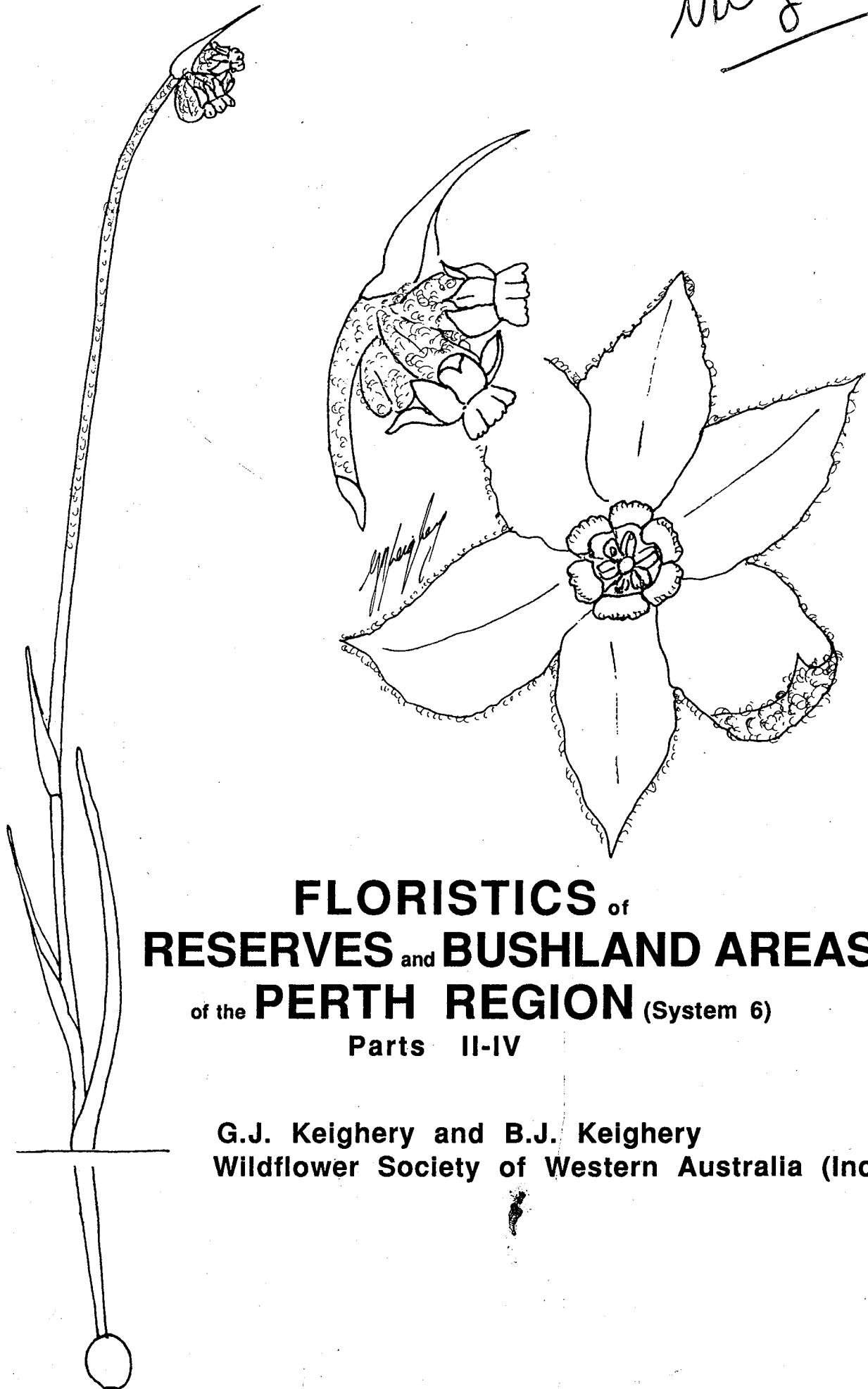


New figs



**FLORISTICS** of  
**RESERVES and BUSHLAND AREAS**  
of the **PERTH REGION** (System 6)  
Parts II-IV

**G.J. Keighery and B.J. Keighery**  
**Wildflower Society of Western Australia (Inc.)**

*New Sub*

**FLORISTICS** of  
**RESERVES** and **BUSHLAND AREAS**  
of the **PERTH REGION** (System 6)  
Parts II-IV

The Wildflower Society of Western Australia has published these three papers, parts of a continuing series, in the interest of the conservation of our unique flora. Two of these areas are currently being considered for clearance for housing. The Society considers it essential that decision makers have available the necessary flora information before making irreversible land use decisions.

**G.J. Keighery and B.J. Keighery**

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Cover Illustration by **G.J. Keighery** of

***Tribonanthes brachypetala*** from the Brixton St Wetlands

**Floristics of Reserves and Bushland Areas  
of System Six Region II  
Brixton Street Wetlands, Kenwick**

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**Floristics of System Six Reserves and  
Bushland III  
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**Floristics of System Six Reserves and  
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**Floristics of Reserves and Bushland Areas  
of System Six Region II  
Brixton Street Wetlands, Kenwick**

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**Abstract**

The floristics of an ephemeral claypan wetland (and surrounding vegetation) of the Swan Coastal Plain is documented. This 19 ha. site contains 307 species of flowering plants, 49 of which are naturalized aliens. Three are declared endangered under the Wildlife Protection act. The vegetation formations themselves are rarely represented in reserves (especially the *Melaleuca laterita* shrubland and *Viminaria* over ironstone).

## Introduction

The remnant detailed in this paper comprises lots 37 and 47, Brixton Street, Kenwick. The site is approximately 19 hectares in extent, and is a flat winter wet plain between Yule and Bickley Brooks, on Guildford formation clays.

The clays contain natural depressions which fill from rainfall, though, the surrounding water table is high (Australian Groundwater Consultants, 1989). These ephemeral wetlands are now rare on the Swan Coastal Plain, and few have had their floristics detailed.

This paper is the second in a series detailing the floristics of bushland remnants of the System Six region (Keighery, 1991a). Aspects of the biology of the uncommon sedge, *Schoenus capillifolius* present at this site have been documented elsewhere (Keighery, 1991b).

These ephemeral claypans are a unique feature of the northern half of the Swan Coastal Plain, and as far as we are aware this is the first complete floristic study of this geomorphic unit.

## Results

### Vegetation - Structure

The site contains seven vegetation complexes, two of which (*Melaleuca raphiophylla* low woodland and low heath) are of very limited extent. Maps of the vegetation structure are given in Australian Groundwater Consultants (1989) and Hames and Sharley (1991).

The *Melaleuca* woodland lines the edge of an ephemeral creek on the south-western quarter of the site.

The "dry" claypans of the southern side of the area are covered by a low heath of *Astartea/Pericalymma* (site description in Table 1,A). The drier claypans of the north-eastern side of the area are covered by a *Kunzea recurva* open heath (Table 1,C).

The winter wet pools themselves usually are covered by a low open *Melaleuca laterita* shrubland (Table 1,D) except for the deepest pool which is covered by an *Amphibromus neesii* grassland (Table 1,B). The central pool of this area contains water up to early December, and in this, the only populations of *Myriophyllum crispatum*, *Eleocharis* sp. (GK 5180), *Villarsia submersa* and *Ottelia ovalifolia* present in this area occur.

Higher in the landscape, where drainage is improved, and the soils are shallow loams and clays over ironstone, the vegetation is a *Viminaria* shrubland (Table 1,E). This vegetation covers most of the block under study.

On the highest ground, where the drainage is best and the soils deepest, a Marri (*Eucalyptus calophylla*) woodland is found (Table 1,F).

Disturbed vegetation (where much of the original cover has been removed) occurs on the western and southern margins of the site. This area is where the majority of the weed records are found (Table 2). One particular site on the S.W. boundary near a large drain contains numerous exotics generally not recorded elsewhere (Table 3). This suite of weeds are apparently the result of dumped garden refuse, and should be removed.

The vegetation types recorded at Lot 37 are characteristic of the heavy soils of the eastern side of the Swan Coastal Plain. The conservation status of ephemeral wetlands on the plain are very poor, and as far as we are aware only J.R. and B. Martyn Reserve has *Kunzea* heath, *Melaleuca lateritia* shrubland and *Viminaria* shrubland present within its boundary.

### Species

Three hundred and seven species of vascular plant were recorded from the site. This total being composed of 5 ferns, 157 species of monocotyledons and 150 species of dicotyledons. 49 species were naturalized aliens. The occurrence of these species in the vegetation types recorded at the site are given in Table 2.

Significant species of flora include three declared rare under the provisions of the Conservation and Land Management Act. 10 species are on the priority list of the Dept. of Conservation and Land Management.

The area also contains 24 species of plants which are normally associated with the heavier soils of the Darling Scarp and range (Table 4).

The following species (*Eleocharis* sp. (GK 5180), *Schoenus capillifolius*, *Hydatella dioica*, *Aponogeton hexatepalus*, *Eryngium* sp (GK 8757), *Calandrinia ?composita*, *Stylidium utricularioides*, *Helipterum pyrethrum* and *Trichocline* sp. (GK 6382)) recorded at Brixton Street, appear to be confined to the Swan Coastal Plain.

Certain species are at the margins of their ranges; eg: northern limit (*Baumea acuta*, *Schoenus bifidus*, *Anarthria laevis*, *Tricoryne humilis*, *Caladenia ferruginea*, *Petrophile media*, *Eryngium* sp II (GK 5390) and *Villarsia submersa*) or southern limit (*Schoenus andrewsii* and *Conostylis festucacea*).

Several other species were recollected at Brixton Street many decades after their previous records for the metropolitan region. These species are:

*Dichopogon preissii*; previous collection 1903  
*Calandrinia composita*; previous collection 1905  
*Eryngium* sp. II; previous collection 1905.

The area are also contains a series of taxonomically significant populations, some of which do not match current taxonomic placement or which will (or have) delimitate closely related species. These taxa are:

- a) *Eleocharis* sp. (GK 5180) is here found growing with *E. acuta*. This species is not recognized as distinct in the Flora of the Perth Region, and appears confined to the Swan Coastal Plain.
- b) *Calectasia cyanea*/*C. grandiflora* are found co-occurring at this site, which is the only area where this has been recorded, and is near the presumed type locality of *C. grandiflora*. The discovery of this population was instrumental in the reinstatement of *C. grandiflora* as a distinct species. This is the only known extant population of *C. grandiflora* on the Swan Coastal Plain.
- c) *Wurmbea dioica* ssp. *alba* at Brixton Street grows submerged in the claypans, flowering in early spring while the claypans are still full of water. These plants are hermaphrodite or andromonoecious, not dioecious and have pure white flowers. The strikingly different habitat



and associated floral differences suggest that this population is genetically different and requires taxonomic re-assessment.

- d) *Tribonanthes ?uniflora* (GK 6259). Currently this taxon is placed under *T. australis* or *T. longipetala*, however, both of these species occur on site, and hybrids between *T. australis* and *T. ?uniflora* (voucher: GK 6260) have been recorded. The status and distribution of *Tribonanthes uniflora* requires further study.

Brixton Street with four species and two hybrid *Tribonanthes* recorded is the richest site ever recorded for this genus.

- e) *Velleia trinervis*: swamp form (GK 10429). This is a glabrous plant with very pale orange and purple flowers. Examination of collections of this widespread species suggest that there are several distinct subspecies, and that the coastal claypan populations are one of these. Further studies are needed on this species.

### Discussion

The vascular flora of this small area is exceedingly diverse, 258 species of native plants in an area of 19 hectares (representing 17% of the known flora of the Perth Region in less than 0.005% of the area). As detailed in the species section of this report a significant proportion of this flora is either rare, geographically restricted, taxonomically or geographically significant. This reflects the rarity of the habitat, which has been almost entirely cleared on the Swan Coastal Plain.

The data presented here suggests that the ephemeral wetlands of the eastern Swan Coastal Plain are the least understood and most poorly conserved of any wetland complex of the Perth to Bunbury area. Most have been cleared for agriculture or drained for housing yet have attracted far less concern for their preservation than the "drowned" wetlands supporting few species of common waterfowl. Further detailed vegetation studies are urgently needed on such wetlands to increase awareness of this vanishing part of our wildlife heritage.

### Acknowledgements

Raelene Hick and Jan Rayner have prepared versions of this paper from a preliminary report to Homeswest through to this, hopefully, final paper on this site. To the Western Australian Wildflower Society for publishing this paper to ensure its availability to interested parties. To the many people who have assisted in helping and promoting the conservation of Perth's wetland heritage.

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Table 1

Vegetation Site Descriptions

A *Astartea fascicularis*/*Pericalymma elliptica* heath

Stratum 1: Shrubs 1-1.5 m, CC = 30  
*Astartea fascicularis*, *Pericalymma elliptica*

Stratum 2: Sedges, 40-60 cm, CC = 20  
*Leptocarpus canus*

Stratum 3: Herbs, CC = 5  
*Goodenia filiformis* var. *filiformis*, *Stylidium roseo-alatum*, *Goodenia filiformis* var. *minutiflora*, \**Cyperus tenellus*

B *Amphibromus* grassy flats

At the edges of these pools, a band of sedges occur:

Stratum 1: Sedges 30-70 cm, CC = 60  
*Leptocarpus canus*, *Dichopogon preissii*, *Pimelea imbricata* var. *gracillima*, *Schoenolaena juncea*

Stratum 2: Aquatics: *Aponogeton hexatepalus*

In the centre:

Stratum 1: Grasses, 60-90 cm, CC = 60  
*Amphibromus neesii*

Stratum 2: Herbs, CC = 30  
*Aponogeton hexatepalus*, *Wurmbea dioica* ssp. nov., *Isolepis cernua*, \**Cyperus tenellus*, \**Lythrum hyssopifolium*

C "Dry" claypans - *Kunzea* heath

Stratum 1: Shrubs, 50 cm-1.5 m, CC = 50  
*Kunzea recurva*, *Vimminaria juncea* (rare)

Stratum 2: Shrubs 20-40, CC = 10  
*Xanthorrhoea brunonis*

Stratum 3: Shrubs, 10-30, CC =  
*Scaevola lanceolata*, *Dampiera linearis*, *Conospermum huegelii*, *Daviesia physodes*, *Grevillea bipinnatifida*

Stratum 4: Sedges and perennial herbs, CC = 10  
*Conostylis festucacea*, *Amphipogon turbinatus*, *Borya scirpioidea*, *Cyathochaeta clandestina*

Stratum 4: Herbs, CC = 5  
*Stylidium calcaratum*, *Stylidium roseo-alatum*, *Stylidium utricularioides*, *Philydrella drummondii*, *Philydrella pygmaea*

D *Melaleuca laterita* shrubland

Stratum 1: Shrubs 1.5-2.5 m, CC = 20  
*Melaleuca laterita*

Stratum 2: Shrubs, 30-60 cm, CC = 20  
*Pimelea imbricata* var. *gracillima*

Stratum 3: Sedges, 40-60 cm, CC = 20  
*Leptocarpus co-angustatus*

Stratum 4: Herbs  
*Aponogeton hexatepalus*, *Wurmbea dioica*, *Hydrocotyle lemnoides*

E *Viminaria* shrubland

Stratum 1: Shrubs 3-5 m, CC = 20  
*Viminaria juncea*

Stratum 2: Shrubs 70 cm-1.2 m, CC = 60  
*Hypocalymma angustifolium*, *Verticordia serrata*, *Allocasuarina humilis*,  
*Xanthorrhoea brunonis*, *Hibbertia hypericoides*, *Acacia lasiocarpa*

Stratum 3: Sedges  
*Mesomelaena tetragona*, *Leptocarpus co-angustatus*

F Marri (*Eucalyptus calophylla*) woodland

Stratum 1: Trees, 10-15 m, CC = 30  
*Eucalyptus calophylla*

Stratum 2: Shrubs, 1-2 m, CC = 1  
*Viminaria juncea*

Stratum 3: Shrubs 30 cm-80 cm, CC = 20  
*Hibbertia hypericoides*, *Nemcia capitata*, *Xanthorrhoea ?preissii*,  
*Opercularia vaginata*

Stratum 4: Shrubs 5 cm - 20 cm, CC = 20  
*Xanthosia huegelii*, *Stylidium brunonianum*, *Senecio minimus*, *Dampiera linearis*,  
*Gompholobium marginatum*, *Kennedia prostrata*, *Triplerooccus brunonis*,  
*Drosera erytherorhiza*, *Drosera macrantha*, *D. stolonifera*

Stratum 5: Sedges and Perennial Herbs  
*Tetraria octandra*, *Burchardia umbellata*, *Anigozanthus manglesii*,  
*Lepidosperma angustatum*, *Thysanotus triandrus*, *Cyathochaeta avenacea*

Stratum 6: Herbs  
*Drosera glanduligera*

**Table 2**  
**BRIXTON STREET FLORA**

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<b>FERNS</b>						
<b>SELAGINELLACEAE</b>						
<i>Selaginella gracillima</i>		x		x		
<b>OPHIOGLOSSACEAE</b>						
<i>Ophioglossum lusitanicum</i> ssp. <i>coriaceum</i>				x		
<b>LYCOPODIACEAE</b>						
<i>Phylloglossum drummondii</i>	x	x		x	x	
<i>Pilularia novae-hollandiae</i>	x					
<b>ISOETACEAE</b>						
<i>Isoetes drummondii</i>	x					
<b>JUNCAGINACEAE</b>						
<i>Triglochin minutissima</i>		x				
<i>T. calcitrapa</i>		x	x			
<i>T. procera</i>	x					
<i>T. stowardii</i>	x	x			x	
<i>T. sp. aff. calcitrapa</i> (GK 10430)					x	
<b>POACEAE</b>						
<i>Agrostis aemula</i>	x	x	x			
<i>A. preissii</i>	x					
* <i>Aira cupiana</i>		x	x			x
<i>Amphibromus neesii</i>	x					
<i>Amphipogon amphipogonoides</i>		x	x			

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<i>A. turbinatus</i>				X		
* <i>Avena fatua</i>						X
* <i>Briza maxima</i>		X	X			X
* <i>B. minor</i>		X	X			
* <i>Cynodon dactylon</i>	X					X
<i>Danthonia cf. caespitosa</i> (GK 9666)	X					
* <i>Ehrharta calycina</i>			X			X
* <i>E. longiflora</i>		X	X			X
* <i>Eragrostis elongata</i>						X
* <i>E. curvula</i>						X
* <i>Paspalum dilatatum</i>	X					X
* <i>Plagiochloa uniolae</i>			X			X
* <i>Lagurus ovatus</i>						X
* <i>Lolium temulentum</i>	X					
<i>Neurachne alopecuroidea</i>		X	X			
<i>Stipa compressa</i>			X			
<i>S. semibarbata</i>						
<i>S. trichophylla</i>			X			
* <i>Vulpia myorus</i>	X	X				X
HYDROCHARITACEAE						
<i>Lepilaena australis</i>	X					
<i>Ottelia ovalifolia</i>	X					
APONOGETONACEAE						
<sup>A</sup> <i>Aponogeton hexatepalus</i>	X					
CYPERACEAE						
<i>Baumea acuta</i>	X	X				
<i>B. juncea</i>		X				
<i>B. preissii</i>	X	X				
<i>Chorizanda enodis</i>	X	X		X		
<i>Cyathochaeta avenacea</i>		X	X	X	X	

TAXON	VEGETATION TYPE					
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	DIST'D
* <i>Cyperus tenellus</i>		x	x	x		x
<i>Eleocharis acuta</i>	x					
<i>Eleocharis</i> sp. (GK 5180)	x					
<i>Isolepis marginatus</i>	x		x			
<i>I. oldfieldiana</i>	x					
<i>I. stellata</i>	x	x				
<i>I. sp.</i> (GK 6458)	x					
<i>Lepidosperma angustatum</i>			x	x		
<i>L. leptostachyum</i>		x				
<i>L. longitudinale</i>			x			
<i>Mesomelaena tetragona</i>		x	x		x	
<i>Schoenus andrewsii</i>		x				
<i>S. asperocarpus</i>		x				
<i>S. benthamiana</i>		x	x			
<i>S. bifidus</i>		x			x	
<sup>B</sup> <i>S. capillifolius</i>	x					
<i>S. elegans</i>		x				
<i>S. grandiflorus</i>			x			
<i>S. odontocarpus</i>	x					
<i>S. sp.</i> (GK 5185)		x			x	
<i>S. sp.</i> (GK 10906)						
<i>Tetraria octandra</i>		x	x			
RESIONACEAE						
<i>Anarthria laevis</i>		x				
<i>Leptocarpus canus</i>	x	x		x		
<i>L. co-angustus</i>		x		x		
<i>Lepyrodia muirii</i>	x			x		
<i>Loxocarya fasciculata</i>		x	x			
CENTROLEPIDACEAE						
<i>Aphelia cyperoides</i>		x	x			
<i>Brizula drummondii</i>	x					
<i>B. muelleri</i>		x				

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<i>Centrolepis aristata</i>		x	x		x	
<i>C. glabra</i>	x	x	x	x		
<i>C. hummillima</i>	x	x		x		
<i>C. polygyna</i>	x					
HYDATELLACEAE						
<sup>B</sup> <i>Hydatella dioica</i>	x					
<i>Trithuria bibracteata</i>	x	x				
<i>T. submersa</i>	x					
PHILYDRELLACEAE						
<i>Philydrella drummondii</i>	x	x			x	
<i>P. pygmaea</i>	x	x			x	
JUNCACEAE						
<i>Juncus bufonius</i>			x		x	
* <i>J. capitatus</i>						x
<i>J. holoschoenus</i>					x	
DASYPOGONACEAE						
<sup>D</sup> <i>Acanthocarpus canaliculatus</i>		x			x	
<sup>E</sup> <i>Calectasia cyanea</i>					x	
<sup>CE</sup> <i>C. grandiflora</i>		x			x	
<i>Kingia australis</i>		x			x	
<i>L. caespitosa</i>			x			
<sup>D</sup> <i>L. micrantha</i>					x	
<i>L. odora</i>			x		x	
XANTHORRHOEACEAE						
<i>Xanthorrhoea brunonis</i>		x			x	
<i>X. ?preissii</i>			x			

TAXON	VEGETATION TYPE						DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH		
<b>PHORMIACEAE</b>							
<sup>D</sup> Agrostocrinum scabrum (glabrous form)		x				x	
Dianella revoluta var. divaricata				x			
<b>ANTHERIACACEAE</b>							
Borya scirpioidea		x		x			
Borya sphaerocephala		x		x			
Caesia occidentalis				x			
Chaemascilla corymbosa		x		x			
Dichopogon capillipes				x			
Dichopogon preissii	x					x	
Laxmannia sessiliflora		x		x			
L. squarrosa				x			
Sowerbaea laxiflora		x		x		x	
Thysanotus arbuscular		x					
T. manglesii		x		x			
T. patersonii		x					
T. sparteus		x		x			
T. thyrsoides		x		x			
T. triandrus		x		x		x	
Tricoryne elatior				x			
<sup>C</sup> T. humilis		x					
<b>COLCHICACEAE</b>							
Burchardia multiflora		x		x		x	
B. umbellata				x			
<sup>E</sup> Wurmbaea dioica ssp. alba	x						
<b>HAEMODORACEAE</b>							
<sup>D</sup> Anigozanthos bicolor		x		x			
A. viridis	x	x				x	
A. manglesii				x			



TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
A. bicolor x manglesii					x	
A. bicolor x viridis					x	
Conostylis aculeata ssp. aculeata			x			
C. festucacea					x	
C. setigera		x	x		x	
Haemodorum laxum		x	x			
H. paniculatum			x			
H. sparsiflorum		x	x		x	
H. simplex		x			x	
H. spicatum			x			
<sup>D</sup> Tribonanthes brachypetala (GK 6249)		x	x	x	x	
T. australis (GK 6248)		x	x		x	
T. australis x						
T. brachypetala (GK 6249)		x	x			
<sup>E</sup> T. sp. (uniflora) (GK 6259)	x					
<sup>E</sup> T. uniflora x australis (GK 6260)		x				
T. longipetala (GK 6262)		x	x		x	
HYPOXIDFACEAE						
Hypoxis occidentalis		x				
IRIDACEAE						
*Babiana stricta						x
*Chasmanthe floribunda						x
*Freesia leichtlinii						x
*Hesperantha falcata		x				x
*Hexaglottis lewisae						x
Patersonia occidentalis		x	x			
<sup>D</sup> P. juncea		x				
*Sparaxis bulbifera						x
*Romulea rosea		x	x			x

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
* <i>Watsonia bulbifera</i>		x				x
* <i>W. marginata</i>		x				
ORCHIDACEAE						
<i>Caladenia deformis</i>		x				
<i>C. flava</i>					x	
<i>C. longicauda</i>		x	x			
<sup>C</sup> <i>C. ferruginea</i>		x	x			
<i>C. pectinata</i>		x	x			
<i>C. huegelii</i>		x	x			
<sup>DE</sup> <i>Diuris longifolia</i> (early fl'ing race)			x	x		
<i>D. emarginata</i>	x	x				
<i>Eriochilus dilatatus</i>		x	x			
<i>Lyperanthus serratus</i>			x			
<i>Microtis unifolia</i>		x				
<i>Prasophyllum drummondii</i>	x	x				
<i>Thelymitra crinita</i>		x	x			
<i>T. antennifera</i>		x				
<i>T. flexuosa</i>		x			x	
<i>T. villosa</i>		x			x	
PROTEACEAE						
<i>Conospermum huegelii</i>		x				
<i>Dryandra nivea</i>		x	x		x	
<sup>D</sup> <i>Grevillea bipinnatifida</i>		x	x			
<sup>C</sup> <i>Hakea ?auriculata</i> (GK 8014)		x				
<i>H. candolleana</i>		x				
<sup>D</sup> <i>H. erinacea</i>		x				
<i>H. incrassata</i>		x	x			
<i>H. lissocarpha</i>		x	x			
<i>H. prostrata</i>			x			
<i>H. sulcata</i>		x		x		
<i>H. trifurcata</i>			x			

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
H. varia				x		
<sup>D</sup> Isopogon asper					x	
<sup>D</sup> I. dubius		x				
<sup>C</sup> Petrophile media var. juncifolia		x	x			
<sup>D</sup> P. seminuda				x		
Stirlingia simplex		x				
<sup>D</sup> Synaphea acutiloba		x				
S. petiolaris		x	x			
<b>LORANTHACEAE</b>						
Nuytsia floribunda			x			
<b>AMARANTHACEAE</b>						
Ptilotus drummondii			x			
<sup>D</sup> P. declinatus		x				
<sup>D</sup> P. manglesii			x			
P. stirlingii		x				
<b>PORTULACACEAE</b>						
<sup>B</sup> Calandrinia composita	x	x				
<b>CARYOPHYLLACEAE</b>						
*Silene gallica var. gallica			x			x
<b>LAURACEAE</b>						
Cassytha glabella					x	
<b>DROSERACEAE</b>						
Drosera bulbigena		x			x	
D. erythrorhiza			x			
D. gigantea	x	x				
D. glanduligera		x	x		x	

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
D. macrantha				x		
<sup>D</sup> D. heterophylla		x				
D. menziesii ssp. menziesii	x	x				
D. occidentalis		x				
D. stolonifera ssp. stolonifera				x		
D. tubaestylus		x		x		
CRASSULACEAE						
Crassula colorata				x		
C. natans	x					
MIMOSACEAE						
Acacia lasiocarpa		x				x
A. pulchella		x		x		x
A. saligna				x		
FABACEAE						
Daviesia physodes				x		
Dillwynia aff. cinerascens		x		x		
Eutaxia virgata	x	x			x	
Gompholobium aristatum				x		
G. marginatum		x		x		
Kennedia prostrata				x		
Nemeia capitatum		x		x		
*Ornithopus compressus	x					x
Sphaerolobium linophyllum		x				
*Trifolium angustifolium						x
*T. dubium				x		x
*T. cernuum						x
*T. arvense						x
*Vicia sativa ssp. nigra				x		x
Viminaria juncea		x		x		x

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<b>OXALIDACEAE</b>						
* <i>Oxalis polyphylla</i>						X
* <i>O. pres-caprae</i>						X
* <i>O. purpurea</i>						X
<b>RUTACEAE</b>						
<i>Eriostemon spicatus</i>		X			X	
<i>Boronia cymosa</i>			X			
<b>POLYGALACEAE</b>						
<i>Comesperma ciliatum</i>		X				
<b>EUPHORBIACEAE</b>						
<i>Monotaxis grandiflora</i>		X	X			
<b>STACKHOUSIACEAE</b>						
<i>Stackhousia pubescens</i>			X			
<i>Tripterococcus brunonis</i>		X	X		X	
<b>DILLENIAEAE</b>						
<i>Hibbertia aurea</i>			X			
<i>H. hypericoides</i>			X			
<b>THYMELAEACEAE</b>						
<i>Pimelea imbricata</i> var. <i>gracillima</i>	X					
<b>LYTHRACEAE</b>						
* <i>Lythrum hyssopifolia</i>				X		X
<b>MYRTACEAE</b>						
<i>Astartea fascicularis</i>	X			X	X	
<i>Baeckea camphorosmae</i>		X	X			
<i>Calytrix aurea</i>	X			X	X	

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<i>Eucalyptus calophylla</i>				x		
<i>Hypocalymma angustifolium</i>		x		x	x	
<i>H. robustum</i>				x		
<i>Kunzea micrantha</i>				x		
<i>K. aff. recurva</i> (GK 6830)	x	x				
<i>Melaleuca raphiophylla</i>		x				
<i>Pericalymma elliptica</i>		x				
<i>Verticordia acerosa</i>		x				
<i>V. densiflora</i>		x				
<sup>D</sup> <i>V. huegelii</i> var. <i>huegelii</i>		x				
<i>V. pennigera</i>		x				
HALORAGACEAE						
<i>Gonocarpus pithyoides</i>				x		
<i>G. nodulosus</i>		x				
<i>Myriophyllum crispatum</i>	x					
APIACEAE						
<sup>B</sup> <i>Eryngium</i> sp. I (GK 8757)	x					
<sup>DC</sup> <i>E.</i> sp. II (GK 5390)	x					
<i>Homalosciadium homalocarpum</i>		x		x		
<i>Hydrocotyle callicarpa</i>		x				
<i>H. diantha</i>	x	x				
<sup>A</sup> <i>H. lemnoides</i>	x					
<i>Schoenolaena juncea</i>	x	x				
<i>Xanthosia huegelii</i>		x		x		
EPACRIDACEAE						
<sup>D</sup> <i>Andersonia aristata</i>				x		
<i>Astroloma pallidum</i>		x		x		
PRIMULACEAE						
* <i>Anagallis arvensis</i>				x		x
* <i>A. minor</i>	x					

TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<b>GENTIANACEAE</b>						
*Centaurium erythraea						x
*Cicendia filiformis	x	x				
<b>CUSCUTACEAE</b>						
Cuscuta australis	x					
<b>MENYANTHACEAE</b>						
Villarsia capitata	x	x				
C. submersa	x					
<b>LAMIACEAE</b>						
*Stachys arvensis						x
<b>SOLANACEAE</b>						
*Solanum nigrum				x		x
<b>SCROPHULARIACEAE</b>						
Glossostigma drummondii	x					
Gratiola peruviana	x					
*Parentuciella viscosa	x	x				x
<b>LENTIBULARIACEAE</b>						
Polypomphlyx multifida	x	x			x	
P. tenella		x			x	
Utricularia menziesii	x			x		
U. violacea	x					
<b>RUBIACEAE</b>						
Opercularia vaginata		x	x			
<b>CAMPANULACEAE</b>						
Wahlenbergia gracilentia		x	x			

TAXON	VEGETATION TYPE					
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	DIST'D
* <i>W. capensis</i>				x		x
<b>LOBELIACEAE</b>						
<i>Isotoma hypocratiformis</i>				x		
<i>Isotoma pusilla</i>	x					
<i>I. scapigera</i>	x					
* <i>Monopsis debilis</i>	x	x				
<b>GOODENIACEAE</b>						
<i>Anthotium junciforme</i>	x	x				
<i>Dampiera linearis</i>		x	x			
<i>Goodenia caerulea</i>	x	x	x			
<i>G. filiformis</i> var. <i>filiformis</i>		x				
<i>G. filiformis</i> var. <i>minutiflora</i>	x	x				
<sup>E</sup> <i>Vellea</i> aff. <i>trinervis</i> (GK 10429)		x		x		
<i>Scaevola lanceolata</i>	x			x		
<b>STYLIDIACEAE</b>						
<i>Levenhookia pusilla</i>		x				
<i>Stylidium brunonianum</i>		x	x			
<i>S. bulbiferum</i>		x				
<sup>E</sup> <i>S. calcaratum</i> (rose form)	x	x				
<sup>D</sup> <i>S. canaliculatum</i>		x				
<i>S. carnosum</i>				x		
<i>S. dichotomum</i>		x				
<i>S. divaricatum</i>		x				
<i>S. ecorne</i>	x					
<i>S. inundatum</i>	x	x				
<i>S. perpusillum</i>	x					
<i>S. petiolare</i>	x	X				
<i>S. pulchellum</i>	x	x				



TAXON	VEGETATION TYPE					DIST'D
	CLAY	VIMIN	MARRI	WET HEATH	DRY HEATH	
<sup>D</sup> S. roseo-alatum	x	x				
<sup>B</sup> S. utricularioides	x	x				
<b>ASTERACEAE</b>						
*Arctotheca calendula						x
Centipedia minima		x				
*Conyza canadensis						x
Craspedia pleiocephala				x		
<sup>B</sup> Hyalospermum cotula		x	x			
<sup>B</sup> H. pyrethrum	x					
*Hypochaeris glabra	x	x	x			x
Ixiolaena viscosa				x		
Myriocephalus isoetes	x					
M. helichrysioides	x					
Podolepis canescens		x				
P. gracilis				x		
Senecio sp. (?gilbertii; GK 6665)				x		
S. minimus		x				
Siloxerus humifusus		x				
*Sonchus oleraceus						x
<sup>CE</sup> Trichocline sp (GK 6382)		x				

Key: \* = naturalized species  
A = Declared Rare Species  
B = Species confined to Swan Coastal Plain  
C = Geographically significant population  
D = Heavy soil species  
E = Taxonomically significant population

**Table 3**

**Species of Disturbed area on S.W. Boundary**

Trees: *Melia azederach*, *Robinia pseudaccacia*, *Brachychiton populeneum*.

Shrubs: *Riccinus communis*, *Osteospermum ecklonis*.

Herbs: Dicotyledons: *Oxalis purpurea*, *Oxalis polyphylla*, *Aster subulatus*, *Anagallis arvensis*, *Linum trigynum*, *Sonchus oleraceus*, *Arctotheca calendula*, *Trifolium angustifolium*, *Trifolium campestre*, *Melilotus indica*, *Stachys arvensis*, *Sonchus oleraceus*.

Herbs: Monocotyledons: *Cynodon dactylon*, *Ehrharta calycina*, *Rhyncheletrum repens*, *Plagiochloa uniolae*, *Lolium perenne*, *Pennisetum clandestinum*.

Table 4

Heavy Soil Species, rarely recorded on Coastal Plain

MONOCOTYLEDONS

**Cyperaceae**

*Schoenus andrewsii*

**Dasyopogonaceae**

*Lomandra micrantha*

*Agrostocrinum scabrum*

**Haemodoraceae**

*Anigozanthos bicolor*

*Tribonanthes brachypetala*

**Anthericaceae**

*Thysanotus arbuscular*

*Tricoryne humilis*

**Iridaceae**

*Patersonia juncea*

**Orchidaceae**

*Diuris cf. longifolia*

DICOTYLEDONS

**Proteaceae**

*Grevillea bipinnatifida*

*Hakea ?auriculata*

*Hakea erinacea*

*Isopogon asper*

*Isopogon dubius*

*Petrophile seminuda*

*Synaphaea acutiloba*

**Amaranthaceae**

*Ptilotus manglesii*

*Ptilotus stirlingii*

**Droseraceae**

*Drosera heterophylla*

**Myrtaceae**

*Verticordia huegelii*

**Epacridaceae**

*Andersonia aristata*

**Stylidiaceae**

*Stylidium cannaliculatum*

*Stylidium ecorne*

*Stylidium roseo-alatum*

**Floristics of System Six Reserves and Bushland III  
Flora List of Blackwell Reach Reserve**

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**Abstract**

**Blackwell Reach, a small reserve vested in the City of Melville, contains 7 vegetation types, and 174 species of vascular plants. The reserve preserves the limestone cliff flora of the Swan River Estuary. This unusual landscape and associated flora makes the reserve of considerable regional significance.**

## Introduction

Blackwell Reach Reserve comprises part of reserve 4813 vested in the City of Melville. The conservation area is 14.8 ha in size, and preserves one of the few river frontages (both limestone cliffs and beaches) of the Swan River Estuary still in a natural state.

A management plan has been prepared for the area (Smith, 1986), which contains a vegetation map. This divides the vegetation communities into two woodland types (Tuart and Jarrah/Marri), two low woodlands (Peppermint and *Banksia*), a shrubland (*Acacia rostellifera*, on the cliff edge), a heath (*Dryandra sessilis*) and a sedgeland on the river foreshore. Species recorded within the reserve are allocated to these formations.

## Floristics

Smith (1986) recorded 100 species (16 naturalised aliens) from the reserve. During this survey the author recorded 174 species of (62 naturalized aliens) of vascular plants. Most of the native species recorded are widespread throughout coastal temperate Western Australia, except for a few species occurring on the limestone cliffs which are documented separately below:

*Alogyne huegelii* var *glabrescens* (Malvaceae). This large shrub, has only been recorded for the Perth metropolitan area from this reserve. It occurs in Yanchep National Park (to the north) and Yalgorup National Park (to the south).

*Alyxia buxifolia* (Apocynaceae). Rarely recorded for the mainland, common on adjacent offshore islands, and at Yalgorup National Park.

*Pittosporum philyraeoides* var *philyraeoides* (Pittosporaceae). This shrub or small tree is also common on the adjacent offshore islands, and in Yanchep and Yalgorup National Parks.

## Weeds

As with many other small urban reserves with a long history of disturbance (fires, tracks, rubbish dumping, grazing and partial clearance) much of the lower layers of the vegetation is now represented by exotic herbs.

Veldt Grass (*Ehrharta calycina*) has invaded and replaced much of the understory of the Tuart woodland.

Along the cliff edges pockets of *Myrsiphyllum asparagooides* (Bridal Creeper) occurs along with numerous annual weeds where disturbance (fishing, fires, trampling) has removed the shrubland vegetation.

The foreshore sedgeland contains a large clone of the rampant smothering weed *Stenotaphrum secundatum* (Buffalo Grass), which should be contained, and then eradicated.

One surprisingly widespread and abundant weed is *Lachenalia reflexa*. This garden escape has also been recorded from Alfred Cove and Woodvale nature reserves. This weed should be monitored.

Other weeds requiring control are Geraldton Carnation Weed (*Euphorbia terracina*), Black Flag (*Ferraria crispa*) and Blue Lupin (*Lupinus cosentinii*).

#### Discussion

This reserve contains a landscape (riverine cliffs), vegetation (cliff top shrubland) and species of flora of considerable regional significance for the Perth metropolitan area.

#### Reference

Smith, V. (1986). Blackwell Reach Reserve, Management Plan. City of Melville.

**TABLE 1. Flora List of Blackwell Reach Reserve**

Columns

1. River Foreshore - Sedgeland
2. River Cliff - Shrubland
3. Tuart Woodland
4. *Agonis flexuosa* low open woodland
5. Heath between Banksia and Cliff Shrubland
6. *Banksia* low open woodland
7. *Dryandra sessilis* heath
8. Jarrah - Marri tall woodland
9. Disturbed areas (tracks, quarries, etc.)

\* = Introduced

	1	2	3	4	5	6	7	8	9
<b>GYMNOSPERMS</b>									
Macrozamia riedlei			x	x		x		x	
<b>FLOWERING PLANTS</b>									
<b>AIZOACEAE</b>									
*Carpobrotus edulis		x			x				
Tetragonia tetragonioides	x								
*T. decumbens	x								
<b>AMARANTHACEAE</b>									
Ptilotus drummondii						x			
P. polystachyus		x	x	x	x	x		x	
<b>AGAVACEAE</b>									
*Sansevieria trifasciata			x						
<b>ANTHERICACEAE</b>									
Burchardia umbellata					x	x		x	
Corynotheca micrantha			x	x	x	x		x	
Dianella revoluta		x	x		x	x	x	x	
Laxmannia squarrosa						x			
<b>ANACARDIACEAE</b>									
*Schinus terebinthifolius		x							
Sowerbaea laxiflora					x			x	
*Trachyandra divaricata	x		x			x			
Tricoryne elatior		x			x	x			
<b>AMARYLLIDACEAE</b>									
*Narcissus papyraceus			x						
*N. tazetta			x						
<b>APIACEAE</b>									
Apium prostratum ssp. prostratum	x								
Daucus glochidiatus							x	x	
Homalosciadium homalocarpum								x	
<b>APOCYNACEAE</b>									
Alyxia buxifolia		x							
<b>ASPARAGACEAE</b>									
*Myrsiphyllum asparagoides		x	x						x
<b>ASPHODELACEAE</b>									
*Asphodelus fistulosus		x							
<b>ASTERACEAE</b>									
*Argyranthemum frutescens		x							
*Arctotheca calendula			x	x					x
*Conyza albida		x							x
*C. bonariensis		x	x						
*Hypochaeris glabra			x	x				x	x
Lagenifera huegelii								x	
Olearia axillaris		x							



	1	2	3	4	5	6	7	8	9
* <i>Osteospermum clandestinum</i>		x	x	x					x
<i>Senecio lautus</i>		x							
* <i>Sonchus oleraceus</i>		x							x
* <i>Ursinia anthemoides</i>				x	x	x			
* <i>Urospermum picroides</i>		x							
<b>BRASSICACEAE</b>									
* <i>Brassica tournefortii</i>		x	x						
* <i>Heliophila pusilla</i>				x	x	x			
* <i>Rhaphanus raphanistrum</i>		x							
* <i>Lobularia maritima</i>							x		
<b>CARYOPHYLLACEAE</b>									
* <i>Cerastium glomeratum</i>		x							
* <i>Sagina apetala</i>		x							
<b>CASUARINACEAE</b>									
<i>Allocasuarina fraseriana</i>						x		x	
<i>A. humilis</i>					x	x			
<i>Casuarina obesa</i>	x								
<b>CHENOPODIACEAE</b>									
<i>Atriplex cinerea</i>	x								
<i>Rhagodia baccata</i> ssp. <i>dioica</i>	x	x					x		
<i>Sarcocornia quinqueflora</i>	x								
<i>Suaeda australis</i>	x								
<i>Threlkeldia diffusa</i>		x							
<b>COLCHICACEAE</b>									
<i>Burchardia umbellata</i>								x	
* <i>Lachenalia reflexa</i>		x	x	x	x	x		x	x
<b>CONVOLVULACEAE</b>									
* <i>Ipomaea indica</i>			x	x					
<b>CYPERACEAE</b>									
<i>Baumea juncea</i>	x								
<i>Gahnia trifida</i>	x								
<i>Isolepis nodosa</i>	x								
<i>Lepidosperma angustatum</i>						x		x	
<i>L. gladiatum</i>	x	x							
<i>L. leptostachyum</i>					x	x		x	
<i>L. longitudinale</i>					x				
<i>Mesomelaena stygia</i>					x	x		x	
<i>Schoenus clandestinus</i>		x			x				
<i>Tetraria octandra</i>								x	
<b>CRASSULACEAE</b>									
<i>Crassula colorata</i>		x	x	x	x	x			
<i>C. exserta</i>		x							
<i>C. decumbens</i>			x						
<b>DASYPOGONACEAE</b>									
<i>Acanthocarpus preissii</i>		x					x		
<i>Lomandra caespitosa</i>				x	x				

	1	2	3	4	5	6	7	8	9
L. maritima				x					
L. preissii								x	
<b>DILLENACEAE</b>									
Hibbertia hypericoides						x		x	
H. racemosa							x		
<b>DROSERACEAE</b>									
Drosera erythrorhiza							x		
D. pallida								x	
<b>EPACRIDACEAE</b>									
Leucopogon parviflorus						x			
L. propinquus		x							
<b>EUPHORBIACEAE</b>									
*Euphorbia peplus		x		x					x
*E. terracina			x				x		
Phyllanthus calycinus								x	
*Ricinus communis									x
<b>FUMARIACEAE</b>									
*Fumaria capreolata		x							
<b>GERANIACEAE</b>									
*Pelargonium capitatum				x			x	x	x
*Erodium moschatum							x	x	x
<b>GOODENIACEAE</b>									
Lechenaultia linarioides					x	x			
Scaevola canescens					x		x		
S. paludosa							x	x	
S. crassifolia		x							
S. nitida		x							
<b>HAEMODORACEAE</b>									
Conostylis candicans		x					x	x	
Haemodorum spicatum								x	
<b>IRIDACEAE</b>									
*Chasmanthe floribunda								x	
*Ferraria crispa	x	x					x		x
*Freesia refracta			x						x
Orthrosanthus multiflorus					x	x			
Patersonia occidentalis								x	
*Romulea rosea		x	x	x					
*Watsonia bulbifera	x								
<b>JUNCACEAE</b>									
Juncus kraussii	x								
<b>LOGONIACEAE</b>									
Logania vaginalis			x						

	1	2	3	4	5	6	7	8	9
<b>MALVACEAE</b>									
Alogyne huegelii var. glabrescens						x			
*Malva parviflora				x					
<b>MIMOSACEAE</b>									
Acacia cochlearis		x							
A. cyclops	x								
A. pulchella				x	x				x
A. lasiocarpa						x			
A. rostellifera		x			x	x	x		
A. saligna			x	x					x
A. xanthina		x					x		
<b>MYRTACEAE</b>									
Agonis flexuosa		x	x	x					
Calothamnus quadrifidus					x				
Eucalyptus calophylla									x
E. gomphocephala			x						
E. marginata									x
Melaleuca acerosa					x	x			
M. scabra				x					
<b>MYOPORACEAE</b>									
Eremophila glabra								x	
Myoporum insulare			x						
<b>OLEACEAE</b>									
*Olea europaea		x							
<b>ONAGRACEAE</b>									
*Oenothera glazioviana			x						
<b>OROBANCHACEAE</b>									
*Orobanche minor				x					
<b>ORCHIDACEAE</b>									
Caladenia huegelii									x
Diuris longifolia									x
<b>OXALIDACEAE</b>									
*Oxalis pes-caprae	x	x	x	x	x	x			x
<b>PAPILIONACEAE</b>									
Gompholobium aristatum					x	x			
Hardenbergia comptoniana		x	x		x		x	x	
Isotropis cuneifolia					x			x	
*Lupinus cosentinii		x			x	x		x	x
Jacksonia furcellata				x	x	x		x	
J. sternbergiana					x			x	
Kennedia prostrata						x		x	
*Medicago polymorpha				x					x
Templetonia retusa		x			x				
*Trifolium angustifolium									x
*T. campestre									x
*Vicia sativa ssp. sativa				x					x

	1	2	3	4	5	6	7	8	9
<b>PITTOSPORACEAE</b>									
Pittosporum phylliraeoides var. phylliraeoides		x							
<b>POACEAE</b>									
*Aira cupaniana		x	x	x	x	x			x
*Avena barbata									x
*Briza maxima		x	x						x
*Bromus diandrus				x					x
*Cynodon dactylon	x								x
*Lagurus ovatus	x	x		x	x				x
*Pennisetum villosum		x			x		x		x
*Setaria sphacelata									x
Sporobolus virginicus	x								
*Stenotaphrum secundatum	x								
Stipa flavescens		x			x				
S. elegantissima		x							
<b>POLYGALACEAE</b>									
Comesperma integerrimum		x							
<b>POLYGONACEAE</b>									
*Rumex crispus	x								
<b>PROTEACEAE</b>									
Banksia attenuata						x			x
B. grandis									x
B. menziesii						x			x
Dryandra nivea					x	x	x		x
D. sessilis		x		x					x
Grevillea vestita				x	x		x		
G. thelemanniana		x					x		
Petrophile linearis						x			x
P. macrostachya						x			
Hakea prostrata						x			x
Stirlingia latifolia					x	x	x		
<b>PRIMULACEAE</b>									
Samolus repens	x								
<b>RANUNCULACEAE</b>									
Clematis microphylla		x							
<b>RESTIONACEAE</b>									
Loxocarya fasciculata		x			x		x		
<b>RHAMNACEAE</b>									
Spyridium globulosum		x			x				
<b>RUBIACEAE</b>									
*Galium murale		x							
Opercularia vaginata					x				x
<b>SOLANACEAE</b>									
*Solanum nigrum		x							

	1	2	3	4	5	6	7	8	9
<b>SAPINDACEAE</b>									
Diplopeltis huegelii				x				x	
Dodonaea viscosa		x							
<b>SCROPHULARIACEAE</b>									
*Dischisma arenaria				x					
<b>THYMELAEACEAE</b>									
Pimelea rosea									x
<b>XANTHORRHOEACEAE</b>									
Xanthorrhoea preissii				x					x
<b>VIOLACEAE</b>									
Hybanthus calycinus		x			x				

## Floristics of System Six Reserves and Bushland IV Vegetation and Flora of Hepburn Heights

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### Abstract

Hepburn Heights, an urban bushland remnant of 43 ha., contains 4 major vegetation types, 244 (196 native) species of flowering plants, one of which *Carpobrotus* sp. (GK11,518) has not previously been recorded for the Metro Region.

### Introduction

Hepburn Heights is a 43 ha. remnant of bushland, bounded by Hepburn Avenue and the Mitchell Freeway in the Shire of Wanneroo, approximately 25 km north of Perth.

The area is the subject of development proposals, which are being opposed by local residents, who wish to retain the area as bushland. In 1989 the area was proposed for listing on the register of the National Estate. The author undertook a floral survey of the area at the request of the Western Australian Heritage Committee. The results of the survey are presented here.

### Vegetation

The area contains four vegetation communities, two confined largely to the eastern portion of the area (Tuart (*Eucalyptus gomphocephala*) woodland and Jarrah (*Eucalyptus marginata*) low open woodland, rarely with Marri (*Eucalyptus calophylla*)). The other two vegetation communities heath and *Banksia* low woodland are found on the western side of the area.

The *Banksia* woodland on the western slope (Table 1A) is unusual in having *Banksia prionotes* as a component of the woodland. Normally where this species occurs (at the southern margin of its range along the coastal plain) it forms almost a pure stand (e.g. Trigg Dunes, Bold Park, Kings Park and Point Walter). The composition of a 100m<sup>2</sup> plot of this vegetation type is given in Table 1A.

Hepburn Heights itself is a limestone outcrop, dominant by a variety of closed or open heaths, which change rapidly over short distances depending on aspect and soil depth (and perhaps fire history). On the deeper soils around the heights a tall open heath of *Acacia rostellifera* is found (floristics documented in Table 1B) this merges into a low heath of *Acacia cochlearis* with emergent *Xanthorrhoea preissii* (floristics are the same as *A. rostellifera* heath) as the soils become shallower on the southern summit of the hill. Below this heath a stand of *Eucalyptus decipiens* occurs, which was too small to have a quadrat placed within it.

On the shallow limestone of the top of Hepburn Heights a closed heath of *Acacia truncata* occurs (Table 1C). Flanking this is a closed heath of *Dryandra sessilis* (Table 1D).

These variable heaths are the most unusual feature of the site. The *Acacia truncata* heath does not have *Trymalium albicans* present (it is present in Neerabup, Bold Park, Kings Park and Yanchep) nor is *Stylidium* aff. *affine* or the limestone variant of *Diplopeltis huegelii*. However, this lack of diversity is probably explained by the small size and isolated nature of the limestone heaths on Hepburn Heights, and is counterbalanced by the rapid changes in dominants and floristics documented in Table 1.

### Floristics

Two hundred and forty four species of flowering plants were recorded at Hepburn Heights during the survey (Table 2). Of these, 48 were naturalized aliens. This is a low total of aliens (Kings Park: 143 species of weed, Starr Swamp: 55 and Bold Park: 130 species) for a remnant in urban Perth, and reflects the still relatively undisturbed nature of much of this area's bushland.

The 196 species of native plants recorded is a large total for such a small area (i.e. Kings Park 400 ha, 275 species; Starr Swamp 100 ha, 166 species; Bold Park 321 ha, 226 species) and reflects the habitat diversity within the site on Hepburn Heights itself.

### Significant Flora

*Cartonema philyroides*, a priority species (CALM 1990 list) was recorded in the *Banksia* woodlands.

Perhaps the most interesting record was of a species of pigface, *Carpobrotus* sp. (voucher G. Keighery 11,518), which appeared abundantly in the *Banksia* woodland behind Hepburn Heights after the 1989 fire. This slender white or pale pink flowered species does not fit any species recorded in the Perth Regional Flora (Marchant, *et al.* 1987). It keys closest to *C. modestus*, a wheatbelt species. This species has not previously been recorded from Neerabup, Yanchep, Trigg Dunes, Starr Swamp, Bold Park or Kings Park. It has been introduced into cultivation to enable its preservation and for future comparison to other species.

### Discussion

The notable features of Hepburn Heights are the diversity of heath vegetation types on the heights, and the lack of the normally abundant coastal limestone endemics (Keighery, 1991) within these heaths. A rich flora of flowering plants (196 natives) with relatively few weeds compared to other urban remnants.

The presence of an apparently previously unrecorded species of *Carpobrotus* for the Perth area is of considerable botanical interest.

### Acknowledgements

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Table 1 VEGETATION SITES

A. *Banksia* low woodland

Stratum 1: Trees 3-5 m, cc = 10

*Banksia menziesii* (50%), *B. attenuata* (40) *B. prionotes*

Stratum 2: Tall shrubs 2-3 m, cc = 5

*Nuytsia floribunda*, *Acacia saligna*, *Xanthorrhoea preissii*

Stratum 3: Shrubs 50 cm - 1 m, cc =

*Acacia pulchella*, *Calothamnus quadrifidus*, *Hakea lissocarpha*, *Melaleuca acerosa*

Stratum 4: Shrubs 30-50 cm

*Hibbertia hypericoides*, *Leucopogon sprengeioides*, *Allocasuarina humilis*, *Hibbertia subvaginata*, *Jacksonia sericea*, *Hovea trisperma*, *Opercularia vaginata*, *Xanthosia huegelii*

Stratum 5: Sedges and Perennial Herbs

*Mesomelaena stygia*, *Thysanotus sparteus*, *Lomandra caespitosa*, *Alexgeorgea nitens*, *Conostylis aculeata*, \**Gladiolus caryophyllaceus*, *Danthonia caespitosa*, \**Romulea rosea*, *Burchardia umbellata*, *Schoenus caespititius*

Stratum 6: Herbs

\**Silene gallica*, *Waitzia suaveolens*, \**Vulpia myuros*, \**Heliophila pusilla*, \**Aira caryophyllea*, *Levenhookia stipitata*, \**Ursinia anthemoides*.

No. of species: 36, 7 aliens

B. *Acacia rostellifera* shrubland

Stratum 1: Shrubs 1-2 m, cc = 40

*Acacia rostellifera* (97% of total cover), *Templetonia retusa*, *Allocasuarina humilis*, *Hakea lissocarpha*

Stratum 2: Shrubs 50-70 cm, cc = 20

*Hibbertia hypericoides*, *Phyllanthus calycinus*, *Acacia cochlearis*, *Olearia axillaris*

Stratum 3: Shrubs 10-40 cm, cc = 40

*Jacksonia sericea*, *Grevillea thelemanniana*, *Calothamnus quadrifidus*, *Cassytha glabella*

Stratum 4: Sedges and Perennial Herbs, cc = 10

*Conostylis aculeata*, *Mesomelaena stygia*, *Loxocarya flexuosa*, *Tetraria octandra*, *Danthonia caespitosa*, *Stipa flavescens*, *Orobanche minor*

Stratum 5: Herbs

\**Hypochaeris glabra*, *Crassula colorata*, *Trachymene pilosa*, *Podolepis nutans*, \**Heliophila pusilla*, \**Briza maxima*

No. of species: 25, 3 aliens

C. *Acacia truncata* closed heath

Stratum 1: Shrubs 1.5-2 m, cc = 70

*Acacia truncata*, *Templetonia retusa*, *Xanthorrhoea preissii*

Stratum 2: Shrubs 30 cm - 1 m, cc = 20

*Melaleuca acerosa*, *Phyllanthus calycinus*

Stratum 3: Sedges and Perennial Herbs, cc = 10

*Lomandra maritima*, *Loxocarya flexuosa*, *Cassytha glabella*

Stratum 4: Herbs

\**Briza maxima*, \**Petrohagia velutina*, \**Sonchus oleraceus*, \**Cerastium glomeratum*, \**Vulpia myuros*, *Poranthera microphylla*

No. of species: 14, 5 aliens

D. *Dryandra sessilis* heath

Stratum 1: Shrubs 2-3 m, cc = 80

*Dryandra sessilis*

Stratum 2: Shrubs 40-80 cm, cc = 10

*Hibbertia hypericoides*, *Phyllanthus calycinus*, *Gompholobium aristatum*, *Jacksonia sericea*, *Hovea pungens*, *Acacia pulchella*, *Allocasuarina humilis*, *Leucopogon sprengelioides*

Stratum 3: Shrubs 10-30 cm, cc = 2

*Scaevola paludosa*, *Scaevola canescens*

Stratum 4: Sedges and Perennial Herbs, cc = 5

*Mesomelaena stygia*, *Loxocarya flexuosa*, *Schoenus grandiflorus*, \**Gladiolus caryophyllaceus*

Stratum 5: Herbs, cc = 5

*Podolepis lessonii*, \**Briza maxima*, \**Sonchus oleraceus*

No. of species: 18, 3 aliens

## Table 2 HEPBURN HEIGHTS FLORA LIST

### Key to Postscript

1. Banksia low open woodland
2. Tuart woodland
3. Jarrah low woodland
4. Heath
5. Disturbed areas

Hepburn	1	2	3	4	5
<b>GYMNOSPERMS</b>					
Macrozamia riedlei	x		x		
<b>FLOWERING PLANTS</b>					
<b>MONOCOTYLEDONS</b>					
<b>ANTHERICACEAE</b>					
Arthropodium capillipes		x	x		
Caesia micrantha	x		x		
Corynotheca micrantha	x		x		
Sowerbaea laxiflora	x			x	
Thysanotus arenarius	x				
T. patersonii	x		x	x	
T. sparteus	x				
T. triandrus	x				
Tricoryne elatior					
<b>COLCHICACEAE</b>					
Burchardia umbellata	x			x	
Wurmbea				x	
<b>CENTROLEPIDACEAE</b>					
Centrolepis drummondiana	x			x	
<b>CYPERACEAE</b>					
Isolepis cernua	x		x	x	
Lepidosperma angustatum	x			x	
L. leptostachyum	x		x		
Mesomelaena stygia	x			x	
Schoenus clandestinus	x				
S. curvifolius	x				
S. grandiflorus	x			x	
Tetraria octandra	x			x	
<b>DASYPOGONACEAE</b>					
Acanthocarpus preissii		x			
Lomandra caespitosa				x	
L. hermaphrodita			x		
L. maritima				x	
L. preissii	x				
L. suaveolens	x		x		
<b>HAEMODORACEAE</b>					
Anigozanthos humilis	x				
A. manglesii	x		x		
Conostylis aculeata	x			x	
C. candicans				x	
Haemodorum laxum	x				
H. paniculatum			x		
H. spicatum		x			

Hepburn	1	2	3	4	5
<b>IRIDACEAE</b>					
* <i>Gladiolus caryophyllaceus</i>	x		x	x	
* <i>Homeria flaccida</i>	x			x	
<i>Orthrosanthus laxus</i>	x				
<i>Patersonia occidentalis</i>	x				
* <i>Romulea rosea</i>	x	x	x	x	
* <i>Sparaxis bulbifera</i>			x		
<b>JUNCACEAE</b>					
<i>Luzula meridionalis</i>			x		
<b>JUNCAGINACEAE</b>					
<i>Triglochin calcitrapa</i>		x		x	
<b>PHILYDRACEAE</b>					
<i>Cartonema philyroides</i>	x				
<b>POACEAE</b>					
* <i>Aira caryophyllea</i>	x			x	
* <i>Avena fatua</i>			x	x	
<i>Amphipogon turbinatus</i>	x				
* <i>Bromus diandrus</i>			x	x	
* <i>Briza maxima</i>			x	x	
* <i>B. Minor</i>				x	
<i>Danthonia caespitosa</i>	x				
* <i>Ehrharta calycina</i>	x			x	
* <i>E. longiflora</i>			x	x	
<i>Microlaena stipoides</i>			x		
* <i>Poa annua</i>				x	
<i>P. drummondiana</i>	x			x	
<i>Stipa compressa</i>	x				
<i>S. flavescens</i>				x	
<i>S. semibarbata</i>				x	
* <i>Vulpia membranacea</i>		x		x	
* <i>V. myuros</i>	x				
<b>ORCHIDACEAE</b>					
<i>Caladenia flava</i>			x		
<i>C. huegelii</i>				x	
<i>C. latifolia</i>		x			
<i>C. longicauda</i> ssp. <i>calcigena</i>	x				
<i>Diuris longifolia</i>			x		
<i>Lyperanthus nigricans</i>				x	
<i>Microtis unifolia</i>			x		
<i>Pterostylis nana</i>				x	
<i>P. recurva</i>			x		
<i>P. vittata</i>	x				
<b>PHORMIACEAE</b>					
<i>Dianella revoluta</i>	x		x		
<b>RESTIONACEAE</b>					
<i>Alexgeorgea nitens</i>	x		x	x	
<i>Hypolaena exsulca</i>	x				
<i>Loxocarya fasciculata</i>				x	
<i>L. flexuosa</i>	x	x			

Hepburn	1	2	3	4	5
<i>Lyginia barbata</i>	x		x		
<b>XANTHORRHOEACEAE</b>					
<i>Xanthorrhoea preissii</i>			x	x	
<b>DICOTYLEDONS</b>					
<b>AIZOACEAE</b>					
<i>Carpobrotus cf. modestus</i> (GK 11,518)	x			x	
* <i>C. edulis</i>	x				
<b>AMARANTHACEAE</b>					
<i>Ptilotus drummondii</i>	x		x		
<i>P. manglesii</i>					x
<i>P. polystachyus</i>	x		x	x	
<i>P. stirlingii</i>	x		x		
<b>APIACEAE</b>					
<i>Daucus glochidiatus</i>		x		x	
<i>Eryngium pinnatifidum</i>	x	x		x	
<i>Homalosciadium homalocarpum</i>	x	x	x	x	
<i>Trachymene pilosa</i>	x			x	
<i>Xanthosia huegelii</i>	x		x		
<b>ASTERACEAE</b>					
* <i>Arctotheca calendula</i>				x	x
* <i>Centaurea melitensis</i>					x
* <i>Conyza albida</i>					x
* <i>Dittrichia graveolens</i>					x
<i>Helichrysum cordatum</i>		x	x		
* <i>Hypochaeris glabra</i>	x	x	x	x	x
<i>Lagenifera huegelii</i>	x		x		
<i>Millotia tenuifolia</i>	x			x	
<i>Olearia axillaris</i>		x		x	
* <i>O. ecklonis</i>					x
<i>Podolepis gracilis</i>	x		x	x	
* <i>Osteospermum clandestinum</i>	x		x	x	x
<i>Podotrochea angustifolia</i>	x				
<i>P. chrysantha</i>	x			x	
<i>Quinetia urvillei</i>				x	
<i>Siloxerus humifusus</i>	x	x	x		
* <i>Sonchus oleraceus</i>		x			x
<i>Senecio hispidulus</i>	x		x		
<i>S. lautus ssp. maritimus</i>	x	x	x		
* <i>Ursinia anthemoides</i>		x	x		x
<i>Waitzia suaveolens</i>	x				
<b>BRASSICACEAE</b>					
* <i>Brassica tournefortii</i>				x	x
* <i>Heliophila pusilla</i>	x			x	x
<b>CAMPANULACEAE</b>					
* <i>Wahlenbergia capensis</i>				x	
<i>W. preissii</i>	x	x	x		

Hepburn	1	2	3	4	5
<b>CARYOPHYLLACEAE</b>					
* <i>Cerastium glomeratum</i>				x	x
* <i>Petrorhagia velutina</i>	x			x	
* <i>Sagina apetala</i>				x	
<b>CASUARINACEAE</b>					
<i>Allocasuarina fraseriana</i>			x		
<i>A. humilis</i>	x			x	
<b>CHENOPODIACEAE</b>					
<i>Rhagodia baccata</i>	x	x			
<b>CUSCUTACEAE</b>					
<i>Cuscuta</i>	x			x	
<b>CRASSULACEAE</b>					
<i>Crassula colorata</i>	x			x	
<i>C. exserta</i>		x			
<b>DILLENIACEAE</b>					
<i>Hibbertia hypericoides</i>	x		x	x	
<i>H. racemosa</i>	x				
<b>DROSERACEAE</b>					
<i>Drosera erythrorhiza</i>	x		x		
<i>D. glanduligera</i>				x	
<i>D. macrantha</i>			x		
<i>D. pallida</i>	x		x		
<i>D. stolonifera</i>			x		
<b>EPACRIDACEAE</b>					
<i>Astroloma pallidum</i>	x		x	x	
<i>Conostephium pendulum</i>	x			x	
<i>C. preissii</i>			x		
<i>Leucopogon australis</i>	x				
<i>L. parviflorus</i>				x	
<i>L. propinquus</i>	x	x	x		
<i>L. spregeloides</i>				x	
<b>EUPHORBIACEAE</b>					
* <i>Euphorbia terracina</i>					x
* <i>E. peplus</i>			x		x
<i>Monotaxis grandiflora</i>			x		
<i>Phyllanthus calycina</i>	x	x	x	x	
<i>Poranthera microphylla</i>	x	x		x	
<i>Ricinocarpos glaucus</i>	x		x	x	
<b>FUMARIACEAE</b>					
* <i>Fumaria capreolata</i>			x		x
<b>GERANIACEAE</b>					
* <i>Erodium cicutarium</i>				x	x
* <i>Geranium pilosum</i>				x	x
* <i>Pelargonium capitatum</i>	x	x	x	x	

Hepburn	1	2	3	4	5
<b>GOODENIACEAE</b>					
<i>Dampiera linearis</i>				x	
<i>Lechenaultia linarioides</i>	x			x	
<i>Scaevola canescens</i>	x			x	
<i>S. paludosa</i>	x			x	
<i>S. thesioides</i>				x	
<b>GYROSTEMONACEAE</b>					
<i>Tersonia cyathiflora</i>	x			x	
<b>HALORAGACEAE</b>					
<i>Glischrocaryon aureum</i>				x	
<b>LAMIACEAE</b>					
<i>Hemiandra pungens</i>	x	x		x	
<b>LAURACEAE</b>					
<i>Cassytha glabella</i>				x	
<i>C. racemosa</i>				x	
<b>LOBELIACEAE</b>					
<i>Lobelia tenuior</i>	x			x	
<i>Isotoma hypocrateriformis</i>	x	x	x	x	
<b>MIMOSACEAE</b>					
<i>Acacia cochlearis</i>				x	
<i>A. cyclops</i>			x	x	
<i>A. lasiocarpa</i>				x	
<i>A. pulchella</i>	x	x	x	x	
<i>A. rostellifera</i>				x	
<i>A. saligna</i>		x	x	x	
<i>A. truncata</i>				x	
<b>MYOPORACEAE</b>					
<i>Myoporum insulare</i>		x			
<b>MYRTACEAE</b>					
<i>Calytrix angulata</i>	x				
<i>Calothamnus quadrifidus</i>				x	
<i>Eucalyptus calophylla</i>			x		
<i>E. decipiens</i>				x	
<i>E. gomphocephala</i>	x	x			
<i>E. marginata</i>			x		
<i>Hypocalymma robustum</i>	x		x		
<i>Melaleuca acerosa</i>	x			x	
<b>OLACACEAE</b>					
<i>Olax benthamiana</i>				x	
<b>OROBANCHACEAE</b>					
<i>Orobanche minor</i>	x	x	x	x	
<b>PAPILIONACEAE</b>					
<i>Bossiaea eriocarpa</i>			x		
<i>Daviesia decurrens</i>			x		
<i>D. divaricata</i>		x	x		



Hepburn	1	2	3	4	5
D. nudiflora	x		x		
D. triflora	x		x		
Gompholobium aristatum	x			x	
G. tomentosum	x		x		
Hovea pungens				x	
H. trisperma	x				
Hardenbergia comptoniana	x	x	x	x	
Jacksonia furcellata			x		
J. sericea	x			x	
J. sternbergiana	x		x		
Isotropis cuneniformis					
Kennedia prostrata					
*Lupinus cosentinii					
*L. mutabilis					
*Medicago polymorpha					
Oxylobium capitatum			x		
O. reticulatum				x	
Sphaerolobium				x	
Templetonia retusa				x	
*Trifolium arvense			x		
*T. campestre				x	
*T. glomeratum				x	x
*T. tomentosum					x
*Vicia sativa			x		x
<b>POLYGONACEAE</b>					
Comesperma confertum				x	
<b>PORTULACACEAE</b>					
Calandrinia corrigioloides	x		x	x	
C. liniflora	x				
<b>PRIMULACEAE</b>					
*Anagallis arvensis		x		x	x
<b>PROTEACEAE</b>					
Conospermum triplinervium				x	
Dryandra nivea	x			x	
D. sessilis				x	
Grevillea crithmifolia	x			x	
G. thelemanniana	x			x	
G. vestita	x			x	
Hakea lissocarpha	x	x		x	
H. prostrata	x		x		
Persoonia saccata			x	x	
Petrophile brevifolia	x			x	
P. linearis			x		
P. macrostachya			x		
Stirlingia latifolia			x		
Synaphea spinulosa	x			x	
<b>RANUNCULACEAE</b>					
Clematis microphylla		x	x		
<b>RHAMNACEAE</b>					
Spyridium tridentatum		x		x	

Hepburn	1	2	3	4	5
<b>RUBIACEAE</b>					
Opercularia vaginata	x	x	x		
<b>RUTACEAE</b>					
Eriostemon spicatus	x		x		
<b>SANTALACEAE</b>					
Exocarpos sparteus				x	
<b>SCROPHULARIACEAE</b>					
*Dischisma arenaria	x			x	
*Parentucellia latifolia				x	
<b>SOLANACEAE</b>					
Anthocercis ilicifolia		x		x	
*Solanum nigrum		x	x		
<b>STACKHOUSIACEAE</b>					
Tripterococcus brunonis			x		
<b>STERCULIACEAE</b>					
Thomasia foliosa				x	
<b>STYLIDIACEAE</b>					
Levenhookia stipitata	x				
Stylidium brunonianum	x				
S. calcaratum	x				
S. macrocarpum				x	
S. repens	x				
S. schoenoides	x		x		
S. junceum				x	
<b>THYMELAEACEAE</b>					
Pimelea calcicola				x	
P. leucantha	x		x		
P. sulphurea	x				
<b>URTICACEAE</b>					
Parietaria debilis				x	
<b>VIOLACEAE</b>					
Hybanthus calycinus	x			x	