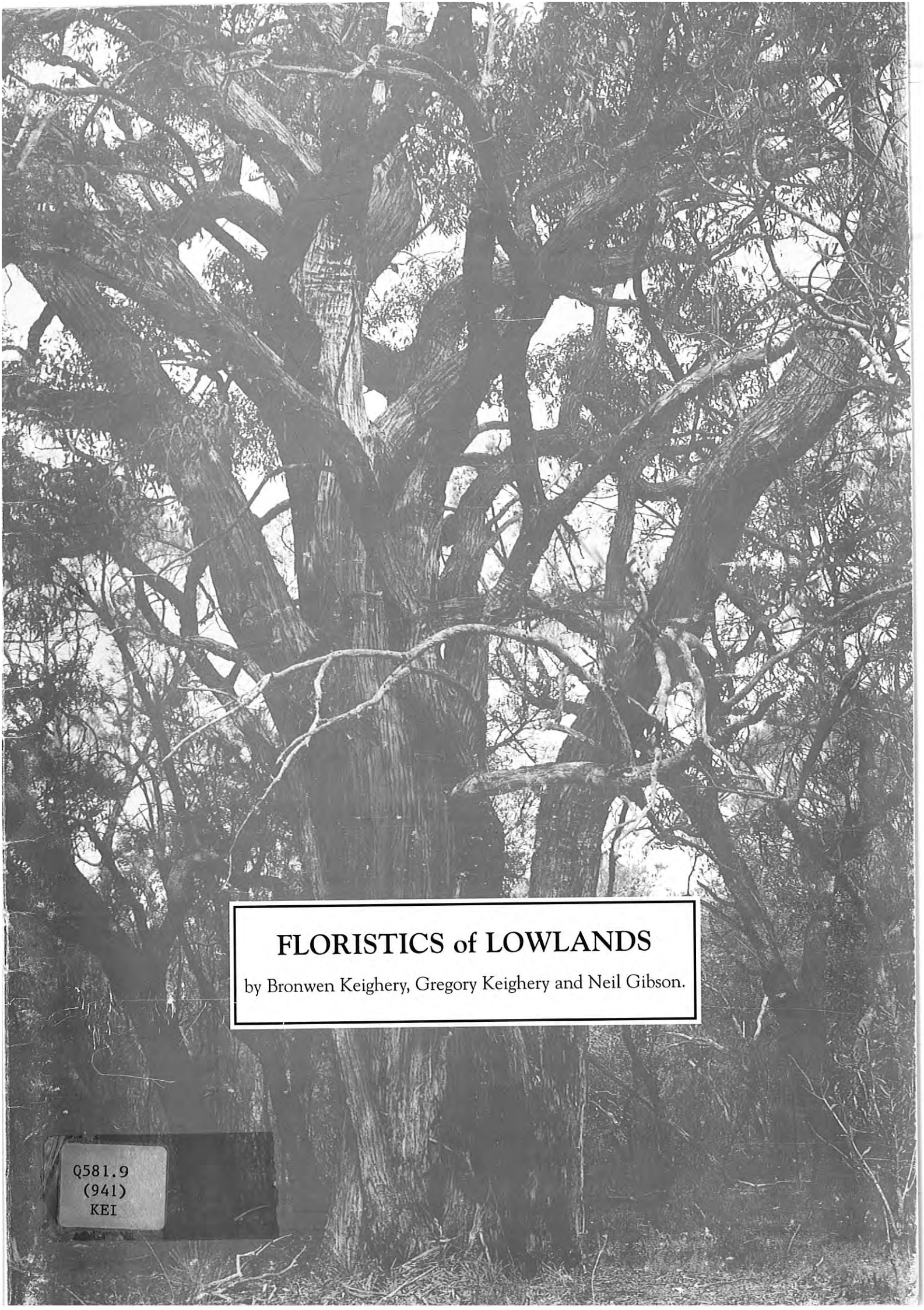

FLORISTICS of LOWLANDS

by Bronwen Keighery, Gregory Keighery and Neil Gibson.

FLORISTICS of LOWLANDS

Part X in the series
Floristics of Reserves and Bushland Areas of the Perth Region (System 6)

by

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Front cover photograph:
A mature Jarrah (*Eucalyptus marginata*) in the *Banksia* Woodland at Lowlands.

CONTENTS

INTRODUCTION

The Lowlands Property (Map 1, page 4) is part of one of the first land grants distributed in Western Australia. This grant was made to Thomas Peel in 1830 and was the largest on the Swan Coastal Plain, stretching from Cockburn Sound to Mandurah. In 1859 much of the area was sold to John Wellard and to this day Lowlands and much of the other land purchased has been retained by Wellard's great grandchildren, the Richardson family.

Visiting Lowlands is both a cultural and natural history experience. Lowlands presents a unique example of a farming settlement in the south - west of Western Australia. The bitumen tarmac of the Lowlands Road ends at the gate to the Lowlands property. A private unsealed road leads from the gate to the homestead. The road winds its way through pasture and bushland along the north side of the Serpentine River then crosses the River and ends at the homestead on the south side of the River. At the river crossing, a weathered lichen covered wooden bridge sets the scene for the historic homestead. There is a series of farm buildings in the homestead, including the main house centered on Thomas Peel's mud brick cottage, built in the 1840's and added to until 1900. Adjacent to the main house is the barn and stables built in 1840.

Lowlands not only retains these original buildings but the surrounding lands are still very much as they were when the farm was first cleared. When the farm was established clearing was an arduous task and only the best soils, the fertile soils of the river, stream and seasonally inundated flats, were cleared of native vegetation. The sandy rises where cultivation was difficult were left uncleared. Also within the cultivated areas some vegetation was retained as individual trees or intact patches of vegetation.

The Serpentine River banks within Lowlands were never cleared. The vegetation along the river was retained for its aesthetic value as well as in the belief that the presence of vegetation along the river was significant in flood mitigation (M. Richardson pers. comm.). This belief, held in face of pressure to 'clean up the river' by de-snagging in the 1930's, has since been established as appropriate management for the River.

Grazing occurred throughout the property but was concentrated in the cultivated pastures. The bushland areas were lightly grazed except along the routes used by the stock to move from one pastured area to another. Since 1990, all stock has been isolated from the pasture areas adjacent to the bushland.

When the farm was established timber required for farm use, such as buildings, fencing and shingles, was obtained from the bushland. As fires in the bushland have been infrequent,

remnants of the felled trees and some unused saw logs remain *in situ* to this day. Timber requirements were comparatively low and this usage virtually ceased about 30 years ago (M. Richardson pers. comm.). As a consequence the bushland has not been periodically logged or burnt as has much of the bushland on the Swan Coastal Plain.

Lowlands has been recognised for its heritage values for many years. The System 6 Report (Department of Conservation and Environment 1983) identified Lowlands (M 105) as an area of historical and natural values. Lowlands is on the Register of the National Estate but the nomination focuses on the area's considerable cultural heritage value. While the System 6 Report gave a brief description of some natural values of the area (a large tract of *Banksia* Woodland, Paperbark Swamp and Flooded Gum (*Eucalyptus rudis*) Woodland along the Serpentine River), there has been no comprehensive vegetation and flora survey of the Property.

In 1992, Midge Richardson, the current owner of Lowlands, invited the Wildflower Society of WA to conduct a flora and vegetation survey of Lowlands to better document some of the natural values of the area. The Royal Australasian Ornithologists Union was also invited to conduct a bird survey in the area and the WA Museum has begun further fauna survey work. The flora survey work has been supported by funding under the National Estates Grant Program (1992-94 and 1994-95).

SURVEY METHOD

Survey work was performed over three flowering seasons in 1992, 1993 and 1994.

Twenty three $100m^2$ study sites were located in Lowlands to sample the range of plant communities identified using aerial photographs and limited field interpretation. Of these sites, 17 are located in the east block (LOW 1, 4, 6a, 6b, 7, 8, 9a, 9b, 10a, 10b, 12a, 12b, 13a, 13b, 14a, 15 & 16, Map 2a, page 21/22) and 6 in the west block (HYMUS 1 - 6, Map 2b, page 23). The location of these sites is shown on Map 2a and 2b and the sites are described in Appendix 1. Two further sites were located in the unmade road reserve to the south of Lowlands (ROWE 1 & 2). Of these 25 sites, 23 were permanently located using four steel pegs (not including LOW 15 & 16).

Groups of conservation volunteers from the Swan Coastal Plain Survey group, each led by a botanist, recorded information in a set format on physical location, vegetation structure and density and the total flora of the permanent study sites (Keighery 1993; Keighery, Keighery and Gibson 1995). The sites were sampled on two occasions over two seasons for the sites in the east block (1992 and 1993) and one season for the west block (1993).

The twenty three permanent sites were included in a detailed floristic survey of the Swan Coastal Plain (Gibson *et al.* 1994).

Opportunistic plant collections, that is collections from outside the sites, were made during foot and vehicular transects of the bushland areas at various times of the year over the three years of survey. Identification of plant collections was made by the volunteers and the co-ordinators and verified at the W.A. Herbarium. A field herbarium has been prepared for the area. It is considered that approximately 95% of the flora have been documented.

The results of the survey have been compiled by the co-ordinators of the Swan Coastal Plain Survey group.

GEOMORPHOLOGY AND SOILS

Lowlands is located on the Swan Coastal Plain where the Pinjarra Plain is up to 15 kilometres broad (Map 1, page 4). While Lowlands is bordered to the east and west by Pinjarra Plain, the soils in Lowlands are predominantly Bassendean Sands. These sands occur as low lying sandy dunes and sandplain laid down over the Pinjarra Plain (Gozzard 1983 and Van Gool 1990). The Pinjarra Plain is exposed along the Serpentine River and in the seasonally waterlogged flats associated with the drainage line to the north of the east block. The Pinjarra Plain is also near or at the surface in the ephemeral wetlands (Map 1c, page 4).

Van Gool (1990) maps the Bassendean Sands as six units (Map 1c, page 4). The differences between the units relate to:

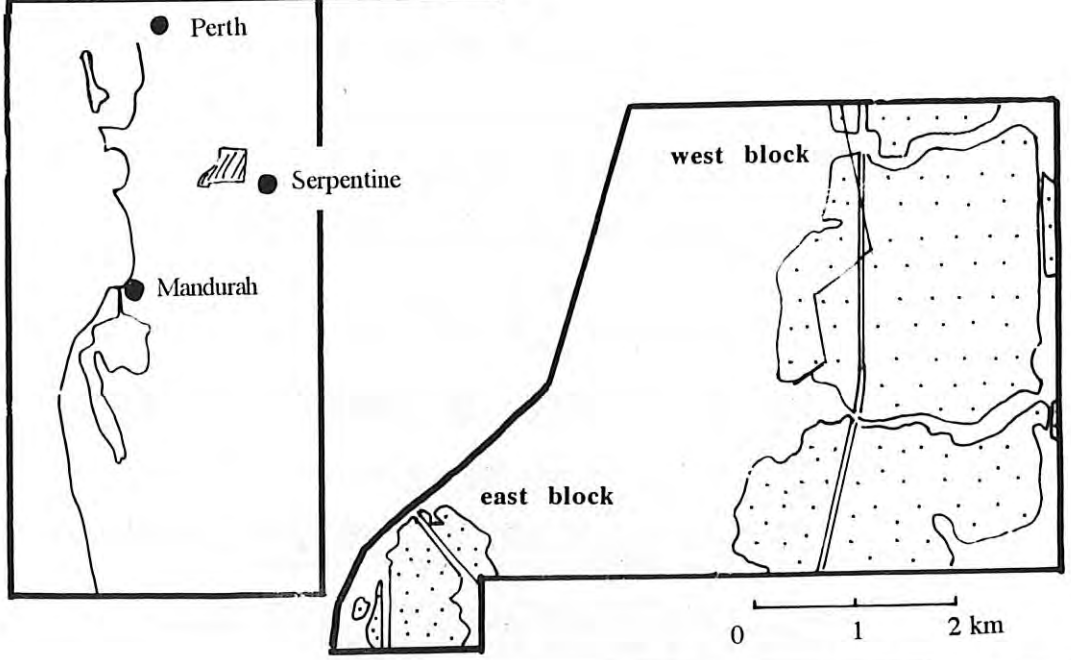
a) the depth of grey sands over yellow sands on the well drained sands

b) the depth of the sand over clay on the poorly drained flats and stream channels.

Gozzard (1983) maps the area in less detail, with alluvium on the low lying area and Bassendean Sands (S8) on the uplands.

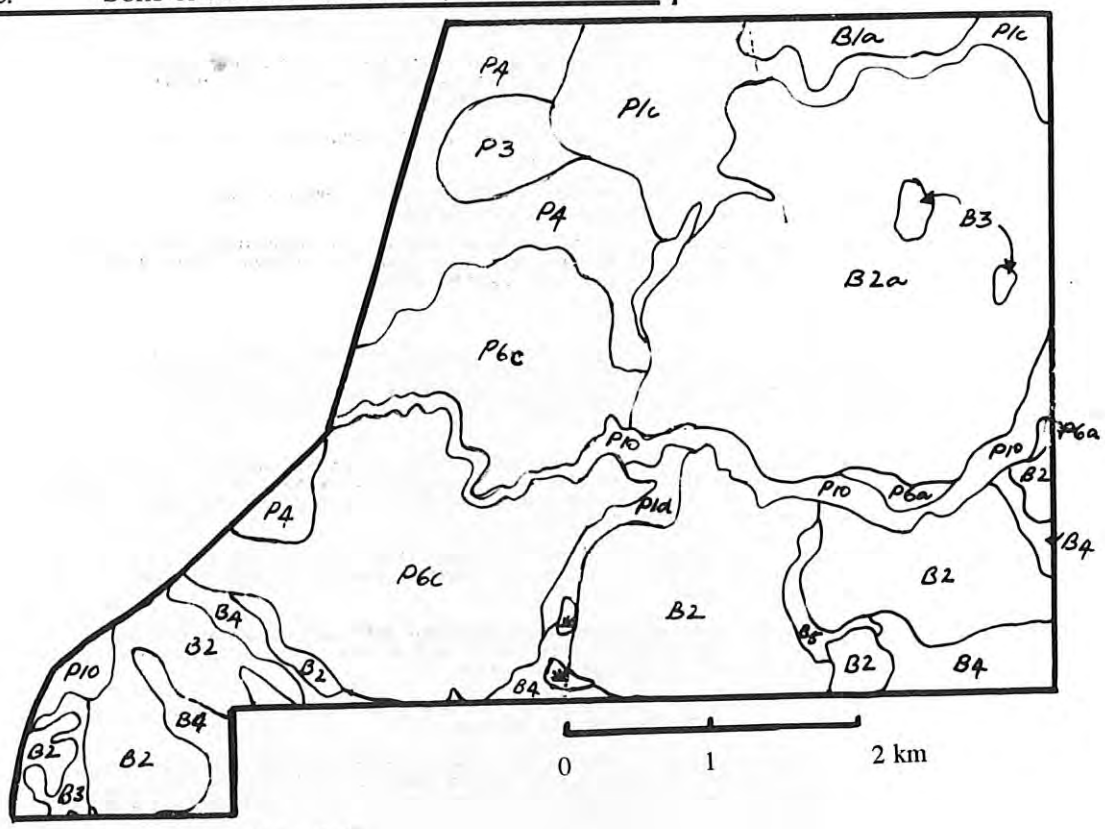
Map 1: Lowlands Location and Soils

Map1a: Lowlands Location



Map1b: Remnant Vegetation of the Lowlands area

Map1c: Soils of the Lowlands area (Van Gool 1990)



see page 5 for a key to symbols

Key to Map 1c: Soils of the Lowland area (Van Gool 1990)

Pinjarra Plain: – Broad low relief plain west of the foothills, comprising predominantly Pleistocene fluvial sediments and some Holocene alluvium associated with major current drainage systems. Major soils are naturally poorly drained and many swamps occur.

P1 Flat to very gently undulating plain with deep acidic mottled yellow duplex (or "effective duplex") soils comprising:

a. shallow pale sand to sandy loam over clay; imperfect to poorly drained and generally not susceptible to salinity

b. moderately deep pale sand to sandy loam over clay: imperfectly drained and moderately susceptible to salinity in limited areas

c. deep pale brown to yellowish sand to sandy loam over clay; imperfectly drained and moderately susceptible to salinity in limited areas

d. as for P1a, but moderately susceptible to salinity

e. shallow pale sand to sandy loam over very gravelly clay; moderately well drained

P2 Flat to very gently undulating plain with deep alkaline mottled yellow duplex soils which generally consist of shallow pale sand to sandy loam over clay.

P2a As for P2, but there is a silcrete hardpan at 50 to 100cm depth generally on top of an (olive–grey) clay

P3 Flat to very gently undulating plain with deep, imperfect to poorly drained acidic gradational yellow or grey–brown earths and mottled yellow duplex soils, with loam to clay loam surfaces

P4 Poorly drained flats, sometimes with gilgai microrelief and with moderately deep to deep black, olive grey and some yellowish brown cracking clays and less commonly non cracking friable clays with generally acidic subsoils.

P4a Sandy margins of the plain adjacent to dune systems where soils have a very shallow grey sand veneer over deep, black or grey cracking clays

P5 Poorly drained flats, commonly with gilgai microrelief and with deep grey to olive brown cracking clays with alkaline subsoils.

P6 Very gently undulating alluvial terraces and low rises contiguous with the plain, with deep moderately well to well drained soils. These are:

a. associated with major current river systems and larger streams, and have acidic red and yellow duplex soils, less commonly gradational red and yellow earths

b. associated with prior stream deposits upon plain, and have uniform brownish sands

c. alluvial fans with uniform friable brown loams, or well structured gradational brown earths.

P10 Gently undulating to flat terraces adjacent to major rivers, but below the general level of the plain, with deep well drained uniform brownish sands or loams subject to periodic flooding

Bassendean Dune and Sandplain System: – Very low relief, leached, grey siliceous Pleistocene sand dunes, intervening sandy and clayey swamps and gently undulating plains. These occur immediately west of, and partly overlie, the Pinjarra Plain. Topography becomes more subdued from west to east.

B1 Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron–organic hardpan at depths generally greater than 2 metres; banksia dominant

B1a As for B1, but with a more intensely coloured yellow B horizon occurring within 1 metre of the surface; marri and jarrah dominant (redgum rises)

B2 Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron organic hardpan at 1–2 metres

B2a As for B2, but with a more intensely coloured yellow B horizon usually well within 1 metre of the surface

B3 Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron–organic pan, or clay at generally less than 1 metre depth; surfaces are dark grey sand or sandy loam

B4 Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 metres by clay or less frequently a strong iron–organic pan

B5 Shallowly incised stream channels of minor creeks and rivers with soils similar to B4 (and B6)

VEGETATION

The Vegetation Map

The vegetation map (Map 2, pages 21 - 23) shows the distribution of the principal vegetation associations. The distribution of the associations are based on the structural units described at the 25 sites (see Appendix 1, page 29) and vehicle and foot transects of the area.

Nine vegetation associations are mapped; these can be grouped in three broad units: *Banksia* Woodlands, Ephemeral Wetlands and River and Creeklines.

Banksia Woodlands

• *Banksia* Woodlands to Forests with scattered emergent eucalypts (mapping symbols ebW). the eucalypts are: Jarrah (*Eucalyptus marginata*), Marri (*Eucalyptus calophylla*) and on one occasion, Tuart (*Eucalyptus gomphocephala*).

• *Banksia*, Sheoak (*Allocasuarina fraseriana*), and/or Paperbark (*Melaleuca preissiana*) Woodlands to Forests (mapping symbols baW, bmW).

All of the *Banksia* Woodlands are characterised by two distinctive features

(i) The maturity of the canopy trees

Mature specimens of Candlestick Banksia (*Banksia attenuata*), Firewood Banksia (*B. menziesii*), Bull Banksia (*B. grandis*), Hollyleafed Banksia (*B. ilicifolia*), *Eucalyptus marginata*, *Allocasuarina fraseriana* and *Melaleuca preissiana* predominate in the woodlands. These Woodlands represent the most extensive area of mature trees of these species observed on the Swan Coastal Plain.

(ii) The openness of the understorey

Shrubs are scattered in much of the Woodlands and herbaceous species are the predominate understorey plants.

Four other structural units are distinguished within these *Banksia* Woodlands:

•Tuart Woodland (mapping symbols tW) - The area in which Tuart occurs as an overstorey tree is quite restricted and is able to be mapped in the east block on the northern side of the River. Tuart also occurs in the east block on the southern side of the River (several trees only) and in the pasture on the west side of the west block.

•*Jacksonia sternbergiana* Low Woodland (mapping symbols jLW) - The *Jacksonia sternbergiana* Low Woodland occurs regularly on the Swan Coastal Plain associated with vegetation on sandy soils that has been long unburnt.

•*Banksia* Woodland or scattered *Banksia* over Spearwood (*Kunzea ericifolia*) Closed Tall Scrub (mapping symbols bkW) - *Kunzea ericifolia* Closed Tall Scrub is associated with much of the the

area between the *Banksia* Woodland in Very Good condition and the pasture areas (see Vegetation Condition, pages 9 -11). *Banksia* occur throughout this unit in varying densities and there is no clear boundary between the two units. Patches of *Kunzea ericifolia* Closed Tall Scrub also occur within the other *Banksia* Woodland units but this Closed Tall Scrub is not mapped separately.

While six units are mapped in the *Banksia* Woodlands, the boundaries between all of these units are not well defined and areas of each are found within the other.

Ephemeral Wetlands (sumplands, damplands, floodplain and palusplain, Semeniuk 1987)
• Freshwater Paperbark (*Melaleuca rhaphiophylla*) Woodland to Shrubland (mapping symbols mrW)
• Woodlands over Sedgelands (mapping symbols WS) where the dominants may be Paperbark (*Melaleuca preissiana*), Marri (*Eucalyptus calophylla*) or Flooded Gum (*Eucalyptus rudis*).
Both of these units contain areas of Herblands, Sedgelands and Shrublands without a tree overstorey. The mosaic pattern of these structural units is characteristic of clay based ephemeral wetlands (Keighery and Trudgen 1992, Keighery and Keighery 1993, Gibson *et al.*1994) and it is not appropriate to map them at this scale . The detailed structural descriptions in Appendix 1 indicate the diversity within these units.

Within the pasture areas there is a series of ephemeral wetlands (sumplands) that contain significant native vegetation. These sumplands are:
• Claypans - Along the northern drainage line there an area of claypans that can be identified by patches of *Amphibromus neesii* grasslands in late spring. Other claypan taxa were associated with these claypans (see Appendix 2, page 34).
• other Sumplands - Sumplands occur along the northern drainage line (sumplands 1 & 2, Map 2a, page 21/22), adjacent to the Serpentine River (sumplands 3& 4, Map 2a) and in the western block (sumpland 5, Map 2b, page 23). These sumplands are characteristically fringed with a dense band of *Melaleuca rhaphiophylla. Melaleuca preissiana* may also be present. Areas of sedges are associated with the sumpland to the south of the entrance (sumpland 3, Map 2a, page 21/22). The sumpland in the eastern block has been excavated and holds a permanent body of water.

River - Creekline (see Figures 1 and 2, page 19 and Figure 3, page 24)
• Flooded Gum (*Eucalyptus rudis*) Forest to Woodland (mapping symbols rF)
The density of *Eucalyptus rudis* in the creekline gradually decreases and eventually disappears as distance from the Serpentine River increases. There is a concurrent reduction in the density of the understorey and an increased proportion of weeds in this understorey.

Floristic Community Types

All but two of the sites in the eastern block are permanent sites which were included in the regional floristic survey of the Swan Coastal Plain (see below and Gibson *et al.* 1994).

"A Floristic Survey of the southern Swan Coastal Plain" by Gibson *et al.* 1994 - Summary

A study was undertaken of the plant communities of remnant bushland on the southern Swan Coastal Plain (between Seabird and the foothills of the Whicher Range). Five hundred and nine sites were established and the floristic data were used to define the major regional community types.

A total of 1485 flowering plant taxa (species, subspecies and varieties) were found in the 509 quadrats or in adjacent areas. Of these taxa 1313 were natives and 172 were weeds. Sixty one taxa appear to be endemic to the study area. Most of the endemics are restricted to the eastern side of the coastal plain (28 taxa) or to areas of ironstone (13 taxa). Seventy seven taxa appear to have their southern range end and 48 taxa to have their northern range end in the study area. Ten species of Declared Rare Flora (DRF) were found during the survey. Two of these taxa (*Schoenus natans* and *Tetraria australiensis*) were previously believed to be extinct. In all, 19 new populations of DRF were recorded and a further 75 priority species were encountered. Eleven species are proposed for listing as Declared Rare Flora (eight of these species are from the very restricted southern ironstone communities) and changes to the priority listing are recommended for another 13 taxa. At least seven taxa appear to have become locally extinct on the southern Swan Coastal Plain.

The floristic analysis defined 30 communities types. It was possible to further subdivide some of these groups and, in all, a total of 43 types and subtypes were recognised. The major environmental correlates with this classification were seasonal moisture regime and geomorphology. Of the 30 major community types, three are found on the heavy soils of the eastern coastal plain, 16 in seasonal wetlands, four are centred on the Bassendean Dunes and seven are largely restricted to Spearwood and Quindalup systems.

The floristic classification showed very poor correlation to vegetation structure and, while geomorphology was a major environmental correlate, floristic community types were poorly correlated to individual mapped units. Similarly the floristic classification was poorly correlated with previously mapped vegetation complexes.

Of the 43 recognised community types or subtypes, ten are unreserved and a further ten are only known from a single National Park or Nature Reserve. One community type (southern ironstones) is considered critically threatened, two communities are considered endangered, 15 are considered vulnerable and 11 are considered susceptible should any change in management or land use occur. Twelve communities are considered at low risk from any present threat and two communities could not be assessed due to insufficient information. Reserve recommendations are made to protect the three most threatened community types.

While the mapping units are structural units they are broadly related to the floristic units identified by Gibson *et al.* (Table 1). In the *Banksia* Woodland units the boundary between the floristic units indistinct and while the floristic units can be discerned at their extremes the boundary is very broad and does not relate well to structure . As a consequence two of the floristic community types (21a and 23a) are mapped within one structural unit. Similarly the majority of two of the wetland floristic units (11 and 4) are mapped together on the vegetation map.

One site, determined as floristic community type 11, was mapped as a separate mapping unit, Site 10b on the Serpentine River. The entire Serpentine River is mapped as a distinct structural unit and is considered a distinct structural and floristic unit. This Flooded Gum (*Eucalyptus rudis*) Riverine Forest community is structurally distinct. Also this was the only riverine site sampled by Gibson *et al.* (1994) and the grouping of this site with floristic community type 11 relates to a limited number of shared taxa. There were several taxa at the site including Maiden Hair Fern (*Adiantum aethiopicum*) and *Acacia dentifera* that were not found in any other site on the Swan Coastal Plain (Gibson *et al.* 1994). There was also a series of taxa only found along the river (see Flora, page 11), but not in this particular site, that further support distinguishing the riverine community.

Table 1:
The relationship between the structural units used for mapping and the floristic units determined in the regional survey (Gibson *et al.* 1994)

Vegetation Mapping Unit	**Floristic Community Type**
Sites	
Eucalypts over *Banksia* Woodland	
LOW 4, 10a, 12a&b, 13a	21a (Central *Banksia*/Jarrah Woodlands)
LOW 13b	23a (Central *Banksia* Woodlands)
Mixed Wet *Banksia* Woodlands	
HYMUS 3&4; LOW 1,6a&b, 7	21c (Low lying Banksia Woodlands)
Melaleuca rhaphiophylla Woodland to Shrubland	
LOW 8, 9a&b	5 (Mixed Shrub Damplands)
Woodlands over Sedgelands	
HYMUS 1, 2 , 5&6, ROWE 1	11 (Wet Forests and Woodlands)
LOW 14a; ROWE 2	4 (*Melaleuca preissiana* damplands)
Eucalyptus rudis Forest to Woodland	
LOW 10b	11 (Wet Forests and Woodlands)

Vegetation Condition

While the core of the areas of native vegetation at Lowlands is in Very Good to Good Condition (Appendix 1) there is considerable disturbance associated with the transitional area between the completely degraded areas (pasture) and the bushland.

Pasture was established on the alluvial soils many years ago and grazing has occurred from these areas into the bushland. Generally the pasture grades into the bushland through

- scattered trees, to complete tree cover, to trees over weeds and scattered native species

or - *Banksia* Woodland over *Kunzea ericifolia* Closed Tall Scrub

with gradually increasing frequency of natives until the vegetation is structurally and floristically intact.

While there is no grazing by domestic animals today, kangaroos maintain the grazing at high levels and weeds are able to move into the bushland in their dung as well as by wind blown seed. It is not suggested that kangaroos be removed as they undoubtedly keep exotic grasses low in the bushland (for example the apparent lack of Perennial Veldt Grass, *Ehrharta calycina*). However it may be necessary to control their numbers if they impact on natural regeneration within the bushland.

There is substantial regeneration of native taxa into the disturbed areas from the bushland areas. This is especially evident

- along the sandy river banks where Marri and Jarrah seedlings are abundant and in spring the area is yellow and white with *Podolepis lessonii* (Figure 4, page 24) and *Asteridea pulverulenta* (respectively) carpeting the ground

- adjacent to wetlands in the south western corner of the east block and around the western wetlands in the west block.

Within the intact bushland, ample regeneration of *Banksia* and Jarrah and other species was observed. However *Banksia* regeneration in the *Banksia* stands within pastured areas is not occurring.

Unfortunately while regeneration from this past disturbance is occurring, disturbance associated with service corridors has impacted and continues to impact on the condition of the bushland (see Map 2a and 2b, pages 21 - 23). Most of the vegetation along the service corridors was cleared. The partially cleared corridors have created a channel for weeds and dieback (a plant disease caused by *Phytophthora* species) to be spread into the core of the bushland areas. There is a definite association between the pattern of distribution of some weeds (for example *Gladiolus caryophyllaceus*) and dieback and the service corridors.

Several patches of *Banksia* Woodland in poor condition (mapping symbols pb, Map 2a) are mapped. In some of these areas the poor condition of the *Banksia* Woodland is clearly caused by dieback (for example the area along the western service corridor) but the presence of dieback in all these areas is not definitely established. Careful mapping for dieback in Lowlands is required to

determine the boundaries of the infection. *Banksia* Woodland over *Kunzea ericifolia* Closed Tall Scrub, widespread in Lowlands, is a vegetation association that can be associated with regrowth after dieback infection but it also occurs naturally across the Swan Coastal Plain in low lying areas. This vegetation association is often the result, but not always, of past disturbance such as fire, clearing and grazing. However dieback does appear to have been introduced along the southern boundary from drainage associated with the roadworks where the *Banksia* trees in the *Banksia* Woodland over *Kunzea ericifolia* Closed Tall Scrub in this location are dead or dying. This appears to have resulted in the introduction of dieback into the southern drainage lines in the east block (see Creekline, Map 2a) that feeds into the Serpentine River. This drainage line area was a route for stock in the past and it now appears that dieback could be affecting regeneration along this drainage line.

FLORA

Lowlands contains a flora of 438 taxa (Appendix 2). Of these 334 are natives and 104 exotics. The Orchidaceae (33 taxa), Cyperaceae (23 taxa), Myrtaceae (22 taxa), Asteraceae (22 taxa), Anthericaceae (20 taxa), Fabaceae (19 taxa), Droseraceae (15 taxa), Proteaceae (16 taxa), Stylideaceae (15 taxa), Poaceae (13 taxa), Haemodoraceae (10 taxa) and the Restionaceae (7 taxa) are the most species diverse families.

The flora is best considered in the three broad vegetation unit.

Banksia Woodlands

Of particular interest at Lowlands is the high proportion of herbaceous taxa. Approximately two thirds of the native taxa are herbaceous. Of the 214 taxa from the 12 most well represented families (see above) 145 taxa in 9 families are herbaceous. Of particular interest is the large number of orchid taxa, with orchids representing the largest family.

Another interesting feature of the flora is that many of the shrubs common in *Banksia* Woodlands elsewhere are uncommon and in some cases absent from Lowlands. For example there are no *Allocasuarina humilis* or *Eremaea* species recorded for Lowlands and *Acacia pulchella*, *Daviesia* species and *Synaphea spinulosa* are uncommon.

While most of the *Banksia* Woodland taxa are characteristic of *Banksia* Woodlands on Bassendean Sands, the presence of *Lechenaultia biloba*, *Styphelia tenuiflora*, *Johnsonia* aff. *pubescens* and *Mesomelaena pseudostygia* were unexpected. These taxa are characteristic of woodlands

associated with the Ridge Hill Shelf. The presence of these taxa probably relates to Lowlands location on the eastern side of the Plain.

Ephemeral Wetlands

A series of taxa restricted to clay based ephemeral wetlands on the Swan Coastal Plain (Keighery and Trudgen 1992, Gibson *et al.*1994) were associated with the ephemeral wetlands. Such taxa are: *Eryngium pinnatifidum* subsp. *palustre*, *Brizula nutans*, *Stylidium longitubum*, *S. mimeticum*, *S. roseo-alatum* and *S. utricularioides* (Appendix 2).

River - Creekline (see Figures 1 and 2, page 19 and Figure 3, page 24)

A series of taxa rarely found on the Swan Coastal Plain occurred on the alluvial banks of the Serpentine River in Lowlands. Maiden Hair Fern (*Adiantum aethiopicum*), Rock Fern (*Cheilanthes austrotenuifolia*), Lowlands Creeper (*Parsonsia diaphanophleba*) and *Sida hookeriana* have not been found elsewhere on the Plain while *Lepidosperma effusum*, *Darwinia citriodora*, *Paraserianthes lophantha* and *Acacia dentifera* are only found associated with drainage lines. In general the vegetation associated with these drainage lines is no longer intact and these taxa are found along the numerous drains on the eastern side of the Plain (Keighery and Trudgen 1992, Keighery and Keighery 1992, Gibson *et al.* 1994).

Of further interest are several other taxa associated with the sandy river banks: *Xanthorrhoea brunonis*, Tuart (*Eucalyptus gomphocephala*), the scarp/plateau form of *Dryandra sessilis* and *Gnephosis angianthoides.*

Tuart (*Eucalyptus gomphocephala*) is one of a series of typically coastal taxa that occur along the rivers of the Swan Coastal Plain. Other coastal taxa that are also associated with rivers are: *Lechenaultia linearioides* along the Moore River; *Spyridium globulosum*, *Callitris preissii* and *Templetonia retusa* along the Swan River estuary. Most of these taxa are associated with limestone but the original distributions of such taxa are obscured as the river vegetation is either cleared or substantially altered.

Significant Flora

Declared Rare Flora

Two species of orchids are found in the *Banksia* Woodlands that are gazetted as Declared Rare Flora (DRF): the Grand Spider Orchid (*Caladenia huegelii*) and Glossy-leaved Hammer Orchid (*Drakea elastica*) (Atkins 1994). The Grand Spider Orchid is found growing in the better drained *Banksia* Woodlands and the Glossy-leaved Hammer Orchid in the *Kunzea ericifolia* Closed Tall

Scrub associated with the low lying *Banksia* Woodlands (Hoffman and Brown 1992). Both taxa were identified at Lowlands in 1990 (S. Hopper pers. comm.).

Other restricted and interesting flora

Five taxa occur at Lowlands that are listed by the Department of Conservation and Land Management on the Priority List of plants under consideration for determination as Declared Rare Flora (Atkins 1994). These are *Eryngium pinnatifidum* subsp. *palustre* (Priority 1) *Parsonsia diaphanophleba* (Priority 2), *Conostephium minus* (Priority 4), *Stylidium longitubum* (Priority 1) and *Stylidium mimeticum* (Priority 1). This is the most southern population of *Conostephium minus*.

Some other taxa are of particular interest these are:

Dillywynia dillwynioides
This is an uncommon species on the Swan Coastal Plain being found on seasonally inundated flats, generally alongside rivers or deeper swamps, between Harvey and north of Yanchep. Two of the eight populations identified by Gibson *et al.* (1994) were found at Lowlands. Only eight collections were located in the WA Herbarium in May, 1994. Gibson *et al.* (1994) recommended that this taxon be listed at Priority 2 level.

Gnephosis angianthoides
A large population of this taxon was found growing on a sandy bank beside the Serpentine River at Lowlands. The majority of collections in the WA Herbarium are from the wheatbelt with only three old collections (1910, 1917 and undated) from the Plain around Perth. Indumentum patterns on these specimens indicate that they may be able be separated from the wheatbelt populations (E.A. Griffin pers. comm.). Gibson *et al.* (1994) recommended that this taxon be listed at Priority 2 level.

Lagenifera huegelii subsp. "glabra"
This taxon is a glabrous, rhizomatous form of *Lagenifera huegelii* that does not match any material currently lodged in the WA Herbarium (March 1995) . *Lagenifera huegelii* subsp. "glabra" grows in mats along the wettest section of the southern creekline. This form of *Lagenifera huegelii* has not been encountered previously on the Swan Coastal Plain.

Johnsonia aff. *pubescens*
This taxon is closely related to *Johnsonia pubescens* and will probably be described as a subspecies of *J. pubescens*. It is known from Cardup, Brickwood and Lowlands, all Bassendean Sands on the eastern side of the Plain (Keighery and Keighery 1993).

Parsonsia diaphanophleba Lowlands Creeper
This creeper is confined to areas of relatively intact native vegetation on the riverine banks on the Murray and Serpentine Rivers. Few such areas remain on along these rivers on the Plain. Gibson *et al.* (1994) recommended that this taxon continue to be listed at Priority 2 level but consideration should be given to gazzettal of this species as DRF once its distribution on the Plateau is known.

Eucalyptus gomphocephala Tuart
Tuart is endemic to the Swan Coastal Plain being found between Jurien to the north, Ludlow to the south (Brooker and Kleinig 1990) and inland to Lowlands (S. Hopper pers. comm.). Typically Tuart is associated with the 'limestony coastal dunes and subcoastal plains' (Brooker and Kleinig 1990) but at Lowlands it occurs on sandy soils associated with the Serpentine River.

Weeds

Of the 438 taxa listed for Lowlands (Appendix 2) 104 are weeds. Many of these weeds are associated with the interface between the bushland and pasture areas (see Vegetation Condition) and reflect the disturbance associated with this interface. The majority of these weeds are absent or do not occur in significant numbers within the bushland itself.

The most severe weed invasion is associated with the wetlands. The wetlands are the most disturbed bushland areas (by partial clearing and past grazing) and provide ideal conditions (high soil moisture and relatively fertile soils) for weed growth.

Along the river the significant weeds are:
a) herbaceous weeds:- Whiteflower Fumitory (*Fumaria capreolata*), Pennyroyal (*Mentha pulegium*), Soursob (*Oxalis pes-caprae*), Large Flower Wood Sorrel (*Oxalis purpurea*), Bridal Creeper (*Myrsiphyllum asparagoides*), Arum Lily (*Zantedeschia aethiopica*), Watsonia (*Watsonia bulbillifera*) and *Gladiolus undulatus*
b) shrub weeds:- Blackberry (*Rubus fruticosus*), Apple of Sodom (*Solanum linnaeanum*) and Castor Oil (*Ricinus communis*).

Appropriate control measures for some of these weeds (*Zantedeschia aethiopica*, *Rubus fruticosus*, *Solanum linnaeanum* and *Ricinus communis*) have begun along the river and should result in the

control of these weeds allowing the essentially intact riverine vegetation to continue to be conserved.

In the ephemeral wetlands the principal weeds are Blowfly Grass (*Briza maxima*) Pennyroyal (*Mentha pulegium*), Trefoils (*Lotus angustissimus* and *L. suaveolens*) and Yellow Serradella (*Ornithopus compressus*).

Within the *Banksia* Woodland the most common weeds are Flatweed (*Hypochaeris glabra*) and *Ursinia anthemoides*, weeds that are characteristic of *Banksia* Woodlands across the Plain. Of interest was the apparent absence of Perennial Veldt Grass (*Ehrhartia calycina*) and rarity of *Gladiolus caryophyllaceus*, both common aggressive weeds in *Banksia* Woodlands across the Plain.

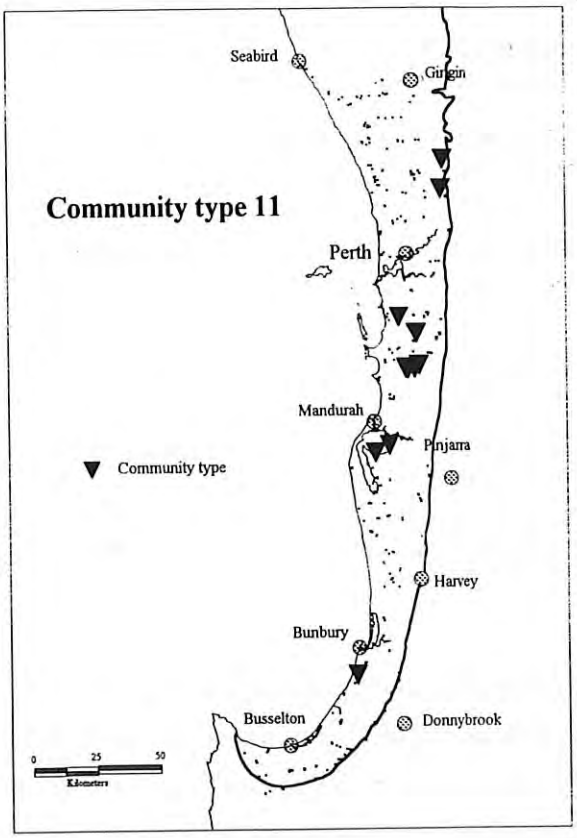
A further uncommon weed at Lowlands was Rose Pelargonium (*Pelargonium capitatum*) found along the southern creekline. This was present in low numbers (approximately five plants) and appears to be a different form than that common on the Spearwood Dunes where it is a very significant weed. The potential of *Pelargonium capitatum* to become a significant weed in this area is not known but it would be advisable to remove these plants.

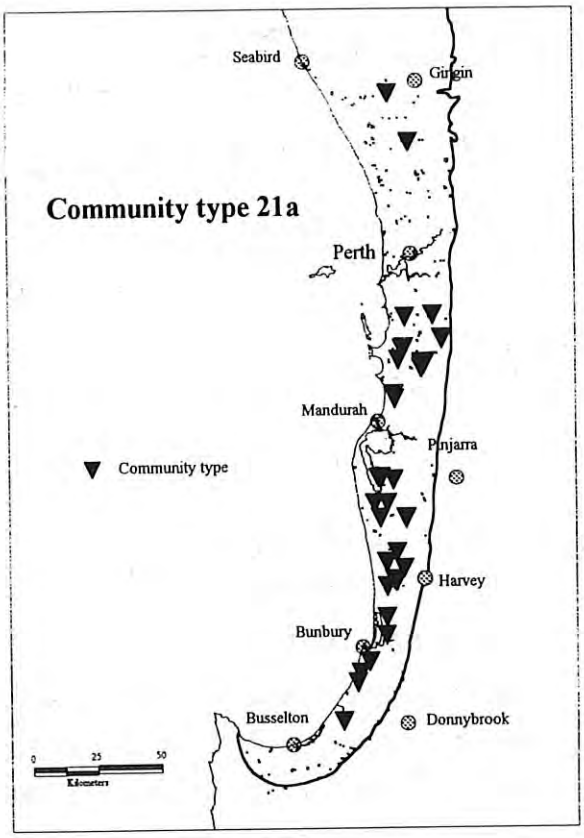
DISCUSSION

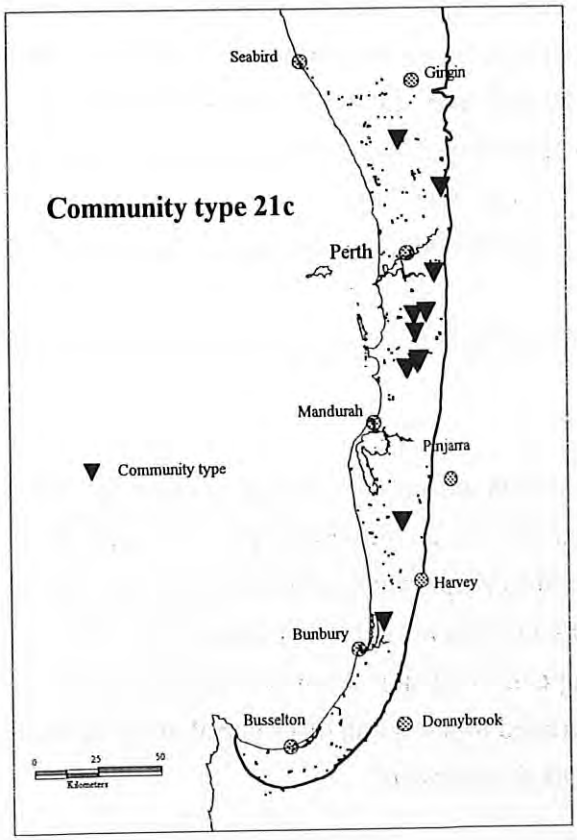
Vegetation

Lowlands is significant regionally as the combination of floristic community types present is not known to occur elsewhere (Gibson *et al.* 1994). While the floristic community types represented in Lowlands are comparatively well reserved (Table 2, page 17) occurring in a series of conservation reserves on the Plain.consideration of the three broad vegetation units will better identify the conservation values of the Lowlands vegetation.

Map 3: Distribution of floristic community types on the Swan Coastal Plain (Gibson *et al.* 1994)







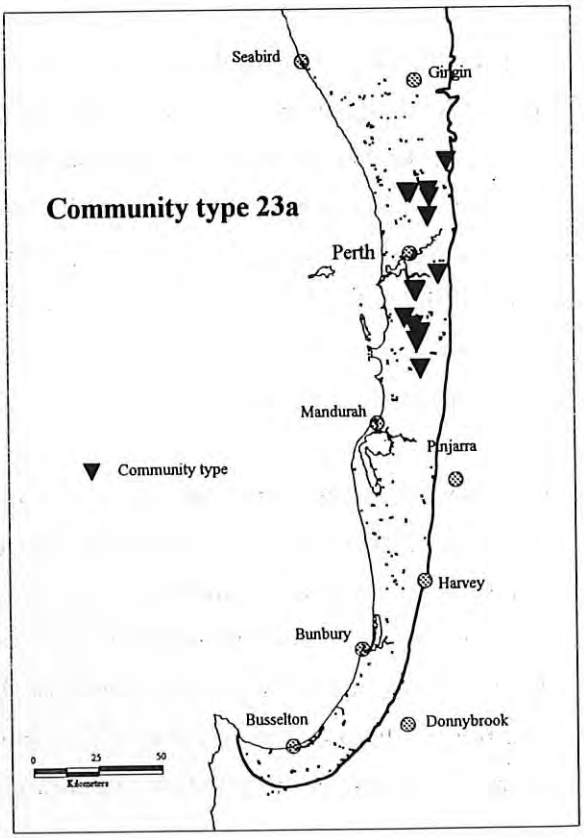


Table 2:
Regional Conservation Status of the Floristic Community Types from Gibson *et al.* 1994.

Floristic Community Type	Reservation Status	Conservation Status
Eucalypts over *Banksia* Woodland		
21a (Central Banksia/Jarrah Woodlands)	Well Reserved (in two or more Conservation Reserves)	Low risk
23a (Central *Banksia* Woodlands)	Well Reserved (two or more Conservation Reserves)	Low risk
Mixed Wet *Banksia* Woodlands		
21c (Low lying Banksia Woodlands)	Well Reserved (in two or more Conservation Reserves)	Susceptible
Wetlands		
5 (Mixed Shrub Damplands)	Well Reserved (in two or more Conservation Reserves)	Low risk
11 (Wet Forests and Woodlands)	Well Reserved (in two or more Conservation Reserves)	Low risk
4 (*Melaleuca preissiana* damplands)	Well Reserved (in two or more Conservation Reserves)	Low risk

Banksia Woodlands

The area of floristic community types 21a and 21c represented in Lowlands is substantial. Floristic community type 21a is predominantly southern in distribution (Map 3, page 16) and is the largest in area at Lowlands. The Lowlands sites also represent the most northern locations of the bulk of this community type (Map 3, page 16). These *Banksia* Woodlands/Forests characteristically have an open understorey in which herbaceous species predominate. Initially it was thought that the structural and floristic features of the Lowlands woodlands were related to the long absence of fire and grazing. However as these structural and floristic patterns were typically associated with *Banksia* Woodlands of floristic community type 21a the following factors may be responsible:

- the higher rainfall in the major area of distribution of the unit (interestingly the only occurrences of this community type north of Lowlands are on wet flats)
- the close association between the Bassendean Sands and the underlying Pinjarra Plain on the area of the Swan Coastal Plain south of Mundijong.

The Grand Spider Orchid (*Caladenia huegelii*), which is Declared Rare Flora, is associated with these Woodlands

Interesting Lowlands represents the most southern location of floristic community type 23a (Map 3) identifying Lowlands as a transition area between the two community types. *Conostephium minus* is also at its most southern limit at Lowlands and *Conospermum capitatum* is at its northern limit on the Coastal Plain but at present there is insufficient data available to comment on other taxa that are at the southern or northern limits of their range at Lowlands. However *Banksia menziesii* is near the southern end of its range at Lowlands (recorded to just south of Pinjarra) and Lowlands contains the largest of the southern populations of *Banksia menziesii.*

While relatively widespread across the Plain the low lying floristic community type 21c (Map 3) is considered 'susceptible' due to the susceptibility of low lying *Banksia* Woodlands to dieback. Unfortunately dieback appears to have been introduced into Lowlands but as yet does not appear to have been introduced to all areas where this community type occurs. The populations of the DRF *Drakea elastica* are also associated with the *Kunzea ericifolia* Closed Tall Scrub in these Woodlands.

In addition as Lowlands contains a rare example of mature *Banksia* Woodlands the Woodlands have high conservation value. These factors are of particular significance when the habitat value of the *Banksia* Woodlands is considered. A concurrent bird survey of Lowlands has identified several bird species from the area that are now rare or unknown elsewhere on the Plain (A. Burbidge pers. comm., RAOU bird survey work). Further fauna survey work is currently being done by the WA Museum.

Ephemeral Wetlands

The wetlands communities are also widespread over the Plain (for example community type 11, Map 4). The occurrence of these community types at Lowlands contributes to the diversity of the vegetation and flora at Lowlands. These wetlands contain significant populations of *Dillywynia dillywynioides*, *Eryngium pinnatifidum* subsp. *palustre* (Priority 1), *Stylidium longitubum* (Priority 1) and *Stylidium mimeticum* (Priority 1).

River - Creekline

The riverine vegetation in Lowlands provides one of the few examples of essentially intact upriver riverine vegetation on the Harvey, Murray, Serpentine, Southern, Canning and Swan Rivers on the Swan Coastal Plain (Keighery and Trudgen 1992, Keighery and Keighery 1992, Gibson *et al.* 1994). Overall this area of fringing vegetation retains its structural and floristic integrity even though there is considerable weed invasion in some patches.

Two taxa occurring in association with the River, *Gnephosis angianthoides* and *Parsonsia diaphanophleba* , are found in significant numbers at Lowlands. *Gnephosis angianthoides* is not presently known from any other location on the Swan Coastal Plain. The habitat of this taxon, the sandy banks beside rivers, is now very rare on the Swan Coastal and this is a very significant population of this species. The taxonomic status of the population at Lowlands does need to be resolved but it is believed that this taxon should be considered for gazzetal as Declared Rare Flora. Also, the populations of *Parsonsia diaphanophleba* are few and also from a rare habitat on the Plain and this species should also be considered for gazzetal as Declared Rare Flora.

Text is continued on page 25

Figure 1: The Flooded *(Eucalyptus rudis)* Gum Forest with festoons of Lowlands Creeper *(Parsonsia diaphanophleba)* on the southern bank of the Serpentine River

Figure 2: The flowers of the Lowlands Creeper *(Parsonsia diaphanophleba)*

Map 2: Vegetation Associations

Key

———	Boundary between pasture and bushland (condition grades gradually from poor to very good and excellent) and between bushland in poor and better than poor condition
—·—·	Boundary between vegetation associations (approximate)
⊣⊣⊣⊣⊣	Boundary of service corridor and bushland
●1	Vegetation Sites (Appendix 1)
	Claypans
	Sumplands, No 1 - 5.
t	Scattered Tuarts in pasture
	Pasture
.....	Track

Vegetation Associations

Banksia Woodlands

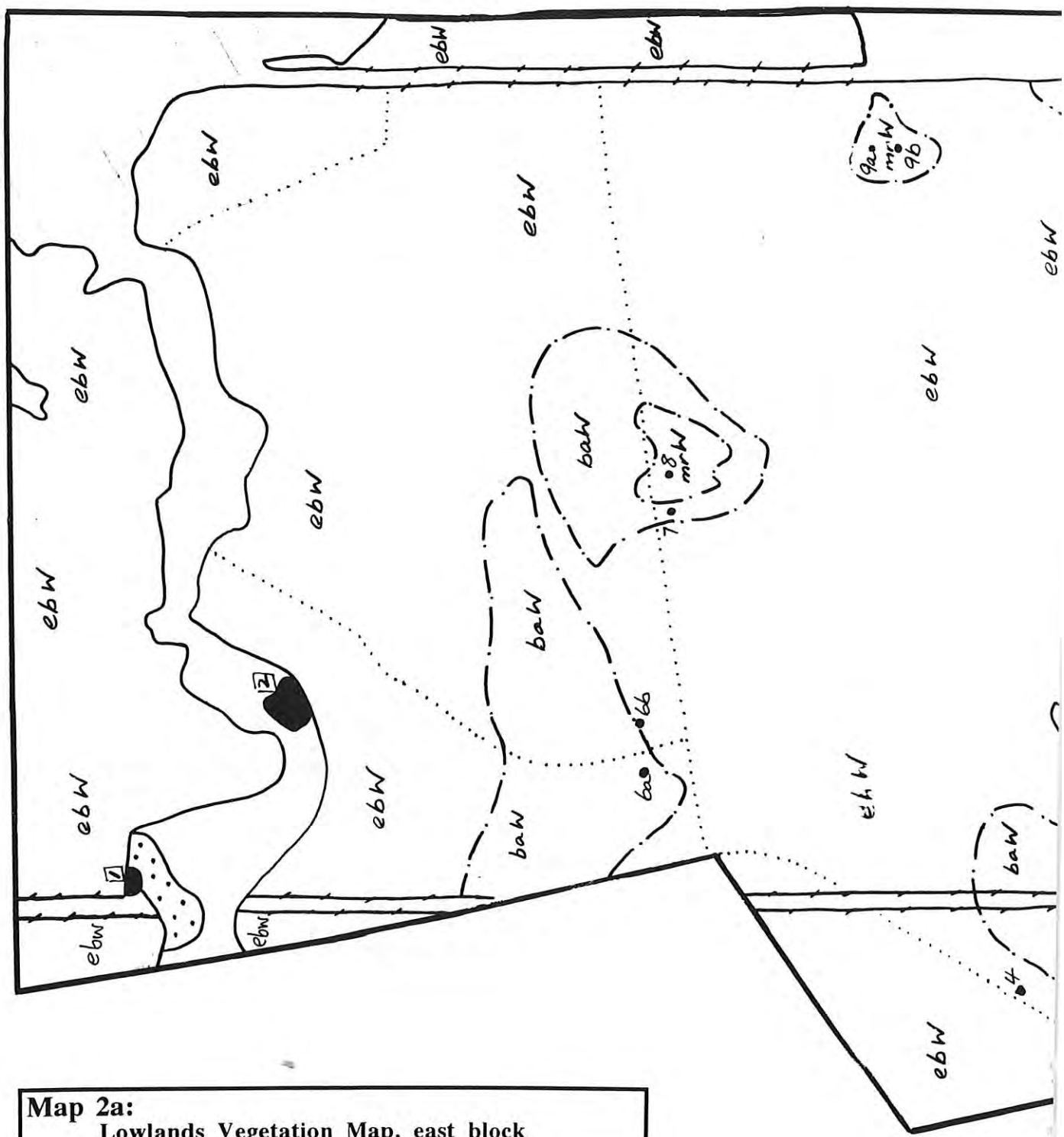
ebW	*Banksia* Woodlands to Forests with scattered emergent Eucalypts
baW	*Banksia*, *Allocasuarina fraseriana*, and/or *Melaleuca preissiana* Woodlands to Forests
bmW	*Banksia* and *Melaleuca preissiana* Woodland
tW	Tuart Woodland
jLW	*Jacksonia sternbergiana* Low Woodland
bkW	*Banksia* Woodland over *Kunzea ericifolia* Closed Tall Scrub
pb	*Banksia* Woodland in poor condition

Ephemeral Wetlands

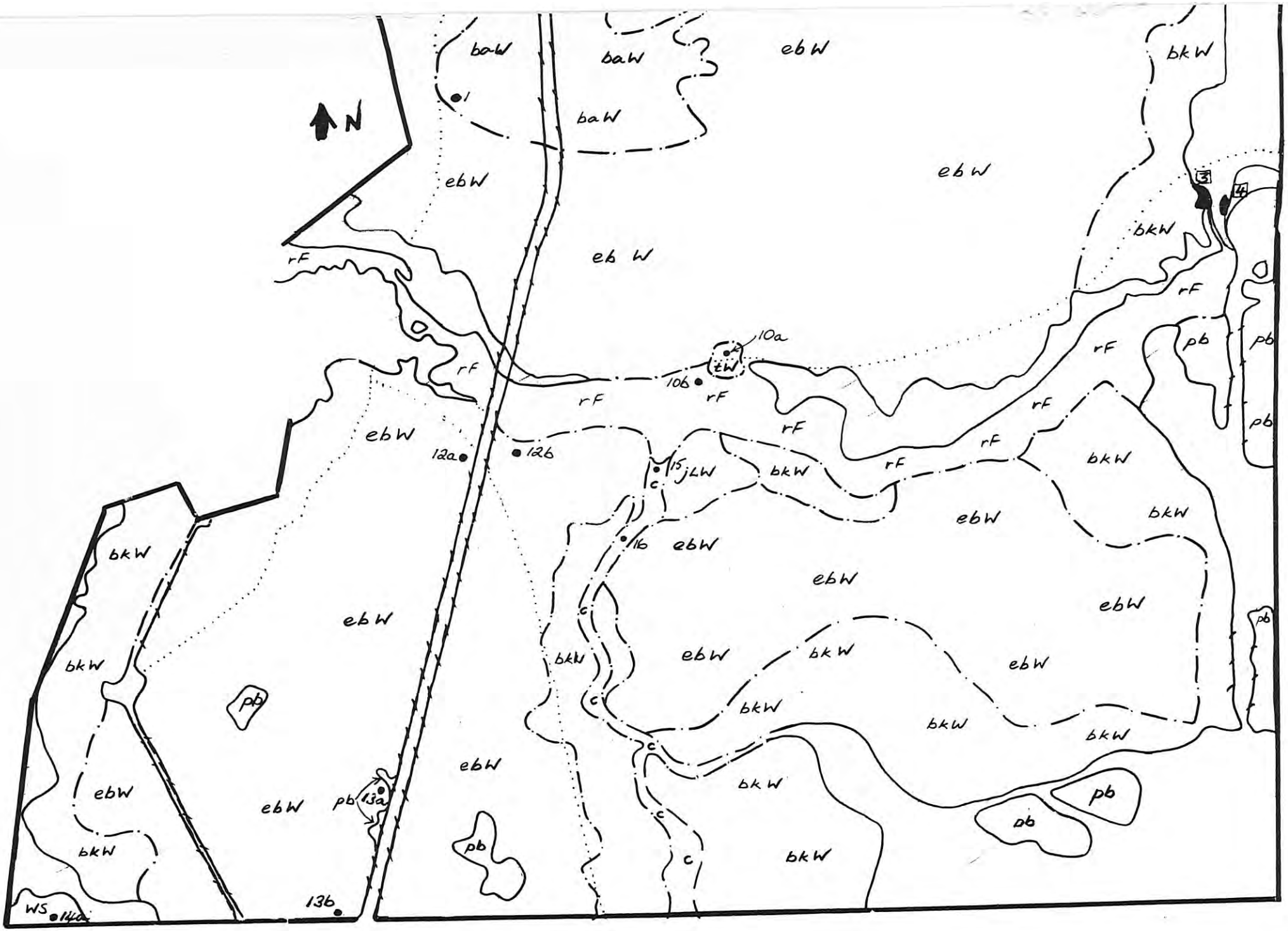
mrW	*Melaleuca rhaphiophylla* Woodland to Shrubland
WS	Woodlands over Sedgelands

River - Creekline

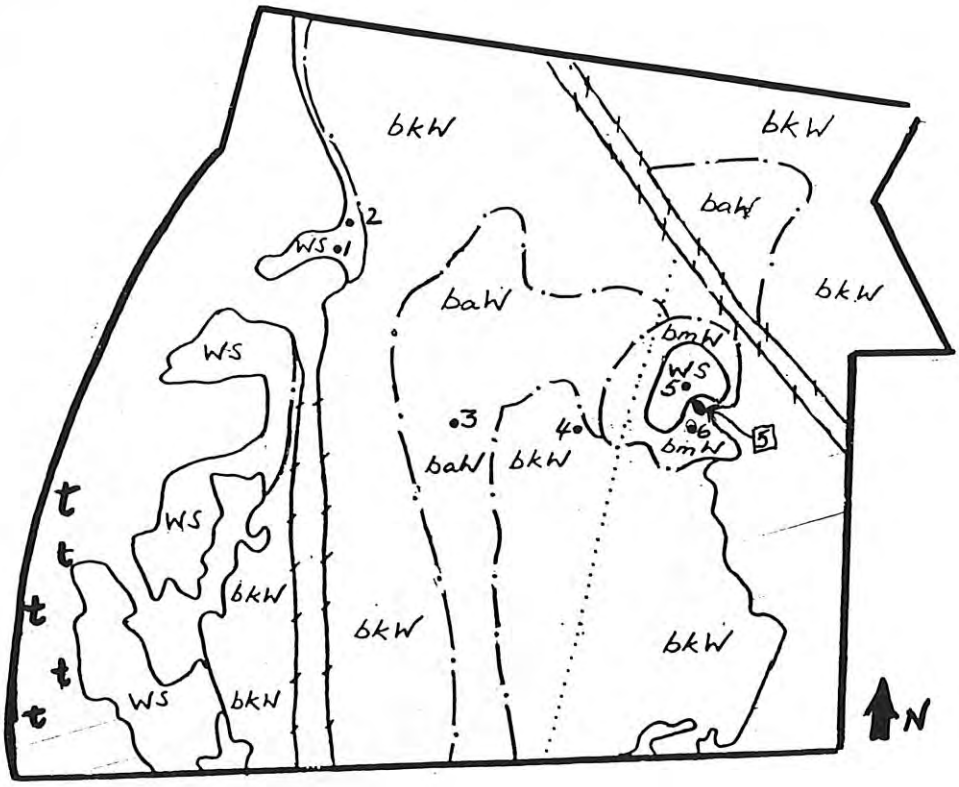
rF	*Eucalyptus rudis* Forest to Woodland
c	Scattered *Eucalyptus rudis* and *Melaleuca preissiana* Low Woodland to Open Low Woodland



Map 2a:
Lowlands Vegetation Map, east block
Key to symbols, page 20


N
baW
ebW
bkW
rF
pb
1
10a
10b
12a
12b
13a
13b
14a
15
16
WS
tW
jLW
c
3
4

Map 2b: Vegetation Associations, west block



Key to symbols, page 20

Figure 3: The Flooded (*Eucalyptus rudis*) Gum Forest with an understorey of flowering *Acacia dentifera* on the northern bank of the Serpentine River

Figure 4: A carpet of yellow *Podolepis lessonii* and Marri and Jarrah seedlings on a sandy bank of the Serpentine River

A further taxon of interest associated with the River was a glabrous, rhizomatous form of *Lagenifera huegelii*, here called *Lagenifera huegelii* subsp. "glabra". Similar habitats elsewhere on the Plain should be searched for this taxon to determine its status.

The Serpentine River banks in Lowlands with their forest of Flooded Gums festooned with Lowlands Creeper over a carpet of ferns (Figure 1, page19) provide a step back in time to our Coastal Plain rivers as they once were.

Flora

Lowlands is essentially part of an 'island of sand' on the Pinjarra Plain. Also, as the Pinjarra Plain has been selectively cleared for agriculture the "island" nature of Lowlands has been exaggerated in recent times. The flora of the Pinjarra Plain and the Bassendean Sands is very different and the Pinjarra Plain forms a barrier to plant dispersal from the large tracts of Bassendean Dunes to the north-west. This may well account for some of the interesting features of the flora

- the absence or rarity of some generally common *Banksia* Woodlands taxa
- the presence of taxa characteristic of woodlands associated with the Ridge Hill Shelf
- the absence of Perennial Veldt Grass and low levels of *Gladiolus caryophyllaceus*

A similar absence of 'expected' taxa on some of the disjunct lateritic uplands in the Mount Leseur area has been observed by E.A. Griffin (pers comm.).

CONCLUSION

The Lowlands bushland is of very high conservation value as it contains:

- mature *Banksia* Woodlands including mature examples most of the dominant tree species characteristic of the Swan Coastal Plain (*Banksia attenuata*, *B. menziesii*, *B. ilicifolia*, *B. grandis*, *Eucalyptus rudis*, *E. marginata*, *Allocasuarina fraseriana* and *Melaleuca preissiana*)
- a diversity of floristic community types in a unique combination
- significant areas of *Banksia* Woodland of community types 21a and 21c
- a rare example of intact riverine communities
- populations of two species of DRF, two further species which may warrant recognition as DRF, five priority taxa and several other significant taxa.
- a significant habitat area.

These natural heritage values together with Lowlands unique cultural heritage makes it an area of outstanding heritage value well deserving listing on the Register of the National Estate and recognition in Western Australia as both a natural and cultural heritage conservation area.

ACKNOWLEDGEMENTS

A preliminary visit to Lowlands by Bronwen Keighery (Wildflower Society), Joan Payne (Conservation Council) and Allan Burbidge and Gregory Keighery (CALM) to meet with Midge Richardson (Lowlands property owner) in May 1992 laid the basis for this survey work.

Four weekend field sessions were held at Lowlands between 1992 and 1994 and Midge Richardson and Mark Angeloni are thanked for their hospitality and support. On two of these weekends survey work was also supported by the enthusiaistic and effective participation of volunteers from the Swan Coastal Plain Survey: Brian, John, Deidre, Leah, Pauline, Lorrine, Kate, Liz, Warick, Jan, Jeanette, Helen, Keld, Rae, Rodney, Anne, Mary, Jeff, Margaret, Jennifer, Rosemary, Sarah, Meredith, Eliane, Lucy, Mike, Alexander and Mary. Thanks to Helen Fredricksen, Pauline Fairall and Mike Hislop for leading groups in the field. The Swan Coastal Plain Survey was a volunteer program run jointly with the Wildflower Society and the Department of Conservation and Land Management, funded in part by the National Estates Grants Program.

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Appendix 1: Lowlands Bushland Vegetation Site Descriptions

Aerial Photo: MSD 1991 Run 9 5144, 10 5049 &5051 and 11 5047.

Sites are grouped on the basis of the Mapping Units (Map 2) and the Floristic Community Type. The vegetation descriptions are based on Aplin (1979) and condition ratings are based on a scale developed by Trudgen (1990).

Mapping Unit - ebW, tW (Site 10a), **pb**
Banksia Woodlands to Forests with scattered emergent Eucalypts; Jarrah, Marri and on one occasion Tuart.

Floristic Community Type 21a

Site 4:
Scattered emergent Jarrah over *Banksia attenuata, B. menziesii, Xylomelum occidentale* and *Allocasuarina fraseriana* Open Forest to Woodland over *Kunzea ericifolia* Tall Shrubland over *Macrozamia reidlii* and *Stirlingia latifolia* Shrubland over mixed Open Herbland and *Loxocarya flexuosa* Sedgeland

CONDITION	Very Good		
Soil:	grey sand over yellow sand: B 2a, Van Gool (1990)or S8 Gozzard (1983)		
Litter	40%	Bare Ground	<1%
Drainage:	good	Aspect:	flat, dune ridge

Site 10a:
Tuart (*Eucalyptus gomphocephala*) Open Forest over *Kunzea ericifolia* Tall Open Shrubland over *Pteridium esculentum* Ferns, mixed Herbland and *Loxocarya flexuosa* Very Open Sedgeland

CONDITION	Good		
Soil:	humus rich grey sand over grey sand: B 3, Van Gool (1990) or S8 Gozzard (1983)		
Litter	0%	Bare Ground	<1%
Drainage:	good	Aspect:	flat, sandy bank beside the river

Site 12a:
Scattered emergent Jarrah over *Allocasuarina fraseriana, Banksia attenuata, B. ilicifolia* and *B. menziesii* Open Forest over *Kunzea ericifolia* and *Xylomelum occidentale* Shrubland over *Brachyloma preissii* Low Open Shrubland over mixed Open Herbland and *Loxocarya flexuosa* Sedgeland

CONDITION	Very Good to Good		
Soil:	grey sand over grey sand: B 2, Van Gool (1990)or S8 Gozzard (1983)		
Litter	<70%	Bare Ground	<2%
Drainage:	good	Aspect:	flat, dune ridge

Site 12b:
Jarrah Woodland over *Banksia attenuata, B. grandis* and *Allocasuarina fraseriana* Low Woodland over *Kunzea ericifolia* and *Xylomelum occidentale* Shrubland over *Brachyloma preissii* and *Macrozamia reidlii* Low Shrubland over mixed Very Open Herbland and *Loxocarya flexuosa* Sedgeland

CONDITION	Very Good to Good		
Soil:	grey sand over grey sand: B 2, Van Gool (1990)or S8 Gozzard (1983)		
Litter	<60%	Bare Ground	>2%
Drainage:	good	Aspect:	flat, dune ridge

Site 13a:
Marri Woodland over *Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Low Woodland over *Stirlingia latifolia* Open Low Heath over mixed Open Herbland and *Loxocarya flexuosa* Sedgeland

CONDITION	Very Good		
Soil:	cream sand over cream sand: B 2, Van Gool (1990)or S8 Gozzard (1983)		
Litter	40%	Bare Ground	0%
Drainage:	good	Aspect:	flat, dune ridge

Floristic Community Type 23a

Site 13b

***Banksia attenuata, B. menziesii* and *B. ilicifolia* Open to Low Open Forest over *Melaleuca thymoides* and *Scholtzia involucrata* Open Shrubland over *Stirlingia latifolia* Low Shrubland over Very Open Herbland and Very Open Sedgeland**

CONDITION	Very Good		
Soil:	grey sand over grey sand: B 2a, Van Gool (1990) or S8 Gozzard (1983)		
Litter	20%	Bare Ground	40%
Drainage:	good	Aspect:	flat

Mapping Unit - baW, bmW, bkW, jLW
Banksia Woodlands associated with high densities of *Allocasuarina fraseriana*, and/or *Melaleuca preissiana*.
Floristic Community Type 21c

Site 1:

***Banksia attenuata* and *B. menziesii* Open Forest to Woodland over *Kunzea ericifolia* and *Adenanthos cygnorum* Tall Open Shrubland over Low Shrubland over mixed Open Herbland and *Loxocarya flexuosa* Very Open Sedgeland**

CONDITION	Very Good		
Soil:	grey sand over grey sand: B 2a, Van Gool (1990)or S8 Gozzard (1983)		
Litter	70%	Bare Ground	0%
Drainage:	good	Aspect:	flat, dune ridge

Site 6a:

Jarrah (*Eucalyptus marginata*), *Banksia grandis*, *B. ilicifolia*, *B. attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Open Forest over scattered *Kunzea ericifolia* over *Xanthorrhoea preissii* and *Scholtzia involucrata* Low Open Shrubland over *Cyathochaeta avenacea* Very Open Sedgeland

CONDITION	Very Good		
Soil:	humus rich grey sand over grey sand: B 2a, Van Gool (1990)or S8 Gozzard (1983)		
Litter	98%	Bare Ground	0%
Drainage:	good	Aspect:	gentle, NW, dune slope

Site LOW 6b:

Jarrah (*Eucalyptus marginata*) Tall Open Forest over *Melaleuca preissiana*, *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Open Forest over scattered *Kunzea ericifolia* over mixed Open Herbland over *Loxocarya flexuosa*, *Hypolaena exsulca* and *Lepidosperma angustatum* Open Sedgeland

CONDITION	Very Good		
Soil:	grey sand over white sand: B 2a, Van Gool (1990)or S8 Gozzard (1983)		
Litter	<70%	Bare Ground	2 - 10%
Drainage:	good	Aspect:	flat, dune swale

Site LOW 7

Marri Woodland over *Banksia attenuata, B. menziesii* and *B. ilicifolia* Low Open Forest over *Xanthorrhoea preissii* Low Shrubland over *Loxocarya flexuosa* Closed Sedgeland

CONDITION	Very Good		
Soil:	white sand over grey sand: B 3, Van Gool (1990)or S8 Gozzard (1983)		
Litter	<70%	Bare Ground	0%
Drainage:	good	Aspect:	gentle, E, dune slope

Site HYMUS 3:

***Banksia attenuata* and *B. menziesii* Low Woodland over *Kunzea ericifolia* Tall Shrubland over *Brachyloma preissii* and *Scholtzia involucrata* Low Open Heath to Low Shrubland over *Loxocarya flexuosa* Open Sedgeland**

CONDITION	Very Good		
Soil:	white sand over grey sand: B 2, Van Gool (1990)or S8 Gozzard (1983)		
Litter	60%	Bare Ground	10%
Drainage:	good	Aspect:	flat, dune ridge

Site HYMUS 4:

***Banksia attenuata* Low Woodland over *Kunzea ericifolia* Tall Open Shrubland over *Hibbertia* species Low Open Shrubland over *Loxocarya flexuosa* Open Sedgeland**

CONDITION Very Good
Soil: grey sand over white sand: B 4, Van Gool (1990)or S8 Gozzard (1983)
Litter 98% Bare Ground 0%
Drainage: good Aspect: flat, dune ridge

Mapping Unit - mrW
Melaleuca rhaphiophylla Woodland to Shrubland
Floristic Community Type 5

Site LOW 8:

***Melaleuca rhaphiophylla* Low Open Woodland *Kunzea ericifolia* Tall Open Scrub over *Astartea* aff. *fascicularis* Shrubland over mixed Open Herbland**

CONDITION Very Good to Good
Soil: black humus rich sand over black humus rich sand: B3 Van Gool (1990) or S8, Gozzard (1983)
Litter 45% Bare Ground 20%
Drainage: moderate, sumpland Aspect: flat

Site LOW 9a

Scattered *Melaleuca rhaphiophylla* to Low Open Woodland *Kunzea ericifolia* Tall Shrubland over *Pericalymma ellipticum* Shrubland over mixed Open Herbland and Very Open Sedgeland

CONDITION Very Good to Good
Soil: black humus rich sand over grey sand: B3 Van Gool (1990) or S8, Gozzard (1983)
Litter 2 - 10% Bare Ground 2 - 10%
Drainage: poor, sumpland Aspect: flat

Site LOW 9b

***Kunzea ericifolia* and *Melaleuca rhaphiophylla* Tall Open Shrubland over Low Open Shrubland over Open Herbland and Open Sedgeland**

CONDITION Very Good to Good
Soil: grey sand over grey sand: B3 Van Gool (1990) or S8, Gozzard (1983)
Litter 2% Bare Ground 2 - 10%
Drainage: poor, sumpland Aspect: flat

Mapping Unit - WS
Woodlands over Sedgelands where the dominants may be *Melaleuca preissiana*, Marri or Flooded Gum.

Floristic Community Type 4

Site LOW 14a:

Scattered *Melaleuca preissiana* over *Melaleuca rhaphiophylla* Low Open Woodland over *Astartea* aff. *fascicularis* Open Heath over *Hypocalymma angustifolium*, *Eriostemon spicatus* and *Xanthorrhoea preissii* Open Shrubland over *Restio stenostachyus* Closed Sedgeland

Adjacent areas have patches of Herbland and Sedgeland which were small in area and showed a greater level of disturbance, being interspersed with patches of weeds.

CONDITION Very Good to Good
Comments: Throughout this area there are patches of pasture as much of the area was originally cleared.
Soil: black humus rich sand over clay: B4 (adjacent is P6c) Van Gool (1990) or S10, Gozzard (1983)
Litter 50% Bare Ground 0%
Drainage: very poor, palusplain Aspect: flat

Site ROWE 2

***Melaleuca preissiana* Low Open Woodland over *Pericalymma ellipticum* Open Heath over *Evandra pauciflora* and *Restio stenostachyus* Open Sedgeland**

CONDITION Very Good
Comments: The road reserve has not been grazed and it is highly likely that this site is a better representation of the vegetation of this area than the site located in the Lowlands property.
Soil: black humus rich sand over clay: B4 (adjacent is P6c) Van Gool (1990) or S10, Gozzard (1983)
Litter 50% Bare Ground 0%
Drainage: very poor, palusplain Aspect: flat

Floristic Community Type 11

Site HYMUS 1

Marri Open Forest over Flooded Gum (*Eucalyptus rudis*) Low Open Woodland over *Astartea* aff. *fascicularis* Tall Open Shrubland over *Vulpia* Very Open Grassland, *Opercularia hispidula* Open Herbland and *Restio stenstachyus* Closed Sedgeland

CONDITION	Good		
Comments:	Throughout this area there are patches of pasture as much of the area was originally cleared.		
Soil:	peaty sandy clay over peaty sandy clay : P10 Van Gool (1990) or S10, Gozzard (1983)		
Litter	>70%	Bare Ground	<2%
Drainage:	poor, palusplain	Aspect:	flat

Site HYMUS 2:

Scattered *Melaleuca preissiana* over *Melaleuca rhaphiophylla* Low Woodland over *Astartea* aff. *fascicularis* Tall Shrubland over *Vulpia* Very Open Grassland, *Cotula corynopifolia* Closed Herbland and *Lepidosperma longitudinale* Very Open Sedgeland

Adjacent areas have patches of Herbland and Sedgeland which were small in area and showed a greater level of disturbance, being interspersed with patches of weeds.

CONDITION	Poor		
Comments:	Throughout this area there are patches of pasture as much of the area was originally cleared.		
Soil:	black/grey clay over grey/brown sandy clay: P10, Van Gool (1990) or S10, Gozzard (1983)		
Litter	<5%	Bare Ground	10%
Drainage:	poor, palusplain	Aspect:	flat

Site HYMUS 5:

***Melaleuca rhaphiophylla* Low Open Forest over *Vulpia Very Open Grassland, *Lotus and *Stylidium* species Closed Herbland and *Lepidosperma longitudinale* Sedgeland**

Adjacent areas have patches of Herbland and Sedgeland which were small in area and showed a greater level of disturbance, being interspersed with patches of weeds.

CONDITION	Poor		
Soil:	brown sand over brown sand: B4, Van Gool (1990) or Cps, Gozzard (1983)		
Litter	30 - 70%	Bare Ground	<2%
Drainage:	poor, palusplain	Aspect:	flat

Site HYMUS 6:

***Melaleuca rhaphiophylla* Low Open Woodland over *Astartea* aff. *fascicularis* and *Melaleuca lateritia* Open Shrubland over *Agrostis avenacea* Very Open Grassland, mixed Herbland and *Lepidosperma longitudinale* Sedgeland**

Adjacent areas have patches of Herbland and Sedgeland which were small in area and showed a greater level of disturbance, being interspersed with patches of weeds.

CONDITION	Very Good to Good		
Soil:	grey sand over grey sand: B4, Van Gool (1990) or Cps, Gozzard (1983)		
Litter	2 - 10%	Bare Ground	0%
Drainage:	poor, palusplain	Aspect:	flat

Site ROWE 1

Marri Closed Forest over *Opercularia hispidula* Open Herbland and *Lepidosperma longitudinale* Closed Sedgeland

CONDITION	Good		
Soil:	sandy clay over ?clay: B4 , Van Gool (1990) or S10, Gozzard (1983)		
Litter	90%	Bare Ground	0%
Drainage:	poor, palusplain	Aspect:	flat

Mapping Unit - rF
Eucalyptus rudis Forest to Woodland
Floristic Community Type 11

Site LOW 10b:
Flooded Gum Tall Closed to Open Forest over Bracken Fernland over *Lepidosperma longitudinale* and *Carex preissii* Open Sedgeland

CONDITION	Good		
Soil:	brown humus rich sand over grey sand: P10 , Van Gool (1990) or Msc1, Gozzard (1983)		
Litter	50%	Bare Ground	0%
Drainage:	variable, river bank	Aspect:	steep, southern bank

Two sites are described from the southern creekline but these were not used in the floristic survey.

Site LOW 15
Flooded Gum Woodland to Open woodland over *Melaleuca preissiana* Low Open Forest to Woodland over exotic Grassland, Herbland and Very Open Sedgeland
CONDITION Poor
Soil: B5 , Van Gool (1990)

Site LOW 16
Flooded Gum Open Forest to Woodland over *Melaleuca rhaphiophylla* Low Open Forest to Woodland over *Astartea* aff. *fascicularis* Shrubland over Bracken Fernland, exotic Grassland, Herbland and Open Sedgeland
CONDITION Poor
Soil: B5 , Van Gool (1990)

Appendix 2: Flora of Lowlands

Records are from the Swan Coastal Plain database, LOW - 15 sites and HYMUS - 6 sites and opportunistic collections by G.J. Keighery, B.J. Keighery and N. Gibson 1992 - 94.
Taxa are listed alphabetically in family groups with Ferns and Fern Allies, Cycads and Flowering Plants listed separately.
Names used are from Marchant *et al.* and Gibson *et al.* 1994 unless otherwise indicated.

Key

Column 1
I = taxon of interest
U = Uncommon
Conservation and Land Management Declared Rare Flora and Priority Taxa (Atkins 1994)
R = Declared Rare Flora
1 = Priority 1: Poorly Known Taxa
2 = Priority 2: Poorly Known Taxa
3 = Priority 3: Poorly Known Taxa
4 = Priority 4: Rare Taxa

Column 2
***** = non-native taxon (weed)
ms = manuscript name, not formally described

Columns 5 - 7
Columns 5 -7 are determined by:

Vegetation Unit	Sites	Floristic Community Type (Gibson *et al.*1994)
bW Banksia Woodland (mapped as ebW, bkW, baW, Map 2)		
Eucalypts over *Banksia* Woodland (mapped as ebW, Map 2)		
	LOW 4, 10a, 12a&b,13a	21a (Central *Banksia*/Jarrah Woodlands)
	LOW 13b	23a (Central *Banksia* Woodlands)
Mixed Wet *Banksia* Woodlands (mapped as bkW, baW)		
	HYMUS 3&4; LOW 1, 6a&b, 7	21c (Low lying Banksia Woodlands)
mW *Melaleuca rhaphiophylla* Woodland to Shrubland (mapped as mrW, Map 2)		
Melaleuca rhaphiophylla Woodland to Shrubland		
	LOW 8, 9a&9b	5 (Mixed Shrub Damplands)
WS Woodlands over Sedgelands (mapped as WS, Map 2)		
Woodlands over Sedgelands		
	HYMUS 1,2,5&6, ROWE 1	11 (Wet Forests and Woodlands)
	LOW 14a; ROWE 2	4 (*Melaleuca preissiana* damplands)
rF *Eucalyptus rudis* Forest to Woodland (mapped as rF, Map 2)		
Eucalyptus rudis Forest to Woodland		
	LOW 10b	11 (Wet Forests and Woodlands)
Dis Degraded margins between bushland and pasture or pasture		

+ = present in this vegetation unit
H = confined to the east block (HYMUS sites)
T = confined to the Tuart Woodland, see map 2
C = confined to the drainage lines (not permanent)
B = confined to the banks of the river (permanent)
No = Floristic Community Type (Gibson *et al.*), indicating that the taxa is confined to this Type.
S = Sumpland, see Map 2
Cp = Claypans, see Map 2

	rF	mW	WS	bW	Dis
FERNS and FERN ALLIES					
Adiantaceae					
Adiantum aethiopicum	+				
Cheilanthes austrotenuifolia	+				
Dennstaedtiaceae					
Pteridium esculentum	+			+T	
Lycopodiaceae					
Phylloglossum drummondii		+	+		Cp
Selaginellaceae					
Selaginella gracillima		+			Cp
CYCADS					
Zamiaceae					
Macrozamia riedlei				+	
FLOWERING PLANTS					
Amaranthaceae					
Alternanthera nodiflora	+	+	+		+
Ptilotus drummondii				+	
Amaryllidaceae					
* Amaryllis belladonna					+
* Narcissus tazetta					+
Anthericaceae					
Arnocrinum preissii				+	
Caesia micrantha		+	+	+	
Caesia occidentalis			+	+	
Chamaescilla corymbosa		+	+	+	
Corynotheca micrantha				+	
Dichopogon capillipes				+	
Johnsonia aff. pubescens GJK 5249				+	
Laxmannia ramosa				+	
Laxmannia squarrosa				+	
Sowerbaea laxiflora		+	+	+	
Thysanotus arbuscula				+	
?Thysanotus arenarius					
Thysanotus dichotomus				+	
Thysanotus manglesianus				+	
Thysanotus multiflorus			+		
Thysanotus patersonii				+	
Thysanotus sparteus				+	
Thysanotus thyrsoideus		+	+	+	
Tricoryne elatior					
Tricoryne tenella				+	
Apiaceae					
Daucus glochidiatus				+T	
Eryngium pinnatifidum subsp. pinnatifidum				+T	

	rF	mW	WS	bW	Dis
1 Eryngium pinnatifidum subsp. "palustre" ms (BJK & NG 744)			+		
Homalosciadium homalocarpum				+	
Hydrocotyle alata		+	+		
Schoenolaena juncea		+			
Trachymene pilosa		+	+	+	
Xanthosia huegelii				+	
Apocynaceae					
2 Parsonsia diaphanophleba	+				
Araceae					
* Zantedeschia aethiopica	+				
Asparagaceae					
* Myrsiphyllum asparagoides	+				
Asteraceae					
* Arctotheca calendula	+			+	+
* Aster subulatus	+	+	+		+
Asteridea pulverulenta				+	
Brachyscome bellidioides		+	+		
* Carduus pycnocephalus	+				
* Centaurea melitensis		+	+		
* Cirsium vulgare		+	+		
* Conyza albida	+				+
Cotula australis	+				
* Cotula bipinnata	+				+
Cotula coronopifolia			+		
* Gnaphalium falcatum	+				
I Gnephosis angianthoides (GJK & BJK sn)	+				
Hyalosperma cotula				+	
* Hypochaeris glabra	+	+	+	+	+
Lagenifera huegelii				+	
I Lagenifera huegelii subsp. "glabra"ms (GJK 13370)	+				
Millotia tenuifolia		+	+		
Myriocephalus helichrysoides			+		
Podolepis gracilis				+	
Podolepis gracilis "Swamp" (GJK 13 126)				+	
Podolepis lessonii		+	+		
Podotheca chrysantha				+	
Podotheca gnaphalioides				+	
Quinetia urvillei				+	
Siloxerus filifolius			+H		
Siloxerus humifusus		+	+		
* Sonchus asper	+				
Sonchus hydrophilus	+				
* Sonchus oleraceus	+	+	+	+	+
* Ursinia anthemoides	+	+	+	+	+
* Vellereophyton dealbatum	+				
Waitzia citrina				+H	
Waitzia paniculata				+	
Waitzia suaveolens				+	
Brassicaceae					
Cardamine paucijuga	+				
Stenopetalum robustum				+T	

	rF	mW	WS	bW	Dis
Campanulaceae					
* Wahlenbergia capensis	+			+	
Wahlenbergia preissii	+				
Caryophyllaceae					
* Cerastium glomeratum	+				+
* Corrigiola litoralis	+	+	+		+
* Moenchia erecta	+				+
* Petrorhagia velutina	+	+	+		+
* Polycarpon tetraphyllum	+				+
* Silene gallica	+				+
* Spergula arvensis	+				+
* Stellaria media	+			+	+
Casuarinaceae					
Allocasuarina fraseriana				+	
U Casuarina obesa					+
Centrolepidaceae					
Aphelia cyperoides		+	+		Cp
Brizula nutans		+			
Centrolepis aristata		+	+		
Centrolepis drummondiana				+	
Centrolepis glabra		+	+		
Centrolepis mutica		+	+		
Centrolepis pilosa				+	
Chenopodiaceae					
* Chenopodium ambrosioides					+R
Chenopodium pumilio	+				
Colchicaceae					
Burchardia multiflora		+	+		
Burchardia congesta#			+	+	
Commelinaceae					
Cartonema philydroides				+	
Crassulaceae					
Crassula colorata				+	
* Crassula decumbens		+	+		
* Crassula natans					
Crassula pedicellosa	+			+	
Cyperaceae					
Baumea juncea	+			+	
?Baumea preissii	+				
Baumea vaginalis	+	+	+		
Carex preissii	+				
Cyathochaeta avenacea		+	+	+	
* Cyperus congestus	+				
* Cyperus tenellus		+	+		
Evandra pauciflora			+4		
Isolepis cernua		+	+	+	
Isolepis marginata		+	+		
Isolepis nodosa		+	+		
Isolepis oldfieldiana		+	+		

	rF	mW	WS	bW	Dis
Isolepis stellata		+	+		
Lepidosperma angustatum				+	
Lepidosperma effusum	+				
Lepidosperma longitudinale			+		
Lepidosperma squamatum				+	
U Mesomelaena pseudostygia				+	
Mesomelaena tetragona				+	
Schoenus clandestinus				+	
Schoenus curvifolius				+	
Schoenus sp. BJK & NG 111			+		
Schoenus rodwayanus			+		
Schoenus tenellus		+	+		
Tetraria octandra				+	
Dasypogonaceae					
Dasypogon bromeliifolius				+	
U Kingia australis					+
Lomandra caespitosa				+	
Lomandra hermaphrodita				+	
Lomandra micrantha				+	
Lomandra nigricans				+	
Lomandra odora		+			
Lomandra preissii			+	+	
Lomandra sericea				+	
Lomandra suaveolens				+	
Dilleniaceae					
Hibbertia commutata	+B			+	
Hibbertia huegelii				+	
Hibbertia hypericoides				+	
Hibbertia racemosa				+	
Hibbertia stellaris		+	+		
Hibbertia subvaginata				+	
Hibbertia vaginata				+	
Droseraceae					
Drosera erythrorhiza				+	
Drosera gigantea			+		
Drosera gigantea sthest subsp. geniculata ms		+	+		
Drosera glanduligera		+	+	+	
Drosera heterophylla				+	
Drosera leucoblasta				+	
Drosera macrantha 'robust form'			+		
Drosera macrantha subsp. macrantha ms (BJK & NG 228)			+		
Drosera menziesii subsp. menziesii		+	+		
Drosera menziesii subsp. penicillaris				+	
Drosera neesii "pink southern form" BJK&NG 096	+				
Drosera nitidula		+	+		
Drosera paleacea subsp. paleacea				+	
Drosera pallida			+	+	
Drosera stolonifera subsp. porrecta				+	
Epacridaceae					
Brachyloma preissii				+	
4I Conostephium minus				+23a	
Conostephium pendulum				+	
Conostephium preissii				+	

		rF	mW	WS	bW	Dis
	Leucopogon australis				+	
	Leucopogon conostephioides				+	
	Leucopogon parviflorus				+	
	Leucopogon propinquus				+	
U	Styphelia tenuiflora				+	
	Euphorbiaceae					
	Phyllanthus calycinus				+	
	Poranthera microphylla				+	
*	Ricicinus communis	+				
	Fumariaceae					
*	Fumaria capreolata	+				
*	Fumaria muralis	+				
	Gentianaceae					
*	Cicendia filiformis		+	+		
	Geraniaceae					
*	Geranium molle	+				
*	Pelargonium capitatum	+				
	Goodeniaceae					
	Dampiera linearis		+	+		
	Goodenia micrantha		+	+		
	Goodenia pulchella		+	+		
U	Lechenaultia biloba				+	
	Velleia trinervis			+		
	Haemodoraceae					
	Anigozanthos manglesii				+	
	Conostylis aculeata				+	
	Conostylis juncea				+	
	Conostylis setigera				+	
	Haemodorum laxum				+	
	Haemodorum paniculatum	+			+	
	Haemodorum sparsiflorum		+	+		
	Haemodorum spicatum				+	
	Phlebocarya ciliata				+	
	Tribonanthes australis		+	+		
	Haloragaceae					
	Gonocarpus pithyoides				+	
	Hypoxidaceae					
	Hypoxis glabella		+	+		
	Hypoxis occidentalis		+	+		
	Iridaceae					
*	Gladiolus undulatus	+				
U*	Gladiolus caryophyllaceus				+	
	Patersonia occidentalis				+	
	Patersonia occidentalis (swamp form)			+		
*	Romulea rosea var. rosea				+	
*	Romulea rosea var. australis	+				
*	Watsonia bulbillifera	+				

		rF	mW	WS	bW	Dis
Juncaceae						
*	Juncus bufonius		+	+		
*	Juncus capitatus	+	+	+		
	Juncus pallidus		+	+		
I	Juncus pauciflorus	+				
*	Juncus polyanthemus	+				
	Luzula meridionalis				+	
Juncaginaceae						
	Triglochin procerum	+	+	+		
Lamiaceae						
	Hemiandra linearis				+	
	Hemiandra pungens				+	
*	Lavandula stoechas	+				
*	Mentha pulegium					S
*	Mentha Xpiperita	+				
*	Stachys arvensis	+				
Lauraceae						
	Cassytha glabella		+	+		
	Cassytha racemosa		+	+	+	
Lemnaceae						
	Lemna trisulca	+				
Lentibulariaceae						
	Polypompholyx multifida		+	+		
Linaceae						
	Linum marginale	+				
Lobeliaceae						
	Lobelia alata	+		+		
	Lobelia tenuior					
*	Monopsis debilis		+	+		Cp
Loganiaceae						
	Mitrasacme paradoxa		+	+	+	
Loranthaceae						
	Nuytsia floribunda				+	
Malvaceae						
*	Malva parviflora	+				
U	Sida hookeriana	+				
Menyanthaceae						
	Villarsia albiflora			+		
Mimosaceae						
I	Acacia dentifera	+				
	Acacia huegelii				+	
U	Acacia pulchella				+	
	Acacia saligna	+B				
	?Acacia spathulata					
	Acacia stenoptera				+	

		rF	mW	WS	bW	Dis
	Acacia willdenowiana				+	
U	Paraserianthes lophantha	+				
	Molluginaceae					
	Macarthuria australis				+	
	Myrtaceae					
	Agonis linearifolia	+				
	Astartea aff. fascicularis	+	+	+		
	Baeckea camphorosmae	B			+	
	Calytrix angulata				+	
	Calytrix flavescens				+	
	Darwinia citriodora	+				
	Eucalyptus calophylla	B		+	+	
	Eucalyptus gomphocephala	B			T	
	Eucalyptus marginata				+	
	Eucalyptus rudis	+		+		
	Hypocalymma angustifolium	+	+	+		
	Kunzea ericifolia				+	
	Melaleuca lateritia		+	+		
	Melaleuca preissiana		+	+	+	
	Melaleuca rhaphiophylla		+	+		
	Melaleuca teretifolia			+		
	Melaleuca thymoides				+	
	Pericalymma "floridum" (BJK & NG 47)			+4		
	Pericalymma ellipticum (BJK & NG 5)		+	+		
	Regelia ciliata			+		
	Scholtzia involucrata				+	
	Verticordia densiflora		+	+		
	Onagraceae					
	Epilobium billardierianum	+				
	Orchidaceae					
	Acianthus reniformis				+	
	Caladenia discoidea				+	
	Caladenia flava				+	
	Caladenia flava X latifolia				+	
R	Caladenia huegelii				+	
	Caladenia latifolia				+	
	Caladenia macrostylis				+	
	Caladenia reptans				+	
	Caladenia sericea				+	
	Cyrtostylis robusta				+	
R	Drakaea elastica				+	
	Drakaea glyptodon				+	
	Drakaea livida				+	
	Elythranthera brunonis				+	
	Elythranthera emarginata			+		
	Eriochilus dilatatus				+	
	Eriochilus helonomos		+	+		
	Leporella fimbriata				+	
	Lyperanthus nigricans				+	
	Microtis media subsp. media		+	+		
*	Monadenia bracteata	+	+	+	+	
	Paracaleana nigrita				+	
	Prasophyllum parvifolium			+		

	rF	mW	WS	bW	Dis
Pterostylis aff. nana (BJK & NG 1003)				+	
Pterostylis concava				+	
Pterostylis recurva				+	
Pterostylis vittata				+	
Thelymitra aff. holmesii				+	
Thelymitra antennifera		+	+		
Thelymitra campanulata				+	
Thelymitra crinita				+	
Thelymitra flexuosa		+	+		
Thelymitra fuscolutea				+	
Orobanchaceae					
* Orobanche minor	+	+	+	+	
Oxalidaceae					
* Oxalis glabra	+				
Oxalis perennans	+			T	
* Oxalis pes-caprae	+				
* Oxalis purpurea	+				
Papilionaceae					
Aotus gracillima		+	+		
Aotus procumbens		+	+		
Bossiaea eriocarpa			+	+	
Daviesia physodes			+	+	
Daviesia triflora				+	
I Dillwynia dillwynioides		+			
Eutaxia virgata		+	+		
Gompholobium marginatum				+	
Gompholobium polymorphum				+	
Gompholobium tomentosum			+	+	
Hardenbergia comptoniana				+	
Hovea trisperma var. trisperma				+	
Isotropis cuneifolia				+	
Jacksonia aff. sericea "swamp form" (BJK & NG 830)			+	+	
Jacksonia furcellata				+	
Jacksonia sternbergiana				+	
Kennedia prostrata				+	
Latrobea tenella		+	+		
* Lotus angustissimus	+	+	+		+
* Lotus suaveolens	+	+	+		+
* Lupinus angustifolius	+				+
* Lupinus cosentinii				+	+
Nemcia capitata				+	
* Ornithopus compressus	+		+		+
* Ornithopus pinnatus	+				+
* Trifolium campestre	+			+	+
* Trifolium cernuum	+			+	+
* Trifolium dubium	+			+	+
* Trifolium glomeratum	+		+		+
* Trifolium repens	+				+
* Trifolium subterraneum	+				+
* Vicia sativa subsp. sativa	+				+
Philydraceae					
Philydrella pygmaea		+	+		

		rF	mW	WS	bW	Dis
Phormiaceae						
	Dianella revoluta	+		+	+	
Pittosporaceae						
	Pronaya fraseri					
Poaceae						
	Agrostis avenacea		+	+		Cp
	Agrostis plebeia		+	+		Cp
*	Aira caryophyllea		+	+	+	
*	Aira cupaniana				+	
U	Amphibromus neesii					Cp
	Amphipogon laguroides			+		
	Amphipogon turbinatus				+	
*	Anthoxanthum odoratum			+		
*	Briza maxima	+			+	
*	Briza minor	+	+	+	+	
*	Bromus diandrus	+			+	
	Cynodon dactylon			+		
	Danthonia occidentalis				+	
*	Echinochloa crus-galli					
*	Ehrharta longiflora	+				
	Eragrostis elongata					
*	Glyceria maxima					
*	Hordeum leporinum					
*	Lagurus ovatus					
*	Lolium multiflorum					
*	Lolium rigidum					
	Microlaena stipoides	+			+	
	Neurachne alopecuroidea				+	
*	Pentaschistis airoides					
*	Phalaris angusta					
*	Phalaris paradoxa					
*	Poa annua					
	Sporobolus virginicus					
	Stipa compressa				+	
	Stipa semibarbata				+	
U	Stipa tenuifolia				+	
*	Vulpia bromoides					
*	Vulpia myuros					
Polygalaceae						
	Comesperma calymega				+	
Polygonaceae						
	Persicaria prostrata	+	+	+		+
*	Rumex acetosella	+				
*	Rumex conglomeratus	+				
*	Rumex crispus	+				
*	Rumex pulcher	+				
Portulacaceae						
	Calandrinia corrigioloides				+	
	Calandrinia liniflora				T	
Primulaceae						
*	Anagallis arvensis	+	+	+	+	

	rF	mW	WS	bW	Dis
Proteaceae					
Adenanthos cygnorum				+	
Adenanthos obovatus			+		
Banksia attenuata				+	
Banksia grandis				+	
Banksia ilicifolia				+	
Banksia littoralis		+	+		
Banksia menziesii				+	
Conospermum capitatum				+	
U Conospermum stoechadis				+	
Dryandra nivea				+	
U Dryandra sessilis				+	
Hakea prostrata				+	
Petrophile linearis				+	
Stirlingia latifolia				+	
U Synaphea spinulosa				+	
Xylomelum occidentale				+	
Ranunculaceae					
* Ranunculus muricatus	C				
* Ranunculus trilobus					S
Restionaceae					
Hypolaena exsulca			+	+	
Leptocarpus coangustatus		+	+		
Leptocarpus roycei ms		+	+		
Loxocarya fasciculata				+	
Loxocarya flexuosa				+	
Lyginia barbata				+	
Restio stenostachyus			+		
Rosaceae					
* Rubus fruticosus	+				
Rubiaceae					
* Galium divaricatum			+		
* Galium murale	+		+		
Opercularia apiciflora			+		
Opercularia hispidula			+		
Opercularia vaginata				+	
Rutaceae					
Boronia crenulata				+	
Eriostemon spicatus				+	
Santalaceae					
Leptomeria spinosa			+		
Scrophulariaceae					
Gratiola peruviana		+	+		Cp
* Parentucellia latifolia	+	+	+		
* Parentucellia viscosa	+	+	+		
* Verbascum virgatum	+				
Solanaceae					
* Solanum americanum	+				

		rF	mW	WS	bW	Dis
*	Solanum linnaeanum	+				
*	Solanum nigrum		+	+		
	Stackhousiaceae					
	Stackhousia monogyna				+	
	Stylidiaceae					
	Levenhookia pusilla				+	
	Levenhookia stipitata				+	
	Stylidium amoenum				+	
	Stylidium brunonianum				+	
	Stylidium calcaratum				+	
	Stylidium dichotomum		+	+		
	Stylidium diuroides				+	
	Stylidium hispidum				+	
1	Stylidium longitubum		+	+		
1	Stylidium mimeticum		+	+		
	Stylidium piliferum				+	
	Stylidium repens			+	+	
	Stylidium roseo-alatum		+	+		
	Stylidium schoenoides				+	
	Stylidium utricularioides		+	+		
	Typhaceae					
*	Typha orientalis	+				
	Violaceae					
	Hybanthus calycinus				+	
	Xanthorrhoeaceae					
	Xanthorrhoea brunonis	+				
	Xanthorrhoea preissii				+	

\# Previously *Burchardia umbellata*, now distinguished from the eastern Australian taxon with this name.