*, *Melaleuca pungens* and *Santalum acuminatum*; low shrubs of *Borya constricta*, *Dryandra* sp. (KRN 5229) and *Melaleuca cordata*; perennial grasses of *Triodia scariosa*; and sedges of *Lepidosperma drummondii* and *L. aff. resinsum*.

Occasional mallees were present in *Callitris preissii* ssp. *verrucosa* Tall Shrubland, including *Eucalyptus aff. occidentalis*, *E. leptophylla*, *E. redunca* and *E. transcontinentalis*. Tall shrubs included *Hakea scoparia*, *H. aff. falcata* and *Melaleuca depauperata*; low shrubs of *Adenanthos glabrescens* ssp. *glabrescens*, *Beaufortia micrantha* var. *micrantha*, *Leucopogon conostephioides*, *Melaleuca cordata*, *M. pentagona* var. *pentagona*, *M. scabra* and *Verticordia endlicheriana*; and sedges of *Lepidobolus preissianus*, *Lepidosperma* sp. (KRN 6488), *Loxocarya cinerea*, *Mesomelaena stygia* ssp. *stygia* and *Schoenus* sp. (KRN 5480).

The main mallee in *Eucalyptus salmonophloia* Woodland was *E. celastroides* var. *virella*. Tall shrubs included *Melaleuca acuminata*, *M. lanceolata* and *M. lateriflora*; and low shrubs of *Acacia erinacea*, *A. merallii*, *Dodonaea stenozyga*, *Olearia muelleri* and *Scaevola spinescens*.

Growing with *Eucalyptus salubris* Low Woodland were tall shrubs of *Melaleuca acuminata*, *M. lanceolata*, *M. aff. cymbifolia* and *M. aff. thyoides*; and

low shrubs of *Acacia merrallii* and *Daviesia benthamii* ssp. *benthamii*.

Eucalyptus celastroides var. *virella* Mallee also included another mallee – *E. aff. occidentalis*; and low shrubs of *Acacia* sp. (KRN 6559) and *Melaleuca cardiophylla* var. *cardiophylla*.

Undulating Plain (greenstone): Almost all the landform unit was covered by *Eucalyptus flocktoniae* Low Woodland. Of very rare occurrence was *Eucalyptus ovularis* (Small-fruited Gum) Low Woodland (higher soil salt content than *E. flocktoniae* Low Woodland), *Eucalyptus* sp. (KRN 5603) Low Woodland and Greenstone Complex. Annuals were present in low numbers at most sites, and included *Angianthus tomentosus*, *Asteridea athrixoides*, *Daucus glochidiatus*, *Senecio glossanthus* and *Stellaria filiformis*. They are not listed below.

Growing in *Eucalyptus flocktoniae* Low Woodland were other low trees of *E. salubris* and *E. annulata* (Open-fruited Mallee) (west); tall shrubs of *Exocarpos aphyllus*, *Melaleuca cucullata* (west) and *M. pauperiflora*; and low shrubs of *Acacia pachypoda*, *A. merrallii*, *A. poliochroa sens. lat.*, *Daviesia pachyloma* (west), *D. aff. collectioides* (west), *D. sp.* (KRN 9182) (west), *Eremophila densifolia* (south-west) and *M. cf. cymbifolia*.

Another low tree in *Eucalyptus ovularis* Low Woodland was *E. longicornis*. Also present were occasional mallees of *E. celastroides* var. *virella* and *E. cylindrocarpa* (Woodline Mallee); tall shrubs of *Melaleuca lanceolata*; low shrubs of *Acacia merrallii*, *Atriplex vesicaria* ssp. *variabilis*, *Eremophila decipiens* and *Sclerolaena diacantha*; and the annual **Mesembryanthemum nodiflorum*.

Low trees of *Eucalyptus eremophila* occurred in *Eucalyptus* sp. (KRN 5603) Low Woodland. Tall shrubs included *Melaleuca lanceolata*, and low shrubs included *Acacia poliochroa sens. lat.*, *A. rendlei*, *Eremophila caerulea*, *M. cardiophylla* var. *cardiophylla* and *Westringia cephalantha*.

The Greenstone Complex included mallees of *E. gracilis*; low shrubs of *Acacia erinacea*, *Melaleuca cardiophylla* var. *cardiophylla* and *Trymalium aff. ledifolium*; and the sedge *Lepidosperma* sp. (KRN 5232).

Broad Valley (V): Twenty-four vegetation types were recorded on Broad Valleys. They are separated in groups according to the soil group or sub-group on which they were recorded. Deep calcareous Earths are divided into three sub-groups in relation to pH of their A horizon. The first group had a pH of 8.25 to 8.5 *Eucalyptus longicornis* Woodlands and Low Woodlands were the most common with a general distribution. Both were combined here even though the woodlands had not been burnt for a much longer period than the low woodlands. Field evidence suggested that at about 75-90 years after fire, low woodlands reach 15 m in height and became woodlands. Species composition was similar in both. *Eucalyptus flocktoniae* Low Woodland was frequently sighted. All of the above vegetation types occurred on Broad Valleys over granite, or on material derived largely from greenstone. However, *Eucalyptus dundasii* (Dundas Blackbutt) Woodland was rare and only occurred near greenstone in the Mt Day area. *Eucalyptus ovularis* Low Woodland was also rare, and occurred in valleys over granite.

The second sub-group of Deep Calcareous Earths had a sandy loam A horizon with a pH of 8.0-8.25. *Eucalyptus salmonophloia* Woodland was common and often associated with *Eucalyptus salubris* Low Woodland (northern two-thirds) or *Eucalyptus diptera* (Two-winged Gimlet) Low Woodland in the central and eastern section of the remainder. Mallee vegetation types of both *E. cylindrocarpa* and *E. gracilis* were frequent over the Study Area. In contrast, *Eucalyptus transcontinentalis* Mallee tended to be confined to lower southern areas where *Eucalyptus diptera* Low Woodland was absent.

The third sub-group had A horizons of loamy sands with pH of 7.0-7.5. *Eucalyptus transcontinentalis* low Woodland was the most common vegetation type and occurred almost entirely over the eastern two-thirds of the Study Area. In some southern and western areas, this vegetation type was replaced by *Eucalyptus sheathiana* (Ribbon-barked Mallee) Low Woodland. Other vegetation types present on the same soil sub-group were *Eucalyptus* aff. *occidentalis* Mallee (scattered, general), *Eucalyptus cylindriflora* (White Mallee) Mallee (rare) and *Eucalyptus scyphocalyx* Mallee (scattered, southern and western).

Aeolian sands were scattered and the most common vegetation was *Eucalyptus leptophylla* Mallee with a general distribution. *Eucalyptus pileata* Mallee was also scattered to frequent and occurred in southern and western sections. Near the southern boundary, occasional patches of *Eucalyptus pileata* Mallee were sighted where the A horizon was 25-50 cm thick. If thicker in the same area, *Eucalyptus tetragona* Mallee usually occurred. *Eucalyptus* aff. *wandoo* Low Woodland was rare and confined to central and eastern sections, while *Acacia jennerae* Tall shrubland was only sighted near Lake Cronin.

Occurring on some flats that were waterlogged for most of the winter (normal rainfall) was *Eucalyptus spathulata* ssp. *grandiflora* Mallee. Growing in claypans, containing some water most winters, was *Melaleuca* aff. *preissiana* Tall Shrubland. A single claypan south of the Bremer Range with a clay floor, supported *Muehlenbeckia cunninghamii* Low Shrubland.

Few 'miscellaneous species' were recorded and most had very small populations. There was a strong tendency for the number of species and population numbers to decrease as pH of the A horizon increased.

Eucalyptus longicornis Low Woodland (and Woodland) sometimes contained tall trees of *E. salmonophloia*; low trees of *E. diptera* (south) and *E. ovularis*; and mallees of *E. calycogona*, *E. gracilis*, *E. concinna* (Victoria Desert Mallee) (north-east) and *E. scyphocalyx* (west and south). Tall shrubs present included *Acacia camptoclada*, *A. hemiteles*, *A. merrallii* (also low shrub), *Daviesia* sp. (KRN 9182) (west), *Eremophila ionantha* (also low shrub), *E. pachyphylla* (east), *E. scoparia*, *E. caerulea*, *E. decipiens*, *Grevillea pectinata* (south), *Melaleuca lanceolata* and *Santalum acuminatum*; and low shrubs of *Acacia erinacea*, *A. intricata* (west), *A. pachypoda*, *Boronia inornata* ssp. *inornata* (south) *Cratystylis conocephala* (east), *Daviesia benthamii* ssp. *benthamii*, *Dodonaea stenozya*, *Halgania andromedifolia*, *Microcybe multiflora* var. *multiflora*, *Olearia muelleri*, *Rhagodia preissii* ssp. *preissii*, *Scaevola spinescens*, *Sclerolaena dia-*

cantha, *Templetonia sulcata*, *Westringia rigida* and *Wilsonia humilis*. While numerous shrub species have been recorded, the number present at any one site was relatively low.

The other low tree species occurring with *Eucalyptus flocktoniae* Low Woodland was *E. diptera*. Tall shrubs included *Melaleuca acuminata*, *M. cucullata* (south), *M. lanceolata*, *M. quadrifida* and *M. aff. undulata* (south); and low shrubs of *Acacia crassuloides* (south), *A. merrallii*, *Daviesia benthamii* ssp. *benthamii* and *Daviesia* sp. (KRN 9182) (west).

Growing in *Eucalyptus dundasii* Woodland were low trees of *E. transcontinentalis*; tall shrubs of *Melaleuca lanceolata*; and low shrubs of *Eremophila caerulea* and *Wilsonia humilis*. No 'miscellaneous plants' were recorded. *Eucalyptus ovularis* Low Woodland also had few main species: tall shrubs of *Melaleuca lanceolata*, and low shrubs of *Acacia merrallii* and *Eremophila scoparia*.

Eucalyptus salmonophloia Woodland contained occasional low trees of *E. flocktoniae* and *E. salubris*. Mallees were usually present and included *E. celastroides* var. *virella*, *E. conglobata* (Port Lincoln Mallee) (south), *E. cylindrocarpa*, *E. gracilis*, *E. scyphocalyx* (south and west) and *E. transcontinentalis* (south and west). The number of shrub species present varied widely, and included tall shrubs of *Acacia colletioides*, *A. hemiteles*, *A. ixiophylla* (south), *A. merrallii*, *A. nyssophylla* (also low shrub), *Alyxia buxifolia*, *Daviesia benthamii* ssp. *benthamii* (also low shrub), *Eremophila ionantha* (also low shrub), *E. paisleyi* (east), *Exocarpos cupressiformis* (west), *Melaleuca acuminata*, *M. cucullata* (south), *M. eleuterostachya*, *M. lanceolata*, *M. laxiflora*, *M. pauperiflora* and *M. uncinata*; low shrubs of *Acacia acutata* (south), *A. erinacea*, *A. hemiteles*, *A. pachypoda*, *A. poliochroa* sens. lat., *Atriplex vesicaria* ssp. *variabilis*, *Cassia nemophila* var. *nemophila*, *Daviesia* sp. (KRN 9182) (west), *Disphyma crassifolium*, *Dodonaea stenozyga*, *Eremophila caerulea*, *E. decipiens*, *Grevillea acuaria*, *Olearia muelleri*, *Rhagodia drummondii*, *Scaevola spinescens*, *Sclerolaena diacantha*, *Templetonia sulcata* and *Wilsonia humilis*; sedges of *Lepidosperma drummondii*; and parasitic *Amyema miquellii* on *Eucalyptus salmonophloia*.

Growing in *Eucalyptus salubris* Low Woodland were mallees of *E. gracilis*; tall shrubs of *Alyxia buxifolia*, *Cratystylis conocephala* (east), *Dodonaea stenozyga*, *Eremophila ionantha*, *E. scoparia*, *Exocarpos aphyllus*, *Melaleuca lanceolata*, *M. quadrifaria*, *Melaleuca* aff. *pauperiflora*, and *Scaevola spinescens* (also low shrub); and low shrubs of *Acacia intricata* (west), *A. nodiflorus* var. *ferox* (west), *A. poliochroa* sens. lat., *Atriplex vesicaria* ssp. *variabilis*, *Eremophila caerulea*, *Grevillea acuaria*, *Melaleuca adnata* (south), *Melaleuca* sp. (KRN 9173) and *Microcybe multiflora* var. *multiflora*.

Often growing in *Eucalyptus diptera* Low Woodland were mallees of *E. aff. occidentalis*, *E. pileata* and *E. transcontinentalis*. Tall shrubs present included *Grevillea* aff. *oncogyne* (south-east), *Melaleuca lanceolata*, *M. aff. undulata* and *Santalum acuminatum*; and low shrubs of *Acacia cometes*, *A. crassuloides* (south-east), *A. mackeyana*, *A. saxatilis*, *Acacia* sp. (KRN 6559) (west), *Astartea ambigua*, *Daviesia benthamii* ssp. *benthamii*, *Dodonaea stenozyga*, *Eremophila*

caerulea, *Exocarpos aphyllus*, *Grevillea acuaria*, *Halgania* sp. (KRN 6433) (south-east), *Melaleuca acuminata*, *M. cardiophylla* var. *parviflora*, *M. lateriflora*, *M. cf. cymbifolia*, *Microcybe multiflora* var. *multiflora* and *Olearia muelleri*.

Eucalyptus cylindrocarpa Mallees contained other mallees of *E. gracilis* and *E. transcontinentalis*; tall shrubs of *Acacia hemiteles*, *Exocarpos cupressiformis* (west), *Melaleuca eleuterostachya* and *M. lateriflora*; and low shrubs of *Acacia intricata* (west), *A. nodiflorus* var. *ferox* (south and west), *A. merralli* and *Eremophila decipiens*. Growing in *E. gracilis* Mallee were other mallees of *E. celastroides* var. *virella*; and low shrubs of *Acacia crassuloides* (south-east), *A. erinacea*, *A. saxatilis* (south), *Cassia nemophila* var. *nemophila*, *Daviesia benthamii* ssp. *benthamii* and *Grevillea acuaria*.

Some of the following mallees were always present in *Eucalyptus transcontinentalis* Mallee: *E. celastroides* var. *virella*, *E. aff. occidentalis*, *E. gracilis*, *E. pileata* and *E. scyphocalyx*. Tall shrubs included *Daviesia benthamii* ssp. *benthamii* (also low shrub), *Grevillea oncogyne* (also low shrub), *Melaleuca acuminata*, *M. eleuterostachya*, *M. lanceolata*, *M. lateralis*, *M. uncinata*, *M. aff. cuticularis*, *M. aff. pungens* and *Santalum acuminatum*; low shrubs of *Acacia erinacea*, *A. nodiflorus* var. *ferox*, *A. mackeyana*, *A. poliochroa sens. lat.*, *Boronia inornata* ssp. *inornata*, *Cooperookia strophiolata*, *Grevillea oligantha*, *Halgania andromedifolia*, *Melaleuca cardiophylla* var. *cardiophylla*, *Pultenaea arida* and *Westeringia rigida*; perennial grasses of *Triodia scariosa* (north); and sedges of *Gahnia ancistrophylla*.

Growing in *Eucalyptus transcontinentalis* Low Woodland were some of the following mallees: *E. celastroides* var. *virella*, *E. aff. occidentalis*, *E. pileata* and *E. concinna* (north-east). The main tall shrubs recorded were *Daviesia* sp. (KRN 5598) (also low shrub), *Exocarpos aphyllus*, *Melaleuca cardiophylla*, *M. eleuterostachya*, *M. holosericea* (also low shrub), *M. lanceolata*, *M. lateriflora* (also low shrub) *M. pauperiflora*, *M. cf. cymbifolia*, *Melaleuca* sp. (KRN 6291); low shrubs of *Acacia camptoclada*, *A. colletioides*, *A. intricata* (west), *A. merralli*, *A. poliochroa sens. lat.*, *Beyeria lechenaultii*, *Daviesia benthamii* ssp. *benthamii*, *Eremophila caerulea*, *Grevillea huegelii*, *G. pauciflora* ssp. *pauciflora*, *G. pectinata*, *Melaleuca cardiophylla* var. *parviflora*, *M. uncinata*, *Olearia muelleri*, *Scaevola spinescens*, *Spyridium* sp. (KRN 6108) (east) and *Westeringia rigida*; sedges of *Gahnia ancistrophylla* and *Lepidosperma brunonianum*; and sedge-like plants of *Lomandra effusa*.

Growing in *Eucalyptus sheathiana* Low Shrubland were mallees of *E. celastroides* var. *virella* and *E. gracilis* tall shrubs of *Daviesia* sp. (KRN 9182) (west) and *Melaleuca lanceolata*; and low shrubs of *Boronia inornata* ssp. *inornata*, *Daviesia benthamii* ssp. *inornata*, *Daviesia benthamii* ssp. *benthamii*, *Grevillea huegelii*, *G. oncogyne*, *Melaleuca pauperiflora*, *Microcybe multiflora* var. *multiflora* and *Westeringia rigida*.

Daviesia benthamii ssp. *benthamii*, *Grevillea huegelii*, *G. oncogyne*, *Melaleuca pauperiflora*, *Microcybe multiflora* var. *multiflora* and *Westeringia rigida*.

An occasional *E. transcontinentalis* was found growing in *E. aff. occidentalis* Mallee, as well as tall shrubs of *Melaleuca uncinata*. Some of the following low shrubs were present: *Acacia intricata* (west), *A. merrallii*, *A. nodiflorus* var. *ferox*, *Acacia* sp. (KRN 6268), *Rinzia sessilis*, *Dodonaea bursarifolia*, *Exocarpos aphyllus*, *Phebalium filifolium*, *Melaleuca adnata*, *M. lateriflora*, *M. aff. cuticularis* and *M. aff. pungens*.

Eucalyptus cylindriflora Mallees also contained *E. celastroides* var. *virella*; tall shrubs of *Melaleuca acuminata* and *M. lateriflora*; and low shrubs of *Acacia cometes*, *A. saxatilis*, *Daviesia benthamii* ssp. *benthamii*, *Grevillea acuaria*, *Halgania* sp. (KRN 6433) (east) and *Melaleuca aff. pungens*.

Present in *Eucalyptus scyphocalyx* Mallee were some of the following mallees: *E. aff. occidentalis*, *E. leptophylla*, *E. incrassata* (Lerp Mallee) and *E. transcontinentalis*. Tall shrubs included *Callitris preissii* ssp. *verrucosa*, *Exocarpos cupressiformis*, *Grevillea oncogyne*, *Melaleuca cardiophylla* var. *cardiophylla*, *M. eleuterostachya* and *M. uncinata*; low shrubs of *Acacia hemiteles*, *Beyeria lechenaultii*, *Boronia baeckeacea*, *Bossiaea leptacantha*, *Cryptandra miliaris*, *Phebalium lepidotum* var. *lepidotum* and *Spyridium cordatum*; perennial grasses of *Triodia scariosa*; and sedges of *Gahnia ancistrophylla* and *Lepidosperma drummondii*.

Eucalyptus leptophylla Mallee contained other mallees of *E. pileata*; tall shrubs of *Acacia jennerae*, *A. leptoneura* (south), *Banksia media* (south-east), *Beyeria lechenaultii*, *Callitris preissii* ssp. *verrucosa*, *Conostephium drummondii sens. lat.*, *Exocarpos cupressiformis* (west), *Grevillea oncogyne*, *Hakea multilineata*, *Melaleuca pentagona*, var. *pentagona*, *M. uncinata*, *Phymatocarpus maxwelli* (south) and *Santalum acuminatum*, low shrubs of *Beaufortia micrantha* var. *micrantha* (south), *Bossiaea leptacantha*, *Brachyloma concolor* (south), *Calytrix* sp. (KRN 6458), *Grevillea oligantha* (south), *Leucopogon aff. conostephioides* (south), *Melaleuca cf. scabra*, *Olearia revoluta*, *Phebalium filifolium*, *Pimelea brevifolia* (south) and *Verticordia brownii* (south); perennial grasses of *Triodia scariosa* (central and north); and sedges of *Gahnia ancistrophylla*, *Lepidobolus preissianus*, *Lepidosperma brunonianum*, *L. carphoides* (west and south), *L. drummondii*, *L. aff. resinum*, *Loxocarya cinerea* (south) and *Schoenus* sp. (KRN 4744) (south and west).

Growing in *Eucalyptus pileata* Mallee were other mallees of *E. aff. occidentalis*, *E. gracilis*, *E. leptophylla* and *E. scyphocalyx*. Tall shrubs present were *Daviesia benthamii* ssp. *benthamii* (also low shrub), *Dodonaea amblyophylla*, *Exocarpos sparteus*, *Grevillea pectinata*, *Melaleuca lanceolata*, *M. uncinata*; low shrubs of *Acacia andrewsii*, *A. ixiophylla*, *A. poliochroa sens. lat.*, *Beaufortia micrantha* var. *micrantha*, *Boronia baeckeaceae*, *Bossiaea letacantha*, *Cooperookia strophiolata*, *Daviesia lancifolia*, *D. pachyloma* (west), *Dodonaea bursariifolia*, *Grevillea oncogyne*, *Melaleuca acuminata*, *M. lateriflora*, *M. pentagona* var. *pentagona*, *Olearia muelleri*, *Phebalium tubercolosum* ssp. *tubercolosum*, *Platysace maxwelli* and *Verticordia densiflora*; and sedges of *Gahnia ancistrophylla*, *Lepidosperma brunonianum*, *L. drummondii*, *L. aff. resinum* and *Tetraria capillaris*.

Eucalyptus incrassata Mallee contained other mallees of *E. aff. occidentalis*, *E. redunca* and *E. uncinata*. Also present were tall shrubs of *Acacia leptoneura*, *Banksia media*, *Callitris preissii* ssp. *verrucosa*, *Conostephium drummondii* sens. lat., *Daviesia benthamii* ssp. *benthamii*, *Grevillea oligantha*, *G. oncogyne*, *Leptospermum erubescens*, *Melaleuca* cf. *scabra*, *M. ? scabra*, *M. uncinata*; low shrubs of *Beyeria lechenaultii*, *Calytrix* sp. (KRN 6458), *Cryptandra glabriflora*, *Dodonaea amblyphylla*, *Grevillea pauciflora* ssp. *pauciflora* (west), *G. pectinata*, *Hibbertia pungens* sens. lat., *Leucopogon* sp. (KRN 4082) *Melaleuca* aff. *pungens*, *Phebalium filifolium*, *P. aff. microphyllum* (east) and *Spyridium* sp. (KRN 6108) (east); and sedges of *Gahnia ancistrophylla*, *Lepidosperma brunonianum*, *L. drummondii* and *L. aff. resinosum*.

Other mallees growing in *Eucalyptus tetragona* Mallee were *E. incrassata* and *E. aff. decipiens*. Low shrubs included *Banksia elderiana*, *B. media*, *Beaufortia micrantha* var. *micrantha*, *Calothamnus gracilis*, *Calytrix* sp. (KRN 64-58), *Daviesia unifolia*, *Hakea corymbosa*, *H. obliqua*, *Leptospermum roei*, *Leucopogon fimbriatus*, *Lysinema ciliatum*, *Melaleuca* aff. *scabra* and *Verticordia roei*. *Restio sphacelatus* was the main sedge present.

Eucalyptus aff. *wandoo* Low Woodland contained few species and only had a dominant tall shrub (*Acacia nysophylla*), low shrub (*Grevillea huegelii*) and perennial grass (*Triodia scariosa*).

Acacia jennerae Tall Shrubland had more dominants than above: tall shrubs of *Grevillea wittweri*, *Hakea trifurcata*, and *Santalum acuminatum*; low shrubs of *Acacia acutata* and *Olearia revoluta*; annuals of *Chrysocoryne pusilla*; and sedges of *Lepidobolus preissianus* and *Schoenus* sp. (KRN 4744).

Eucalyptus transcontinentalis was the mallee growing in *E. spathulata* ssp. *grandiflora* Mallee; as well as tall shrubs of *Acacia enervia* and *Melaleuca pauperiflora*; low shrubs of *Darwinia* sp. (KRN 5796), *Daviesia benthamii* ssp. *benthamii*, *Conostephium drummondii* sens. lat., *Melaleuca thyoides*, *M. aff. thyoides*, *Microcybe multiflora* var. *multiflora* and *Phebalium filifolium*; and sedges of *Lepidosperma brunonianum*.

Three other tall shrub *Melaleuca* species were present in *Melaleuca* aff. *preissiana* Tall Shrubland: *M. uncinata*, *M. aff. cuticularis* and *Melaleuca* sp. (KRN 6263). Present were low shrubs of *Goodenia viscida* and *Muehlenbeckia cunninghamii*; and annuals of *Angianthus conocephalus*, *Calandrinia granulifera*, *Centrolepis polygyna* and *Crassula exserta*. The floor of Lake Cronin was covered with the aquatic *Myriophyllum verrucosum*. *Muehlenbeckia cunninghamii* Low Shrubland was a simple vegetation type and only contained another dominant low shrub, *Tecticornia verrucosa*.

Discussion

About three-quarters of the Study Area is within the Roe Botanical District of the South-west Botanical Province (Beard 1980). The remaining quarter is the north-eastern corner that is within the Coolgardie Botanic District of the South-western Interzone. Most vegetation types within the Study Area extend into

surrounding areas (Beard 1981; Burgman and Newbey 1987; Newbey and Hnatiuk 1984, 1985, in prep. a, b). Seven are unique to the Study Area: Breakaway Complex, Banded Ironstone Formation Complex, Greenstone Complex, *Acacia jennerae* Tall Shrubland, *Eucalyptus georgei* Low Woodland, *Eucalyptus* sp. (KRN 5603) Low Woodland, *E. scyphocalyx* Mallee. Another five are rare, both within and outside of the Study Area. *Eucalyptus* sp. (KRN 9710) Low Woodland occurs on Sub-saline Soils in the Peak Charles area and also in the Norseman-Balladonia Study Area. *Muehlenbeckia cunninghamii* Low Shrubland occurs on Lake Bryde (Newbey unpublished data) and in northern and eastern study areas of the Eastern Goldfields biological survey. *Melaleuca* spp. Tall Shrubland also occurs to the south of the Study Area. *Eucalyptus* aff. *foecunda* Low Woodland is also present in the western section of the Norseman-Balladonia study area, while *Melaleuca* aff. *preissiana* Tall Shrubland has been recorded in the Boorabin-Southern Cross Study Area, and to the west of this Study Area.



Plate 1 Freshwater Lake Cronin surrounded by *Melaleuca* aff. *preissiana* Tall Shrubland, after heavy rains. July 1979.



Plate 2 The 658 metre high granite Peak Charles rises 300 metres from the surrounding plain and is the tallest point in the Study Area. March 1980.



Plate 3 Vegetation Site LH8. *Allocasuarina campestris* ssp. *campestris* Tall Shrubland with *Borya constricta* 4 km SW of McDermid Rock. October 1978.



Plate 4 View from Hill, granite across mallee on Broad Valley, to Saltlakes on east side of Peak Charles. November 1979.



Plate 5 Vegetation Site LH46. *Eucalyptus pileata* Mallee over *Melaleuca uncinata* shrubs, 6 km W. of Lake Cronin. July 1979.



Plate 6 Vegetation Site LH34. *Eucalyptus salmonophloia* Woodland, 0.7 km W. of Lake Cronin. October 1978.



Plate 7 Vegetation Site LH38. *Eucalyptus salubris* Low Woodland, 2 km E. of McDermid Rock. July 1979.



Plate 8 *Eucalyptus salmonophloia* Woodland, 44 km W. of Norseman. July 1978.



Plate 9 Vegetation Site LH15. *Eucalyptus georgei* Low Woodland, 6.5 km E. of Lake Cronin. July 1981. *E. georgei* is a rare species confined to a few small depressions.