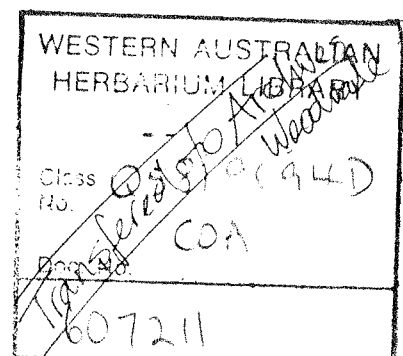


**VEGETATION SURVEY OF
RESERVE NO. 16418
AND PART RESERVE NO. 18672
WONGAN HILLS AREA**

Prepared for: Department of Conservation and
Land Management
Western Australia

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1.0 SUMMARY AND CONCLUSIONS

The Water Reserve No. 16418 (985 hectares) and remnant bushland on the Experimental Farm No. 18672 (620 hectares) were surveyed for vegetation and flora. The intricate mosaic of vegetation on the reserves is linked to the complex variation in soils, topography and underlying rock formations. The reserves lie in the Guangan Vegetation System which refers to the classical Guangan of James Drummond and is named with his original spelling which has now been standardised under the term "kwongan". Kwongan associations (shrubland and heath formations) occur on deeper sands and lateritic soils, mallee associations are found on duplex soils and salmon gum and York gum woodlands on heavier loam soils. Twenty seven vegetation associations are mapped and described including woodlands (6), mallee (3), kwongan (16), a lithic complex (granite) and salt complex (samphire).

A total of 366 plant species have been identified for the Water Reserve. This includes 5 species of gazetted rare flora (*Acacia semicircularis*, *Conostylis wonganensis*, *Gastrolobium glaucum*, *Hemigenia viscida*, *Stylidium coroniforme*) and 9 Department of Conservation and Land Management priority species. A total of 376 species have been identified for the block of bushland on the Experimental Farm including 4 species of gazetted rare flora (*Conostylis wonganensis*, *Daviesia euphorbioides*, *Gastrolobium glaucum*, *Gastrolobium hamulosum*) and 8 Department of Conservation and Land Management priority species.

Both areas surveyed have a high level of floristic diversity and occur in an area which is famous botanically for its rich and unique flora. The 7 gazetted rare plants recorded during the survey are confined to the kwongan associations which are species rich and extensive. However, all the vegetation associations mapped during the survey are of considerable importance to nature conservation as the surrounding district has been extensively cleared. Of special significance are the York gum (*Eucalyptus loxophleba*) and salmon gum (*Eucalyptus salmonophloia*) woodlands which grow in the heavier soils of loam and clay loam. These soil types were the first to be cleared and remaining woodland areas are now a top conservation priority in the wheatbelt. The priority species *Scaevola tortuosa* also occurs in the York gum woodlands on the Water reserve. Because of the high conservation value of these vegetation remnants the total area of the Water Reserve and the bushland block on the Experimental Farm are nominated for listing on the Register of the National Estate and it is strongly recommended that these areas be vested in the National Parks and Nature Conservation Authority for the purpose of nature conservation.

2.0 INTRODUCTION

2.1 Project Description

The aim of this project is to map the vegetation types and locate populations of rare flora on Reserve No. 16418 (Water Railway Supply, 985 ha) and part Reserve No. 18672 (Experimental Farm, 620 ha) in the Wongan-Ballidu Shire.

Reserve Nos 16418 and 18672 adjoin about 3000 ha of remnant vegetation on the 'Wongan Hills'. The actual hills have been listed on the Register of the National Estate since 1978.

The Wongan Hills include a large number of endemic species and are internationally known as an area of high flora conservation value. To date, vegetation surveys by the WA Naturalists Club and consultants employed by CALM have concentrated on the hills themselves. Coates (1988) located 12 gazetted rare flora and an additional 20 geographically restricted species in the hills. Of these, 14 species are endemic to the Wongan Hills.

However, the vegetation on Reserve Nos 16418 and 18672 differs markedly from the adjoining hills area. These Reserves have seven species of gazetted rare flora of which six are restricted to the sand plain soils and not found in the hills. No vegetation surveys have been undertaken for Reserve No. 16418 and only a preliminary flora collection by the WA Herbarium (Coates 1989 Appendix 4) for reserve 18672.

In addition, the two reserves adjoin the Wongan Hills townsite and are regularly visited by local people and tourists, particularly during the spring wildflower displays. If formal bush walks or pamphlets are to be developed they must be planned and implemented in a way which protects the vegetation and rare flora.

The vegetation survey is essential to:

- a. better document the conservation values of the reserves;
- b. complete vegetation mapping of the Wongan Hills area initiated by Coates (1988);
- c. provide information to guide detailed ground surveys for rare flora by CALM staff and volunteers from the WA Naturalists Club in the Spring of 1991;
- d. provide data for management of the area; and
- e. provide sufficient information to prepare nominations of significant areas for the Register of the National Estate.

2.2 Project Requirements

The objectives of this project are to:

1. map the vegetation types within remnant native vegetation on Reserves Nos 16418 and 18672;
2. locate and describe populations of rare flora on the reserves; and
3. prepare nominations of significant areas for the Register of the National Estate.

2.3 History of the Areas Surveyed

A detailed account of the history of the Wongan Hills area can be found in "The Natural History of the Wongan Hills" edited by K F Kenneally. The account refers to a letter written by James Drummond to Hooker at the Royal Botanic Gardens Kew in June 1836 describing the sand plain country north and east of the Toodyay Valley and extending for 200 miles. This description of "Guangan" would have included areas of residual sand plain occurring in the Wongan Hills District.

The flora and fauna of the Wongan Hills area has attracted a number of naturalists, botanists and ornithologists over the years. From some of the collections made new species were subsequently described for which the hills or surrounds are the type locality, for example, *Acacia orbifolia*, *Acacia semicircularis*, *Astartea heteranthera*, *Caladenia drummondii*, *Eremophila sargentii*, *Stylidium coroniforme* and *Phebalium brachycalyx* (Kenneally 1977).

The red clay soils and their associated woodlands around the hills attracted first the pastoralists then the agriculturalists. As early as the 1920s concern was being expressed at the diminishing flora in and around the Wongan Hills but even so, over the following years, large areas were cleared for agriculture.

a) Agricultural Experimental Farm Reserve 18672

Reserve No. 18672 was gazetted on 18 June 1924 for the purpose of "experimental farm" and vested in the Minister for Agriculture. The current vesting (4 August 1989) is with the Chief Executive Officer of the Department of Agriculture. The original area of 6 682 hectares has now been reduced to 6 186 hectares. The farm has been extensively cleared with approximately 620 hectares remaining in a block in the western section.

In the Report of the Conservation through Reserves Committee to the Environmental Protection Authority (1974), the Committee recommended that: "The Department of Agriculture be approached with a view to obtaining the release of portions of Reserve No. 18672 Experimental Farm still in their natural state for addition to Reserve No. A 25808 (Elphin Reserve). This recommendation was approved by Cabinet in 1976.

b) Wongan Hills Water Reserve No. 16418

Reserve No. 16418 was gazetted on 5 April 1957 for the purpose of "Water Railway Supply" and vested in the minister for water resources. The area had previously been utilised by the then Department of Public Works. The original area was 2 584 hectares which has gradually been reduced to the present area of 971.6 hectares.

2.4 Physical Environment

a) Climate

The area has a typical wheatbelt climate with hot dry summers and mild wet winters. Rainfall recorded at the Wongan Hills Experimental Farm (referred to as the Research Station) between 1937 and 1990 gives a mean annual rainfall of 352 mm. Most of the rain falls in winter from May to August with occasional thunderstorms in summer.

Mean maximum and minimum temperatures for each season taken from data recorded at the Wongan Hills Research Station are as follows:

	Maximum	Minimum
Autumn (March to May)	25.4°C	13.0°C
Winter (June to August)	16.6°C	6.7°C
Spring (September to November)	23.9°C	9.8°C
Summer (December to February)	32.9°C	16.7°C

(Bureau of Meteorology, 1991)

The mean annual 900H recording of relative humidity is 69%, with the highest recordings in July (88%) and the lowest in January (51%).

This type of regime with wet winters and dry summers is known as a Mediterranean climate and Beard (1979) classifies this area with its 7 dry months as Dry Warm Mediterranean following the classification system of Bagnouls and Gaussen (1957).

b) Geology and soils

The Wongan Hills District is underlain by the Archaean rocks of the Darling Plateau which are part of the Yilgarn Block, a stable nucleus composed mainly of granite and gneisses with some altered volcanics and sediments known as "greenstone belts" (Carter and Lipple 1982). The granite and gneiss form gently undulating country with few topographic features. Granite domes and tors are not common in the general area but are confined to a few specific localities (Beard 1979) principally around and to the east of the Wongan Hills townsite including the southern section of the Water Reserve No. 16418.

An extensive cover of laterite soil developed on the plateau probably during the late cretaceous and tertiary. This tertiary duricrust is now eroded but is still preserved along drainage divides and is bounded in places by breakaways and scarp slopes (Chin 1986).

At one time the Darling Plateau was capped by an undulating sand plain (now largely eroded) overlying the tertiary duricrust. This sand plain is now extensively reworked so that the sand veneer is much thinner on the top of the hills than on the flanks where it accumulates as colluvial deposits. The sand is derived by degradation of the underlying duricrust and has not been transported far (Chin 1986).

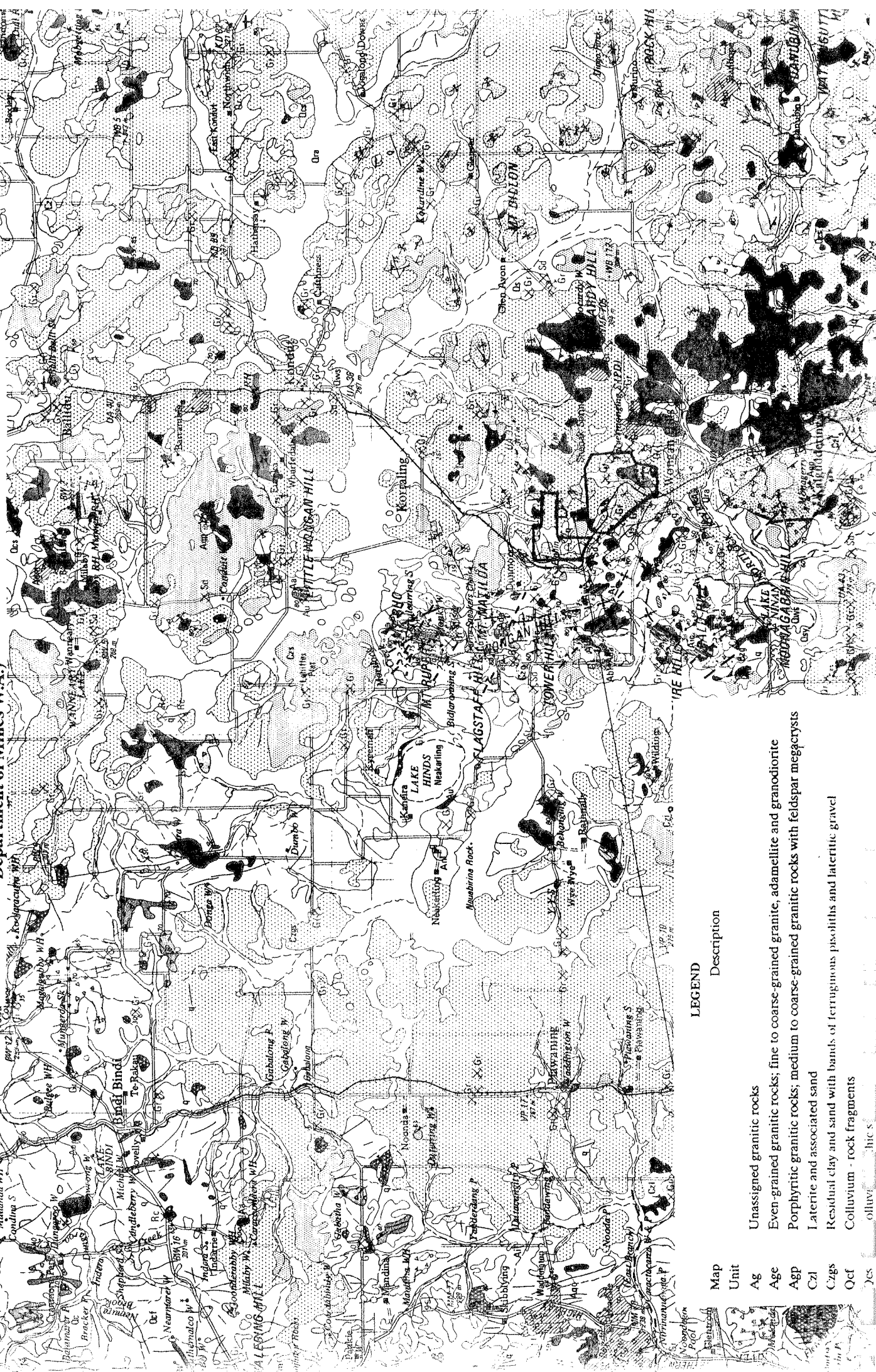
Except locally where granite resistant to weathering approaches the surface or forms outcrops the country rock is deeply weathered and covered with a thick overburden of kaolinised material known as the "pallid zone" which is capped either by soil or massive laterite, ironstone gravel and sand (Beard 1979).

Figure 1 has been taken from the Moora grid square of the 1:250 000 Geological Survey series. Table 1 provides descriptions of the map units covering the water reserve and remnant vegetation on the experimental farm.

Table 1: A Description of the geological map units covering Reserves 18672 and 16418. 1:250 000 Geological series, Department of Mines W.A.

Map Unit	Description
Ag	Unassigned granitic rocks
Age	Even-grained granitic rocks; fine to coarse-grained granite, adamellite and granodiorite
Agp	Porphyritic granitic rocks; medium to coarse-grained granitic rocks with feldspar megacrysts
Czl	Laterite and associated sand
Czgs	Residual clay and sand with bands of ferruginous pisoliths and lateritic gravel
Qcf	Colluvium - rock fragments
Qcs	Colluvium - lithic sand

Geological map of Water Reserve No. 1418, Experimental Farm No. 18672 and surrounding countryside (1:250 000 Geological series, Department of Mines W.A.)



LEGEND

Map Unit	Description
Ag	Unassigned granitic rocks
Ag	Even-grained granitic rocks; fine to coarse-grained granite, adamellite and granodiorite
Agp	Porphyritic granitic rocks; medium to coarse-grained granitic rocks with feldspar megacrysts
Czl	Laterite and associated sand
Czg	Residual clay and sand with bands of ferruginous pisoliths and lateritic gravel
Ocf	Colluvium - rock fragments
Ces	Colluvium - fine s

The southern section of the bushland remaining on the experimental farm is covered by map units Czgs and Qcs, the eastern section by map unit Czgs, the northern section adjacent to the western boundary by Agp and the central area by Czl. The southern section of the water reserve is covered by map units Agp and Age with areas in the northern section covered by units Czl and Czgs. Qcf covers a small area adjacent to the railway line.

The soils of the Darling Plateau are considerably varied with gravel and ironstone on uplands. Yellow earths appear in residual sand plains on higher ground and in patches of aeolian sand plain which occur in the valleys. Hard-setting loamy soils are characteristic of the lower slopes under eucalypt woodlands and saline soils are found in the depressions (Beard 1979).

The soils of the Wongan Hills district are included in sheet 5 of the Atlas of Australian Soils (Northcote *et al*, 1967). The landscape/map units covering the reserves are listed below. The block of bushland remaining on Reserve No. 18672 is covered by map unit Ms10 and Reserve No. 16418 by map units Ms10 (northern section) and Ub98 (southern section).

Ms10 Gently sloping to gently undulating plateau areas or uplands with long and very gentle slopes and, in places abrupt erosional scarps: chief soils on depositional slopes are sandy, acidic, and neutral yellow earths (Gn 2.21, Gn 2.22, Gn 2.25 and Gn 2.35) and yellow earthy sands (Uc 5.22), all containing some ironstone gravels or underlain by indurated ironstone gravel pans. Associated on erosional ridges and slopes are (Uc 2.12), (Uc 2.21), and (Uc 4.11) soils all containing some ironstone gravels and underlain by indurated ironstone gravel pans or hardened mottled-zone materials.

Ub98 Hilly with granitic and gneissic rock outcrops: chief soils are hard neutral yellow mottled soils (Dy 3.42). Small areas of other soils are likely.

The Department of Agriculture has recently completed a soil survey of the Experimental Farm. This survey has not been published but information relating to the block of uncleared bushland has been made available. Figure 2 (back folder) shows the portion of the soil map covering the remnant vegetation and Appendix 3 presents descriptions of the soil types and associations mapped.

The uncleared land was surveyed at a scale of 1:25 000 by free survey method, using a site observation density of one observation per 7 hectares. Soils of the Yaling series generally have textures of gravelly sand to clayey sand. The soil type gravelly loam

(Ylg) usually has a ferruginous hardpan at a depth of 40 cm. The Wongan series is divided into two types although intergrades between the two soil types is common.

Wls deep yellowish-brown clayey sand to sandy loam with firm to hard setting surface conditions

Ws light yellowish-brown to yellow sand to clayey sand with soft to loose surface conditions.

Elphin series soils are loamy sand to sand over gravel at various depths. The gravel content of these soils is highly variable and transitions between Elphin and Yaling series are common.

Soils in the Mocardy series are generally pale coloured gritty sands to clayey sands overlying a massive sandy clay subsoil. Fine textured soils include soil type 10, a shallow duplex soil with massive or coarse structured subsoils, Soil type 7 which is associated with basic parent materials and Soil type 8, shallow to moderately deep, gritty red-brown to brown sands associated with granite outcrops. Soil unit A soils are loamy sand to clayey sand grading into sandy loam to sandy clay at depth.

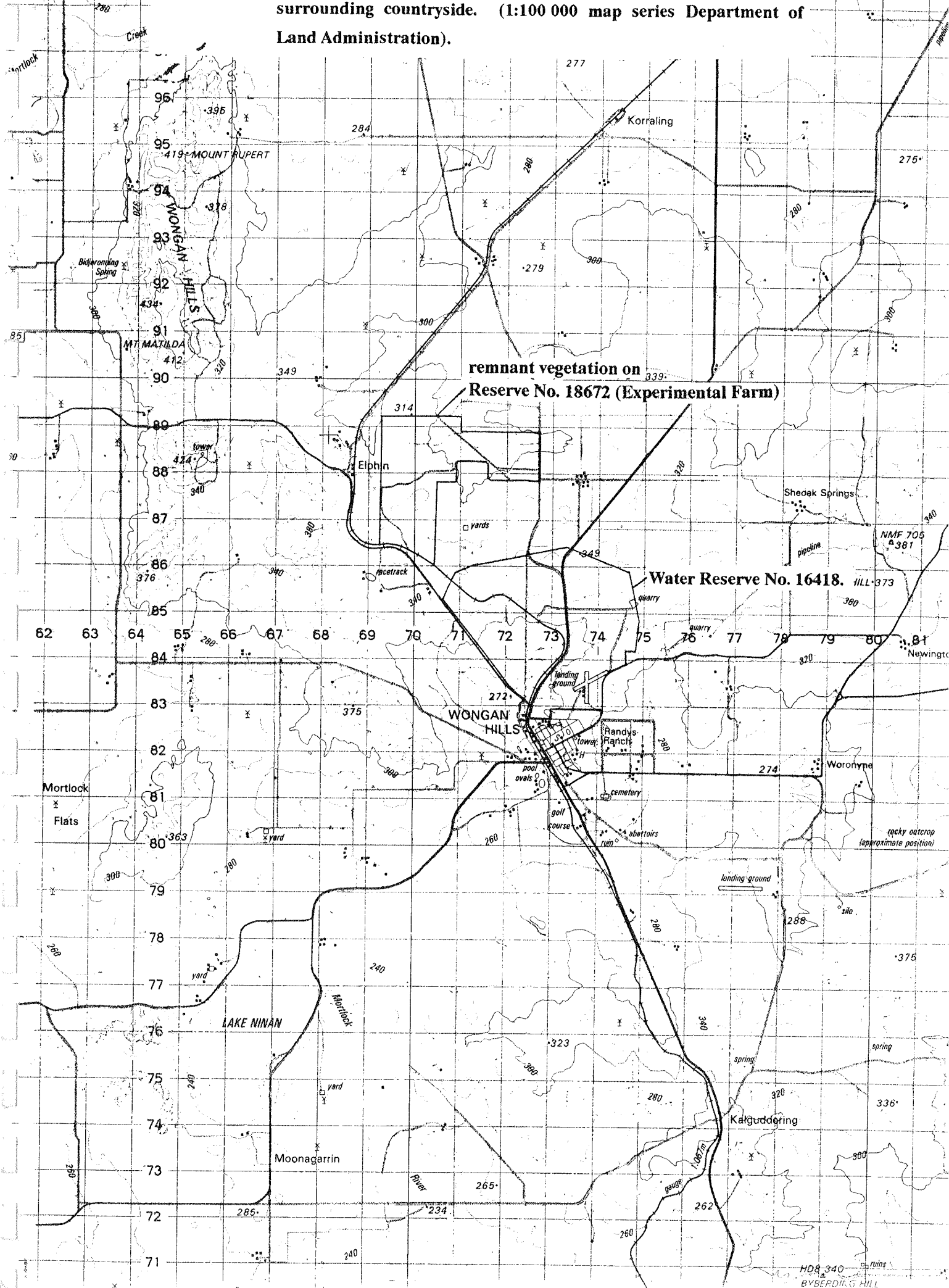
2.5 Location and Physical Features of the Areas Surveyed

a) Remnant Vegetation on Reserve No. 18672

The remnant bushland on the experimental farm is situated approximately 3.75 kilometres north west of the townsite of Wongan Hills. Approximately 620 hectares of bush remains in the block which is irregular in shape (see Figure 4). The reserve is situated in the Shire of Wongan-Ballidu. Cadastral and topographical information for the area is available from the Department of Land Administration lithographs including 1:25 000 Wongan Hills NE 2236-111 (cadastral) and 1:100 000 Wongan 2236 (topographical, see Figure 3).

The lowest point on the block of remnant bushland is in the north eastern section at 300 metres above sea level. This area is covered by sandy soils and drainage lines. The block grades to 320 metres in the southern section which consists mainly of residual laterite and a small breakaway. Areas of granite pavements and small outcrops are present in the block with the largest area adjacent to the western boundary.

FIGURE 3. Topographical map of Reserve No. 18672, Reserve No. 16418 and surrounding countryside. (1:100 000 map series Department of Land Administration).



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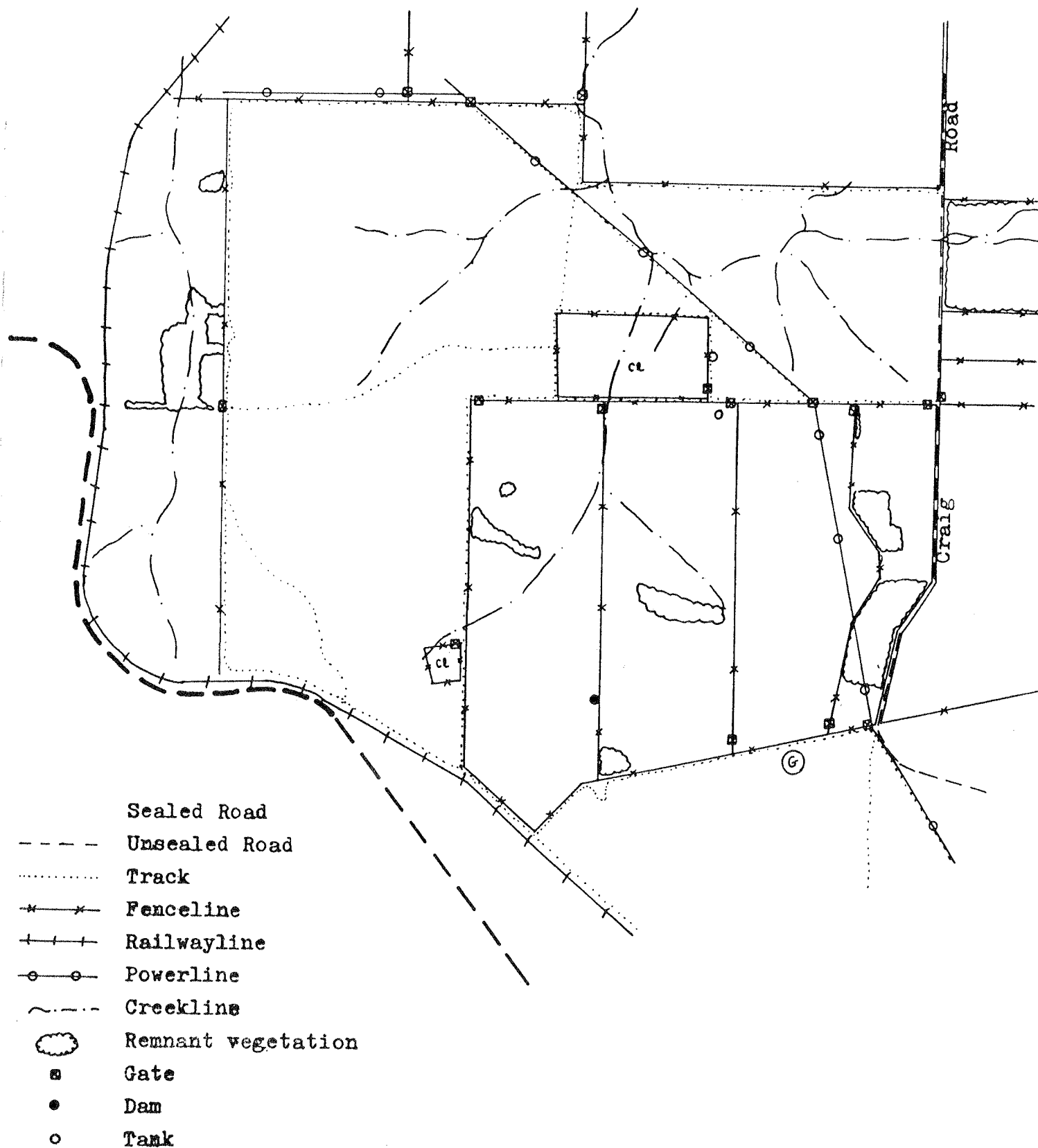
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FIGURE 4. Human Usage Plan for area covered by remnant vegetation on Reserve No. 18672.



There is good access to sections of the remnant bushland. Tracks are situated on the perimeter and through central areas (Figure 4). Craig Road runs along part of the eastern boundary and the railway line runs along the southern boundary.

b) Water Reserve No. 16418

Reserve No. 16418 is situated in the Shire of Wongan-Ballidu, adjacent to the Wongan Hills townsite, and covers an area of 971.6 hectares. Cadastral and topographical information for the area covered by the reserves include the following Department of Land Administration lithographs: 1:100 000 Wongan 2336 (topographical, see figure 3) and 1:25 000 Wongan Hills NE 2236-111, 1:10 000 57/80, 1:2 000 2423 (cadastral).

The reserve slopes from a high point of 349 metres above sea level in the northern section to 300 metres in the south eastern section. This gradual slope includes high areas of residual laterite to low areas of granite and associated soils with heavier soils in the south west section.

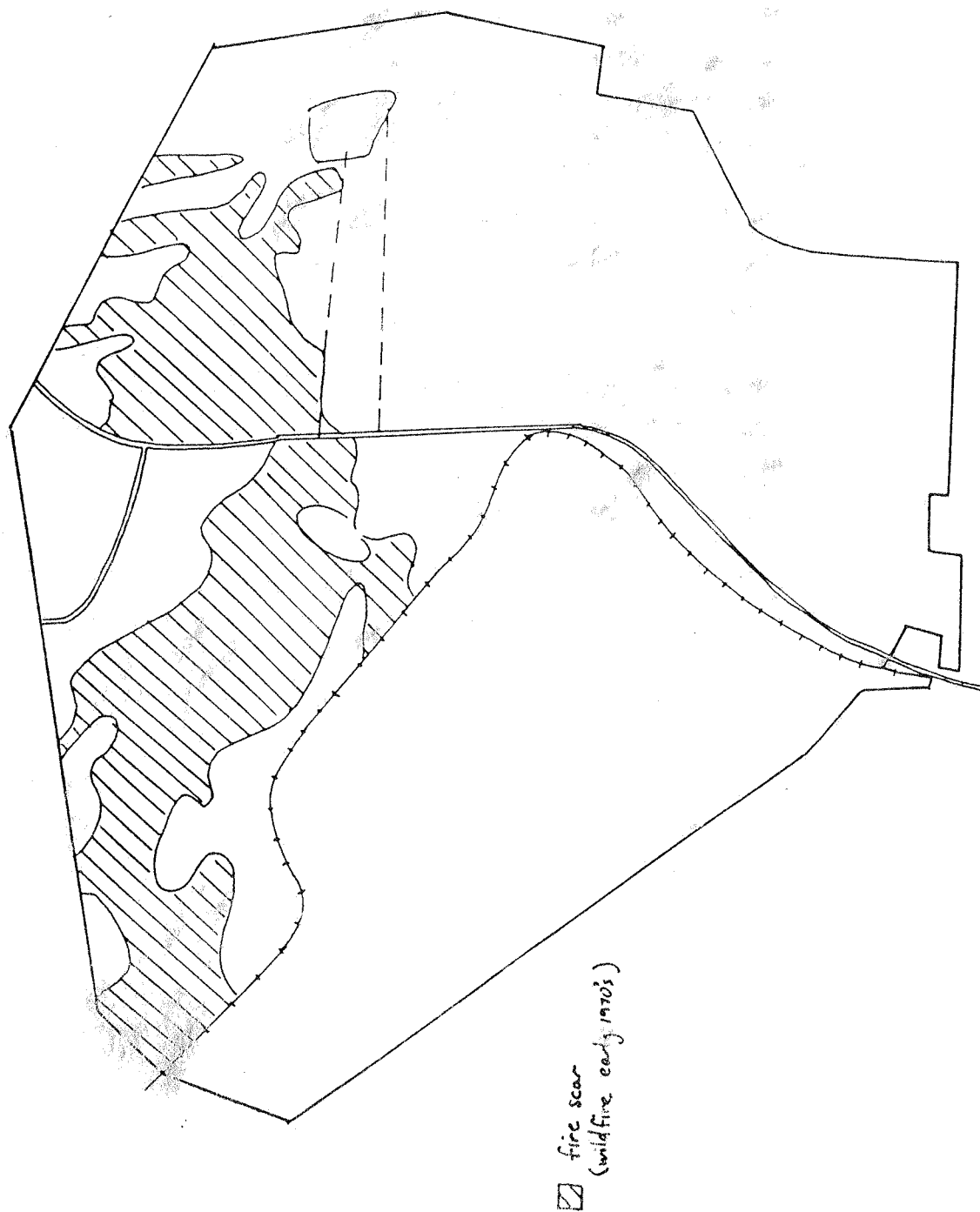
There is good access to all sections of the reserve with peripheral and central tracks. The Wongan-Ballidu Road passes through the centre of the reserve and the railway line passes through the western section. Numerous services also traverse the area including powerlines, water pipe lines and Telecom cables. Two large gravel pits and seven smaller gravel or sand pits are also situated on the reserve. These pits appear to be no longer in use. The airfield is adjacent to the south eastern corner of the area and a water supply dam is situated near the south western boundary. Tourists also visit the area and a nature walk has been developed to Christmas Rock. An area east of the dam has been previously cleared.

2.6 Fire History of the Areas Surveyed

There is no evidence of recent fire in the remnant vegetation on Reserve No. 18672. Part of the northern section of Water Reserve No. 16418 was burnt in the early 1970s. The fire is reported to have started near the gravel pit in the north eastern section and spread in a westerly direction. Figure 5 indicates the approximate boundaries of the fire scar.

Control burns have been carried out in salmon gum and York gum woodland near the water supply dam.

FIGURE 5. Fire History of Water Reserve No. 16418.



3.0 METHOD

The ground survey of the vegetation and flora of Water Reserve No. 16418 and Experimental Farm No. 18672 was carried out during September 1991

General vegetation divisions were noted using colour aerial photography at a scale of 1:25 000. Areas of interest thus delineated were examined in the field and the vegetation and soils at selected sites described. Because of time limitations some areas were not covered in detail in the ground survey and mapping was carried out by extrapolation of known vegetation associations using aerial photographs.

Vegetation association descriptions were based on the classification system devised by Muir (1977) which was specifically designed for describing wheatbelt vegetation (Table 2).

Voucher specimens of most plant species encountered were collected and identified using keys and by comparison with specimens at the Western Australian Herbarium. Experts involved in revising particular genera were consulted wherever possible to ensure accuracy with identification.

TABLE 2 - MUIR SYSTEM OF VEGETATION CLASSIFICATION

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70 - 100%	MID DENSE 30 - 70%	SPARSE 10 - 30%	VERY SPARSE 2 - 10%
T Trees > 30 metres	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M Trees 15 - 30 metres	Dense Forest	Forest	Woodland	Open Woodland
LA Trees 5 - 15 metres	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
LB Trees < 5 metres	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
KT Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
KS Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
S Shrubs > 2 metres	Dense Thicket	Thicket	Scrub	Open Scrub
SA Shrubs 1.5 - 2.0 metres	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
SB Shrubs 1.0 - 1.5 metres	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
SC Shrubs 0.5 - 1.0 metres	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
SD Shrubs 0.0 - 0.5 metres	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
P Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
H Hummock Grass	Dense Hummock Grass	Mild Dense Hummock Grass	Hummock Grass	Open Hummock Grass
GT Bunch grass > 0.5 metres	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
GL Bunch grass < 0.5 metres	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
J Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
VT Sedges > 0.5 metres	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
VL Sedges < 0.5 metres	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
X Ferns, Mosses, Liverwort	Dense Ferns Dense Mosses	Ferns Mosses	Open Ferns Open Mosses	Very Open Ferns Very Open Mosses

4.0 VEGETATION SURVEY

4.1 Previous Surveys

The remnant vegetation on Reserve No. 18672 and the Water Reserve No. 16418 is situated within the Guangan Vegetation system which is a subdivision of the Avon botanical district. This system is the classical Guangan of James Drummond and is named with his original spelling (Beard 1979). Beard (1976) has discussed the various spellings of the word "Guangan" in the literature and suggests that it should be standardised under the spelling "kwongan" as a term for the south western Australian sandplains and their shrubland vegetation.

The area covered by the Guangan Vegetation System consists mainly of residual sand plain underlain by granite. The sand plain is dominated by outcropping granite domes. The valleys are saline and occupied by salt lakes. Beard (1979) describes the intricate mosaic formed by the vegetation types which are not in the usual catenary sequence but linked to the intricate pattern of soil types. The residual sand plain is described as broadly *Allocasuarina* thicket with emergent mallee, with mallee becoming more prominent on duplex soils of sand over clay. Woodland of *Eucalyptus loxophleba*, *Eucalyptus salmonophloia* and *Eucalyptus salubris* are found on patches of red loam with thickets of *Melaleuca uncinata* and other *Melaleuca* species with scattered *Eucalyptus* also occurring.

Beard describes the uncleared land on the Experimental Farm and Water Reserve as follows:

The areas are "the only substantial remnant of natural vegetation in the Guangan System. The vegetation is best described as *Casuarina campestris* Thicket with patches of heath, floristically as thicket with elements of the Banksia-Xylomelum alliance..... The soil is a yellow sand overlying ironstone gravel. When long unburnt the bush thickens to 3 metres in height, dense, with the *Casuarinas* dominant..... *Eucalyptus loxophleba* and *Eucalyptus salmonophloia* are present in the valley close to the town, with mallee higher up the slope. Granite outcrops occur with *Casuarina huegeliana*, *Acacia acuminata*, *Verticordia preissii* and *Waitzia aurea*."

The remnant vegetation on both reserves is situated within the Moora and Hill river Grid square mapped by Beard (1979) at a scale of 1:250 000. The map unit covering the remnant vegetation on the Experimental Farm and the northern section of the water reserve is "Mallee and Casuarina Thicket" (ecSc). The water reserve is also covered by the map units e8⁶Mi, York gum and salmon gum (south west corner) and areas of rock outcrops.

In October 1984 and 1985 field work was carried out by staff from the WA Herbarium to collect plant specimens from the block of bushland remaining on the Wongan Hills Experimental Farm. The consultancy report summarising the information obtained is presented in Appendix 4. Site descriptions for plant collections include some vegetation descriptions based on the classification system of Spect.

4.2 Current Survey

In the present survey the vegetation of the Water Reserve No. 16418 and the block of remnant bushland on the Experimental Farm No. 18672 is analysed in more detail. The plant communities form the intricate mosaic typical of wheatbelt vegetation. The changes in vegetation are linked to topography, pedological and/or geological features.

Plant communities are primarily divided into formations based on the following formation definitions by Muir (1977):

Woodlands are those formations in which the dominant life-form of the upper stratum is trees, the total canopy cover of which is greater than 2%.

Mallee formations are those in which the dominant life-form of the upper stratum is shrub-form or tree-form mallees the total canopy cover of which is greater than 2%.

Shrublands are formations where the upper stratum is dominated by shrub life-form and the top of that stratum exceeds 2 metres from the ground and has a total canopy cover exceeding 2%.

Heaths are formations where the upper stratum is dominated by the shrub life-form and the top of that stratum does not exceed 2 metres from the ground and has a total canopy cover exceeding 2%.

Lithic complexes are mosaics of cryptogams, shrubs, sedges, trees and other life-forms the nature and distribution of which is directly affected by its proximity to granitic or other rock exposures. The term includes all the species growing in crevices or soil filled depressions and all the annual species occupying rock pools. The term is used where the scale of work is not large enough to map the various component formations of the lithic complex.

Salt complexes are those physiognomic groups and species associated with saline sources such as salt pans, lakes and streams or any other place where halophytes are prominent and associated with visible signs of vegetation changes or soil changes resulting from salt accumulation."

The vegetation was then further divided into species associations within these groupings. Table 3 and Table 4 list the vegetation associations described and mapped in this study. The vegetation maps of the Water Reserve and the remnant vegetation on the Experimental Farm are presented in Figures 6 and 7 and Muir descriptions for the vegetation found at selected sites marked on the maps are listed in Appendix 2. A preliminary species list for each vegetation type is presented in Appendix 5 based on data collected at sites selected for vegetation descriptions.

VEGETATION MAP

Stereo pairs of colour aerial photos at a scale of 1:25 000 (1989) were used for mapping the vegetation of the Water Reserve No. 18672 and remnant bushland on Reserve No. 16418. Enlargements to a scale of 1:6 000 were used as a base for the final vegetation maps to compliment maps of the vegetation in the hills and Elphin Nature Reserve No. A25080 (Coates 1988).

The symbol "K" has been used as a map unit indicating Kwongan vegetation, with "M" indicating areas of Mallee and "W" areas of Woodland. Beard (1979) has included areas of *Melaleuca coronicarpa* as kwongan however these areas are mapped as mallee in the present report following the definition by Muir. Areas of this association where mallee is very sparse or scattered cannot be differentiated on the aerial photographs from areas where mallee becomes more prominent. Although the mallee stratum is patchy and discontinuous the association has therefore been mapped as a mallee formation overall. It should be noted that areas where the mallee are scattered or very sparse are usually on breakaway slopes.

Site numbers with the prefix E are situated on the Experimental Farm and those with the prefix W on the Water Reserve.

VEGETATION OF WATER RESERVE NO. 16418

The vegetation associations on the Water Reserve form an intricate mosaic which is linked to the complex variation in soils, topography and underlying rock formations. Areas of residual laterite (or uplands) with abrupt erosional scarps in places cover the northern section with duplex soils on lower slopes and heavy loam soils in the valley area south. Granite outcrops and associated soils are also common in the southern section of the reserve.

The summits and slopes of areas of residual laterite are covered by *Dryandra/Petrophile shuttleworthiana* Thicket (Kdt). This association is similar to areas of Mallee over *Petrophile shuttleworthiana/Allocasuarina campestris* Thicket which is extensive in the hills area (Coates 1988). Both these associations include areas of scattered shrub mallee with *Dryandra* species prominent. *Dryandra* Low Heath (Kdh) also covers summits and areas near erosional scarps growing in gravelly soils over ironstone. Areas of *Dryandra* Low Heath were burnt in the early 1970's and are probably equivalent to areas of *Dryandra/Petrophile shuttleworthiana* Thicket regenerating after fire. Scrub Heath (Kh) is found on the depositional slopes back from the summits on deeper gravelly soils with ironstone in places. *Actinostrobus arenarius* is a characteristic species. The association of Dense Mixed Heath described for Elphin Nature Reserve (Coates 1988) can be included as part of the Scrub Heath association.

Below the uplands of residual laterite on duplex soils of sand over clay, mallee associations become more prominent including Mallee over *Melaleuca uncinata* (broombush) Thicket (Mm) and Mallee over *Melaleuca coroncarpa* Heath (Mc). In some areas especially on escarpment slopes *Melaleuca coroncarpa* becomes dominant with the shrub mallee occurring only as scattered individuals. Interspersed amongst the mallee associations are areas of *Melaleuca scabra* Thicket (Kc) on gravelly surface soils and *Melaleuca* Thicket (Km) covering small areas.

Allocasuarina campestris Thicket (Kt) is mainly associated with granite but also covers areas of gravelly sand. On deeper sandy soils over gravel *Allocasuarina campestris* is jointed by *Hakea erecta* (Ky) with an understorey of *Ecdeiocolea monostachya* in places. The gazetted rare plant *Conostylis wonganensis* is found in this vegetation type and in the Sedges/Heath (Ks) association which also occurs on sandy soils over gravel. The association mapped as Sedges on Elphin Nature Reserve has been broadened to include areas where shrub species also become prominent to form the Sedges/Heath association. Characteristic species include *Ecdeiocolea monostachya*,

Melaleuca aff. *cordata*, *Mesomelaena preissii* and *Melaleuca conothamnoides*. *Allocasuarina campestris* Thicket is often interspersed.

Low lying areas in the valley near the townsite with loam and clay loam soils support *Eucalyptus salmonophloia* (salmon gum) Woodland (Ws). *Eucalyptus loxophleba* (York gum) Low Forest (Wl) also covers extensive areas of red brown loam soils in these areas with granite pavement in places. *Acacia acuminata* (jam) commonly forms an understorey (Wla) but is replaced by *Melaleuca* species in drainage lines. *Acacia acuminata* becomes dominant in loam soils adjacent to granite.

The complex pattern of vegetation associations found on the Water Reserve also includes a small area of *Eucalyptus wandoo* (white gum) Low Woodland (Ww) and small areas of the kwongan associations *Beaufortia* Heath (Kb), *Eremaea* Heath (Ke) and *Melaleuca sclerophylla* Low Heath (Kl). *Beaufortia* Heath occurs on gravelly soils with characteristic species include *Beaufortia interstans*, *Beaufortia squarrosa*, *Verticordia monadelph*a and *Verticordia venusta*. *Eremaea pauciflora* becomes prominent on deep grey sandy soils and *Melaleuca sclerophylla* becomes prominent over short distances on clayey sand with rock fragments, often on slopes.

Areas of granite have a characteristic flora with mosses and lichens on the bare rock and *Borya sphaerocephala* forming a mat on flatter areas with shallow soils. Shrubs, ferns, herbs, sedges and grasses are scattered or occur in patches on shallow soil pockets. Commonly occurring species include *Calytrix depressa*, *Verticordia chrysanthella*, *Thryptomene australis*, *Spartochloa scirpoidea*, *Ecdeiocola monostachya*, *Melaleuca fulgens* and *Melaleuca radula*. *Allocasuarina campestris* Thicket occurs in the deeper soils bordering the rocks with areas of *Hakea petiolaris*, *Acacia lasiocalyx* and *Allocasuarina huegeliana* in deeper soils receiving run-off at the base of Christmas Rock, a larger outcrop. Small areas of Open Scrub over Herbs/Sedges (Ku) with *Acacia acuminata*, *Allocasuarina campestris* and *Melaleuca uncinata* over an understorey with *Borya sphaerocephala*, *Loxocarya aspera* and *Lepidobolus* species prominent also occurs in shallow soils in association with granite.

VEGETATION OF REMNANT BUSHLAND ON EXPERIMENTAL FARM NO. 18672

The vegetation associations on the Experimental Farm are not in catenary sequence but form an intricate mosaic which is linked to the complex soil mix, topography and underlying rock formations in the remnant bushland block.

Only small areas of residual laterite with gravelly soils over ironstone remain in the area and these support *Dryandra/Petrophile shuttleworthiana* Thicket (Kdt) with a small patch of Scrub Heath (Kh) in the south east corner growing in deeper gravelly soils. Duplex soils of sand and sandy loam over clay are extensive and are dominated by mallee associations including Mallee over *Melaleuca uncinata* Thicket (Mm) and Mallee over *Melaleuca coronicarpa* Heath (Mc). *Melaleuca* Thicket (Km) is also found interspersed within the mallee associations often on poorly drained soils and along streamlines. *Melaleuca uncinata* is usually dominant but *Melaleuca hamulosa*, *Melaleuca adnata*, *Melaleuca lateriflora* and *Melaleuca undulata* are also characteristic species. Also interspersed within the mallee areas on gravelly surface soils is *Melaleuca scabra* Heath (Kc). This association is very variable and patchy with *Melaleuca conothamnoides* or *Melaleuca sclerophylla* prominent as understorey species in places.

Areas of clayey sand to clay loam soils over clay (Soil Type 7) support *Eucalyptus salmonophloia* (salmon gum)/*Eucalyptus salubris* (Gimlet) Woodland (Wsg) with small areas of Mallee over *Melaleuca* (Me) in adjacent areas where rock fragments are numerous. Understorey species in the Mallee over *Melaleuca* association include *Callitris canescens*, *Melaleuca uncinata* and *Melaleuca coronicarpa*.

Allocasuarina campestris (Kt) is extensive and covers soils associated with granite (Soil Type 8), Elphin series soils, Yaling gravelly loam and Mocardy sand. *Calothamnus aspera*/*Allocasuarina campestris* Thicket (Ka) covers a small area growing in sandy clay soils with rock outcrops in places. This vegetation type is extensive in the hills area where it is very variable ranging from Thicket to a more open formation. *Allocasuarina campestris* is also joined by *Hakea meisneriana* (Kg) on Elphin series (hard pan phase) soils.

On deeper sandy soils over gravel in places Sedges/Heath (Ks) is found. The gazetted rare plant *Conostylis wonganensis* occurs within this association. *Nuytsia floribunda* over Low Heath (Kn) is also found on sandy soils including some spillway sands and Mocardy sand which has a massive sandy clay sub soil and is imperfectly drained. The gazetted rare plants *Gastrolobium glaucum* and *Gastrolobium hamulosum* occur in these two vegetation associations and also in open areas amongst the *Allocasuarina campestris* Thicket in the north east section.

Other associations covering only small areas include *Allocasuarina acutivalvis* Thicket (Kv) on sandy soils with gravel, often covering areas too small to map. *Eucalyptus wandoo* (white gum) Low Woodland (Ww) covers an area of sandy loam on the northern boundary and *Eucalyptus loxophleba* (York gum) Low Forest (Wl) a small area of red brown loam. A salt affected area in the north of the block has been mapped as Samphire (S).

Small granite outcrops occur in the block of remnant bushland and are surrounded by *Allocasuarina campestris* Thicket growing in the deeper border soils. The bare rocks are covered with mosses and lichens with *Borya sphaerocephala* and *Borya laciniata* forming a mat on shallow soils on flat surfaces. Shallow soils receiving run-off support shrubs, herbs, sedges and ferns including *Calytrix depressa* and *Verticordia chrysanthella*.

**TABLE 3 - VEGETATION ASSOCIATIONS OF THE REMNANT BUSHLAND ON
EXPERIMENTAL FARM No. 18672**

	Map Unit
Woodland Formations	
<i>Eucalyptus salmonophloia</i> (salmon gum)/ <i>Eucalyptus salubris</i> (gimlet) Woodland	Wsg
<i>Eucalyptus wandoo</i> (white gum) Low Woodland	Ww
<i>Eucalyptus loxophleba</i> (York gum) Low Forest	Wl
Mallee Formations	
Mallee over <i>Melaleuca uncinata</i> (broombush) Thicket	Mm
Mallee over <i>Melaleuca coroncarpa</i> Heath	Mc
Mallee over <i>Melaleuca</i>	Me
Shrubland and Heath Formations	
<i>Dryandra/Petrophile shuttleworthiana</i> Thicket	Kdt
Scrub Heath	Kh
<i>Allocasuarina campestris</i> Thicket	Kt
<i>Allocasuarina campestris/Calothamnus aspera</i> Thicket	Ka
<i>Allocasuarina campestris/Hakea meisneriana</i> Thicket	Kg
<i>Allocasuarina acutivalvis</i> Thicket	Kv
<i>Melaleuca</i> Thicket	Km
<i>Melaleuca scabra</i> Heath	Kc
Sedges/Heath	Ks
<i>Nuytsia floribunda</i> over Low Heath	Kn
Lithic Complex	
Granite rock - Herbs, Shrublands	G
Salt Complex	
Samphire	S

TABLE 4 - VEGETATION ASSOCIATIONS OF WATER RESERVE No. 16418

Woodland Formations

<i>Eucalyptus salmonophloia</i> (salmon gum) Woodland	Ws
<i>Eucalyptus salmonophloia</i> (salmon gum)/ <i>Eucalyptus salubris</i> (gimlet) Woodland	Wsg
<i>Eucalyptus wandoo</i> (white gum) Low Woodland	Ww
<i>Eucalyptus loxophleba</i> (York gum) Low Forest	Wl
<i>Eucalyptus loxophleba</i> (York gum) Low Forest over <i>Acacia acuminata</i> (jam)	Wla
<i>Acacia acuminata</i> Low Forest	Wa

Mallee Formations

Mallee over <i>Melaleuca uncinata</i> (broombush) Thicket	Mm
Mallee over <i>Melaleuca coronicarpa</i> Heath	Mc

Shrubland and Heath Formations

<i>Dryandra/Petrophile shuttleworthiana</i> Thicket	Kdt
<i>Dryandra</i> Low Heath	Kdh
Scrub Heath	Kh
<i>Allocasuarina campestris</i> Thicket	Kt
<i>Allocasuarina campestris/Hakea erecta</i> Heath (unburnt)	Ky1
<i>Allocasuarina campestris/Hakea erecta</i> Heath (burnt)	Ky2
<i>Melaleuca</i> Thicket	Km
<i>Melaleuca scabra</i> Heath	Kc
<i>Melaleuca sclerophylla</i> Low Heath	Kl
<i>Eremaea</i> Heath	Ke
<i>Beaufortia</i> Heath	Kb
Sedges/Heath	Ks
Open Scrub over Herbs/Sedges	Ku

Lithic Complex

Granite, Herbs, Shrublands	G
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WOODLAND FORMATIONS

Ws *Eucalyptus salmonophloia* (salmon gum) Woodland

- Diagnosis** Woodland (Forest) over variable understorey including *Eucalyptus loxophleba* Open Low Woodland A to Low Forest A or Open Scrub to Thicket and/or over Low Heath C/Dwarf Scrub C over Herbs in places.
- Sites** W38, W41, W48, W55, W57
- Description**
- Stratum 1** Woodland, occasionally Forest or rarely Open Woodland, of *Eucalyptus salmonophloia* 12 to 25 metres.
- Stratum 2** In some areas Open Low Woodland A to Low Forest A of *Eucalyptus loxophleba* to 10 metres forms a lower stratum.
- Stratum 3** Open Scrub to Scrub of mixed shrub species or Open Scrub to Thicket, rarely Dense Thicket, of *Melaleuca* species to 3 metres in places. Stratum 3 species include *Acacia ligustrina*, *Acacia acuminata*, *Acacia aestivalis*, *Dodonaea inaequifolia*, *Melaleuca acuminata*, *Melaleuca adnata*, *Melaleuca coroncarpa*, *Melaleuca uncinata*, *Melaleuca undulata* and *Santalum acuminatum*.
- Lower Stratum** Low Heath C to Dwarf Scrub C in some areas, with herbaceous species prominent in spring. Lower stratum species include *Acacia erinacea*, *Acacia orbifolia*, *Arthropodium capillipes*, *Avena* sp., *Cephalopterum drummondii*, *Dianella revoluta*, *Enchylaena lanata*, *Erymophyllum tenellum*, **Ehrharta calycina*, *Hyalosperma glutinosum*, *Podolepis lessonii*, *Rhagodia drummondii*, *Rhagodia preissii*, *Templetonia sulcata*, *Trachymene cyanopetala* and *Trachymene ornata*.

Comments

Eucalyptus salmonophloia (salmon gum) Woodland is found on the Water Reserve No. 16418 growing in heavy loam soils in the low lying portion of the landscape. In some areas the woodland has been disturbed leaving open areas in the understorey. Regular control burns have been carried out near the dam and the Wongan Hills-Ballidu Road.

Photograph 1: *Eucalyptus salmonophloia* Woodland on the Water Reserve



Wsg *Eucalyptus salmonophloia* (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland

- Diagnosis** Woodland over Shrub Mallee/Open Shrub Mallee in places or over Open Scrub/Scrub over Open Dwarf Scrub C to Low Heath C over Herbs/Low Heath D in places.
- Sites** E5, E8, E23, E25, W42
- Description**
- Stratum 1** Woodland, occasionally Forest, or Low Woodland A/Open Low Woodland A at the edges of the association. *Eucalyptus salmonophloia* and *Eucalyptus salubris*, 15 to 25 metres, are dominant. On the Water Reserve *Eucalyptus salubris* forms a lower stratum of Low Woodland A/Low Forest A.
- Stratum 2** Shrub Mallee/Open Shrub Mallee (to 8 metres) in some areas. Mallee species include *Eucalyptus arachnaea*, *Eucalyptus celastroides*, *Eucalyptus loxophleba*, *Eucalyptus plauricaulis*, *Eucalyptus semivestita* and *Eucalyptus sheathiana*.
- Stratum 3** Open Scrub (Open Low Scrub A) to Scrub of mixed shrub species form a patchy lower stratum in most places with occasional areas of *Melaleuca* Thicket. Stratum 3 species include *Acacia acuminata*, *Acacia ligustrina*, *Melaleuca acuminata*, *Melaleuca adnata*, *Melaleuca coronicarpa* and *Santalum acuminatum*. *Melaleuca acuminata* Thicket is often found on the edge of the association.
- Stratum 4** Low Heath C to Open Dwarf Scrub C in some areas. Stratum 4 species include *Acacia dura*, *Acacia jacksonii*, *Acacia orbifolia*, *Grevillea huegelii*, *Rhagodia drummondii*, *Rhagodia preissii* and *Templetonia sulcata*.
- Stratum 5** Herbs/Low Heath D in some areas. Lower stratum species include *Acacia erinacea*, *Chamaescilla corymbosa*, *Helipterum lindleyi*, *Hyalosperma glutinosum*, *Olearia muelleri*, *Podotheca gnaphalioides*, *Senecio glomeratus*, *Trachymene cyanopetala*, *Trachymene ornata* and *Wilsonia humilis*.

Comments

Eucalyptus salmonophloia (salmon gum), *Eucalyptus salubris* (gimlet) Woodland occurs on the Experimental Farm growing in soil type 7. This soil type consists of clayey sand to silty clay loam (sometimes with gravel) over clay. The association covers only a small area on the Water Reserve where *Eucalyptus salmonophloia* Woodland without gimlet is more extensive.

Photograph 2: *Eucalyptus salubris* (gimlet) and *Eucalyptus salmonophloia* (salmon gum) at site E8 on the Experimental Farm



Ww *Eucalyptus wandoo* (white gum) Low Woodland

Diagnosis	Low Woodland A over Open Scrub/Thicket over Open Herbs/Herbs
Sites	E37, W37
Description	
Stratum 1	Low Woodland A of <i>Eucalyptus wandoo</i> to 15 metres forms a patchy stratum to Open Low Woodland A in places. Scattered trees of <i>Eucalyptus loxophleba</i> and <i>Acacia acuminata</i> were also recorded.
Stratum 2	Open Scrub (Site E37) or Thicket (Site W37) of mixed shrub species including <i>Acacia ?fragilis</i> , <i>Allocasuarina campestris</i> , <i>Melaleuca uncinata</i> and <i>Santalum acuminatum</i> .
Lower Stratum	Scattered Shrubs, Open Herbs to Herbs, Open Low Grass or <i>Ecdeiocolea monostachya</i> Tall Sedges in places. Scattered shrubs or sub shrubs include <i>Astroloma serratifolium</i> , <i>Baeckea ?crispiflora</i> , <i>Diplolaena microcephala</i> and <i>Hibbertia rupicola</i> . Species of grasses include <i>*Aira cupaniana</i> and <i>*Bromus species</i> and herbaceous species recorded include <i>Angianthus tomentosus</i> , <i>Blennospora drummondii</i> , <i>Borya sphaerocephala</i> , <i>Caladenia flava</i> , <i>Caladenia roei</i> , <i>Cyanicula gemmata</i> , <i>Dianella revoluta</i> , <i>Helipterum verecundum</i> , <i>Muehlenbeckia adpressa</i> , <i>Podolepis canescens</i> , <i>Podolepis lessonii</i> , <i>Podotheca angustifolia</i> , <i>*Ursinia anthemoides</i> , <i>Waitzia acuminata</i> and <i>Waitzia citrina</i> .
Comments	<i>Eucalyptus wandoo</i> covers only two small areas, one on the Experimental Farm and the other on the Water Reserve. The association occurs on sandy loam soils in low lying areas and is more extensive on Elphin Nature Reserve No. A 25808 nearby.

Photograph 3: *Eucalyptus wandoo* (white gum) covering a small area on the Experimental Farm at site E37



W1 *Eucalyptus loxophleba* Low Forest

Diagnosis Low Forest A (Tree Mallee) over *Melaleuca* Scrub/Thicket in places over Dwarf Scrub C/Dwarf Scrub D/Herbs.

Sites E29, W33, W39, W43, W60

Description

Stratum 1 Low Forest A, occasionally to Low Forest B of *Eucalyptus loxophleba* to 12 metres in height. The York gum appears to grow as Tree Mallee or Shrub Mallee in places. Scattered trees of *Eucalyptus salmonophloia* to 15 metres are present as emergents in some areas. Other occasional stratum 1 species include *Acacia acuminata*, *Eucalyptus arachnaea* and *Eucalyptus erythronema*.

Stratum 2 Thicket, Scrub to Open Scrub occasionally, with *Melaleuca uncinata* prominent in drainage lines. Other stratum 2 species include *Acacia ligustrina*, *Allocasuarina campestris*, *Melaleuca adnata*, *Melaleuca lateriflora* and *Melaleuca undulata*.

Stratum 3 In some areas scattered shrubs to 1 metre form a stratum of Open Dwarf Scrub C to Low Heath C. Commonly occurring species include *Acacia ?chrysella*, *Acacia leptospermoides*, *Astroloma serratifolium*, *Dodonaea viscosa*, *Melaleuca radula* and *Templetonia sulcata*.

Stratum 4 Open Dwarf Scrub D, Herbs/Open Herbs occasionally to Dense Herbs. Shrub species include *Acacia jacksonii*, *Acacia lasiocarpa* var. *bracteolata*, *Acacia orbifolia*, *Rhagodia drummondii*, *Rhagodia preissii* and *Verticordia acerosa* ssp. *preissii*. Herbaceous species include *Borya sphaerocephala*, *Chamaescilla corymbosa*, *Dampiera lavandulacea*, *Erymophyllum tenellum*, *Erodium cygnorum*, *Gnephosis tenuissima*, *Helichrysum lindleyi*, *Helipterum splendidum*, *Helipterum verecundum*, *Helipterum manglesii*, *Hyalosperma glutinosum*, *Podolepis lessonii*, *Trachymene cyanopetala*, *Trachymene ornata*, *Thysanotus dichotomus*, *Waitzia acuminata* and *Waitzia aurea*. Species of grasses recorded include **Briza maxima*, **Avena* sp. and *Spartochloa scirpoidea*.

Comments

Eucalyptus loxophleba Low Forest covers low lying areas on red-brown loam to clay loam soils with *Melaleuca* species forming an understorey in drainage lines. The association covers only a small area on the Experimental Farm mapped as soil types 7 and 8 (fine textured soils).

Photograph 4: *Eucalyptus loxophleba* (York gum) at site W39



W1a *Eucalyptus loxophleba* Low Forest over *Acacia acuminata* (jam)

Diagnosis Low Forest A (Tree Mallee) over Low Forest B over Dwarf Scrub C in places over Herbs.

Sites W40, W44, W47a, W47b, W58.

Description

Stratum 1 Low Forest A, occasionally to Low Woodland A, of *Eucalyptus loxophleba* growing as mallee in some situations. Scattered trees of *Eucalyptus salmonophloia* emergent to 20 metres are rare.

Stratum 2 Low Forest B, occasionally to Low Woodland B, of *Acacia acuminata*. Other species present as scattered individuals include *Acacia ?multispicata*, *Allocasuarina campestris*, *Allocasuarina huegeliana*, *Hakea preissii*, *Melaleuca radula* and *Santalum acuminatum*.

Stratum 3 Scattered shrubs to 1 metre occasionally form a lower stratum of Dwarf Scrub C. Shrub species include *Acacia erinacea*, *Astroloma serratifolium*, *Grevillea paniculata*, *Hibbertia ?rupicola*, *Rhagodia drummondii*, *Rhagodia preissii* and *Verticordia acerosa* ssp. *preissii*.

Stratum 4 Herbs to Dense Herbs form a patchy stratum with Low Grass in some areas. Species of grasses include **Aira cupaniana*, **Avena* sp., **Briza maxima*, **Bromus diandrus* and *Neurachne alopecuroidea*. Herbaceous species include **Arctotheca calendula*, *Arthropodium capillipes*, *Borya sphaerocephala*, *Chamaescilla corymbosa*, *Conostylis prolifera*, *Dianella revoluta*, *Dampiera oligophylla*, *Erodium cygnorum*, *Erymophyllum tenellum*, *Helichrysum lindleyi*, *Helipterum manglesii*, *Opercularia vaginata*, *Podolepis canescens*, *Podolepis capillaris*, *Podolepis lessonii*, *Ptilotus spathulata*, *Trachymene cyanopetala*, *Trachymene ornata*, **Ursinia anthemoides*, *Waitzia acuminata*, *Waitzia aurea*, and *Waitzia citrina*. Also recorded were sedges including *Loxocarya aspera* and *Lepidosperma ?leptophyllum* and a fern *Chleianthes austrotenuifolia*.

Comments

Eucalyptus loxophleba Low Forest over *Acacia acuminata* covers extensive areas on low lying terrain on the Water Reserve. The association is found on red-brown loam soils with granite pavement in some areas.

Photograph 5: *Eucalyptus loxophleba* (York gum) with an understorey of *Acacia acuminata* (jam) at site W58



Photograph 6: *Acacia acuminata* (jam) at site W46.



Wa *Acacia acuminata* Low Forest**Diagnosis** Low Forest B over Herbs**Sites** W46, W56**Description****Stratum 1** Low Forest B, rarely Low Forest A, of *Acacia acuminata* to 6 metres in height. Scattered *Eucalyptus loxophleba*, *Acacia saligna* and *Santalum spicatum* may also be present.**Lower Stratum** Scattered sedges and shrubs to 1.5 metres of mixed species including *Acacia restiacea*, *Allocasuarina campestris*, *Astroloma serratifolium*, *Calytrix depressa*, *Chorizema genistoides*, *Hakea lissocarpha*, *Hibbertia rupicola*, *Hypocalymma angustifolium*, *Loxocarya aspera*, *Melaleuca radula* and *Mirbelia ramulosa*.

Herbs to Dense Herbs in places or Tall Grass of *Avena* sp., **Aira cupaniana* and **Briza maxima*. Herbaceous species include *Borya sphaerocephala*, *Burchardia umbellata*, *Chamaescilla spiralis*, *Cyanicula gemmata*, *Dianella revoluta*, *Drosera subhirtella*, *Drosera macrantha*, *Helichrysum lindleyi*, *Podolepis canescens*, *Podolepis lessonii*, *Stylidium calcaratum*, *Stypandra glauca* and *Tribonanthes longipetala*.

Comments *Acacia acuminata* usually becomes dominant in areas adjacent to granite outcrops growing in red-brown loam soils. The association covers only small areas on the Water Reserve interspersed with *Eucalyptus loxophleba* Low Forest.

MALLEE FORMATIONS

Mm Mallee over *Melaleuca uncinata* Thicket

- Diagnosis** Open Shrub Mallee (Shrub Mallee) over Thicket (Heath B to Dense Thicket) over Open Low Sedges/Dwarf Scrub D in places.
- Sites** E4, E15, W8, W11, W14, W28, W32
- Description**
- Stratum 1** Open Shrub Mallee, occasionally to Shrub Mallee, with Tree Mallee/Open Tree Mallee at site W32. This stratum is patchy and discontinuous. Mallee species recorded include *Eucalyptus arachnaea*, *Eucalyptus erythronema*, *Eucalyptus flocktoniae*, *Eucalyptus hypoclamydea*, *Eucalyptus plauricaulis*, *Eucalyptus rigidula*, *Eucalyptus semivestita*, *Eucalyptus sheathiana* and *Eucalyptus subangusta*.
- Stratum 2** Thicket, occasionally Dense Thicket, to Heath B with *Melaleuca uncinata* prominent. Heath C occurs in areas regenerating after fire (early 1970s). Other stratum 2 species include *Acacia leptospermoides*, *Allocasuarina campestris*, *Gastrolobium parviflorum*, *Hypocalymma angustifolium*, *Leptospermum erubescens*, *Melaleuca acuminata*, *Melaleuca adnata*, *Melaleuca coronicarpa*, *Melaleuca ctenoides*, *Melaleuca laxiflora*, *Melaleuca scabra*, *Melaleuca spicigera*, *Microcorys obovata*, *Phebalium ambiguum*, *Phebalium filifolium*, *Phebalium tuberosum*, *Santalum acuminatum* and *Thryptomene ramulosa*.
- Stratum 3** In some areas scattered shrubs and sedges to 0.5 metres form a lower stratum of Open Low Sedges/Dwarf Scrub D. Stratum 3 species include *Acacia bidentata*, *Acacia ericksonii*, *Acacia orbifolia*, *Astroloma serratifolium*, *Bossiaea eriocarpa*, *Cryptandra leucophracta*, *Dodonaea bursariifolia*, *Dodonaea pinifolia*, *Hibbertia rostellata* and *Lepidosperma ?leptophyllum*. Herbaceous species recorded include *Cyanicula gemmata*, *Helichrysum lindleyi*, *Helipterum manglesii*, *Pimelea leucantha*, *Podolepis capillaris*, *Podolepis lessonii*, *Stylidium crassifolium*, *Stylidium leptophyllum* and *Waitzia acuminata*.

Comments

Mallee over *Melaleuca uncinata* occurs on duplex soils in low lying areas below the lateritic plateau on sloping or flat terrain. The association is a major component of the vegetation on the Experimental Farm covering smaller areas on the Water Reserve. Soil types associated with areas of Mallee over *Melaleuca uncinata* on the Experimental farm include 7, 7b, 10 and A (shallow duplex soils) and to a lesser extent Elphin series soils of loamy sandy to sandy clay loam with laterite at depth and Mocardy series soils with massive sandy clay sub soils.

Photograph 7: Mallee over *Melaleuca uncinata* at site W14. The area was burnt in the early 1970s



Mc Mallee over *Melaleuca coronicarpa* Heath

Diagnosis	Open Shrub Mallee (Very Open Shrub Mallee) over <i>Melaleuca uncinata</i> Scrub/Open Scrub in places over Heath B to Low Heath C/Dense Low Heath C.
Sites	E9, E19, E21, E22, W6, W9, W15, W16
Description	
Stratum 1	Open Shrub Mallee, occasionally to Very Open Shrub Mallee, to 8 metres in height forms a patchy and discontinuous stratum. This stratum may be absent with mallee present only as scattered individuals in some areas, usually on scarp slopes. Scattered <i>Callitris canescens</i> form a patchy stratum of Open Low woodland B at site E22. Mallee species recorded include <i>Eucalyptus celastroides</i> , <i>Eucalyptus eremophila</i> , <i>Eucalyptus erythronema</i> , <i>Eucalyptus pluricaulis</i> ssp. <i>pluricaulis</i> and <i>Eucalyptus subangusta</i> .
Stratum 2	Scattered shrubs of <i>Melaleuca uncinata</i> to 3 metres in height may form a stratum of Scrub to Open Scrub occasionally.
Stratum 3	Heath B or Heath C, occasionally to Dense Heath B or Dense Heath C, with <i>Melaleuca coronicarpa</i> ssp. <i>coronicarpa</i> dominant. Other species occurring as scattered individuals include <i>Acacia orbifolia</i> , <i>Acacia sulcata</i> ssp. <i>platyphylla</i> , <i>Astroloma serratifolium</i> , <i>Dodonaea bursariifolia</i> , <i>Gastrolobium parviflorum</i> , <i>Gastrolobium spinosum</i> , <i>Hibbertia rostellata</i> , <i>Melaleuca adnata</i> , <i>Melaleuca undulata</i> , <i>Phebalium filifolium</i> and <i>Phebalium tuberculosum</i> . Low Heath D occurs in areas regenerating after fire (early 1970s).
Comments	Mallee over <i>Melaleuca coronicarpa</i> Heath is found on scarp slopes immediately below the breakaway and on flat terrain. The association favours duplex soils or shallow red soils overlying the residual laterite debris associated with breakaways. The upper stratum of Mallee may be absent on scree slopes.

Me Mallee over *Melaleuca*

Diagnosis	Shrub Mallee (Tree Mallee) over <i>Callitris canescens</i> Open Low Woodland B/Low Woodland B in places over Open Low Scrub A to Low Scrub B.
Sites	E11, E24, E27
Description	
Stratum 1	Shrub Mallee, occasionally Tree Mallee, to 10 metres in height. Mallee species recorded include <i>Eucalyptus ?arachnaea</i> , <i>Eucalyptus pluricaulis</i> , <i>Eucalyptus semivestita</i> , <i>Eucalyptus sheathiana</i> and <i>Eucalyptus subangusta</i> .
Stratum 2	Scattered <i>Callitris canescens</i> to 4 metres in height form a patchy stratum of Open Low Woodland B to Low Woodland B in some areas.
Stratum 3	Open Low Scrub A to Open Low Scrub B, occasionally Low Scrub B of <i>Melaleuca</i> species, with <i>Melaleuca coronicarpa</i> and <i>Melaleuca uncinata</i> prominent, form a patchy stratum. Open Low Scrub A of <i>Melaleuca uncinata</i> may form a separate stratum in some areas. Other commonly occurring species include <i>Melaleuca acuminata</i> , <i>Melaleuca adnata</i> and <i>Melaleuca undulata</i> . Occasional species include <i>Acacia sulcata</i> , <i>Astroloma serratifolium</i> , <i>Dodonaea bursariifolia</i> , <i>Gastrolobium parviflorum</i> and <i>Melaleuca sclerophylla</i> .
Comments	Mallee over <i>Melaleuca</i> covers only small areas on the Experimental Farm adjacent to areas of salmon gum and gimlet. The association favours soil type 7 with rock fragments commonly occurring.

Photograph 8: Mallee over *Melaleuca coronicarpa* at site W9



Photograph 9: Mallee over *Melaleuca* at site E24



SHRUBLAND AND HEATH FORMATIONS

Kdt *Dryandra/Petrophile shuttleworthiana* Thicket

Diagnosis Heath A (Dense Heath A) to Heath B (Dense Heath B) over Open Dwarf Scrub C/Dwarf Scrub C in places.

Sites E42, W4, W22, W30

Description

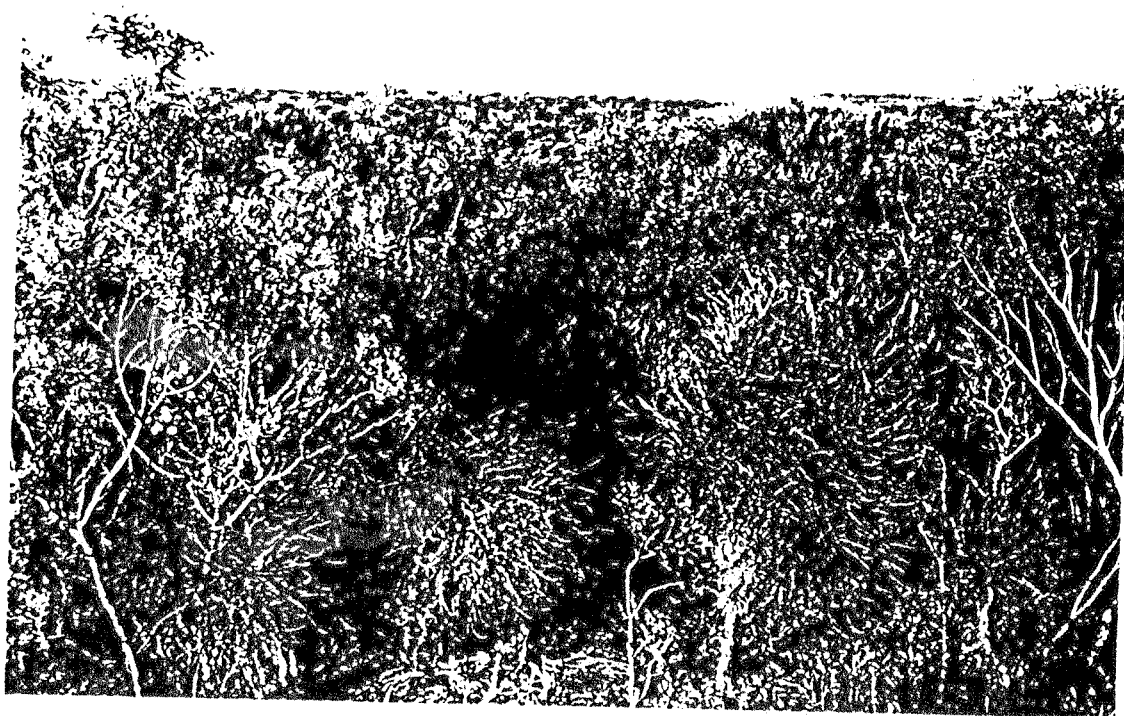
Stratum 1 Heath A or Heath B, occasionally Dense Heath A or Dense Heath B. Low Heath C was recorded in an area regenerating after fire. Scattered shrub mallee emergent to 6 metres may be present, forming Very Open Shrub Mallee over a small area at site W30. Mallee species recorded include *Eucalyptus ?hypoclamydea*, *Eucalyptus pyriformis*, *Eucalyptus semivestita* and *Eucalyptus subangusta*. Prominent stratum 1 species occurring frequently within the association include *Allocasuarina drummondiana*, *Allocasuarina campestris*, *Dryandra purdieana*, *Hakea scoparia*, *Melaleuca scabra* and *Petrophile shuttleworthiana*. Other characteristic species include *Dryandra comosa*, *Chamelaucium drummondii*, *Grevillea armigera*, *Grevillea petrophiloides*, *Hakea gilbertii*, *Hakea meisneriana*, *Isopogon divergens*, *Isopogon scabriusculus* and *Melaleuca pungens*.

Lower Stratum Open Dwarf Scrub C to Dwarf Scrub C of shrubs, sub shrubs and scattered herbaceous species occur in some areas. Commonly occurring species include *Acacia jacksonii*, *Beaufortia bracteosa*, *Conostylis androstemma*, *Cryptandra leucophracta*, *Calytrix leschenaultii*, *Dampiera lindleyi*, *Daviesia* aff. *daphnoides*, *Goodenia pinifolia*, *Hibbertia exasperata*, *Hibbertia huegelii*, *Lysinema ciliatum*, *Melaleuca conothamnoides*, *Petrophile media*, *Persoonia quinquenervis* and *Verticordia chrysantha*.

Comments

Dryandra/Petrophile shuttleworthiana Thicket covers the summits and upper slopes of areas of residual laterite which, for the most part, have remained unburnt for some time. The association is related to the Mallee over *Petrophile shuttleworthiana/Allocasuarina campestris* Thicket which covers extensive areas on the summits and slopes of the Wongan Hills (Coates 1988). The similarity between the associations is most obvious when comparing *Dryandra/Petrophile shuttleworthiana* Thicket with areas of the hills association where mallee are scattered and *Dryandra* species become more prominent.

Photograph 10: *Dryandra/Petrophile shuttleworthiana* Thicket at site W30 with *Dryandra comosa* and *Petrophile shuttleworthiana* in the foreground.



Kdh *Dryandra* Low Heath

Diagnosis Low Heath D to Low Heath C (Dense Low Heath C)

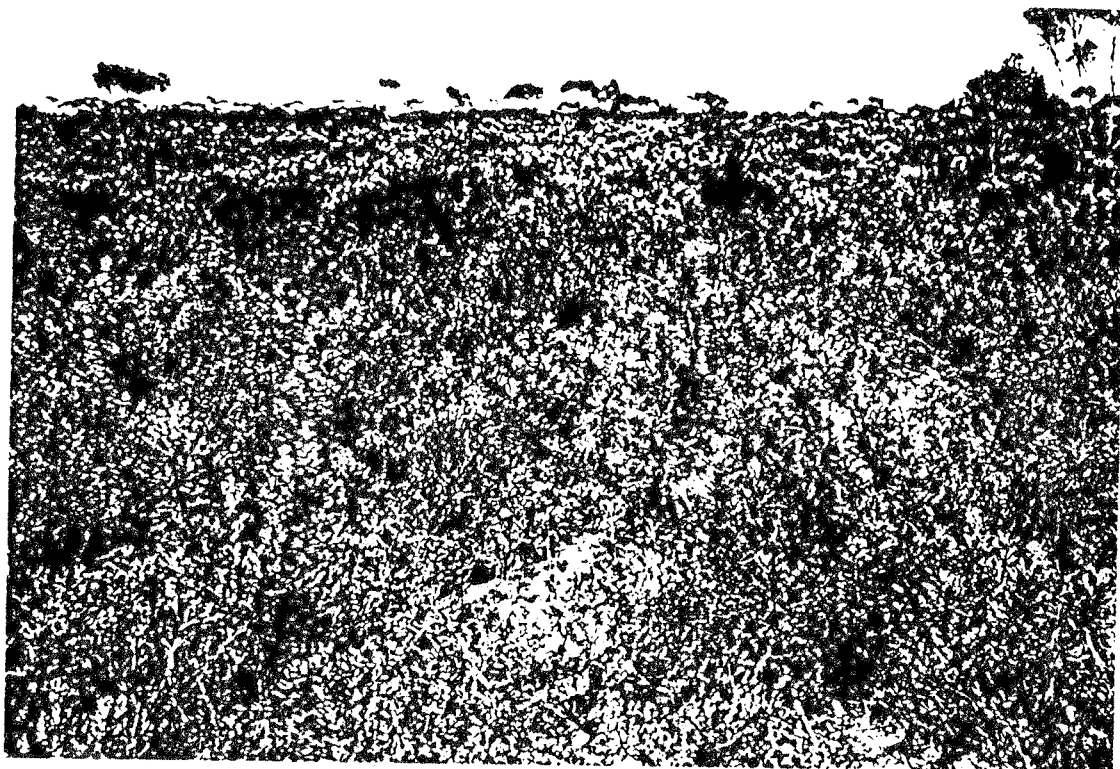
Sites W5, W7, W12, W18

Description

Stratum 1 Low Heath D to Low Heath C, Dense Low Heath occasionally. Scattered emergents include *Eucalyptus flocktoniae*, *Eucalyptus pyriformis* and *Eucalyptus ?rigidula*. Frequently occurring species which may be prominent in some areas include *Allocasuarina campestris*, *Dryandra purdieana*, *Hakea gilbertii*, *Hakea scoparia*, *Melaleuca conothamnoides*, *Melaleuca holosericea*, *Melaleuca scabra* and *Petrophile shuttleworthiana*. Other characteristic species include *Acacia jacksonii*, *Beaufortia interstans*, *Calytrix leschenaultii*, *Conostylis androstemma*, *Cryptandra leucophracta*, *Chamelaucium drummondii*, *Dampiera oligophylla*, *Grevillea armigera*, *Grevillea integrifolia* ssp. *shuttleworthiana*, *Grevillea petrophiloides*, *Hibbertia exasperata*, *Hibbertia huegelii*, *Isopogon scabriusculus*, *Melaleuca pungens*, *Petrophile media*, *Synaphea* sp., *Thryptomene racemulosa* and *Verticordia chrysantha*.

Comments *Dryandra* Low Heath occurs on residual laterite, frequently above breakaways and benched slopes. The association is found only in areas regenerating after the fire which burnt extensive areas in the northern section of the Water Reserve. *Dryandra* Low Heath is probably equivalent to burnt areas of the *Dryandra/Petrophile shuttleworthiana* Thicket but as some uncertainty exists with this interpretation the associations have been mapped separately.

Photograph 11: *Dryandra* Low Heath at site W18. The area was burnt in the early 1970s



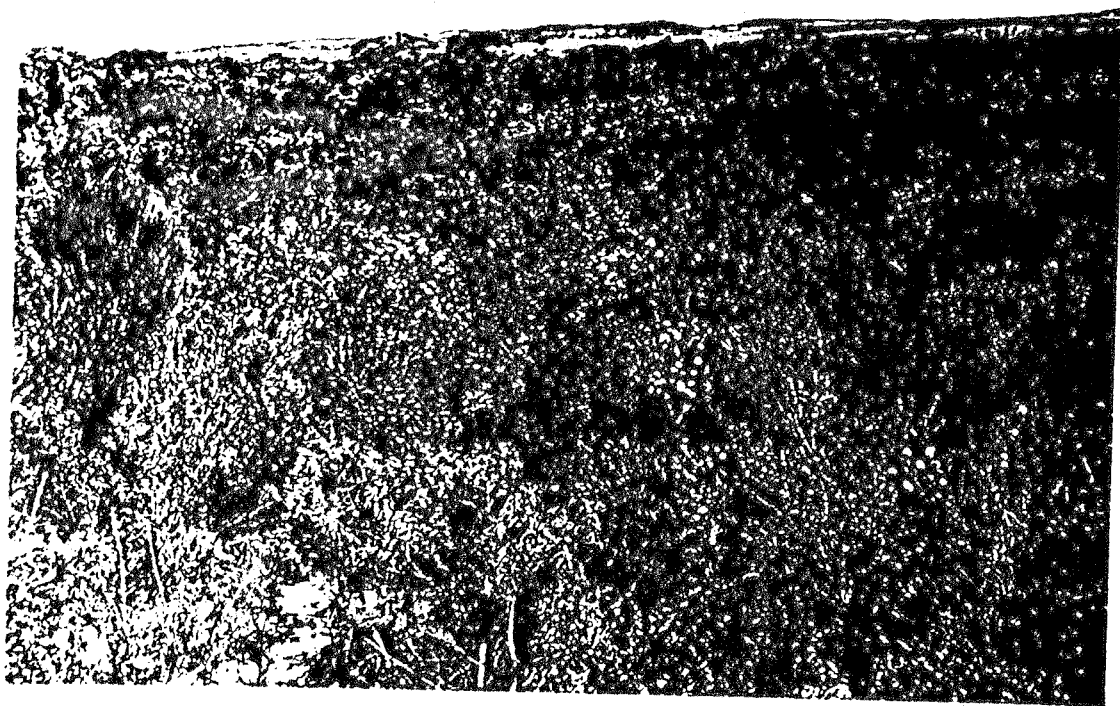
Kh Scrub Heath

Diagnosis	Open Scrub over Heath A/Heath B (Dense Heath B). Regeneration - Open Low Scrub A/Open Low Scrub B over Low Heath C.
Sites	E1, W1, W20, W21, W23
Description	
Stratum 1	Open Scrub to 3 metres with Open Low Scrub A to Open Low Scrub B in areas regenerating after fire. <i>Actinostrobos arenarius</i> is usually prominent. This stratum may be absent in some areas with shrubs and Shrub Mallee only present as scattered individuals. Other species, occasional in stratum 1, include <i>Acacia multispicata</i> , <i>Exocarpos sparteus</i> , <i>Eucalyptus eudesmioides</i> , <i>Eucalyptus pyriformis</i> , <i>Eucalyptus rigidula</i> , <i>Grevillea armigera</i> and <i>Leptospermum erubescens</i> .
Stratum 2	Heath A to Heath B, occasionally to Dense Heath B. Heath C, occasionally to Dense Heath C, occurs in areas regenerating after fire. Characteristic species occurring frequently within the association and prominent in some areas include <i>Allocasuarina campestris</i> , <i>Dryandra purdieana</i> , <i>Eremaea pauciflora</i> , <i>Melaleuca pungens</i> , <i>Melaleuca scabra</i> and <i>Petrophile shuttleworthiana</i> . Other characteristic species include <i>Acacia phaeocalyx</i> , <i>Beaufortia elegans</i> , <i>Beaufortia interstans</i> , <i>Calothamnus sanguineus</i> , <i>Calytrix violacea</i> , <i>Chamelaucium drummondii</i> , <i>Conostylis setigera</i> , <i>Dampiera oligophylla</i> ssp. <i>juncea</i> , <i>Daviesia</i> aff. <i>daphnoides</i> , <i>Daviesia nudiflora</i> , <i>Grevillea uncinulata</i> , <i>Hakea gilbertii</i> , <i>Hakea incrassata</i> , <i>Hakea trifurcata</i> , <i>Hakea lissocarpha</i> , <i>Hibbertia hypericoides</i> , <i>Isopogon dubius</i> , <i>Lysinema ciliatum</i> , <i>Melaleuca</i> aff. <i>cordata</i> , <i>Petrophile ericifolia</i> , <i>Petrophile media</i> , <i>Stylidium repens</i> , <i>Synaphea "constricta"</i> , <i>Verticordia chrysantha</i> , <i>Verticordia eriocephala</i> , and <i>Verticordia picta</i> .
Comments	Scrub Heath favours areas of residual sandplain with sandy gravel soils over gravel or ironstone on the slopes back from the plateau summits. The association tends to merge with <i>Dryandra</i> Low Heath or <i>Dryandra/Petrophile shuttleworthiana</i> Thicket which occur on upper slopes and summits. Mixed Dense Heath described and mapped for Elphin Nature Reserve (Coates 1988) is included in this vegetation type.

Photograph 12: Scrub Heath at site W21



Photograph 13: Scrub Heath regenerating after fire (early 1970s) at site W23



Kt *Allocasuarina campestris* Thicket

Diagnosis Thicket to Heath B over *Ecdeiocolea* Very Open Tall Sedges to Tall Sedges in places over Open Low Sedges/Dwarf Scrub D in places over Very Open Herbs to Herbs.

Sites E3, E13, E17, E33, E47, W13, W35, W49, W53

Description

Stratum 1 Thicket to Heath B, occasionally to Dense Heath B or Dense Heath A, with *Allocasuarina campestris* dominant. Scattered trees and Shrub Mallee emergent to 6 metres are present in some areas forming Very Open Shrub Mallee at site W13 where shrubs are regenerating after fire. Species include *Eucalyptus loxophleba* (near granite) and *Eucalyptus pyriformis* (gravel soils). Other occasional species include *Acacia fragilis*, *Acacia lasiocalyx* (granite), *Hakea meisneriana*, *Hakea scoparia*, *Hypocalymma angustifolium*, *Leptospermum erubescens*, *Melaleuca scabra*, *Melaleuca uncinata*, *Petrophile seminuda* and *Santalum acuminatum*.

Stratum 2 Very Open Tall Sedges to Tall Sedges of *Ecdeiocolea monostachya* form a variable stratum in some areas.

Lower Stratum Open Low Sedges/Dwarf Scrub D, occasionally Dwarf Scrub C, form a patchy stratum in places with areas of *Borya sphaerocephala* Very Open Herbs to Herbs. Shrubs, sedges with scattered herbaceous species and grasses include *Astroloma serratifolium*, *Baeckea ?crispiflora*, *Baeckea ?preissiana*, *Caladenia flava*, *Calytrix depressa*, *Chamaescilla spiralis*, *Chamaescilla corymbosa*, *Cyanicula gemmata*, *Diuris* aff. *corymbosa*, *Dodonaea divaricata*, *Drosera macrophylla*, *Drosera subhirtella*, *Elythranthera brunonis*, *Grevillea tridentifera*, *Hibbertia exasperata*, *Hibbertia rostellata*, *Isotoma hypocrateriformis*, *Loxocarya aspera*, *Mesomelaena preissii*, *Microcorys obovata*, *Podolepis canescens*, *Spartochloa scirpoidea*, *Stylidium neglectum*, *Verticordia brachypoda*, *Verticordia eriocephala* and *Waitzia aurea*.

Comments

Allocasuarina campestris is extensive on the Experimental Farm surrounding granite outcrops and covering areas of sandy loam with gravel. The association is also common on the Water Reserve where it is usually associated with granite. Soil types recorded in areas covered by *Allocasuarina campestris* Thicket include soil type 8 (granite), Elphin series soils, Yaling gravelly loam and Mocardy sand.

Photograph 14: *Allocasuarina campestris* Thicket at site W35



Ka *Allocasuarina campestris*/*Calothamnus aspera* Thicket

Diagnosis Thicket

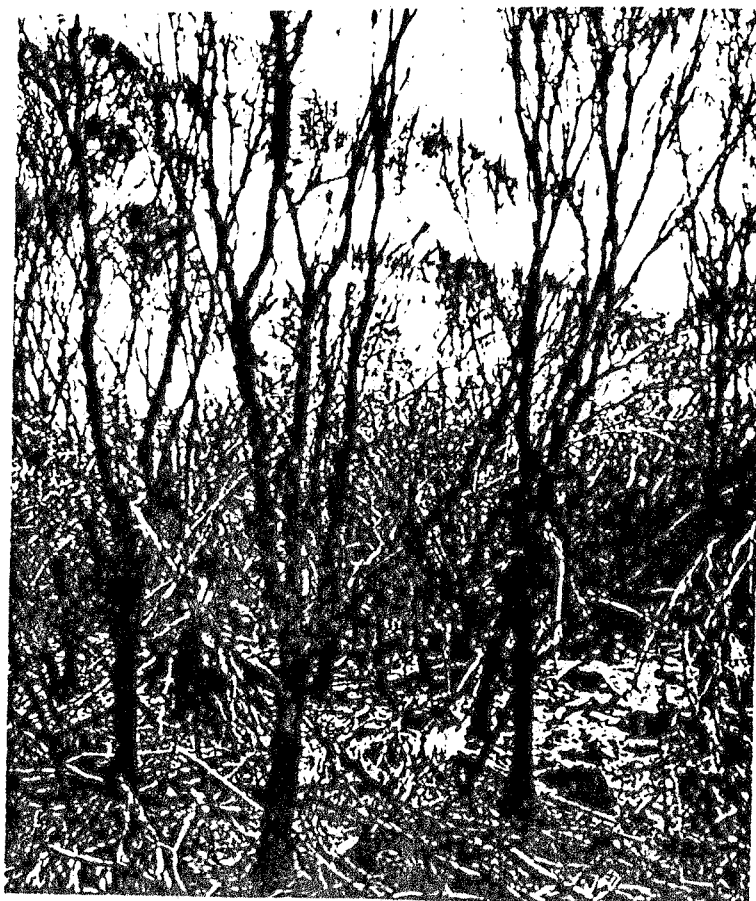
Sites E26

Description

Stratum 1 Thicket of *Allocasuarina campestris* and *Calothamnus aspera* to 4 metres in height. Scattered shrubs, sedges, grasses, ferns and herbaceous species include *Acacia ulicina*, *Acacia lasiocalyx*, *Astroloma serratifolium*, *Cheilanthes austrotenuifolia*, *Chamaescilla corymbosa*, *Diuris* sp., *Drosera macrophylla*, *Dodonaea divaricata*, *Hakea scoparia*, *Melaleuca radula*, *Spartochloa scirpoidea*.

Comments *Allocasuarina campestris*/*Calothamnus aspera* Thicket covers a small area on the Experimental Farm. The association is very variable in the hills area ranging from Thicket to a more open formation with an understorey of *Melaleuca radula* and *Spartochloa scirpoidea*. *Calothamnus aspera* joins *Allocasuarina campestris* on sandy clay soils with rock outcrops in places. The gazetted rare plants *Acacia pharangites* and *Eriostemon wonganensis* occur in this vegetation type in the hills area but were not found during the present survey.

Photograph 15: *Allocasuarina campestris* and *Calothamnus aspera* Thicket at site E26



Kg *Allocasuarina campestris/Hakea meisneriana* Thicket

- Diagnosis** Scrub/Thicket over Heath A (Low Scrub A) over *Ecdeiocolea* Tall Sedges to Very Open Tall Sedges in places or over Low Heath C to Open Dwarf Scrub C.
- Sites** E40, E41
- Description**
- Stratum 1** Scrub, occasionally to Thicket of *Allocasuarina campestris* and *Hakea meisneriana* to 3 metres in height. Scattered shrubs of *Santalum acuminatum* were also recorded.
- Stratum 2** Heath A, Low Scrub A in places. Characteristic species include *Allocasuarina campestris*, *Melaleuca scabra* and *Petrophile shuttleworthiana*. Occasional species include *Acacia sulcata* ssp. *platyphylla*, *Dryandra purdieana* and *Petrophile seminuda*.
- Stratum 3** Tall Sedges to Very Open Tall Sedges of *Ecdeiocolea monostachya* in some areas.
- Stratum 4** Low Heath C to Open Dwarf Scrub C forms a patchy stratum. Stratum 4 species include *Beaufortia bracteosa*, *Conostylis androstemma*, *Cryptandra leucophracta*, *Darwinia purpurea*, *Gastrolobium calycinus*, *Hakea circumalata*, *Hakea incrassata*, *Hibbertia exasperata*, *Hemigenia westringioides*, *Melaleuca conothamnoides*, *Melaleuca* aff. *cordata* and *Petrophile media*.
- Comments** *Allocasuarina campestris* is joined by *Hakea meisneriana* on gravel soils on the Experimental Farm. The association occurs on an area of residual laterite on soil type Elphin hardpan which consists of sand to sandy loam with gravel at ~10 cm over a ferruginous hardpan.

Photograph 16: *Allocasuarina campestris*/*Hakea meisneriana* Thicket at site E40



Ky *Allocasuarina campestris/Hakea erecta* Heath

Ky1 Unburnt

Diagnosis Heath A (Heath B) over Very Open Tall Sedges to Tall Sedges over Open Dwarf Scrub D (Open Low Scrub C).

Sites W25, W27, W63

Description

Stratum 1 Heath A, occasionally Heath B, with *Allocasuarina campestris* and *Hakea erecta* prominent. Scattered shrubs greater than 2 metres in height form Open Scrub at site W63. Commonly occurring species include *Acacia filifolia*, *Actinostrobos arenarius*, *Grevillea didymobotrya*, *Hakea platysperma*, *Hakea circumalata*, *Petrophile ericifolia* and *Santalum acuminatum*.

Stratum 2 Tall Sedges to Very Open Tall Sedges of *Ecdeiocolea monostachya* form a patchy stratum variable at different localities.

Stratum 3 Open Dwarf Scrub D, occasionally Open Low Scrub C, occurs in most areas together with scattered sedges and herbaceous species. Stratum 3 species include *Boronia coerulescens*, *Baeckea ?crispiflora*, *Baeckea ?preissiana*, *Conospermum stoechadis*, *Conospermum brownii*, *Comesperma scoparia*, *Conostylis wonganensis*, *Cryptandra glabriflora*, *Darwinia purpurea*, *Grevillea uncinulata*, *Hibbertia exasperata*, *Isopogon scabriusculus*, *Jacksonia macrocalyx*, *Melaleuca conothamnoides*, *Melaleuca* aff. *cordata*, *Mesomelaena preissii*, *Stylidium repens*, *Verticordia chrysantha*, *Verticordia eriocephala* and *Verticordia picta*.

Ky2 Regeneration

Diagnosis Open Low Scrub A in places over Heath B/Low Heath C over Tall Sedges/Low Sedges over Dwarf Scrub D.

Sites W2, W24, W29

Description**Stratum 1**

Open Low Scrub A, occasionally Open Scrub, of mixed shrub species including *Acacia filifolia*, *Acacia latipes*, *Acacia multispicata*, *Actinostrobilus arenarius*, *Grevillea armigera*, *Grevillea didymobotrya* and *Hakea platysperma*.

Stratum 2

Low Heath C to Heath B, Low Scrub B occasionally, with *Hakea erecta* and *Allocasuarina campestris* prominent. Other characteristic species include *Conospermum stoechadis*, *Dryandra purdieana*, *Daviesia uniflora*, *Grevillea tridentifera*, *Hakea cygna*, *Hakea scoparia*, *Isopogon scabriusculus*, *Melaleuca platycalyx*, *Petrophile ericifolia*, *Petrophile media* and *Petrophile seminuda*.

Stratum 3

Tall Sedges to Low Sedges of *Ecdeiocolea monostachya*. This stratum may be absent in some areas with *Ecdeiocolea* forming one stratum with Low Heath C or Low Heath D.

Stratum 4

Low Heath D to Dwarf Scrub D with scattered herbaceous species. Stratum 4 species include *Boronia coerulescens*, *Burchardia umbellata*, *Baeckea ?preissiana*, *Calytrix gracilis*, *Calytrix leschenaultii*, *Conostylis wonganensis*, *Dampiera oligophylla*, *Darwinia purpurea*, *Drosera spilos*, *Jacksonia fasciculata*, *Grevillea eryngioides*, *Grevillea uncinulata*, *Glischrocaryon* sp., *Leucopogon hamulosus*, *Melaleuca* aff. *cordata*, *Mesomelaena preissii*, *Mirbelia spinosa*, *Psammomoya choretroides*, *Prasophyllum sargentii*, *Stylidium repens*, *Stypandra glauca*, *Synaphea* sp. and *Verticordia picta*.

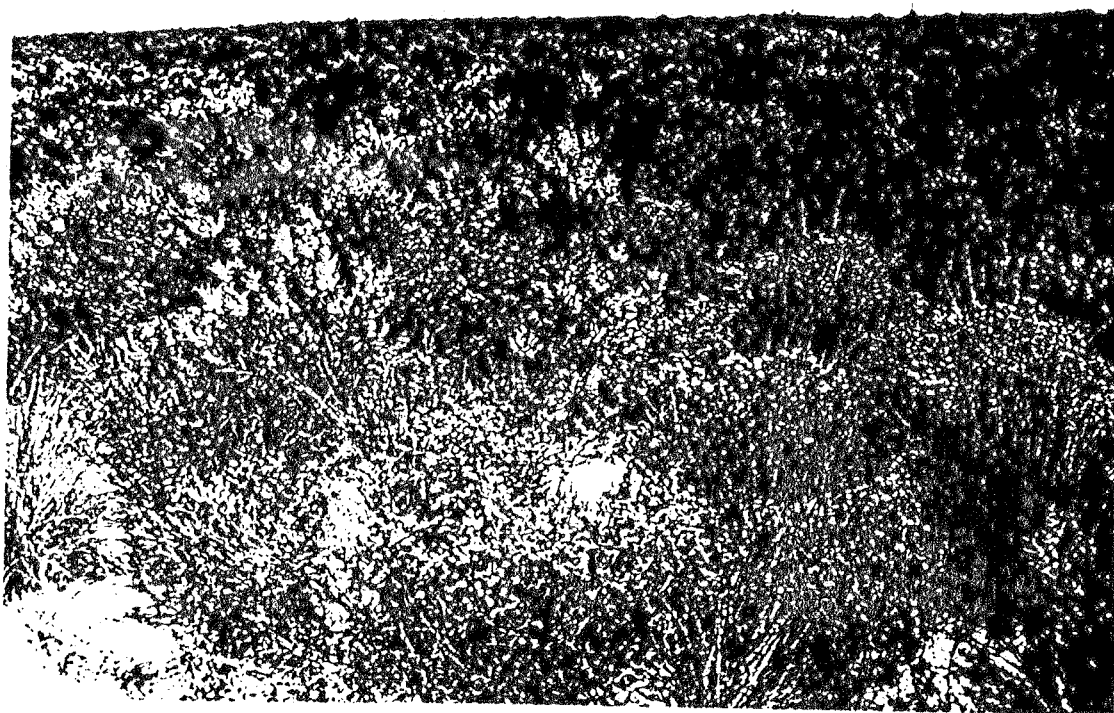
Comments

Allocasuarina campestris is joined by *Hakea erecta* and other species on yellow sandy soils over gravel at depth. The association covers extensive areas on the Water Reserve. The gazetted rare plant *Conostylis wonganensis* is found in this vegetation type.

Photograph 17: *Allocasuarina campestris*/*Hakea erecta* Heath (unburnt) at site W25



Photograph 18: *Allocasuarina campestris*/*Hakea erecta* Heath regenerating after fire at site W29



Kv *Allocasuarina acutivalvis* Thicket

Diagnosis Thicket over Open Scrub in places over Dwarf Scrub C (Low Heath C).

Sites E6, E10, E44

Description

Stratum 1 Thicket of *Allocasuarina acutivalvis* to 6 metres in height.

Stratum 2 Scattered shrubs to 2.5 metres of mixed species form Open Scrub at site E10. Stratum 2 species include *Allocasuarina campestris*, *Grevillea didymobotrya*, *Grevillea petrophiloides*, *Hakea scoparia*, *Hypocalymma angustifolium*, *Isopogon scabriusculus*, *Melaleuca uncinata* and *Thryptomene racemulosa*.

Stratum 3 Dwarf Scrub C, rarely to Low Heath C, forms a patchy stratum in some areas. Commonly occurring species include *Astroloma serratifolium*, *Cryptandra leucophracta*, *Cyanicula gemmata*, *Dianella revoluta*, *Elythranthera brunonis*, *Hakea incrassata*, *Hibbertia exasperata*, *Hibbertia rostellata*, *Leucopogon* species, *Melaleuca conothamnoides*, *Psammomoya choretroides*, *Waitzia acuminata* and *Waitzia paniculata*.

Comments *Allocasuarina acutivalvis* occurs on top of breakaways and covers small areas of sandy loam with gravel on the Experimental Farm. Areas of *Allocasuarina acutivalvis* are often too small to map.

Km Melaleuca Thicket

Diagnosis Thicket (Dense Thicket) over Low Scrub B in places over Low Heath D to Open Dwarf Scrub D or Herbs/Low Grass in places.

Sites E20, E35, E36, W52, W59

Description**Stratum 1**

Thicket, occasionally to Dense Thicket or Heath A, with *Melaleuca uncinata* usually prominent. Other *Melaleuca* species recorded include *Melaleuca acuminata*, *Melaleuca adnata*, *Melaleuca coronicarpa*, *Melaleuca ctenoides*, *Melaleuca hamulosa* (streamline), *Melaleuca lateriflora*, *Melaleuca laxiflora*, *Melaleuca platycalyx*, *Melaleuca scabra*, *Melaleuca spicigera* and *Melaleuca undulata* ssp. *undulata*. *Melaleuca coronicarpa* and *Melaleuca ctenoides* form a lower stratum of Low Scrub B at site E20. Other stratum 1 species include *Allocasuarina campestris*, *Callitris canescens*, *Gastrolobium parviflorum*, *Hypocalymma angustifolium* and *Santalum acuminatum*.

Lower Stratum

Low Heath D to Open Dwarf Scrub D forms a lower stratum in places. Areas of Herbs or Low Grass may also occur in some areas. Shrubs, sub shrubs, herbaceous species, sedges and grasses forming the lower stratum include *Acacia ericksonii*, **Avena species*, *Baeckea ?preissiana*, **Briza maxima*, **Bromus diandrus*, *Borya sphaerocephala*, *Ecdeiocolea monostachya*, *Halosarcia ?lepidosperma*, *Halosarcia ?pergranulata*, *Hibbertia rostellata*, *Helichrysum lindleyi*, *Isotoma hypocrateriformis*, *Lepidosperma* sp., **Lolium rigidum*, *Loxocarya aspera*, **Mesembryanthemum nodiflorum*, *Podolepis lessonii*, *Spartochloa scirpoidea*, *Stypandra glauca* and *Waitzia acuminata*.

Comments

Melaleuca Thicket covers small areas on the Experimental Farm and the Water Reserve in low lying areas including streamlines. The association occurs amongst areas of Mallee over *Melaleuca uncinata* on shallow duplex soils of clayey sand over clay, often poorly drained, including soil types 10 and A.

Photograph 19: *Allocasuarina acutivalvis* Thicket at site E44



Photograph 20: *Melaleuca* Thicket on the Water Reserve No. 16418



Kc *Melaleuca scabra* Heath

Diagnosis Open Low Scrub B to Open Scrub over Low Heath C to Heath A (Low Scrub A) over Dwarf Scrub D to Dwarf Scrub C (Low Heath C).

Sites E7, E12, E16, E43, E45, E46, W17, W31

Description

Stratum 1 Scattered shrubs form Open Scrub to Open Low Scrub B in places. This stratum is patchy and discontinuous with *Callitris canescens* forming Open Low Woodland B occasionally. Stratum 1 species include *Allocasuarina campestris*, *Melaleuca uncinata* and *Petrophile shuttleworthiana*. Patches of Shrub Mallee may also occur.

Stratum 2 Low Heath C to Heath A/Low Scrub A with *Melaleuca scabra* prominent. This stratum is also very variable and patchy with *Melaleuca scabra* present as scattered individuals over short distances. Other stratum 2 species include *Acacia leptospermoides*, *Hakea scoparia*, *Hemigenia westringioides*, *Hypocalymma angustifolium*, *Isopogon scabriusculus*, *Melaleuca uncinata*, *Petrophile seminuda* and *Thryptomene racemulosa*.

Stratum 3 Dwarf Scrub D to Dwarf Scrub C, Low Heath C occasionally. *Melaleuca conothamnoides* (gravel soil) or *Melaleuca sclerophylla* are prominent in some areas. Other commonly occurring species include *Beaufortia bracteosa*, *Conostylis androstemma*, *Cryptandra leucophracta*, *Drosera glanduligera*, *Drosera subhirtella*, *Hibbertia exasperata*, *Kunzea limnicola*, *Persoonia striata*, *Psammomoya choretroides* and *Verticordia chrysantha*.

Comments *Melaleuca scabra* Heath is very patchy and variable and is interspersed with Mallee over *Melaleuca uncinata* in some areas. The association is more extensive on the Experimental Farm on duplex soils of sand with gravel over clay and occasionally on Yaling series soils.

Photograph 21: *Melaleuca scabra* Heath at site E7



KI *Melaleuca sclerophylla* Low Heath

Diagnosis Low Heath D.

Sites W26, W34, W50

Description

Stratum 1 Low Heath D with *Melaleuca sclerophylla* and in some areas *Kunzea limnicola* prominent. Scattered shrubs and shrub mallee are emergent including *Allocasuarina campestris*, *Dryandra purdieana*, *Hakea marginata*, *Hakea scoparia*, *Melaleuca coronicarpa*, *Melaleuca uncinata*, *Petrophile seminuda* and *Santalum acuminatum*. Other stratum 1 species include *Acacia lasiocarpa*, *Acacia pulchella* ssp. *goadbyi*, *Andersonia* sp., *Beaufortia bracteosa*, *Comesperma volubile*, *Dampiera lindleyi*, *Drosera glanduligera*, *Elythranthera brunonis*, *Gastrolobium calycinus*, *Hakea erinacea*, *Hibbertia exasperata*, *Isopogon scabriusculus*, *Melaleuca scabra*, *Nemcia obovata* and *Stylidium nungarinense*.

Comments *Melaleuca sclerophylla* Low Heath covers small areas on the Water Reserve on clayey sands with rock fragments. The association occurs on sloping terrain often adjacent to areas of Mallee over *Melaleuca uncinata*.

Photograph 22: *Melaleuca sclerophylla* Low Heath at site W50



Ke *Eremaea* Heath

Diagnosis Open Scrub/Open Low Scrub A in places over Dwarf Scrub D in places.

Sites W3, W45, W64

Description

Stratum 1 Scattered shrubs to 2.5 metres in height form Open Scrub or Open Low Scrub A in some areas. Characteristic species include *Actinostrobis arenarius*, *Grevillea armigera*, *Grevillea eriostachya*, *Grevillea ?integrifolia* ssp. *biformis* and *Leptospermum erubescens*.

Stratum 2 Low Heath C with *Eremaea pauciflora* prominent. Other commonly occurring species include *Adenanthos drummondii*, *Allocasuarina humilis*, *Calothamnus quadrifidus*, *Conospermum stoechadis*, *Dampiera oligophylla*, *Dicrastylis velutina*, *Glischrocaryon* sp., *Grevillea uncinulata*, *Hakea incrassata*, *Hakea lissocarpa*, *Hakea trifurcata*, *Jacksonia fasciculata*, *Lysinema ciliatum*, *Melaleuca* aff. *cordata*, *Pileanthus peduncularis*, *Petrophile ericifolia*, *Petrophile media* and *Verticordia eriocephala*.

Stratum 3 Dwarf Scrub D in some areas with scattered sedges and herbaceous species. Stratum 3 species include *Allocasuarina microstachya*, *Anigozanthos humilis*, *Borya sphaerocephala*, *Brunonia australis*, *Burchardia umbellata*, *Caladenia flava*, *Calytrix violacea*, *Conostylis setigera*, *Conostylis villosa*, *Dampiera spicigera*, *Lechenaultia biloba*, *Loxocarya ?myrioclada*, *Loxocarya parthenica*, *Opercularia vaginata*, *Podolepis canescens*, *Stylidium repens* and *Waitzia aurea*.

Comments *Eremaea* Heath covers only small areas on the Water Reserve on grey sands to gravel at depth.

Kb *Beaufortia* Heath

Diagnosis Open Low Scrub A/Low Scrub A over Low Scrub C/Heath C over Open Dwarf Scrub D in places.

Sites W62

Description

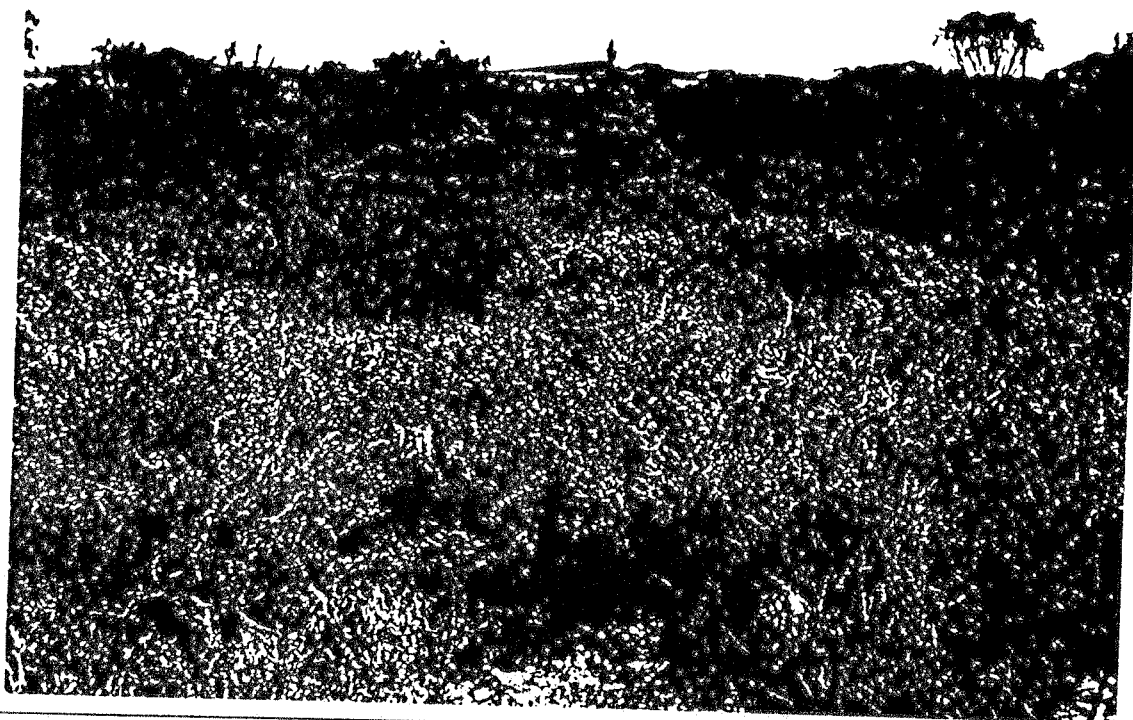
Stratum 1 Open Low Scrub A to Low Scrub A., occasionally to Heath A, forms a patchy discontinuous stratum. Commonly occurring species include *Acacia ?filifolia*, *Grevillea armigera* and *Grevillea didymobotrya*. Occasional species include *Allocasuarina campestris*, *Actinostrobos arenarius*, *Dryandra purdieana*, *Eucalyptus pyriformis*, *Grevillea eriostachya*, *Grevillea integrifolia* ssp. *shuttleworthiana* and *Hakea erecta*.

Stratum 2 Low Heath C to Dwarf Scrub C of mixed shrub species form a patchy stratum. Characteristic species include *Baeckea* sp. 9, *Beaufortia interstans*, *Beaufortia squarrosa*, *Conospermum stoechadis*, *Grevillea eryngioides*, *Grevillea paniculata*, *Hakea ?cygna*, *Isopogon scabriusculus*, *Melaleuca conothamnoides*, *Melaleuca* aff. *cordata*, *Petrophile ericifolia*, *Petrophile media*, *Petrophile seminuda*, *Verticordia chrysantha*, *Verticordia eriocephala*, *Verticordia monadelphica* and *Verticordia venusta*.

Stratum 3 Open Dwarf Scrub D in some areas of mixed species including *Baeckea ?preissiana*, *Conostylis androstemma*, *Calytrix sapphirina*, *Hibbertia huegelii* and *Glischrocaryon aureum*.

Comments *Beaufortia* Heath covers a small area on the Water Reserve upslope on residual laterite on gravelly soils.

Photograph 23: *Eremaea pauciflora* Heath at site W45



Photograph 24: *Beaufortia* Heath at site W62



Ks Sedges/Heath

Diagnosis Open Low Scrub B to Low Scrub A in some areas over Tall Sedges/Low Heath C or Tall Sedges/Open Tall Sedges over Low Heath D.

Sites E2, E18, E30, E32, E38, W10, W19

Description

Stratum 1 In some areas *Allocasuarina campestris* forms a patchy stratum of Open Low Scrub B to Low Scrub A. *Allocasuarina campestris* Thicket occurs in adjacent areas and may form a mosaic with the Sedge/Heath association. Other shrubs occurring as scattered individuals include *Acacia filifolia*, *Calothamnus quadrifidus*, *Grevillea armigera*, *Grevillea didymobotrya*, *Grevillea eriostachya*, *Hakea platysperma* and *Santalum acuminatum*.

Stratum 2 Tall Sedges/Low Heath C with *Ecdeiocolea monostachya*, *Melaleuca* aff. *cordata* and *Mesomelaena preissii* prominent. *Melaleuca conothamnoides* and *Melaleuca sclerophylla* may become prominent in areas with surface gravel. In some places a separate stratum of Tall Sedges over Low Heath D occurs. Open Herbs to Very Open Herbs of *Borya sphaerocephala* may also occur in some areas. Other stratum 2 species include *Allocasuarina microstachya*, *Baeckea ?crispiflora*, *Boronia coerulescens*, *Burchardia umbellata*, *Calytrix leschenaultii*, *Conospermum incurvum*, *Conospermum stoechadis*, *Conostylis wonganensis*, *Dampiera lavandulacea*, *Dampiera lindleyi*, *Dampiera oligophylla*, *Daviesia nudiflora*, *Elythranthera brunonis*, *Gastrolobium glaucum*, *Gastrolobium hamulosum*, *Grevillea teretifolia*, *Hakea incrassata*, *Hibbertia exasperata*, *Mirbelia spinosum*, *Psammomoya choretroides*, *Stylidium repens*, *Stypandra glauca*, *Synaphea* sp., *Verticordia chrysantha* and *Verticordia eriocephala*.

Comments The association mapped and described as Sedges on Elphin Nature Reserve (Coates 1988) has here been broadened to include areas where shrub species also become prominent. The association occurs on yellow sands ± gravel. The gazetted rare plant *Conostylis wonganensis* occurs in this vegetation association. Soil types covered by this association on the Experimental Farm include Wongan loamy sand, Wongan sand, Mocardy sand and a small area of spillway sand.

Photograph 25: Sedges/Heath at site W10 with *Ecdeiocola monostachya* prominent



Photograph 26: Sedges/Heath at site E38 with *Melaleuca aff. cordata*, *Ecdeiocola monostachya* and *Mesomelaena preissii* prominent



Kn *Nuytsia floribunda* Over Low Heath

Diagnosis Open Scrub to Open Low Scrub B in places over Low Scrub C/Low Scrub B to Open Low Scrub B over Low Heath D (Low Sedge).

Sites E31, E34

Description

Stratum 1 Scattered shrubs form Open Scrub to Open Low Scrub B in some areas. Characteristic species include *Acacia filifolia*, *Acacia acuminata*, *Allocasuarina campestris*, *Leptospermum oligandrum* and *Nuytsia floribunda*.

Stratum 2 Low Scrub C to Low Scrub B, occasionally Open Low Scrub B of mixed shrub species including *Allocasuarina humilis*, *Baeckea* aff. *crispiflora* A, *Calothamnus quadrifidus*, *Calothamnus sanguineus*, *Daviesia nudiflora*, *Ecdeiocolea monostachya*, *Hakea incrassata*, *Hakea trifurcata* and *Melaleuca* aff. *cordata*.

Stratum 3 Low Heath D and in places Low Sedges including scattered herbaceous plants. Commonly occurring species include *Mesomelaena preissii*, *Allocasuarina microstachya*, *Daviesia hakeoides* and *Lepidobolus* sp. Other stratum 3 species include *Acacia lasiocarpa*, *Boronia coerulescens*, *Borya sphaerocephala*, *Burchardia umbellata*, *Beaufortia bracteosa*, *Calytrix depressa*, *Chamaescilla corymbosa*, *Chamaescilla spiralis*, *Dampiera lavandulacea*, *Dampiera oligophylla*, *Goodenia trichophylla*, *Grevillea uncinulata*, *Jacksonia* sp., *Microcorys ericifolia*, *Nemcia obovata*, *Persoonia quinquenervis*, *Podolepis canescens*, *Podotheca angustifolia*, *Podotheca gnaphalioides*, *Stylidium leptophyllum*, *Stypandra glauca*, *Verticordia acerosa* ssp. *preissii*, *Verticordia chrysantha*, *Verticordia brachypoda*, *Verticordia densiflora*, *Verticordia huegelii*, *Verticordia picta*, *Waitzia acuminata* and *Waitzia paniculata*.

Comments *Nuytsia floribunda* over Low Heath covers a relatively small area in the north eastern section of the Experimental Farm bushland. The association favours sandy soils including Mocardy sand and spillway sand which are imperfectly drained.

Ku Open Scrub Over Herbs/Sedges

Diagnosis	Open Scrub in places over Open Dwarf Scrub D in places over Herbs/Low Sedges.
Sites	W51
Description	
Stratum 1	Scattered trees and shrubs forming Open Scrub in places. Stratum 1 species include <i>Acacia acuminata</i> , <i>Allocasuarina campestris</i> , <i>Melaleuca uncinata</i> and <i>Santalum spicatum</i> .
Stratum 2	Open Dwarf Scrub D of mixed shrub species including <i>Acacia ericksonii</i> , <i>Acacia restiacea</i> , <i>Astroloma serratifolium</i> , <i>Allocasuarina microstachya</i> , <i>Baeckea ?preissiana</i> , <i>Chorizema aciculare</i> , <i>Chorizema genistoides</i> , <i>Cryptandra spinescens</i> , <i>Dampiera oligophylla</i> , <i>Hakea incrassata</i> , <i>Hibbertia exasperata</i> , <i>Nemcia obovata</i> and <i>Verticordia chrysanthella</i> .
Stratum 3	Herbs with <i>Borya sphaerocephala</i> prominent and Low Sedges with <i>Loxocarya aspera</i> and <i>Lepidobolus ?chaetocephalus</i> frequent. Other stratum 3 species include * <i>Briza maxima</i> , <i>Burchardia umbellata</i> , <i>Caladenia roei</i> , <i>Cyanicula gemmata</i> , <i>Drosera subhirtella</i> , <i>Diuris laxiflora</i> , <i>Helipterum manglesii</i> , <i>Mesomelaena preissii</i> , <i>Opercularia vaginata</i> , <i>Podolepis lessonii</i> , <i>Prasophyllum cyphochilum</i> , <i>Stylidium neglectum</i> , <i>Stylidium periscelanthum</i> , <i>Trachymene cyanopetala</i> and <i>Trachymene ornata</i> .
Comments	Open Scrub over Herbs/Sedges covers small areas on the Water Reserve occurring on sandy soils associated with granite and interspersed with areas of <i>Allocasuarina campestris</i> Thicket.

Photograph 27: *Nuytsia floribunda* Heath at site E34



Photograph 28: Open Scrub over Herbs/Sedges at site W51



LITHIC COMPLEX

G Granite Rock

Sites E14, E28, W36, W53, W54, W61, W61a

Rock Surface

- Shallow Soil

Borya sphaerocephala and *Borya laciniata* Herbs/(Dense Herbs) form a mat on flat areas of the rock surface.

Rock Crevices

- Shallow Soil

Low Heath D to Low Heath C of *Calytrix depressa* and/or *Verticordia chrysanthella*.

Other herbaceous species growing in shallow soils include *Arthropodium capillipes*, *Blennospora drummondii*, *Bulbine semibarbata*, *Caladenia dimidia*, *Caladenia microchila*, *Caladenia roei*, *Cyanicula gemmata*, *Diuris picta*, *Diuris* aff. *corymbosa*, *Drosera macrantha*, *Drosera glanduligera*, *Drosera subhirtella*, *Elythranthera brunonis*, *Helipterum manglesii*, *Helichrysum lindleyi*, *Millotia myosotidifolia*, *Podolepis lessonii*, *Stackhousia monogyna*, *Stypandra glauca*, *Stylidium neglectum*, *Stylidium breviscapum*, *Thelymitra antennifera*, *Thysanotus dichotomus*, *Thysanotus patersonii* and *Tribonanthes longipetala*. Scattered grasses including **Aira cupaniana*, **Briza maxima* and **Pentaschistis airoides* and the fern *Cheilanthes austrotenuifolia* also occurs with *Spartochloa scirpoidea* Tall Grass in places.

Ecdeiocolea monostachya Tall Sedges occur in border soils in some areas. Other "sedges" include *Lepidosperma ?leptophyllum* and *Loxocarya aspera*. Scattered shrubs occur in patches in rock crevices including *Acacia lasiocalyx*, *Acacia acuminata*, *Calothamnus quadrifidus*, *Dodonaea viscosa*, *Hibbertia glomerosa*, *Hibbertia rupicola*, *Kunzea pulchella*, *Leptospermum erubescens*, *Leptospermum oligandrum*, *Melaleuca fulgens*, *Melaleuca radula* and *Thryptomene australis*.

Deeper Soil-border
of Rock Outcrop

Dense Thicket/Thicket to Heath A/Dense Heath A of *Allocasuarina campestris*.

Allocasuarina huegeliana Low Forest B (site W61a) *Hakea petiolaris*/*Acacia lasiocalyx* Dense Thicket/Thicket (site W61).

Comments

Areas of outcropping granite have a characteristic flora including mosses and lichens. *Borya* species form a mat on shallow soils on the rock surface with scattered shrubs in crevices and soil pockets and species such as *Thryptomene australis*, *Verticordia chrysanthella* and *Calytrix depressa* in run off zones. *Allocasuarina campestris* Thicket occurs in deeper soils surrounding the rock and at the base of large outcrops such as Christmas Rock on the Water Reserve *Allocasuarina huegeliana* Low Forest and *Hakea petiolaris*/*Acacia lasiocalyx* Thicket are formed. Soils associated with granite include soil type 8 and Mocardy sand.

Photograph 29: Granite outcrop at site E28 with a mat of *Borya* Herbs, areas of *Verticordia chrysanthella* and *Calytrix depressa* and *Allocasuarina campestris* Thicket in the background



Photograph 30: *Acacia lasiocalyx* and *Hakea petiolaris* Thicket at Christmas Rock
(site W61)



Photograph 31: *Allocasuarina huegeliana* at site W61a (Christmas Rock)



SALT COMPLEX

S Samphire

Diagnosis Low Heath D.

Sites E39

Description

Stratum 1 Low Heath D of *Halosarcia lepidosperma* and/or *Halosarcia pergranulata*. Scattered shrubs of *Melaleuca uncinata* and *Allocasuarina campestris* emergent to 2 metres also occur. Other species recorded include *Rhagodia drummondii* and *Scaevola helmsii*.

Comments Samphire covers only small areas on the Experimental Farm.

Photograph 32: Samphire on the Experimental Farm at site E39



5.0 FLORA SURVEY

Plant species recorded for the block of remnant vegetation on the Experimental Farm No. 18672 and the Water Reserve No. 16418 are listed in Appendix 1. Manuscript names (ms) have been included to help differentiate between undescribed species within a particular genus. Identifications with the generic name followed by "?" are uncertain due to a lack of flowering or fruiting material or to confusion in the current taxonomy of the group concerned. Affinity or "aff." is used in relation to undescribed species which are very similar to named species yet different enough to be kept as separate taxa. The nomenclature follows that of Green (1985) and Supplement 7 (November 1988 unpublished) unless otherwise specified below. Six species included in the species list have been described since the completion of Supplement 7. These species include:

Eucalyptus pluricaulis, *Eucalyptus subangusta* (Brooker and Hopper 1991)

Verticordia chrysanthella, *Verticordia eriocephala*, *Verticordia venusta* and *Verticordia wonganensis* (George 1991).

The nomenclature further differs from Green (1985) and Supplement 7 in including the new combinations in *Nemcia* and *Gastrolobium* (Crisp and Weston 1987).

5.1 Flora of the Remnant Vegetation on the Experimental Farm No. 18672

A total of 376 plant species are recorded in Appendix 1 as occurring in the block of remnant vegetation on the Experimental Farm, including 3 species of moss, 1 species of fern, 2 gymnosperms and 370 angiosperms. Twenty of the species recorded are exotic or introduced.

Field trips were undertaken in October 1984 and 1985 by staff from the Western Australian Herbarium to collect plant specimens from the remnant vegetation on the Experimental Farm. The information accumulated during the field work is presented in Appendix 4. Fifty one of the species listed in Appendix 1 were not found during the present survey but were collected during the Herbarium field trips. The identity of some of these species is in doubt due to changes in the taxonomy of many groups since the time of recording. Time restrictions did not allow for the checking of voucher specimens collected. However some corrections have been made to the original report (Coates 1989) where re-identification of voucher specimens was noted during herbarium work.

The families with the largest representatives of genera and species are listed below.

Family	No. of Species	No. of Genera	No. of Exotics
Myrtaceae (Eucalyptus etc)	73	16	0
Proteaceae (Banksia, Dryandra etc)	40	8	0
Asteraceae (daisies)	27	20	2
Papilionaceae (pea flowers)	26	10	1
Mimosaceae (wattles)	23	1	0
Goodeniaceae (Lechenaultia, etc)	14	6	0
Poaceae (grasses)	12	11	9
Orchidaceae (orchids)	11	5	0
Anthericaceae (lilies)	7	4	0

The families Myrtaceae, Proteaceae, Asteraceae, Papilionaceae and Mimosaceae were the most strongly represented in the flora of the Experimental Farm. Of the monocotyledons, members of the Poaceae, Orchidaceae and Anthericaceae are the most common.

Using the present data, the overall floristic diversity of the remnant bushland can be estimated at 68 species/square kilometre. This is high indicating a rich flora when compared to other reserves such as Bendering Nature Reserve (5.9 species/square kilometre) and Tutanning Nature Reserve (22 species/square kilometre) but in part reflects the extent to which the area has been studied and the small size of the block. The overall floristic diversity of the hills was estimated at 20.5 species/square kilometre and of Elphin Nature Reserve No. A 25808 at 87 species/square kilometre (Coates 1988). As Muir (1977) points out such estimates will depend on the distribution of vegetation types within the reserve boundary and reserve size, both of which are largely fortuitous.

5.2 Flora of the Water Reserve No. 16418

A total of 366 plant species are recorded in Appendix 1 as occurring in the area of the Water Reserve No. 16418, including 1 species of fern, 2 gymnosperms and 363 angiosperms. Nineteen of the species recorded are exotic or introduced.

The families with the largest representatives of genera and species are listed below:

Family	No. of Species	No. of Genera	No. of Exotics
Myrtaceae (Eucalyptus, bottlebrushes etc)	67	16	0
Proteaceae (Banksia, Dryandra etc)	47	9	0
Mimosaceae (wattles)	29	1	0
Asteraceae (daisies)	26	16	2
Papilionaceae (pea flowers)	23	10	1
Orchidaceae (orchids)	10	5	0
Anthericaceae (lilies)	8	5	0
Poaceae (grasses)	8	7	5

The families Myrtaceae, Proteaceae, Mimosaceae and Papilionaceae were the most strongly represented in the flora of the Water Reserve. Of the monocotyledons, members of the family Orchidaceae, Anthericaceae and Poaceae are the most common.

Using the present data, the overall floristic diversity of the reserve can be estimated at 38 species/square kilometre. This is high when compared to other reserves such as Bendering Nature Reserve (5.9 species/square kilometre) and Tutanning Nature Reserve (22 species/square kilometre) but not as high as the estimate for the remnant bushland on the Experimental Farm (68 species/square kilometre) and Elphin Nature Reserve No. A 25808 at 87 species/square kilometre (Coates 1988). The Water Reserve has a very rich flora with extensive areas of species rich kwongan. The diversity estimate reflects in part the time constraints of the present survey and Appendix 1 only represents part of the flora of the area. Information from other field work carried out in the area was not available. The area is also much larger than Elphin Nature Reserve (198 hectares). The diversity figure will reflect the size, distribution of vegetation types within the boundaries and the extent to which the area has been studied.

5.3 Species of Interest

Plant species of interest recorded for remnant vegetation on the Experimental Farm No. 18672 and Water Reserve No. 16418 are listed in Table 5. These species have been classified by the Department of Conservation and Land Management into categories which reflect their conservation status. These categories are listed below.

CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

X: Declared Rare Flora - Presumed Extinct Flora

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which known wild populations have been destroyed more recently, and have been gazetted as such.

1: Priority One - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, which are under threat either due to small population size, or being on lands under immediate threat, eg. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, eg. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

2: Priority Two - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

3: Priority Three - Poorly Known Taxa

Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

TABLE 5: DECLARED RARE AND PRIORITY FLORA

Species	Conservation Status	Geographical Distribution
<i>Acacia drewiana</i> ssp. minor	2	Wongan Hills, Newdegate - Lake King
<i>Acacia dura</i>	2	Piawaning, Wongan Hills, Yerecoin
<i>Acacia filifolia</i>	3	Wongan Hills, Burracoppin, Southern Cross
<i>Acacia phaeocalyx</i>	3	Kellerberrin, Tammin, Wongan Hills
<i>Acacia semicircularis</i>	R	Wongan Hills
<i>Conostylis wonganensis</i>	R	Wongan Hills, Manmanning
<i>Daviesia euphorbioides</i>	R	Cadoux - Wongan Hills
<i>Dryandra comosa</i>	2	Wongan Hills
<i>Gastrolobium glaucum</i>	R	Wongan Hills
<i>Gastrolobium hamulosum</i>	R	Wongan Hills
<i>Gompholobium asperulum</i>	1	Wongan Hills, Mullewa
<i>Goodenia trichophylla</i>	2	Eneabba, Lake Grace, Cascades
<i>Hemiandra coccinea</i>	3	Mullewa, Tardun
<i>Hemigenia viscida</i>	R	Wongan Hills - Quairading
<i>Melaleuca sclerophylla</i>	3	New Norcia, Dalwallinu, Moora, Manmanning, Marchagee, Wongan Hills
<i>Scaevola tortuosa</i>	1	Kellerberrin, Wyola
<i>Stylidium coroniforme</i>	R	Wongan Hills, Latham
<i>Stylidium neglectum</i>	X	Dragon Rocks NR, Wongan Hills
<i>Verticordia venusta</i>	3	Perenjori to Moonijin, Wongan Hills
<i>Verticordia wonganensis</i>	3	Wongan Hills

a) Gazetted Rare Flora

Seven gazetted rare plants were recorded for the areas surveyed. Five species including *Acacia semicircularis*, *Conostylis wonganensis*, *Gastrolobium glaucum*, *Hemigenia viscida* and *Stylidium coroniforme* occur on Water Reserve No. 16418 and four species including *Conostylis wonganensis*, *Daviesia euphorbioides*, *Gastrolobium glaucum* and *Gastrolobium hamulosum* occur on Experimental Farm No. 18672. Of these species only *Acacia semicircularis* is known to occur in the hills area. The localities of these rare plants are marked on the vegetation maps (Figures 6 and 7).

Acacia semicircularis has been previously recorded at six major localities in the Wongan Hills area including Reserve No. A 33530, Fowlers Gully, the television translator tower, Telecom access road, along the Wongan Hills-Piawaning Road and Water Reserve No. 16418 at site [redacted]. Details of seven new populations found on the Water Reserve during the present survey are detailed below. Plant numbers given are the number of plants seen during general field work. Due to time limitations no detailed surveys of rare flora populations were carried out. *Acacia semicircularis* is illustrated in Figure 8.

Location	Vegetation Association	Soil Type	Plant Numbers
Site [redacted]	Scrub Heath	gravelly sand	30
Site [redacted]	<i>Dryandra</i> Low Heath	sandy gravel, ironstone in places	10
Edge of sand pit near site [redacted]	disturbed area	sand over gravel	20
Site [redacted] and along track	<i>Dryandra</i> Low Heath	gravel soils, ironstone in places	~40
Near site [redacted] adjacent to gravel pit	<i>Dryandra</i> Low Heath	gravel soils	4
SE of site [redacted] along track to escarpment edge	<i>Dryandra/Petrophile shuttleworthiana</i> Thicket	gravel soils, ironstone in places	32
Site [redacted]	<i>Melaleuca scabra</i> Heath	gravelly sand	4

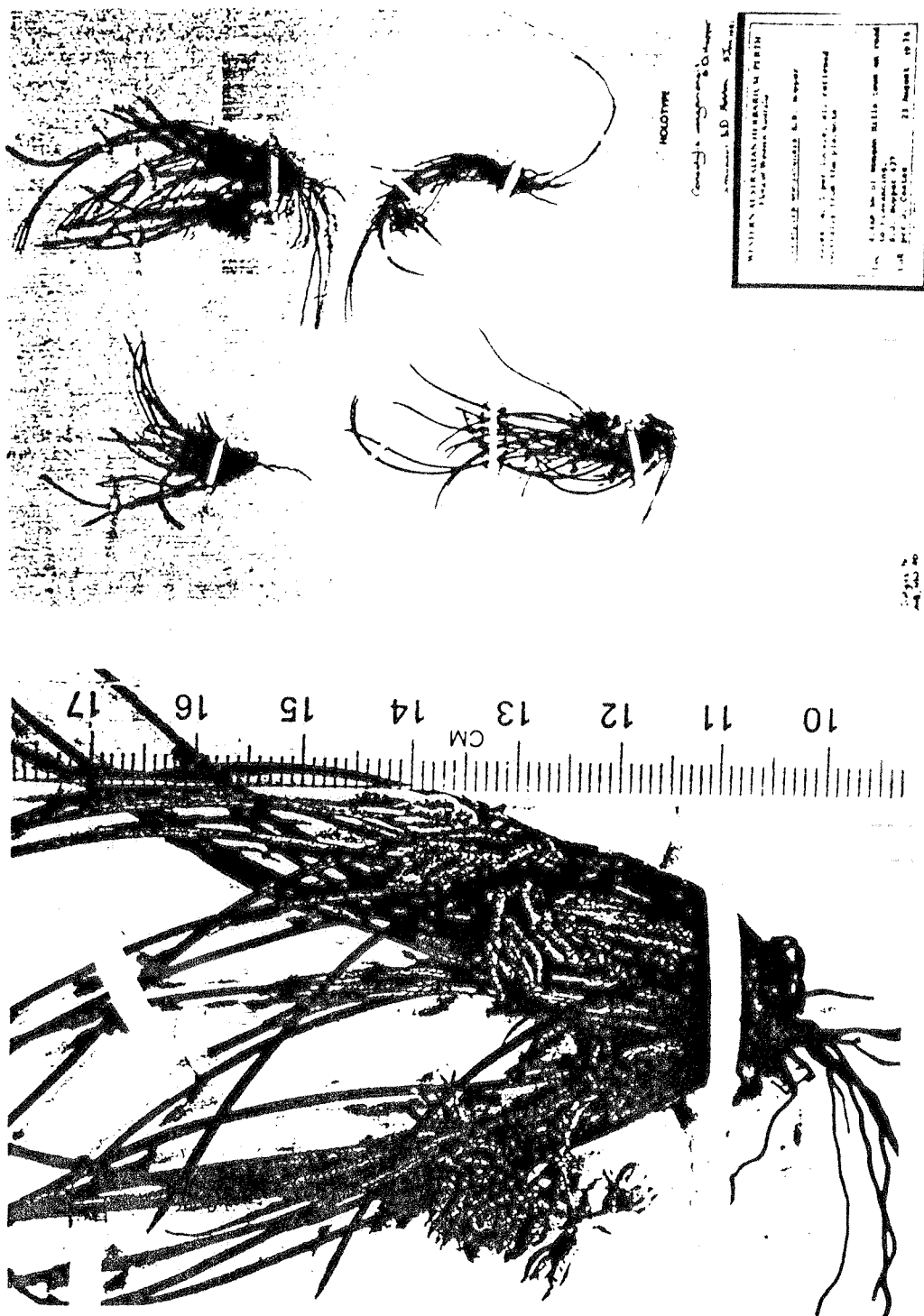
Figure 8: Line drawing of *Acacia semicircularis*



Conostylis wonganensis is known only from the Wongan Hills district and Manmanning. Populations of this species were recorded during a survey of Elphin Nature Reserve No. A 25808 at sites 18, 20 and 26 and along the roadside verge (Coates 1988). Ten new populations were found on the Water Reserve No. 16418 and Experimental Farm bushland during the present survey. Details of these new populations are presented below. *Conostylis wonganensis* plants were rare to occasional within the vegetation associations covering the localities listed. The plants were found growing in sandy soils (often yellow) sometimes with gravel over gravel at depth including Wongan loamy sands, Wongan sand and Mocardy sand. *Conostylis wonganensis* is illustrated in Figure 9.

Location	Associated Vegetation
Site E ■	Sedges/Heath
Site E ■	Sedges/Heath
Site E ■	Sedges/Heath
Site E ■	<i>Nuytsia floribunda</i> over Low Heath
Site W ■	Sedges/Heath
NE of site W ■	<i>Allocasuarina campestris</i> / <i>Hakea erecta</i> Heath
Site W ■ and surrounding area	<i>Allocasuarina campestris</i> / <i>Hakea erecta</i> Heath
Site W ■	<i>Allocasuarina campestris</i> / <i>Hakea erecta</i> Heath
Site W ■ and surrounding area	<i>Allocasuarina campestris</i> / <i>Hakea erecta</i> Heath
West of site W ■	Sedges/Heath

Figure 9: *Conostylis wonganensis*. Top - holotype sheet (S.D. Hopper 427 per D. Coates). Bottom - enlargement of upper right hand specimen on the holotype sheet. Illustrated in Nuytsia Vol 4, No. 1 (1982).



Daviesia euphorbioides has been recorded at nine localities from Wongan Hills to Cadoux. One of these localities is the south eastern corner of the Experimental Farm bushland extending into the railway reserve. This species also occurs on Elphin Nature Reserve No. A 25808 in two areas near the boundary with Water Reserve No. 16418. Populations of *Daviesia euphorbioides* have been surveyed by Rare Flora Volunteers in 1991. No new populations were discovered during the present survey.

Gastrolobium glaucum has previously been known from three localities which are listed below:

1. north eastern corner of the Experimental Farm bushland Populations 1a (768 plants) and 1b (46 plants) were surveyed by Rare Flora Volunteers in 1991 (see Figures 10 and 11);
2. Water Reserve No. 16418. Along a track (with powerlines) running south from site W [redacted] and
3. Manmanning road verge.

A new population of *Gastrolobium glaucum* was found during the present survey adjacent to a sand and gravel pit north of site [redacted] in the Water Reserve. The area has been disturbed and only 3 "patches" were observed. Another "patch" of *Gastrolobium glaucum* was recorded at site [redacted] on the Experimental Farm bushland further west of the other plants mapped by Rare Flora Volunteers (Figures 10 and 11). On the Experimental Farm the plants occur mainly in areas of Sedges/Heath and open spaces in the *Allocasuarina campestris* Thicket. *Nuytsia floribunda* over Low Heath occurs at site [redacted]. These vegetation associations cover sandy soils with gravel at depth.

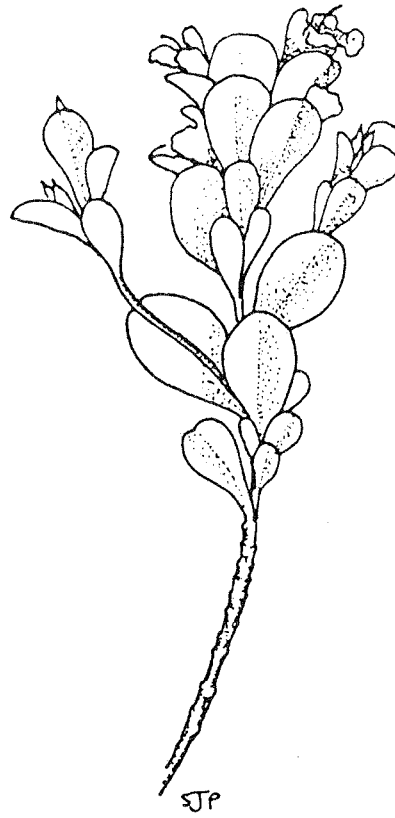
Figures 10 and 11 showing locations of rare flora have been removed from this copy

Gastrolobium hamulosum is restricted to two populations in the Wongan Hills area. Population 1a (33 plants), 1b (11 plants), 1c (6 plants) and 1d (74 plants) occur in the north eastern section of the Experimental Farm bushland and have been mapped by Rare Flora Volunteers in 1991 (Figures 10 and 11). The plants occur in the Sedges/Heath vegetation association and in open spaces in *Allocasuarina campestris* Thicket growing in sandy soils over gravel.

Hemigenia viscida has been previously located on Charles Gardner Reserve No. A 20041, Elphin Nature Reserve No. A 25808 and Water Reserve No. 16418 (between sites [redacted] and [redacted]). The plants on Elphin Nature Reserve occur in the north eastern section near the boundary with the Water Reserve and the Railway Reserve. Three new populations were discovered on the Water Reserve during the present survey. Details of these new populations are presented below. *Hemigenia viscida* is illustrated in Figure 12.

Location	Vegetation Association	Soil Type	Plant Numbers
adjacent to track (with power lines) ~350 metres NE of site [redacted]	<i>Dryandra</i> Low Heath. <i>Dryandra purdieana</i> and <i>Melaleuca scabra</i> prominent	gravelly sand	12
between sites [redacted] and [redacted] (track with power lines)	Scrub Heath adjacent	sandy gravel, ironstone in places	4
near site [redacted]	<i>Dryandra/Petrophile shuttleworthiana</i> Thicket	sandy gravel, over ironstone	1

Figure 12: Line drawing of *Hemigenia viscida*



Stylidium coroniforme occurs at three localities within the Wongan Hills district:

1. west of Elphin Nature Reserve No. A 25808, adjacent to the race track - 30 plants (1991);
2. northern edge of gravel pit at site [REDACTED] - 260 plants (1991); and
3. south of site [REDACTED] on track with power lines - 100 plants (1991).

Stylidium coroniforme is found in disturbed areas adjacent to *Dryandra/Petrophile shuttleworthiana* Thicket, *Dryandra* Low Heath and Scrub Heath growing in gravelly soils over ironstone in places. No new populations were discovered during the present survey.

b) X: Declared Rare flora - Presumed Extinct

Stylidium neglectum was recorded on granite outcrops on both the Water Reserve and Experimental Farm bushland. This species has been classified as Presumed Extinct due to past confusion in the taxonomy of this group. Voucher specimens collected were identified by Allen Lowrie.

c) Other Species of Interest

Table 6 presents information on location, soil type, associated vegetation and an estimate of abundance for Department of Conservation and Land Management priority species found on the Water Reserve (9 species) and the Experimental Farm bushland (8 species).

TABLE 6: DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT PRIORITY SPECIES OCCURRING ON RESERVE NO. 16418 AND PART RESERVE NO. 18672 WONGAN HILLS AREA

SPECIES	PRIORITY CODE	LOCATION	ASSOCIATED VEGETATION	SOIL TYPE	ABUNDANCE
<i>Gompholobium asperulum</i>	1	site [redacted] Collection CP193 site 1 = Near site [redacted]	Sedges/Heath, <i>Nuytsia floribunda</i> over Low Heath	sandy soils	Rare to Occasional
<i>Scaevola tortuosa</i>	1	adjacent to track running north to dam from the Wongan Hills-Piawaning Road	<i>Eucalyptus laxophleba</i> (York gum) Low Forest	loam to clay loam soils	Rare
<i>Acacia drewiana</i> ssp. minor	2	sites [redacted], [redacted], between [redacted] and [redacted]	Scrub Heath <i>Dryandra/Petrophile shuttleworthiana</i> Thicket	gravelly soils, over ironstone in places	Occasional
<i>Acacia dura</i>	2	sites [redacted], [redacted] north east of [redacted]	<i>Eucalyptus salmonophloia</i> / <i>Eucalyptus salubris</i> Woodland	Soil type 7, clayey sand to clay loam over clay	Occasional
<i>Dryandra comosa</i>	2	site [redacted], ~200 metres north of site [redacted]	<i>Dryandra/Petrophile shuttleworthiana</i> Thicket	gravel soils with ironstone in places	Occasional to Frequent
<i>Goodenia trichophylla</i>	2	site [redacted]	<i>Nuytsia floribunda</i> over Low Heath	sandy soils poorly drained	Rare

SPECIES	PRIORITY CODE	LOCATION	ASSOCIATED VEGETATION	SOIL TYPE	ABUNDANCE
<i>Acacia filifolia</i>	3	sites [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED]	Sedges/Heath, <i>Nuyisia floribunda</i> over Low Heath <i>Allocasuarina campestris/Hakea erecta</i> Heath	sandy soils over gravel at depth	Occasional
<i>Acacia phaeocalyx</i>	3	sites [REDACTED], [REDACTED], [REDACTED], SE of site [REDACTED] (track with power lines)	Scrub Heath, <i>Eremaea</i> Heath	gravelly sand and sand over gravel	Occasional
<i>Hemiandra coccinea</i>	3	site [REDACTED], Near site [REDACTED] (track with power lines)	Scrub Heath	gravelly sand	Rare
<i>Melaleuca sclerophylla</i>	3	commonly occurring in listed vegetation associations	<i>Melaleuca sclerophylla</i> Low Heath, <i>Melaleuca scabra</i> Heath, Sedges/Heath	gravelly soils, sand over gravel	Abundant to Occasional
<i>Verticordia venusta</i>	3	east of [REDACTED], [REDACTED]	<i>Dryandra</i> Low Heath Scrub Heath <i>Beaufortia</i> Heath	gravelly soils	Occasional to Frequent
<i>Verticordia wonganensis</i>	3	~60 metres NW site [REDACTED]	<i>Eremaea</i> Heath	grey sand	Occasional

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**APPENDIX 1 - PLANT SPECIES LIST FOR RESERVE NO. 16418 AND
REMNANT VEGETATION ON RESERVE NO. 18672 - WONGAN HILLS AREA**

ms Manuscript name
 * Introduced Species
 1234 Collecting Number for Voucher specimen
 C.P. Collected by C Parker
 K.K. Collected by K Knight

	Reserve No. 16418	Reserve No. 18672
<u>BRYOPHYTA (Mosses)</u>		
Campylopus introflexus		X
Eccremidium pulchellum		X
Brachymenium preissianum		X
<u>PTERIDOPHYTA (Ferns)</u>		
ADIANTACEAE		
Cheilanthes austrotenuifolia 2750	X	X
<u>GYMNOSPERMAE</u>		
CUPRESSACEAE		
Actinostrobus arenarius	X	X
Callitris canescens 2740	X	X
<u>MONOCOTYLEDONAE</u>		
POACEAE		
Amphipogon strictus C.P. 178		X
* Aira cupaniana 3090a	X	X
* Avena sativa	X	X
* Briza maxima 3074	X	X
* Briza minor	X	X
* Bromus diandrus		X

	Reserve No. 16418	Reserve No. 18672
* <i>Ehrharta calycina</i>	X	
* <i>Hordeum marinum</i> C.P. 303, K.K. 325		X
* <i>Lolium rigidum</i>		X
<i>Neurachne alopecuroidea</i>	X	X
* <i>Pentaschistis airoides</i> 3090b	X	X
* <i>Polypogon monspeliensis</i> C.P. 221		X
<i>Spartochloa scirpoidea</i>	X	X
CYPERACEAE		
<i>Caustis ?dioica</i>		X
<i>Caustis pentandra</i> K.K. 366		X
<i>Lepidosperma ?letophyllum</i> 2791	X	X
<i>Lepidosperma ?resinosum</i> 2978	X	
<i>Mesomelaena preissii</i> 3010	X	X
<i>Schoenus aff. obtusifolius</i> C.P. 276		X
RESTIONACEAE		
<i>Ecdeiocolea monostachya</i> 2693	X	X
<i>Empodisma gracillimum</i> K.K. 362		X
<i>Lepidobolus chaetocephalus</i> 3086	X	X
<i>Lepidobolus preissianus</i> K.K. 304		X
<i>Loxocarya aspera</i> (ms) 2818	X	X
<i>Loxocarya parthenica</i> (ms) 2686	X	X
<i>Loxocarya myrioclada</i> (ms) 2675	X	X
JUNCACEAE		
<i>Juncus</i> sp. C.P. 222		X
PHORMIACEAE		
<i>Dianella revoluta</i>	X	X
<i>Stypandra glauca</i>	X	X
ANTHERICACEAE		
<i>Arthropodium capillipes</i> 3055	X	
<i>Borya laciniata</i> 2780a		X
<i>Borya sphaerocephala</i> 3091	X	X
<i>Chamaescilla corymbosa</i> 2730	X	X
<i>Chamaescilla spiralis</i>	X	X

	Reserve No. 16418	Reserve No. 18672
Laxmannia grandiflora 2968	X	X
Thysanotus dichotomus 3058	X	
Thysanotus patersonii	X	X
Thysanotus ?thyrsoideus 3554	X	
Thysanotus sp. K.K. 303		X
ASPHODELACEAE		
Bulbine semibarbata 3076	X	
COLCHICACEAE		
Burchardia umbellata 2912	X	X
HAEMODORACEAE		
Anigozanthos humilis 2927	X	X
Conostylis androstemma 2783	X	X
Conostylis prolifera 3042	X	X
Conostylis setigera 2680	X	X
Conostylis villosa 3441	X	
Conostylis wonganensis 2969	X	X
Haemodorum ?sp.		X
Tribonanthes longipetala 3073	X	
IRIDACEAE		
* Homeria ?sp.	X	
Patersonia drummondii 3035	X	
Patersonia umbrosa K.K. 361		X
Patersonia sp.		X
* Romulea rosea	X	
ORCHIDACEAE		
Caladenia dimidia (ms) 2779		X
Caladenia flava	X	X
Caladenia microchila (ms) 2781a		X
Caladenia roei 3059	X	
Caladenia longicauda x ?hoffmannii hybrid 2999	X	
Cyanicula amplexans (ms) 2716		X
Cyanicula gemmata (ms)		X
Diuris aff. corymbosa 2731		X

	Reserve No. 16418	Reserve No. 18672
<i>Diuris laxiflora</i> 3086a	X	
<i>Diuris picta</i> 3073a	X	
<i>Diuris</i> ?setacea		X
<i>Elythranthera brunonis</i> 2718	X	X
<i>Prasophyllum cyphochilum</i> 3086c	X	
<i>Prasophyllum ringens</i> (ms) 3073b	X	
<i>Thelymitra antennifera</i> 2822	X	X
<i>Thelymitra campanulata</i> 2966	X	X
<i>Thelymitra fuscolutea</i> var. <i>fuscolutea</i> C.P. 347		X

DICOTYLEDONAE

CASUARINACEAE

<i>Allocasuarina acutivalvis</i>	X	X
<i>Allocasuarina campestris</i>	X	X
<i>Allocasuarina drummondiana</i> 2673	X	X
<i>Allocasuarina huegeliana</i>	X	
<i>Allocasuarina humilis</i> 2925	X	X
<i>Allocasuarina microstachya</i> 2970, 2997	X	X
<i>Casuarina obesa</i> K.K. 322		X

PROTEACEAE

<i>Adenanthos drummondii</i> 3002	X	
<i>Conospermum brownii</i> 3011	X	X
<i>Conospermum incurvum</i> 2971	X	X
<i>Conospermum stoechadis</i> 2664	X	X
<i>Dryandra comosa</i>	X	
<i>Dryandra fraseri</i>	X	
<i>Dryandra purdieana</i> (ms) 2685	X	X
<i>Grevillea acerosa</i> 3447		X
<i>Grevillea armigera</i> 2682	X	X
<i>Grevillea didymobotrya</i> ssp. <i>didymobotrya</i> 3013	X	X
<i>Grevillea eriostachya</i>	X	X
<i>Grevillea eryngioides</i>	X	X
<i>Grevillea hakeoides</i> ssp. <i>stenophylla</i> 2958	X	
<i>Grevillea huegelii</i> 2761		X
<i>Grevillea integrifolia</i> ssp. <i>shuttleworthiana</i>	X	X
<i>Grevillea</i> ? <i>integrifolia</i> ssp. <i>biformis</i>	X	

	Reserve No. 16418	Reserve No. 18672
<i>Grevillea paniculata</i> 2790, 3077	X	X
<i>Grevillea petrophiloides</i>	X	X
<i>Grevillea pterosperma</i> 3425	X	
<i>Grevillea teretifolia</i> 2712	X	X
<i>Grevillea tridentifera</i> 2671	X	X
<i>Grevillea umbellulata</i> 3014	X	
<i>Grevillea uncinulata</i> ssp. <i>uncinulata</i> 2687	X	X
<i>Hakea circumalata</i> 2706	X	X
<i>Hakea coriacea</i> 2772	X	X
<i>Hakea cygna</i> ssp. <i>cygna</i> 2885	X	
<i>Hakea erecta</i> 2824	X	X
<i>Hakea erinacea</i> 3020	X	
<i>Hakea gilbertii</i>	X	X
<i>Hakea incrassata</i> 2908	X	X
<i>Hakea lissocarpa</i>	X	X
<i>Hakea marginata</i> 3089	X	
<i>Hakea meisneriana</i> 2788	X	X
<i>Hakea petiolaris</i>	X	
<i>Hakea platysperma</i>	X	X
<i>Hakea preissii</i>	X	
<i>Hakea scoparia</i>	X	X
<i>Hakea ?sulcata</i> K.K. 376		X
<i>Hakea trifurcata</i>	X	X
<i>Isopogon divergens</i> 2904	X	X
<i>Isopogon ?drummondii</i> C.P. 273		X
<i>Isopogon dubius</i> 2665	X	X
<i>Isopogon scabriusculus</i> 2699	X	X
<i>Persoonia coriacea</i> 3426	X	
<i>Persoonia quinquenervis</i> 3453	X	X
<i>Persoonia scabrella</i> 2789		X
<i>Persoonia striata</i> 2771		X
<i>Petrophile ericifolia</i> 2690	X	X
<i>Petrophile media</i> 2898	X	X
<i>Petrophile seminuda</i> 3044	X	X
<i>Petrophile shuttleworthiana</i> 2681	X	X
<i>Petrophile striata</i> 3068	X	X
<i>Synaphea constricta</i> (ms) 2979	X	X

	Reserve No. 16418	Reserve No. 18672
SANTALACEAE		
Exocarpos sparteus 2905	X	
Santalum acuminatum	X	X
Santalum spicatum	X	
POLYGONACEAE		
Muehlenbeckia adpressa	X	X
OLACACEAE		
Olex benthamiana	X	
LORANTHACEAE		
Nuytsia floribunda		X
CHENOPODIACEAE		
Enchylaena lanata 2946	X	X
Halosarcia lepidosperma 3461		X
Halosarcia pergranulata K.K. 326, C.P. 295		X
Maireana carnosia 3056	X	X
Maireana georgei C.P. 293		X
Rhagodia drummondii 3057	X	X
Rhagodia preissii ssp. preissii 2755	X	X
Sclerolaena diacantha 3412	X	
AMARANTHACEAE		
Ptilotus declinatus C.P. 229		X
Ptilotus polystachyus		X
Ptilotus spathulatus 3040	X	X
Ptilotus stirlingii K.K. 364		X
Ptilotus sp. C.P. 363		X
AIZOACEAE		
* Mesembryanthemum nodiflorum	X	X
PORTULACACEAE		
Calandrinia ?sp. 3076	X	

CARYOPHYLLACEAE

- * Petrorhagia velutina
- * Spergularia rubra C.P. 219, 305

LAURACEAE

- Cassytha aurea var. hirta 2697
- Cassytha glabella 3028
- Cassytha melantha 2787
- Cassytha ?pubescens C.P. 277

FUMARIACEAE

- * Fumaria muralis

BRASSICACEAE

- * Raphanus raphanistrum

DROSERACEAE

- Drosera glanduligera 2779b
- Drosera ?leucoblata C.P. 320
- Drosera macrantha 3074
- Drosera macrophylla 2812
- Drosera ?parvula C.P. 325
- Drosera spilos 2694
- Drosera subhirtella ssp. subhirtella 2717

CRASSULACEAE

- Crassula colorata 3082

PITTOSPORACEAE

- Billardiera coriacea 2937
- Billardiera erubescens 3026

MIMOSACEAE

- Acacia acuarua 2944
- Acacia acuminata 2753
- Acacia aestivalis 3080
- Acacia bidentata 2960
- Acacia ?chrysella 3065

Reserve
No.
16418

Reserve
No.
18672

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

	Reserve No. 16418	Reserve No. 18672
<i>Acacia cupularis</i> 3007	X	
<i>Acacia drewiana</i> ssp. <i>minor</i> 2689	X	X
<i>Acacia dura</i> 2765		X
<i>Acacia erinacea</i> 2762	X	X
<i>Acacia ericksonii</i> 2719	X	X
<i>Acacia filifolia</i> 2709	X	X
<i>Acacia fragilis</i> 2809	X	X
<i>Acacia jacksonioides</i> 3030	X	X
<i>Acacia lasiocalyx</i>	X	X
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> 2720	X	X
<i>Acacia latipes</i> 2920	X	X
<i>Acacia leptospermoides</i>	X	X
ssp. <i>leptospermoides</i> 2919		
<i>Acacia ligustrina</i> 2972	X	X
<i>Acacia multispicata</i> 2702	X	X
<i>Acacia neurophylla</i> 3411	X	
<i>Acacia nigripilosa</i> ssp. <i>nigripilosa</i> 2676	X	X
<i>Acacia orbifolia</i> 2763	X	X
<i>Acacia phaeocalyx</i> 2688	X	X
<i>Acacia pulchella</i> ssp. <i>goadbyi</i> 3019	X	
<i>Acacia resinosa</i> C.P. 210, 312		X
<i>Acacia restiacea</i> 3409, 2663	X	X
<i>Acacia saligna</i> 3071	X	X
<i>Acacia semicircularis</i> 2907	X	
<i>Acacia stereophylla</i> 3085	X	
<i>Acacia sulcata</i> var. <i>platyphylla</i> 2721	X	X
<i>Acacia ulicina</i>		X
<i>Acacia</i> sp. 2782, 3458		X
PAPILIONACEAE		
<i>Bossiaea eriocarpa</i>	X	X
<i>Chorizema aciculare</i>	X	X
<i>Chorizema genistoides</i> 3069	X	
<i>Daviesia benthamii</i>	X	
<i>Daviesia</i> aff. <i>daphnoides</i>	X	X
<i>Daviesia euphorbioides</i>		X
<i>Daviesia</i> ? <i>hakeoides</i> 2710	X	X
<i>Daviesia nudiflora</i>	X	X

	Reserve No. 16418	Reserve No. 16672
Daviesia ?pachyphylla K.K. 356		X
Daviesia sp. 2956	X	
Gastrolobium calycinus	X	X
Gastrolobium glaucum 3004	X	X
Gastrolobium hamulosum		X
Gastrolobium parviflorum 2936	X	X
Gastrolobium spinosum	X	X
Gastrolobium trilobum		X
Gompholobium asperulum 3452		X
Gompholobium obcordatum	X	X
Gompholobium tomentosum C.P. 269		X
Jacksonia ?lehmannii K.K. 314		X
Jacksonia macrocalyx 3433b	X	
Jacksonia fasciculata 2926	X	
Jacksonia ?sericea C.P. 188, 244		X
Jacksonia ?spinoso K.K. 372		X
Jacksonia sp. 3433	X	X
* Lupinus sp.	X	
Mirbelia dilatata	X	
Mirbelia floribunda 2701	X	X
Mirbelia ramulosa 3070	X	
Mirbelia spinosa 3009	X	X
Nemcia hookeri 2801		X
Nemcia obovata 3016	X	X
Templetonia sulcata	X	X
* Trifolium arvense C.P. 232		X
GERANIACEAE		
Erodium cygnorum 3063	X	
RUTACEAE		
Boronia coerulescens ssp. spinescens 2713	X	X
Boronia ramosa ssp. anethifolia 2691		X
Diplolaena microcephala 3050	X	
Phebalium ambiguum 2795		X
Phebalium filifolium 2959	X	
Phebalium tuberosum 2732	X	X

	Reserve No. 16418	Reserve No. 18672
POLYGALACEAE		
Comesperma calymega K.K. 367		X
Comesperma drummondii 2896	X	
Comesperma integerrimum 3060	X	
Comesperma scoparium	X	X
Comesperma volubile 2729	X	X
CELASTRACEAE		
Psammomoya choretroides 2679	X	X
STACKHOUSIACEAE		
Stackhousia monogyna 2975	X	X
Stackhousia scoparia 3039	X	X
Tripterococcus brunonis C.P. 246		X
SAPINDACEAE		
Dodonaea bursariifolia 2955	X	X
Dodonaea divaricata 2724		X
Dodonaea inaequifolia 3079	X	
Dodonaea aff. microzyga 2963	X	
Dodonaea pinifolia 2804	X	X
Dodonaea viscosa ssp. angustissima 3408	X	X
RHAMNACEAE		
Cryptandra glabriflora 2668	X	X
Cryptandra leucophracta	X	X
Cryptandra pomaderroides C.P. 255		X
Cryptandra pungens 2667	X	X
MALVACEAE		
Alyogyne hakeifolia	X	X
STERCULIACEAE		
Commersonia pulchella 3027	X	
Guichenotia micrantha 3094	X	
Guichenotia sarotes 3542	X	
Keraudrenia integrifolia 3541	X	X
Lasiopetalum molle 2951	X	

	Reserve No. 16418	Reserve No. 18672
<i>Lysiosepalum rugosum</i> 2794		X
<i>Rulingia densiflora</i> 3438	X	
DILLENACEAE		
<i>Hibbertia acerosa</i> 3017	X	X
<i>Hibbertia drummondii</i> 3012	X	
<i>Hibbertia enervia</i> 3031	X	
<i>Hibbertia exasperata</i> 2678	X	X
<i>Hibbertia glomerata</i> C.P. 238		X
<i>Hibbertia glomerosa</i> 2726	X	X
<i>Hibbertia huegelii</i> 2950	X	X
<i>Hibbertia hypericoides</i> 2895	X	X
<i>Hibbertia rostellata</i> 2725		X
<i>Hibbertia rupicola</i> 3048	X	X
THYMELAEACEAE		
<i>Pimelea avonensis</i> 2811	X	X
<i>Pimelea brevifolia</i> 2995	X	
<i>Pimelea ?brevistyla</i> C.P. 334		X
<i>Pimelea imbricata</i> var. <i>piligera</i> 3100	X	X
<i>Pimelea leucantha</i> 2984	X	
<i>Pimelea sulphurea</i> 2784	X	X
MYRTACEAE		
<i>Baeckea crispiflora</i> 2714	X	X
<i>Baeckea</i> aff. <i>crispiflora</i> A. 3455		X
<i>Baeckea muricata</i> 3436	X	
<i>Baeckea</i> aff. <i>preissiana</i> 2923	X	
<i>Baeckea</i> sp. 9 3006	X	
<i>Baeckea</i> sp. 2776		X
<i>Beaufortia bracteosa</i> 3437	X	X
<i>Beaufortia elegans</i> 3445	X	X
<i>Beaufortia interstans</i> 3427	X	X
<i>Beaufortia squarrosa</i> 3428	X	
<i>Calothamnus quadrifidus</i> 3000	X	X
<i>Calothamnus sanguineus</i> 2695	X	X
<i>Calothamnus</i> sp. 2774, 3018	X	X
<i>Calytrix ?angulata</i> C.P. 183, 309		X

	Reserve No. 16418	Reserve No. 18672
<i>Calytrix depressa</i> 3406	X	X
<i>Calytrix gracilis</i> 2918	X	
<i>Calytrix leschenaultii</i> 2986	X	X
<i>Calytrix sapphirina</i> 3430	X	X
<i>Calytrix violacea</i> 2924	X	X
<i>Chamelaucium drummondii</i> ssp. <i>hallii</i> 2674	X	X
<i>Darwinia purpurea</i> 3466b	X	X
<i>Eremaea pauciflora</i> 2892	X	X
<i>Eucalyptus arachnaea</i> 2816	X	X
<i>Eucalyptus celastroides</i> 2942	X	X
<i>Eucalyptus eremophila</i> 2987	X	X
<i>Eucalyptus erythronema</i>	X	X
<i>Eucalyptus eudesmioides</i>	X	X
<i>Eucalyptus flocktoniae</i> 2953	X	
<i>Eucalyptus hypoclamydea</i> ssp. <i>edysiustes</i> 2918	X	X
<i>Eucalyptus longicornis</i>		X
<i>Eucalyptus loxophleba</i> 2758	X	X
<i>Eucalyptus myriadena</i> 2815		X
<i>Eucalyptus pluricaulis</i> ssp. <i>pluricaulis</i> 2797b	X	X
<i>Eucalyptus pyriformis</i>	X	X
<i>Eucalyptus rigidula</i> 2698	X	X
<i>Eucalyptus</i> aff. <i>rigidula</i> C.P. 224		X
<i>Eucalyptus salmonophloia</i>	X	X
<i>Eucalyptus salubris</i>		X
<i>Eucalyptus semivestita</i> ssp. "western" 2764	X	X
<i>Eucalyptus sheathiana</i> 2756		X
<i>Eucalyptus subangusta</i> 3448		X
<i>Eucalyptus wandoo</i>	X	X
<i>Hypocalymma angustifolium</i>	X	X
<i>Kunzea limnicola</i> (ms) 3045	X	X
<i>Kunzea pulchella</i>	X	
<i>Leptospermum erubescens</i> 2670	X	X
<i>Leptospermum oligandrum</i>		X
<i>Melaleuca acuminata</i> ssp. <i>websteri</i> 2941	X	X
<i>Melaleuca adnata</i>	X	X
<i>Melaleuca conothamnoides</i> 2770	X	X
<i>Melaleuca</i> aff. <i>cordata</i> 2826	X	X
<i>Melaleuca coronicarpa</i> ssp. <i>coronicarpa</i> (ms) 3398	X	X

	Reserve No. 16418	Reserve No. 18672
<i>Melaleuca ctenoides</i> (ms) 3532, 2768		X
<i>Melaleuca fulgens</i> 3407	X	X
<i>Melaleuca holosericea</i> 3465	X	X
<i>Melaleuca lateriflora</i>	X	X
<i>Melaleuca laxiflora</i> 2962	X	X
<i>Melaleuca</i> ?pentagona C.P. 192, K.K. 379		X
<i>Melaleuca platycalyx</i>	X	X
<i>Melaleuca pungens</i>	X	X
<i>Melaleuca radula</i> 2777	X	X
<i>Melaleuca sclerophylla</i> 2981	X	X
<i>Melaleuca scabra</i> 2962	X	X
<i>Melaleuca spicigera</i>	X	X
<i>Melaleuca uncinata</i>	X	X
<i>Melaleuca undulata</i> ssp. <i>undulata</i> "Wongan biotype" 2803	X	X
<i>Micromyrtus racemosa</i> ssp. <i>racemosa</i> 2785	X	X
<i>Pileanthus peduncularis</i> 3440	X	
<i>Scholtzia drummondii</i> 2982	X	X
<i>Thryptomene australis</i> 3098	X	X
<i>Thryptomene</i> ?prolifera C.P. 287		X
<i>Thryptomene racemulosa</i> 2704	X	X
<i>Verticordia acerosa</i> ssp. <i>preissii</i> 2727		X
<i>Verticordia brachypoda</i> 3415, 3422	X	X
<i>Verticordia chrysantha</i> 2915	X	X
<i>Verticordia chrysanthella</i> 3405	X	X
<i>Verticordia densiflora</i> 3439	X	X
<i>Verticordia eriocephala</i> 3431	X	X
<i>Verticordia huegelii</i> var. <i>stylosa</i> 3451		X
<i>Verticordia monadelphica</i> 3420	X	X
<i>Verticordia picta</i>	X	X
<i>Verticordia</i> ?pritzellii K.K. 303		X
<i>Verticordia venusta</i> 3429	X	
<i>Verticordia wonganensis</i> 3444	X	
HALORAGACEAE		
<i>Glischrocaryon aureum</i> 3435	X	X
<i>Glischrocaryon flavescens</i> 3404	X	

	Reserve No. 16418	Reserve No. 18672
APIACEAE		
Actinotus ?superbus 3546	X	
Daucus glochidiatus 2749	X	X
Trachymene cyanopetala 2807b	X	X
Trachymene ornata 3090	X	X
Platysace ?maxwellii	X	X
EPACRIDACEAE		
Andersonia lehmanniana ssp. pubescens 2992	X	
Astroloma serratifolium 2775	X	X
Leucopogon ?conostephioides 3540	X	X
Leucopogon gracillimus 2722		X
Leucopogon hamulosum 2825	X	X
Leucopogon ?planifolius 3446	X	X
Leucopogon ?tamminensis C.P. 259		X
Lysinema ciliatum	X	X
PRIMULACEAE		
* Anagallis arvensis var. caerulea	X	X
LOGANIACEAE		
Logania flaviflora C.P. 323, K.K. 347		X
Mitrasacme paradoxa	X	X
GENTIANACEAE		
* Centaurium erythraea 3417b	X	X
APOCYNACEAE		
Alyxia buxifolia 2773		X
CONVOLVULACEAE		
Wilsonia humilis 2766	X	X
BORAGINACEAE		
* Echium plantagineum	X	
Halgania sp. 3466	X	X

CHLOANTHACEAE

Cyanostegia angustifolia

Dicrastylis velutina 3443

LAMIACEAE

Hemiandra coccinea 2700

Hemigenia sericea 3084

Hemigenia viscida

Hemigenia westringioides 3032

Microcorys obovata 2957

SOLANACEAE

Solanum oldfieldii 3072

* Solanum hystrix K.K. 371

SCROPHULARIACEAE

* Parentucellia latifolia

MYOPORACEAE

Eremophila decipiens 2752

Eremophila lehmanniana 2817

Eremophila sp. 2820

PLANTAGINACEAE

* Plantago coronopus ssp. commutata K.K. 382

RUBIACEAE

Opercularia vaginata

CAMPANULACEAE

* Wahlenbergia capensis 3076b

LOBELIACEAE

Isotoma hypocrateriformis

Lobelia rarifolia C.P. 216

Reserve
No.
16418Reserve
No.
18672

X

X

X

X

X

X

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X

X

X

GOODENIACEAE

	Reserve No. 16418	Reserve No. 18672
<i>Brunonia australis</i>	X	X
<i>Dampiera lavandulacea</i> 2980	X	X
<i>Dampiera lindleyi</i> 2669	X	X
<i>Dampiera oligophylla</i> ssp. <i>junceae</i> 2897	X	X
<i>Dampiera spicigera</i> 3442	X	X
<i>Dampiera ?terres</i> C.P. 322, K.K. 329		X
<i>Dampiera wellsiana</i> 2976	X	X
<i>Goodenia caerulea</i> 3402b	X	X
<i>Goodenia helmsii</i> 3462	X	X
<i>Goodenia pinifolia</i> 3424	X	X
<i>Goodenia trichophylla</i> 3457b		X
<i>Lechenaultia biloba</i>	X	X
<i>Scaevola arenaria</i> C.P. 212		X
<i>Scaevola hamiltonii</i> 3419	X	
<i>Scaevola spinescens</i>	X	
<i>Scaevola tortuosa</i> 3083	X	
<i>Verreauxia reinwardtii</i> C.P. 281		X

STYLIDIACEAE

<i>Levenhookia stipitata</i> C.P. 236		X
<i>Stylidium breviscapum</i> 3043	X	X
<i>Stylidium bulbiferum</i> C.P. 217, 288, 307		X
<i>Stylidium crassifolium</i> 2965	X	
<i>Stylidium calcaratum</i>	X	X
<i>Stylidium coroniforme</i>	X	
<i>Stylidium leptophyllum</i> 3416	X	X
<i>Stylidium ?macrocarpum</i> C.P. 274, 351		X
<i>Stylidium neglectum</i> 3416b	X	X
<i>Stylidium nungarinense</i> 2947	X	X
<i>Stylidium periscelanthum</i> 2807	X	X
<i>Stylidium petiolare</i> 2736		X
<i>Stylidium repens</i> 2707	X	X

ASTERACEAE

	Reserve No. 16418	Reserve No. 18672
* <i>Arctotheca calendula</i>	X	X
<i>Angianthus tomentosus</i> 3403	X	X
<i>Blennospora drummondii</i>	X	X
<i>Brachycome bellidioides</i> C.P. 298		X
<i>Brachycome iberidifolia</i> 2990b	X	
<i>Cephalipterum drummondii</i> 3082b	X	
<i>Chthonocephalus pseudevax</i> 2807b	X	X
<i>Cotula coronopifolia</i>		X
<i>Erymophyllum tenellum</i> 3401	X	X
<i>Erymophyllum ramosum</i> K.K. 387		X
<i>Gnephosis tenuissima</i> 3401b	X	X
<i>Helichrysum lindleyi</i> 2769	X	X
<i>Helipterum manglesii</i>	X	X
<i>Helipterum splendidum</i> 3401	X	
<i>Helipterum verecundum</i> 3058b	X	
<i>Hyalosperma cotula</i>	X	X
<i>Hyalosperma glutinosum</i> 3041	X	X
<i>Millotia myosotidifolia</i> 2780		X
<i>Olearia muelleri</i>	X	X
<i>Olearia ?revoluta</i> 2934	X	
<i>Podolepis capillaris</i>	X	X
<i>Podolepis canescens</i> 3051	X	X
<i>Podolepis lessonii</i>	X	X
<i>Podotheca angustifolia</i>	X	X
<i>Podotheca gnaphalioides</i>	X	X
<i>Pogonolepis stricta</i> C.P. 220		X
<i>Senecio glomeratus</i> 2747		X
* <i>Ursinia anthemoides</i>	X	X
<i>Waitzia acuminata</i>	X	X
<i>Waitzia aurea</i> 3078	X	X
<i>Waitzia citrina</i> 3052	X	X
<i>Waitzia paniculata</i>	X	X

APPENDIX 2 - MUIR VEGETATION DESCRIPTIONS

Eucalyptus salmonophloia Woodland

- Site W38** Woodland (patchy) over Herbs (Low Grass) (surrounded by *Eucalyptus loxophleba* Low Forest A)
- Site W41** Woodland (Forest) over Open Scrub/Scrub over Low Scrub C in places. Area of Shrub Mallee and *Melaleuca acuminata* Thicket
- Site W48** Open Woodland (Low Woodland A) over *Eucalyptus loxophleba* Low Forest A (patchy) over Scrub (patchy) over Dwarf Scrub C (Herbs)
- Site W55** Woodland over *Melaleuca adnata*, *Melaleuca undulata* Thicket (Dense Thicket)
- Site W57** Woodland/Forest (patchy) over *Eucalyptus loxophleba* Open Low Woodland A over *Melaleuca coronicarpa* Thicket in places. Area of *Melaleuca acuminata* Scrub

Eucalyptus salmonophloia/Eucalyptus salubris Woodland

- Site E5** Open Low Woodland A over *Melaleuca acuminata* Thicket/Dense Thicket over Heath A of *Melaleuca adnata/Melaleuca coronicarpa* in places
- Site E8** Woodland over Open Scrub/Open Low Scrub A over Open Dwarf Scrub C over Herbs/Low Heath D. Area of Shrub Mallee
- Site E23** Woodland over Low Heath C in places (scattered shrubs to 2.5 metres). Areas of *Melaleuca acuminata*, *Melaleuca adnata* Thicket/Dense Thicket and Shrub Mallee
- Site E25** Low Woodland A over *Melaleuca acuminata* Thicket
- Site W42** Forest over *Eucalyptus salubris* Low Woodland A/Low Forest A with Open Tree Mallee over Scrub (patchy) over Low Heath C

***Eucalyptus wandoo* Low Woodland**

- Site E37** Low Woodland A (patchy) over Open Scrub over Low Grass/Herbs (patchy)
- Site W37** Low Woodland A (Open Low Woodland A) over Thicket over Herbs/Open Herbs (patchy) area of *Ecdeiocolea monostachya* Tall sedges

***Eucalyptus loxophleba* Low Forest**

- Site E29** Low Forest A over *Melaleuca uncinata* Scrub/Thicket
- Site W33** Low Forest A (Shrub Mallee) over Thicket over Open Dwarf Scrub D/Open Herbs
- Site W39** Low Forest A (Tree Mallee) over *Melaleuca uncinata* Thicket over Dwarf Scrub C in places over Herbs (streamline)
- Site W43** Low Forest A (Tree Mallee) over *Melaleuca uncinata* Thicket over Low Heath C near track over Herbs
- Site W60** Low Forest A (Tree Mallee) over Open Scrub over Open Dwarf Scrub C over Open Dwarf Scrub D over Herbs (Dense Herbs) in places

Eucalyptus loxophleba* Low Forest over *Acacia acuminata

- Site W40** Low Forest A (Tree Mallee) over Low Woodland B over Herbs (scattered *Eucalyptus salmonophloia* at edge)
- Site W44** Low Forest A (Tree Mallee) over Low Forest B over Herbs
- Site W47a)** Low Woodland A over Low Forest B over Dwarf Scrub C in places over Herbs
- Site W47b)** Low Forest A over Low Forest B over Dwarf Scrub C in places over Herbs/Low Grass

Site W58 Low Woodland A (Open Tree Mallee) over Low Forest B over Herbs/Dense Herbs (patchy)

Acacia acuminata Low Forest

Site W46 Low Forest A/Low Forest B over Herbs (Dense Herbs) (scattered shrubs)

Site W56 Low Forest B (scattered *Eucalyptus loxophleba*) over Herbs/Tall Grass

Mallee over *Melaleuca uncinata*

Site E4 Open Shrub Mallee (patchy) over Thicket over Open Low Sedge/Dwarf Scrub D

Site E15 Open Shrub Mallee (patchy) over Thicket/Dense Thicket

Site W8 Open Shrub Mallee (patchy) over Heath B

Site W11 Open Shrub Mallee over Heath A/Thicket over Open Dwarf Scrub D in places

Site W14 Open Shrub Mallee (patchy) over Heath C (regeneration)

Site W28 Open Shrub Mallee/Shrub Mallee over Heath A over Dwarf Scrub D in places

Site W32 Tree Mallee/Open Tree Mallee over Thicket (Dense Thicket in places)

Mallee over *Melaleuca coronicarpa*

Site E9 Very Open Shrub Mallee/Open Shrub Mallee (patchy) over Heath B (Dense Heath B)

- Site E19** Very Open Shrub Mallee (scattered in places) over Dense Heath B/Heath B (breakaway slope)
- Site E21** Open Shrub Mallee/Very Open Shrub Mallee (patchy) over Dense Low Heath C
- Site E22** Very Open Shrub Mallee/Shrub Mallee over *Melaleuca uncinata* Scrub/Open Scrub over Low Heath C. Area of *Callitris canescens* Open Low Woodland B (patchy)
- Site W6** Low Heath C (scattered mallee) (breakaway slope)
- Site W9** Open Shrub Mallee (patchy) over Dense Heath B (Heath A in places)
- Site W15** Open Shrub Mallee over Low Heath D - regeneration (scattered *Melaleuca uncinata* to 1.5 metres)
- Site W16** Open Shrub Mallee over *Melaleuca uncinata* Scrub over Heath B

Mallee over *Melaleuca*

- Site E11** Shrub Mallee over Open Low Scrub A of *Melaleuca coroncarpa* and *Melaleuca adnata*
- Site E24** Shrub Mallee over Open Low Woodland B of *Callitris canescens* (patchy) over *Melaleuca uncinata* Open Low Scrub A over Open Low Scrub B/Low Scrub B of *Melaleuca coroncarpa* (patchy)
- Site E27** Shrub Mallee/Tree Mallee over Low Woodland B of *Callitris canescens* (patchy) in places over Open Low Scrub A of *Melaleuca coroncarpa*, *Melaleuca undulata* and *Melaleuca uncinata*

***Dryandra/Petrophile shuttleworthiana* Thicket**

- Site E42** Heath A (Dense Heath A) over Dwarf Scrub C
- Site W4** Heath B/Dense Heath B

Site W30 Very Open Shrub Mallee in places over Heath A over Open Dwarf Scrub C

Site W22 Low Heath C (Dense Low Heath C) to Heath B in places

***Dryandra* Low Heath**

Site W5 Low Heath D (Dense Low Heath D) to Low Heath C in places

Site W7 Low Heath C (Dense Low Heath C)

Site W12 Low Heath C (scattered mallee)

Site W18 Low Heath C/Low Heath D (scattered mallee)

Scrub Heath

Site E1 Open Low Scrub A/Open Low Scrub B in places over Heath B (Low Heath C) [scattered *Eucalyptus pyriformis*]

Site W1 Open Low Scrub A/Open Low Scrub B in places over Low Heath C [scattered *Eucalyptus pyriformis*]

Site W20 Open Scrub over Heath A

Site W21 Open Scrub in places over Heath A/Heath B (Dense Heath B) [scattered mallee]

Site W23 Open Scrub in places over Heath C (Dense Heath C)

***Allocasuarina campestris* Thicket**

Site E3 Thicket patchy over Open Dwarf Scrub D over *Borya sphaerocephala* Open Herbs in places

Site E13 Heath A (Thicket around granite) over Dwarf Scrub D

Site E17 Heath B/Low Scrub B over *Ecdeiocolea monostachya* Tall Sedges/Open Tall Sedges in places over Open Herbs of *Borya sphaerocephala*

Site E33 Heath A (Thicket) over *Ecdeiocolea monostachya* Very Open Tall Sedges/Open Tall Sedges over Open Low Sedges/Dwarf Scrub D (*Borya sphaerocephala* Herbs in places)

Site E47 Thicket (scattered mallee) over Dwarf Scrub C (patchy)

Site W13 Very Open Shrub Mallee over Dense Heath B (regeneration)

Site W35 Dense Heath A/Heath A (Heath B in places) over *Ecdeiocolea monostachya* Very Open Tall Sedges in places over *Borya sphaerocephala* Herbs in places. *Eucalyptus loxophleba* scattered - near granite

Site W49 Dense Heath B to Dense Heath A of *Ecdeiocolea monostachya* Open Tall Sedges in places

Site W53 Heath A over Dwarf Scrub D - adjacent to granite

Allocasuarina campestris/Calothamnus aspera Thicket

Site E26 Thicket/Dense Thicket

Allocasuarina campestris/Hakea meisneriana Thicket

Site E40 Scrub/Thicket over Heath A (Low Scrub A) over Low Heath C/Dwarf Scrub C

Site E41 Scrub over Heath A over Open Dwarf Scrub C

Allocasuarina campestris/Hakea erecta Heath - Unburnt

Site W25 Heath A over *Ecdeiocolea monostachya* Tall Sedges (patchy) over Open Dwarf Scrub D in places.

- Site W27** Heath A over *Ecdeiocolea monostachya* Tall Sedges/Open Tall Sedges (patchy) over Open Dwarf Scrub D in places
- Site W63** *Grevillea eriostachya* Open Scrub over Heath B (patchy) over *Ecdeiocolea monostachya* Very Open Tall Sedges/Open Low Scrub C

***Allocasuarina campestris/Hakea erecta* Heath - Regeneration**

- Site W2** Open Scrub/scattered shrubs to 3 metres over Low Heath C over Open Low Sedges (Low Sedges)/Dwarf Scrub D (Low Heath D)
- Site W24** Open Low Scrub A over Low Heath C/Dwarf Scrub C (*Ecdeiocolea monostachya* Tall Sedges) over Dwarf Scrub D/Low Heath D (*Ecdeiocolea monostachya* Low Sedges)
- Site W29** Open Low Scrub A over Low Heath C/Heath B/*Ecdeiocolea monostachya* Tall Sedges over Dwarf Scrub D/*Ecdeiocolea monostachya* Open Low Sedges

***Allocasuarina acutivalvis* Thicket**

- Site E6** Thicket over Dwarf Scrub C
- Site E10** Thicket over Open Scrub over Dwarf Scrub C
- Site E44** Thicket (Dense Thicket) over Dwarf Scrub C/Low Heath C (patchy)

***Melaleuca uncinata* Thicket**

- Site E20** Thicket over *Melaleuca coroncarpa*, *Melaleuca ctenoides* Low Scrub B in places
- Site E35** Heath A (Heath B) over Low Heath D (patchy) streamline - Dense Thicket upslope
- Site E36** Thicket (*Melaleuca hamulosa*, *Melaleuca uncinata*)
- Site W52** Dense Thicket/Thicket over Open Dwarf Scrub D in places

Site W59 Thicket over Herbs/Low Grass in places

***Melaleuca scabra* Heath**

Site E7 *Melaleuca uncinata* Open Low Scrub A over *Melaleuca scabra* Low Heath C over Dwarf Scrub D (*Melaleuca sclerophylla* prominent) to *Melaleuca uncinata*, *Melaleuca scabra* Low Scrub B over Low Heath C/Dwarf Scrub C (*Melaleuca sclerophylla* and *Kunzea limnicola* prominent). Scattered *Callitris canescens* to 3 metres forming Open Low Woodland B in places

Site E12 Open Scrub over *Melaleuca scabra* Low Scrub B over *Melaleuca conothamnoides* Low Heath C

Site E16 Open Scrub over *Melaleuca scabra* Low Scrub A/Heath A (patchy) over *Melaleuca conothamnoides* Low Heath C

Site E43 Mosaic of Open Shrub Mallee over *Melaleuca uncinata* Thicket and *Melaleuca scabra* Low Heath C (Heath B) over *Melaleuca sclerophylla* Dwarf Scrub D in places (patchy). Patches of *Callitris canescens* Low Forest B, scattered overall

Site E45 *Melaleuca scabra* Open Low Scrub B (scattered) over *Melaleuca conothamnoides* Low Heath C

Site E46 Open Scrub over *Melaleuca scabra* Heath B over *Melaleuca conothamnoides* Dwarf Scrub C/Heath C

Site W17 Open Low Scrub B/Low Scrub B over *Melaleuca scabra* Low Heath C (scattered shrub mallee)

Site W31 Open Scrub over *Melaleuca scabra* Heath B over *Melaleuca conothamnoides*, *Melaleuca* aff. *cordata* Dwarf Scrub D (scattered shrub mallee)

***Melaleuca sclerophylla* Low Heath**

- Site W26** Low Heath D (scattered shrubs to 1.5 metres)
- Site W34** Low Heath D (scattered shrubs to 1.5 metres)
- Site W50** Low Heath C (scattered shrubs to 1.5 metres and scattered shrub mallee)

***Eremaea* Heath**

- Site W3** Open Scrub in places over Low Heath C over Dwarf Scrub D in places
- Site W45** Low Heath C over Dwarf Scrub D/Herbs in places
- Site W64** Open Low Scrub A over Low Heath C over Dwarf Scrub D

***Beaufortia* Heath**

- Site W62** Open Low Scrub A/Low Scrub A (Heath A) over Low Heath C/Low Scrub C over Open Dwarf Scrub D in places

Sedges/Heath

- Site E2** Tall Sedges/Low Heath C. Scattered shrubs to 3 metres including *Allocasuarina campestris*. (*Allocasuarina campestris* Thicket adjacent)
- Site E18** *Allocasuarina campestris* Open Low Scrub B over Tall Sedges over *Borya sphaerocephala* Open Herbs/Very Open Herbs in places
- Site E30** Tall Sedges/Low Heath C (scattered shrubs to 3 metres including *Allocasuarina campestris*)
- Site E32** Thicket/Heath A Of *Allocasuarina campestris* in adjacent areas and interspersed in places. Tall Sedges/Low Heath C or Open Tall Sedges over Low Heath D

Site E38 *Allocasuarina campestris* Open Low Scrub A in places over Open Low Scrub C (*Ecdeiocolea monostachya* frequent to occasional) over Low Heath D *Melaleuca conothamnoides* prominent
Tall Sedges/Low Heath C in areas of deeper sand

Site W10 Mosaic of *Allocasuarina campestris* Thicket in patches forming Low Scrub A (patchy) over Tall Sedges/Low Heath C

Site W19 *Grevillea didymobotrya* Open Low Scrub B in places over Low Heath D/Low Sedges - regeneration.

***Nuytsia floribunda* over Low Heath**

Site E31 Open Low Scrub B over Low Scrub C over Low Sedges/Low Heath D/Herbs

Site E34 Open Scrub over Open Low Scrub B (Low Scrub B) in places over Low Sedges/Low Heath D/Herbs

Open Scrub over Herbs/Sedges

Site W51 Open Scrub in places over Open Dwarf Scrub D in places over Herbs/Low Sedges

Granite Rock

Site E14 *Borya sphaerocephala/Borya laciniata* Herbs (patchy)
Calytrix depressa Low Heath D
Allocasuarina campestris Thicket

Site E28 *Borya* Herbs (Dense Herbs) patchy
Low Heath D to Low Heath C of *Verticordia chrysanthella*, *Calytrix depressa*
Tall Grass of *Spartochloa scirpoidea*
Allocasuarina campestris Heath A - scattered *Eucalyptus loxophleba*

Site W36*Borya* Herbs

Low Heath D of *Calytrix depressa*, *Verticordia chrysanthella*,
Allocasuarina campestris Heath A (Dense Heath A)

Site W53*Borya* Herbs (Dense Herbs)*Ecdeiocolea monostachya* Tall Sedges*Verticordia chrysanthella* Low Heath C*Allocasuarina campestris* Thicket**Site W54***Borya* Herbs (Dense Herbs)Low Heath C *Calytrix depressa*, *Verticordia chrysanthella**Allocasuarina campestris* Thicket**Site W61***Borya* Herbs/Dense Herbs (patchy) scattered shrubs to 1.5 metresLow Heath C of *Verticordia chrysanthella*, *Calytrix depressa**Allocasuarina campestris* Thicket/Dense Thicket*Hakea petiolaris*/*Acacia lasiocalyx* Dense Thicket to 8 metres**Site W61a***Allocasuarina huegeliana* Low Forest B**Samphire****Site E39**

Low Heath D (scattered shrubs to 2 metres)

**APPENDIX 3 - DESCRIPTIONS OF SOIL ASSOCIATIONS MAPPED FOR THE
REMANT VEGETATION ON RESERVE 18672 (DEPARTMENT OF AGRICULTURE,
UNPUBLISHED)**

**1. DESCRIPTIONS OF TYPICAL SOIL PROFILES OBSERVED IN A SOIL
SURVEY CONDUCTED IN 1945**

YALING SERIES

Yaling sandy gravel (Ysg)

Surface is gravelly. Below is light yellowish brown sandy ironstone gravel. This gravel probably overlies massive laterite at depths greater than 60 cm.

Yaling loamy gravel (Ylg)

0-15 cm Ironstone gravel with matrix of loamy sand or sandy loam.

15+ cm Hard laterite.

ELPHIN SERIES

Elphin loamy sand (Els)

0-12 cm Grey loamy sand.

12-35 cm Yellowish grey to greyish yellow sandy loam to sandy clay loam cemented with slight gravel.

35-68 cm Mottled light grey yellow and brown sandy clay loam, weakly cemented with slight gravel.

68-152 cm Mottled and more cemented below 68 cm.

Elphin loamy sand - Hardpan phase (Elsh)

Surface sometimes little gravelly.

0-10 cm	Grey loamy sand.
10-23 cm	Light grey and greyish yellow sandy loam to sandy clay loam.
23-35 cm	Greyish yellow sandy clay loam with much laterite gravel.
35-45 cm	Yellow and brown hardpan of vesicular laterite.
45-180 cm	Yellow, brown and light grey cemented but not as hard as 35-45 cm.

WONGAN SERIES

Wongan loamy sand (Wls)

0-10 cm	Greyish yellow or yellowish grey loamy sand.
10-60 cm	Yellow to bright yellow mellow sandy loam sometimes tending to sandy clay loam.
60-305 cm	Yellow mellow sandy loam with red brown ferruginous soft cemented pockets.

Wongan sand (Ws)

Similar to Wongan loamy sand but lighter in texture. Often runs on to harder gravel below 60 cm.

Note: In the survey of the newly cleared land an area of Ws is shown with gravel at 38-60 cm. This is probably a transition between Ws and Ylg in which the Ws is overlying the Ylg.

MOCARDY SERIES

Mocardy sand (Ms)

- 0-12 cm Light grey gritty coarse sand.
- 12-45 cm Greyish yellow gritty sand sometimes with quartz gravel below 30 cm.
- 45-81 cm Mottled red brown yellow and grey gritty clay.
- 81-99 cm Mottled gritty clay with pockets weathered granite rock.

Mocardy loamy sand (Mls)

Much quartz rubble on surface.

- 0-10 cm Grey loamy sand with quartz rubble.
- 10-23 cm Greyish yellow loamy sand with quartz rubble and grit.
- 23-38 cm Greyish yellow gritty clay.
- 38-45 cm Grey and yellow gritty clay which shows granite structure and becomes more compacted.

Type 7

- 0-7 cm Grey brown sandy loam sometimes gravelly.
- 7-30 cm Brown gravelly clay. Gravel is very small and is of dark ironstone.
- 30-70 cm Brown to light red brown tough clay with slight lime.

This type is probably formed from a more basic intrusion.

Type 8

A very immature soil consisting of 30 cm or so of sand overlying granitic rock. No development of clay horizons.

Type 10

0-15 cm	Grey to yellowish grey sandy loam.
15-45 cm	Brown to light brown tough gritty clay.
45-76 cm	Light brown gritty clay. Rather tough.
76-83 cm	Yellow and grey gritty clay. Compacted and shows rock structure.

This type is not extensive as yet. It may prove more extensive in the portion not surveyed.

2. SOIL PROFILE DESCRIPTIONS FROM RECENT SURVEY WORK

Soil unit:	Wongan loamy sand
Soil classification:	
Principal profile form -	Uc 5.11
Landform:	Upper-midslopes
Slope:	1-3%
Drainage:	Rapid or well drained
Surface condition when dry:	Firm to hardsetting
Surface gravel/stone/boulders:	Nil
Vegetation:	Allocasaurina shrubland
Limitation:	Subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-15		Brown to dark brown (10 YR 5/3-4/3, moist); loamy fine to coarse sand to clayey sand; apedal; sandy fabric; pH 5.5-6.0. Gradual boundary to
B1	10-60		Yellowish brown to brownish yellow (10 YR 6/6, 6/8-5/8, moist), loamy fine to coarse sand to clayey sand. Few bleached mottles may be evident; apedal, weak coherence; sandy fabric; pH 6.0-6.5. Diffuse boundary to
B2	30-100		As above, fine to coarse clayey sand to sandy loam; less commonly light sandy clay loam; may contain up to

10% ferruginous segregations; pseudo earthy fabric;
pH 6.5-7.0. Diffuse boundary to

B3 65-200+ Brownish yellow to yellow (10 YR 6/8, 7/8, moist), few red mottles associated with soft iron segregation. clayey sand to sandy loam less commonly sandy clay loam, up to 50% soft and hard ferruginous segregation; pseudo earthy fabric; pH 6.5-7.3.

Soil unit: Wongan sand

Classification:

Principal profile form - Uc 2.21, Uc 4.21, Uc 3.21

Landform: Upper-midslopes

Slope: 1-3%

Drainage: Rapid-excessive

Surface condition when dry: Loose

Surface gravel/stone/boulders: Nil

Vegetation: Shrubland

Limitation: Wind erosion, low AWC and subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
A1	0-15		Greyish brown to brown (10 YR 5/2-5/3, moist); fine to coarse sand; apedal, loose; sandy; fabric; pH 5.5-6.5. Clear boundary to

A2	15-35	Yellow, light yellowish brown to brownish yellow (10 YR 6/4-6/6, 7/6, moist), (7/4-8/6, dry), up to 20% sporadic bleached mottles (10 YR 7/3-8/3); medium to coarse sand, apedal; sandy fabric; pH 6.0-6.5. Diffuse boundary to
B1	30-100	Yellow to brownish yellow (10 YR 6/6-7/8, 2.5 Y 7/6, moist), mottles as above; fine to coarse sand to loamy sand. Up to 30% rounded ferruginous segregations. Diffuse boundary to
B2	60-200+	As above; fine to coarse loamy sand to clayey sand less commonly sandy loam. Up to 30% soft and hard ferruginous segregations; apedal; sandy fabric; pH 6.5-7.0.
		Note: Soils may extend to 200 cm + or a ferruginous gravel layer or dense hardpan may be encountered after 60 cm.
Soil unit:		Elphin hardpan phase (Esh-Elsh)
Classification:		
Principal profile form -		Uc 3.12, Gn 1.82, Gn 1.85, Uc 2.12
Landform:		Crests to lower slopes
Slope:		0-3%
Drainage:		Moderately well drained
Surface condition when dry:		Loose
Surface gravel/stone/boulders:		< 5%
Vegetation:		Allocasaurina shrubland or mallee heath
Limitation:		Shallow soil depth

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-15		Dark greyish brown to brown (10 YR 4/2-5/3, moist); loamy medium to coarse sand, apedal, loose, sandy fabric; pH 6.0-6.5. Clear boundary to
A2/B1	10-35		Pale brown to light yellowish brown (10 YR 6/3-6/5, moist); loamy medium to coarse sand to sandy loam. Up to 10% ferruginous gravel and few soft ferruginous segregations may be present; apedal, weakly coherent to compact; sandy fabric; pH 6.0-6.5. Gradual boundary to
B2	15-50		As above with red and yellowish red mottles (2.5 YR 4/8, 5 YR 5/8), 5-20%; Gravelly clayey sand to light sandy clay loam; apedal, weakly coherent; sandy or earthy fabric; pH 6.5-7.0. Gradual or abrupt boundary to
C	40-50+		As above; gritty sandy clay loam, variably indurated ferruginous pan (mottled zone).
Soil unit:			Els Elphin loamy sand
Classification:			
Principal profile form -			Uc 6.14
Landform:			Mid-lower slopes
Slope:			0-3%
Drainage:			Well drained
Surface condition when dry:			Loose

Surface gravel/stone/boulders:	Commonly nil or < 10% ferruginous gravel
Vegetation:	Allocasaurina shrubland or mallee shrubland
Limitation:	Subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-15		Dark greyish brown to brown (10 YR 4/2-5/3, moist); loamy medium to coarse sand; apedal, loose; sandy fabric; pH 5.5. Clear boundary to
A2/B1	10-30		Light yellowish brown to brownish yellow (10 YR 6/4-6/6, moist), (7/4, 7/5, dry); clayey medium to coarse sand to sandy loam; up to 40% ferruginous gravel; apedal, weakly coherent; sandy fabric; pH 5.0-6.0. Gradual boundary to
B2	20-60		As above; up to 60% ferruginous gravel and few to common soft segregations; apedal, coherent; earthy fabric; pH 6.0-7.0. Diffuse boundary to
B3	40-80+		As above, mottled light grey (10 YR 7/2-7/3) and red (2.5 YR 4/8); gravelly sandy loam to sandy clay loam, 40-80% ferruginous gravel; apedal, massive; earthy fabric; may become indurated with depth, pH 6.5-7.0.

Soil unit: Es Elphin sand

Classification:

Principal profile form - Uc 5.11, Uc 2.21

Landform: Mid slopes to flats

Slope: 0-3%

Drainage:	Well drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	< 10% ferruginous gravel
Vegetation:	Allocasaurina shrubland
Limitation:	Subject to soil compaction, wind erosion.

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-15		Dark greyish brown to brown (10 YR 4/2-5/2, 5/3, moist); medium to coarse sand to loamy sand; apedal, loose, sandy fabric; pH 5.0-6.0. Clear boundary to
A2/B1	10-35		Pale brown to light yellowish brown (10 YR 6/3-6/5, moist); loamy medium to coarse sand to clayey sand; may contain up to 60% ferruginous gravel; apedal, loose, sandy fabric; pH 6.0-6.5. Diffuse boundary to
B2	20-70+		As above; gravelly loamy sand to sandy loam, commonly 60-70% ferruginous gravel. Subsoils with sandy loam textures may be mottled (light grey and red); apedal, weak coherence; sandy fabric; pH 6.5.

Soil unit: Mocardy sand (Ms)

Classification:

Principal profile form - Dg 4.82

Landform: Mid to lower slopes

Slope: 2-3%

Drainage: Imperfectly drained

Surface condition when dry: Loose

Surface gravel/stone/boulders: < 10% quartz grit and gravel

Vegetation: Heath

Limitation: Waterlogging

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-10		Dark greyish brown (10 YR 4/2, moist) coarse sand to loamy coarse sand; apedal, loose; sandy fabric; pH 5.5-6.0. Gradual boundary to
A2	10-50		Light grey to light yellowish brown (10 YR 7/2-7/4, 6/4, moist); coarse sand to clayey sand, may contain ferruginous gravel; apedal, loose to weakly coherent; sandy fabric. pH 6.0-7.0. Gradual to clear boundary to
B2	25-80+		Light grey to light yellowish brown (10 YR 7/2, 6/2-6/4, moist), less commonly brownish yellow (10 YR 6/6) mottled red to yellowish red (2.5 YR 4/8, 5 YR 5/8); gritty sandy clay loam to sandy clay, 20-40% ferruginous gravel may be present; apedal, massive; pH 6.5-7.5.

Soil unit: Yaling gravelly loam (Ylg)

Classification:

Principal profile form - Ks-Uc 1.22

Landform: Crests and upper slopes

Slope:	0-2%
Drainage:	Well drained
Surface condition when dry:	Loose to soft
Surface gravel/stone/boulders:	5-60% ferruginous gravel
Vegetation:	Allocasaurina shrubland and heath
Limitation:	Root development is restricted.

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-10		Greyish brown to yellowish brown (10 YR 5/2-5/4, moist); gravelly sand to loamy sand, 5-80% ferruginous gravel (10-30 mm diameter); apedal, loose; sandy fabric; pH 6.0-6.5. Clear boundary to
A12	5-40		Very pale brown to yellowish brown (10 YR 7/4-7/6, 6/5, 5/6-5/8, moist) gravelly sand to clayey sand, 60-80% ferruginous gravel (5-70 mm diameter); apedal, loose to coherent; sandy fabric; pH 6.5. Clear boundary to
C	10-40+		Ferruginous hardpan or laterite.

Soil unit: Yaling series (Ysb), (Ysg)

Classification:

Principal profile form - Uc 1.22

Landform: Crests to midslopes

Slope: 0-3%

Drainage: Rapidly drained

Surface condition when dry: Loose

Surface gravel/stone/boulders: 0-60%

Vegetation: Allocasaurina shrubland

Limitation: Wind erosion

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-15		Greyish brown to yellowish brown (10 YR 5/2-5/4, moist); sand to gravelly sand; apedal, loose; sandy fabric; pH 6.0-6.5. Clear boundary to
B21	5-30		Yellow to yellowish brown (10 YR 7/6, 6/5, 5/6-5/8, moist); gravelly sand to clayey sand, 40-80% ferruginous gravel (average diameter 20-50 mm), apedal, loose to weakly coherent; sandy fabric; pH 6.5.
B22/D	20-80+		As above; gravel content 60-80%. Lateritic stone or boulders may be present.

Soil unit: 7

Classification:

Principal profile form: Dr 2.13, Dr 2.53, Dy 2.52

Landform: Crest-upper slopes and associated with dykes

Slope: 0-3%

Drainage: Moderate to well drained

Surface condition when dry:	Hardsetting to firm
Surface gravel/stone/boulders:	Minor ferruginous gravel and rock outcrop
Vegetation:	Eucalyptus woodland or mallee shrubland
Limitation:	Possible subsoil salinity

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-10		Dark reddish brown, dark brown less commonly yellowish brown, (5 YR 3/4, 7/5 4/4, 10 YR 5/5, moist); fine to coarse clayey sand to silty clay loam; weak angular blocky to fine polyhedral structure; rough ped fabric; pH 6.0-7.5. Gradual boundary to
B21	7-40		Yellowish red to yellowish brown (5 YR 4/6, 10 YR 5/5, moist); light sandy clay loam, sandy clay or light medium clay (dark ferruginous gravels (5mm) may be present); weak angular blocky to crumb structure; rough ped fabric; pH 7.0-9.0. Gradual and irregular boundary to
B22	30-70+		Yellowish red to brown (5 YR 5/6-5/8, 7.5 YR 5/5), moist); sandy clay to light medium clay; massive or weak angular blocky structure; lime nodules or segregations may be present; pH 7.5-9.2.
Soil unit:	8		
Classification:			
Principal profile form -	Uc 1.22, Uc 1.23, Uc 5.11		
Landform:	Upper slopes associated with granite outcrops		

Slope:	0-3%
Drainage:	Rapidly drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	Granite outcrops - few to common
Vegetation:	Shrubland
Limitation:	Variable soil depth
Comments:	Shallow (< 20 cm) reddish brown sands occur adjacent to the granite outcrops

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
A11	0-10		Dark reddish brown to brown (5 YR 3/4, 10 YR 4/3, moist); coarse loamy sand to clayey sand; apedal, weakly coherent; sandy fabric; pH 5.5-6.5. Diffuse boundary to
A12	10-60		Reddish brown to strong brown (5 YR 4/4-4/6, 7.5 YR 5/8, moist); coarse loamy sand to clayey sand; apedal, weakly coherent, sandy fabric; pH 5.5-6.0. Diffuse boundary to
A13	40-70		Yellowish red to brownish yellow (5 YR 5/6, 10 YR 6/8, moist), coarse loamy sand to clayey sand. Up to 60% ferruginous gravel or quartz; apedal, weakly coherent; sandy fabric; pH 6.0-7.0.
C	20+		Granitic substrate.
Soil unit:	10		

Classification:

Principal profile form - Dy 3.82, Dy 3.42

Landform: Upperslope

Slope: 1-2%

Drainage: Imperfectly drained

Surface condition when dry: Hardsetting to firm

Surface gravel/stone/boulders: Nil

Vegetation: Mallee shrubland

Limitation: Surface runoff, periodic waterlogging, saline subsoils

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-10		Brown (10 YR 4/3, moist); loamy coarse sand to clayey sand; apedal, compact; sandy fabric; pH 6.0-6.5. Clear boundary to
A2	7-20		Pale brown (10 YR 6/3, moist), very pale brown (10 YR 7/3, dry); clayey coarse sand to sandy loam; apedal, cemented and brittle; sandy fabric; pH 6.5-7.0. Clear boundary to
B2	20-55		Pale brown (10 YR 6/3-6/4, 7/3, moist), mottled red (2.5 YR 4/8), yellowish red (5 YR 5/8) and yellowish brown (10 YR 5/8), coarse sandy clay loam to sandy clay. Red mottling increasing with depth. Massive to coarse columnar structure; pH 7.0-8.0.
Soil unit:	A		

Classification:

Principal profile form - Gn 1.22

Landform: Upper-midslopes

Slope: 2-3%

Drainage: Moderate to rapidly drained

Surface condition when dry: Loose to soft

Surface gravel/stone/boulders: Minor ferruginous gravel

Vegetation: Shrubland

PROFILE MORPHOLOGY:

Horizon	Depth range cm		Description
	Upper	Lower	
Ap	0-10		Brown (10 YR 4/3-4/2.5, moist); loamy medium to coarse sand to clayey sand; < 30% ferruginous gravel (20 mm diameter); apedal, loose; sandy fabric; pH 5.5-6.0. Gradual boundary to
B1	05-50		Yellowish brown (10 YR 5/6-6/8, moist); clayey medium to coarse sand to sandy loam; 60-80% ferruginous gravel; apedal, weakly coherent, sandy fabric; pH 6.0-6.5. Gradual boundary to
B2	50-90		Yellowish brown (10 YR 5/6-6/8, moist); light sandy clay loam to sandy clay loam; < 60% gravel decreasing with depth; apedal, weak crumb structure; pH 6.5-7.0.
B3	90+		As above, few red mottles (2.5 YR 4/8); sandy clay loam to sandy clay.

APPENDIX 4 - HERBARIUM INVENTORY - WONGAN HILLS

(AUGUST 1989 by ANNE COATES)

PROJECT DESCRIPTION

During October 1984 and 1985 field trips were undertaken by staff of the W.A. Herbarium to collect plant specimens from uncleared bushland remaining on the Department of Agriculture Research Station at Wongan Hills. Information from these trips was recorded in field books by C Parker (collections CP 173-294, 23 to 25 October 1984 and CP 295-363, 10 and 11 October 1985) and K Knight (collections KK 300-388, 23 to 25 October 1984).

The information recorded includes data on topography, soil type, vegetation formation, collecting number, plant identification and species abundance. Some discrepancy appears to exist between the descriptions given by the two recorders and frequently more than one vegetation or soil type is described for each site. Vegetation descriptions were generally based on Specht's classification (Table 1) although some of the terminology used in the field books does not relate to this system.

The following sections summarise the available data and include site descriptions and a species list for the areas. Due to time limitations and the difficulties involved in locating some of the plant collections the identifications given in the field books have not been checked. The location of collecting sites and the gazetted rare flora *Daviesia euphorbioides*, *Gastrolobium hamulosum* and *Gastrolobium glaucum* are indicated on the map provided (Figure 1).

Key Site Descriptions	
ABUNDANCE	D - dominant
	A - abundant
	F - frequent
	O - occasional
	R - rare
VOUCHER	Collection Number
*	Introduced Species

TABLE 1 - Plant Communities - Major Structural Formations Specht's Classification

Life-form and height of tallest stratum	Foliage cover of tallest stratum (%)	Description
Trees over 30 m	70 - 100 30 - 70 10 - 30 Under 10	High closed forest High open forest High woodland High open woodland
Trees 10 - 30 m	70 - 100 30 - 70 10 - 30 Under 10	Closed forest Open forest Woodland Open woodland
Trees under 10 m	70 - 100 30 - 70 10 - 30 Under 10	Low closed forest Low open forest Low woodland Low open woodland
Shrubs over 2 m	70 - 100 30 - 70 10 - 30 Under 10	Closed scrub Open scrub High scrubland High open scrubland
Shrubs 1 to 2 m	70 - 100 30 - 70 10 - 30 Under 10	Closed heath Open heath Shrubland Open shrubland
Shrubs under 1 m	70 - 100 30 - 70 10 - 30 Under 10	Low closed heath Low open heath Low shrubland Low open shrubland
Herbs	70 - 100 30 - 70 10 - 30	Closed herbland, closed tussock grassland, closed sedgeland etc Herbland etc Open herbland etc
Hummock grasses	10 - 30 Under 10	Hummock grassland Open Hummock grassland

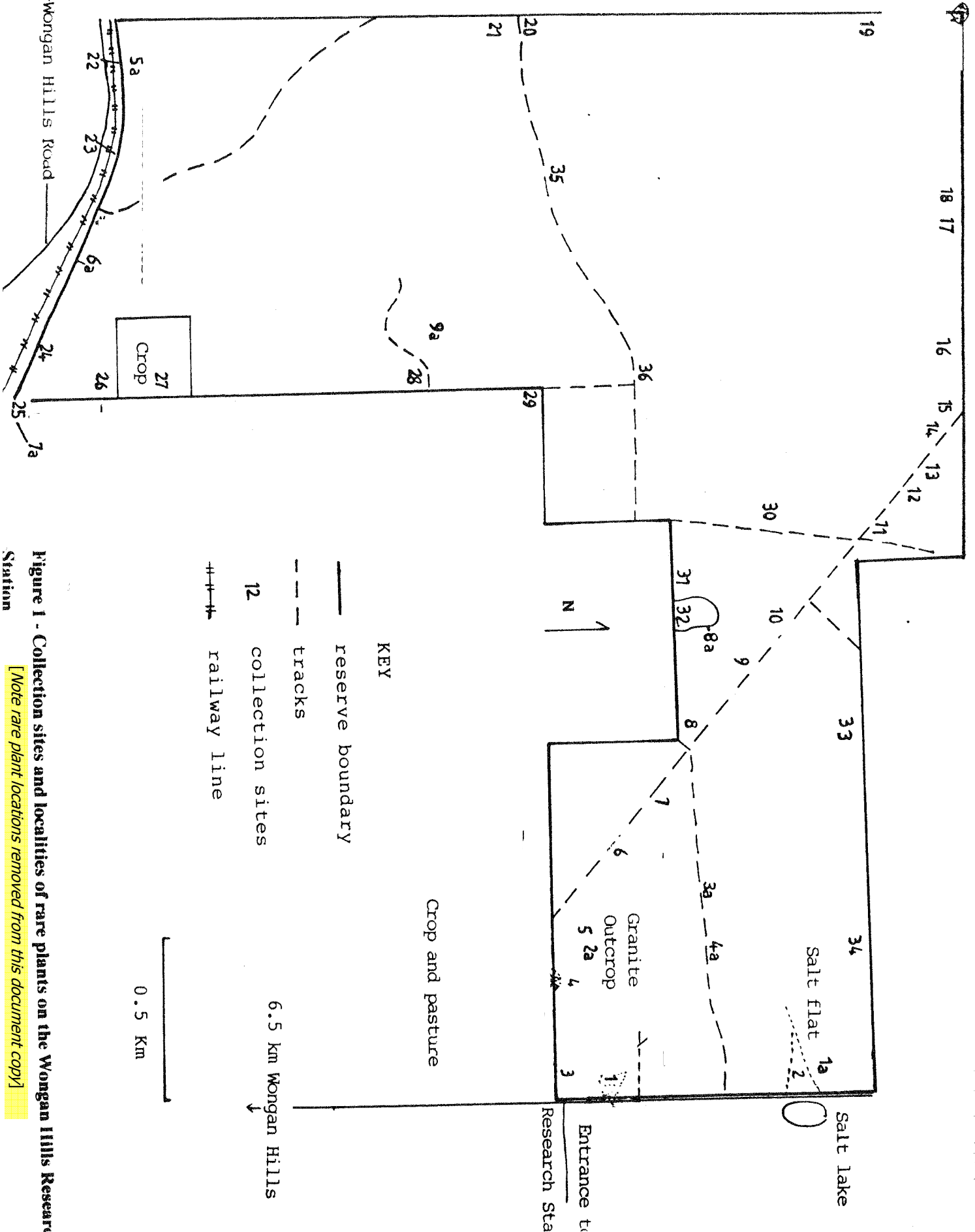


Figure 1 - Collection sites and localities of rare plants on the Wongan Hills Reserve
 [Note rare plant locations removed from this document copy]

SITE DESCRIPTIONS

SITE 1

Soil Type: Yellow brown sandy clay over laterite

Topography: Flat to undulating

Vegetation Formation: Open Scrub - Open Heath - Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Allocasuarina campestris</i>	D	CP 173
<i>Ecdeiocolea monostachya</i>	F	CP 175
<i>Mesomelaena preissii</i>	O	CP 176
<i>Neurachne alopecuroidea</i>	F	CP 177
<i>Amphipogon strictus</i> var. <i>strictus</i>	F	CP 178
<i>Baeckea crispiflora</i>	O	CP 179
<i>Opercularia vaginata</i>	F	CP 180
<i>Melaleuca</i> sp. nov. (aff. <i>cordata</i>)	O	CP 181
<i>Calothamnus quadrifidus</i>	O	CP 182
<i>Calytrix angulata</i>	O	CP 183
<i>Astroloma serratifolium</i>	O	CP 184
<i>Hibbertia rupicola</i>	O	CP 185
<i>Goodenia caerulea</i>	O	CP 186
<i>Pimelea imbricata</i>	O	CP 187
<i>Jacksonia</i> ? <i>sericea</i>	O	CP 188
<i>Acacia filifolia</i>	O	CP 189
<i>Conospermum stoechadis</i>	O	CP 190
<i>Verticordia acerosa</i> var. <i>preissii</i>	O	CP 191
<i>Melaleuca pentagona</i>	O	CP 192
<i>Gompholobium asperulum</i>	O	CP 193
<i>Gastrolobium glaucum</i>	O	CP 194
<i>Waitzia acuminata</i>	O	CP 195
<i>Psammomoya choretroides</i>	O	CP 196
<i>Cassytha glabella</i>	O	CP 197
<i>Petrophile media</i>	O	CP 198
<i>Petrophile seminuda</i>	F	CP 203
<i>Thysanotus patersonii</i>	O	CP 204
<i>Petrophile striata</i>	O	CP 205
<i>Dianella revoluta</i>	O	CP 206

Hakea platysperma	O	CP 207
Gastrolobium calycinum	O	CP 208
Beaufortia bracteosa	O	KK 302
Verticordia pritzelii	O	KK 303
Lepidobolus preissianus	F	KK 304
Lepidobolus chaetocephalus	F	KK 306
Leptospermum oligandrum	F	KK 307
Scholtzia drummondii	O	KK 308
Glischrocaryon aureum	F	KK 309
Calothamnus quadrifidus	F	KK 311
Jacksonia lehmannii	F	KK 314
Chorizema aciculare	O	KK 316
Laxmannia grandiflora	O	KK 317
Ptilotus polystachyus	F	KK 318
Petrophile ericifolia	O	KK 319
Gastrolobium hamulosum	O	-
Lichens		CP 199-202

Identifications were unavailable for plant collections KK 305, KK 310, KK 312, KK 313 and KK 315.

SITE 2**Soil Type:** Orange brown sandy clay, salt encrusted near the lake**Topography:** Flat**Vegetation Formation:** Salt flat and adjacent *Allocasuarina* "Thicket" - Shrubland - Heath**Species List:**

SPECIES	ABUNDANCE	VOUCHER
*Mesembryanthemum nodiflorum	O	CP 209
Acacia resinosa	O	CP 210
Comesperma volubile	O	CP 211
Scaevola arenaria	O	CP 212
Melaleuca uncinata	F	CP 213
Billardiera sp.		CP 214
Melaleuca conothamnoides	O	CP 215
Lobelia rarifolia	O	CP 216
Stylidium bulbiferum	O	CP 217
Isotoma hypocrateriformis	O	CP 218
*Spergularia rubra	O	CP 219
Pogonolepis stricta	F	CP 220
*Polypogon monspeliensis	O	CP 221
Juncus sp.	O	CP 222
Santalum acuminatus	O	CP 223
Eucalyptus aff. rigidula	O	CP 224
Astroloma serratifolium	F	KK 321
Casuarina obesa	A	KK 322
Gastrolobium spinosum	O	KK 323
*Hordeum marinum		KK 325
Halosarcia pergranulata	A	KK 326
Dodonaea viscosa		KK 328
Dampiera teres	O	KK 329

Identifications were unavailable for plant collections KK 320, and KK 324.

SITE 3**Soil Type:** Yellow brown sandy clay**Vegetation Formation:** Shrubland - disturbed roadside vegetation**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Acacia saligna		CP 225

SITE 4**Soil Type:** Yellow brown sandy clay - White yellow clay sand over laterite**Topography:** Flat**Vegetation Formation:** Open Scrub of *Allocasuarina campestris*, *Santalum acuminatum* and *Melaleuca***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Gnephosis tenuissima		CP 226
Melaleuca radula		CP 227
Melaleuca coronicarpa ssp. coronicarpa	O	CP 228
Thysanotus sp.	O	KK 303

At least 10 *Gastrolobium hamulosum* plants were present growing on the road verge in low heath.

SITE 5**Soil Type:** Grey sandy clay adjacent to a granite outcrop**Topography:** Flat seepage area**Vegetation Formation:** Herbland with *Stylidium*, *Calytrix*, and grasses**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Ptilotus declinatus	O	CP 229
Isotoma hypocrateriformis	F	CP 230
Diuris setacea	O	CP 231
Stackhousia huegelii	F	KK 332

SITE 6**Soil Type:** Yellow brown sandy clay - clay sand over laterite**Topography:** Flat**Vegetation Formation:** Open Scrub - shrubland - "Thicket" of *Melaleuca*, *Allocasuarina campestris* and *Eucalyptus* sp.**Species List:**

SPECIES	ABUNDANCE	VOUCHER
* <i>Trifolium arvense</i>	F	CP 232
<i>Stylidium</i> sp.	O	CP 233
* <i>Anagallis arvensis</i> var. <i>caerulea</i>		KK 334

Identifications were unavailable for plant collections CP 234, KK 333, and KK 335.

SITE 7**Soil Type:** Yellow white clayey sand over laterite**Topography:** Flat**Vegetation Formation:** - cleared area on roadside**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Isopogon divergens</i>	O	KK 336

SITE 8**Soil Type:** Yellow brown sandy clay - yellow white clay sand**Topography:** Flat**Vegetation Formation:** "Thicket" of *Allocasuarina* and *Melaleuca***Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Acacia resinosa</i>	O	CP 235
<i>Melaleuca uncinata</i>	A	KK 337

SITE 9**Soil Type:** Yellow brown sandy clay**Vegetation Formation:** Open scrub of *Allocasuarina campestris***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Levenhookia stipitata	O	CP 236
Hyalosperma cotula	F	CP 237

SITE 10**Soil Type:** Yellow white clayey sand over laterite**Vegetation Formation:** - cleared area on the roadside**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Dampiera teres		KK 338

SITE 11**Soil Type:** Yellow brown sandy clay - Yellow white clayey sand over laterite**Topography:** Flat**Vegetation Formation:** Open Scrub - Heath of *Allocasuarina campestris* and adjacent cleared area**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Hibbertia glomerata	O	CP 238
Waitzia paniculata	O	CP 240
Goodenia caerulea	F	CP 241
Verticordia eriocephala	F	KK 339
Calytrix sapphirina	O	KK 340
Verticordia pritzelii	O	KK 341
Verticordia picta	F	KK 342
Haemodorum paniculatum	O	KK 343
Baeckea preissiana	O	KK 344

SITE 12**Soil Type:** White sandy clay - yellow white clayey sand**Vegetation Formation:** Open Scrub of *Allocasuarina campestris* and *Eucalyptus* sp.**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Dryandra ?armata	F	CP 242
Eucalyptus pyriformis	O	CP 243
Jacksonia ?sericea	O	CP 244
Grevillea didymobotrya	O	CP 245
Verticordia sp.	F	KK 345
Hemigenia westringioides		KK 346
Logania flaviflora	F	KK 347

SITE 13**Soil Type:** White sandy loam**Vegetation Formation:** Open Scrub of *Allocasuarina*, *Melaleuca* and *Santalum***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Tripterococcus brunonis	F	CP 246

SITE 14**Soil Type:** White yellow clay sand**Vegetation Formation:** Heath**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Verticordia pritzelii	O	KK 348

SITE 15**Soil Type:** Yellow brown sandy clay**Vegetation Formation:** Open Scrub of *Melaleuca* aff. *cordata***Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Grevillea eriostachya</i>	O	CP 247

SITE 16**Soil Type:** Yellow brown sandy clay**Vegetation Formation:** - firebreak adjacent to an area under crop**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Dampiera wellsiana</i>	O	CP 248

SITE 17**Soil Type:** Yellow white clayey sand**Vegetation Formation:** "Thicket" of *Eucalyptus* mallee**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Melaleuca laxiflora</i>	F	KK 349

SITE 18**Soil Type:** White sandy clay**Vegetation Formation:** Mallee Woodland**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Eucalyptus semivestita</i> (ms)	F	CP 249

SITE 19

Soil Type: Red brown sandy clay - brown clayey sand over granite
Topography: Flat
Vegetation Formation: "Thicket" of *Allocasuarina* - Woodland of *Allocasuarina* and *Eucalyptus* species

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Keraudrenia integrifolia</i>	O	CP 250
<i>Spartochloa scirpoidea</i>	O	KK 350

SITE 20

Soil Type: Red brown sandy clay - brown clayey sand over granite
Topography: Flat base of hill
Vegetation Formation: Mallee Woodland - Woodland/Scrub of *Eucalyptus* species and *Melaleuca*

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Allocasuarina acutivalvis</i>	O	CP 251
<i>Lysiosepalum rugosum</i>	O	CP 252
<i>Grevillea petrophiloides</i>	O	CP 253
<i>Melaleuca acuminata</i> ssp. <i>websteri</i>	A	KK 352
<i>Acacia erinacea</i>	F	KK 353

Identifications were unavailable for plant collections CP 254, KK 351 and KK 354.

SITE 21

Soil Type: Yellow brown clayey sand
Topography: Base of a hill
Vegetation Formation: Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Darwinia purpurea</i>		

SITE 22**Soil Type:** Yellow brown sandy clay - Yellow brown clayey sand over laterite**Vegetation Formation:** - disturbed area along the railway line**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Cryptandra pomaderroides	O	CP 255
Melaleuca laxiflora	O	CP 256
Cassytha sp.	O	CP 257
Chamelaucium drummondii ssp. drummondii	O	CP 258
Leucopogon tamminensis ssp. tamminensis	O	CP 259
Hibbertia huegelii	O	CP 260
?Daviesia pachyphylla	O	KK 356
Micromyrtus racemosa	O	KK 357
*Mesembryanthemum nodiflorum	O	KK 358
Ptilotus sp.	F	KK 359
Wilsonia humilis		

SITE 23**Soil Type:** Yellow brown clayey sand**Vegetation Formation:** ?Woodland of Mallee, *Melaleuca* and *Allocasuarina***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Callitris canescens	O	KK 360

Conospermum brownii (CP 290) and *Hakea meisneriana* (KK 385) were collected between Sites 23 and 24.

SITE 24**Soil Type:** White sand - White clayey sand over laterite**Topography:** Flat**Vegetation Formation:** Dense Scrub of *Allocasuarina* - Open Scrub - Shrubland - Heath**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Lechenaultia biloba	O	CP 261
Dampiera spicigera	O	CP 262
Hemiandra coccinea	O	CP 263
Eremaea pauciflora	F	CP 264
Grevillea sp.	O	CO 265
Hibbertia sp.	O	CP 266
Petrophile media	O	CO 267
Beaufortia elegans	F	CP 268
Gompholobium tomentosum	O	CP 269
Dampiera lavandulacea	O	CP 271
Melaleuca scabra	O	CP 272
Isopogon drummondii	O	CP 273
Patersonia umbrosa	O	KK 361
Empodisma gracillimum	O	KK 362
Anigozanthos humilis	F	KK 363
Ptilotus stirlingii	O	KK 364
Goodenia caerulea	O	KK 365
Caustis pentandra	F	KK 366

No identification was available for plant collection CP 270.

SITE 25**Soil Type:** White sand ; - White sand with laterite**Topography:** Flat**Vegetation Formation:** KK collections - Shrubland

CP collections - regrowth along a firebreak adjacent to pasture

Species List:

SPECIES	ABUNDANCE	VOUCHER
Stylidium macrocarpum	O	CP 274
Hibbertia acerosa	O	CP 275
Schoenus aff. obtusifolius	O	CP 276
Cassytha pubescens	F	CP 277
Cassytha aurea var. hirta	F	CP 278
Comesperma calymega	O	KK 367
Allocasuarina humilis	O	KK 368
Grevillea tridentifera	O	KK 369
Allocasuarina humilis	F	KK 370
*Solanum hystrix		KK 371

SITE 26**Soil Type:** White sand**Vegetation Formation:** Open Scrub with *Melaleuca*, *Calothamnus*, *Dryandra* and *Santalum***Species List:**

SPECIES	ABUNDANCE	VOUCHER
?Dampiera helmsii	O	CP 279
Grevillea eryngioides	O	CP 280

SITE 27**Soil Type:** White sand - white sand with laterite**Topography:** Flat**Vegetation Formation:** Open Scrub - Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Verreauxia reinwardtii	O	CP 281
Jacksonia spinosa	F	KK 372

SITE 28

Soil Type: White sand with laterite

Vegetation Formation: Woodland/Scrub of *Allocasuarina* and *Eucalyptus*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Maireana carnosia	O	KK 373

SITE 29

Soil Type: White sand

Vegetation Formation: Mallee Woodland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Microcorys	O	CP 282

SITE 30

Soil Type: Yellow white sand - white clayey sand

Vegetation Formation: "Thicket" - Shrubland of *Allocasuarina*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Stylidium leptophyllum	O	CP 283
Baeckea crispiflora	F	CP 284
Allocasuarina campestris	F	KK 374
Hakea sulcata	A	KK 376
Acacia multispicata	A	KK 377

No identification was available for collection KK 375.

SITE 31**Soil Type:** White sandy clay - Grey white clayey sand**Topography:** Flat**Vegetation Formation:** Scrub of *Melaleuca* species**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Melaleuca sp.	O	CP 285
Melaleuca scabra	O	CP 286
Melaleuca scabra var. tuberculata	F	KK 378
Melaleuca pentagona	A	KK 379

Identifications were unavailable for collections KK 380, and KK 381.

SITE 32**Soil Type:** Yellow brown clayey sand - Grey white clay sand with laterite**Topography:** Flat**Vegetation Formation:** Open Scrub - "Thicket" of *Allocasuarina***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Thryptomene prolifera	O	CP 287
Stylidium bulbiferum	F	CP 288
*Centaurium		CP 289
*Plantago coronopus ssp. commutata	F	KK 382

SITE 33**Soil Type:** Brown clayey sand over granite**Topography:** Flat; area surrounding a granite outcrop**Vegetation Formation:** "Thicket" of *Melaleuca* species**Species List:**

SPECIES	ABUNDANCE	VOUCHER
Ptilotus spathulata		KK 383

SITE 34**Soil Type:** Yellow brown clayey sand**Topography:** Flat**Vegetation Formation:** *Melaleuca* Heath**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Alyogyne hakeifolia</i>	O	KK 384

SITE 35**Soil Type:** Yellow brown sandy clay - brown clayey sand**Vegetation Formation:** Open Woodland - Woodland**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Acacia erinacea</i>	F	CP 291
<i>Eucalyptus celastroides</i> ssp. <i>virella</i>	F	CP 292
<i>Maireana georgei</i>	O	CP 293
<i>Erymophyllum ramosum</i>	F	KK 387
<i>Enchylaena lanata</i>	A	KK 388

No identification was available for plant collection KK 386.

SITE 36**Soil Type:** Brown sandy clay**Vegetation Formation:** Mallee woodland**Species List:**

SPECIES	ABUNDANCE	VOUCHER
<i>Eucalyptus erythronema</i> var. <i>marginata</i>		CP 294

SITE 1a

Soil Type: Brown sandy clay and wet clay at the fringe of a salt flat

Vegetation Formation: Open Heath of *Acacia filifolium* with *Melaleuca uncinata* in places

Species List:

SPECIES	ABUNDANCE	VOUCHER
Halosarcia pergranulata	F	CP 295
Hemigenia	O	CP 296
Brachycome bellidioides	F	CP 298
Blennospora drummondii	F	CP 299
*Anagallis arvensis var. caerulea	O	CP 300
Enchylaena lanata	O	CP 302
*Hordeum marinum	F	CP 303
*Lolium rigidum	O	CP 304
*Spergularia rubra	F	CP 305
Halosarcia pergranulata	F	CP 306
Stylidium bulbiferum var. septentrionale	O	CP 307
Calytrix angulata	F	CP 309
Baeckea crispiflora	O	CP 311
Acacia resinosa	D	CP 312
Hibbertia sp.	O	CP 313

Identifications were unavailable for collections CP 297, CP 301, CP 308 and CP 310.

SITE 2a

Soil Type: Light brown sandy clay over granite

Vegetation Formation: CP 314, 320-322 - Heath/Open Heath of *Allocasuarina campestris* and *Melaleuca uncinata*

CP 315-319 - Herbland with an area of *Borya nitida* fringing the granite outcrop

Species List:

SPECIES	ABUNDANCE	VOUCHER
Melaleuca scabra	O	CP 314
Stackhousia huegelii	F	CP 315
Cyanicula gemmata (ms) forma gemmata	O	CP 316
Ecdeiocolea monostachya	F	CP 317
Stypandra glauca	O	CP 318
Baeckea crispiflora	O	CP 319
Drosera leucoblasta	O	CP 320
Stylidium sp.	O	CP 321
Dampiera teres	F	CP 322

SITE 3a

Soil Type: White sandy clay

Vegetation Formation: Open Scrub of *Allocasuarina campestris*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Logania flaviflora		CP 323

SITE 4a

Soil Type: White sandy clay

Vegetation Formation: CP 324, 325 - Low Open Woodland of scattered *Eucalyptus*
 CP 326-332, 334, 335 - Open Heath of *Allocasuarina campestris*
 with *Melaleuca scabra* and *Acacia* sp. nov in places
 CP 333 - Mallee Woodland with an understorey of *Melaleuca uncinata*
 CP 336 - Mallee Woodland
 CP 331-336 were collected along the firebreaks

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Drosera parvula</i>	F	CP 325
<i>Brunonia australis</i>	F	CP 326
<i>Calytrix</i> sp.	F	CP 327
<i>Muehlenbeckia adpressa</i>	O	CP 328
<i>Allocasuarina microstachya</i>	F	CP 330
<i>Micromyrtus racemosa</i>	O	CP 332
<i>Eucalyptus erythronema</i> var. <i>marginata</i>	F	CP 333
<i>Pimelea brevistyla</i>	F	CP 334
<i>Stylidium</i> sp.	O	CP 335
<i>Wilsonia humilis</i>	O	CP 336

Identifications were unavailable for collections CP 324 and 331.

SITE 5a

Soil Type: White brown sandy clay - yellow brown sandy clay with laterite

Vegetation Formation: CP 337-341 - Open Woodland with *Allocasuarina acutivalvis* over Heath/Open Heath with *Hakea sulcata*, *Melaleuca* aff. *conothamnoides*, *Melaleuca uncinata* and *Santalum*
CP 342-344 - Heath/Open Heath with *Allocasuarina campestris*, *Grevillea armigera* and *Hakea sulcata*

Species List:

SPECIES	ABUNDANCE	VOUCHER
<i>Microcorys obovata</i>	O	CP 338
<i>Hemigenia westringioides</i>	O	CP 339
<i>Hibbertia rostellata</i>	O	CP 341
<i>Stackhousia scoparia</i>	O	CP 343

Identifications were unavailable for collections CP 337, CP 340, CP 342 and CP 344.

SITE 6a**Soil Type:** White brown sandy clay - white sand**Vegetation Formation:** CP 345, 346, 349 - Open Heath with *Eremaea pauciflora*, *Hakea sulcata*, *Grevillea petrophiloides* and *Dryandra*
CP 347, 348 - "Thicket" of *Allocasuarina campestris***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Dampiera sp.	O	CP 346
Thelymitra fuscolutea var. fuscolutea		CP 347
Hakea meisneriana	A	CP 348
Hakea sp.	O	CP 349

No identification was available for collection CP 345.

SITE 7a**Soil Type:** White sand - white sand with gravel**Vegetation Formation:** Open Heath with *Melaleuca* aff. *cordata*, *Eremaea beaufortioides*, *Grevillea armigera*, *Anigozanthos humilis*, *Leptospermum* and *Conospermum***Species List:**

SPECIES	ABUNDANCE	VOUCHER
Stylidium macrocarpum	O	CP 351
Acacia drewiana ssp. minor	F	CP 354
Stylidium sp.		CP 356
Verticordia sp.	F	CP 357

Identifications were unavailable for collections CP 350, CP 352, CP 355 and CP 358.

SITE 8a**Soil Type:** Light brown sandy clay - seepage area**Vegetation Formation:** Open Heath with *Melaleuca uncinata* and ?*Thryptomene***Species List:**

SPECIES	ABUNDANCE	VOUCHER
? <i>Conostylis prolifera</i>	F	CP 360
<i>Stylidium calcaratum</i>	O	CP 361

SITE 9a**Soil Type:** Brown sandy clay**Vegetation Formation:** *Eucalyptus* Woodland**Species List:**

Identifications were unavailable for collections CP 362 and CP 363.

SPECIES LIST

* Introduced species

CP 123 collecting number

POACEAE

Amphipogon strictus	C.P. 178
* Hordeum marinum	C.P. 303, K.K. 325
* Lolium rigidum	CP 304
Neurachne alopecuroidea	CP 177
* Polypogon monspeliensis	CP 221
Spartochloa scirpoidea	KK 350

CYPERACEAE

Caustis pentandra	KK 366
Mesomelaena preissii	CP 176
Schoenus aff. obtusifolius	CP 276

RESTIONACEAE

Ecdeiocola monostachya	CP 175, 316
Empodisma gracillimum	KK 362
Lepidobolus chaetocephalus	KK 306
Lepidobolus preissianus	KK 304

JUNCACEAE

Juncus sp.	CP 222
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PHORMIACEAE

Dianella revoluta	CP 206
Stypandra glauca	CP 318

ANTHERICACEAE

Laxmannia grandiflora	KK 317
Thysanotus patersonii	CP 204
Thysanotus sp.	KK 303

HAEMODORACEAE

Anigozanthos humilis	KK 363
?Conostylis prolifera	CP 360

IRIDACEAE

<i>Patersonia umbrosa</i>	KK 361
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ORCHIDACEAE

<i>Cyanicula gemmata</i> forma <i>gemmata</i>	CP 316
<i>Diuris setacea</i>	CP 231
<i>Thelymitra fuscolutea</i> var. <i>fuscolutea</i>	CP 347

DICOTYLEDONAE

CASUARINACEAE

<i>Allocasuarina acutivalvis</i>	CP 251
<i>Allocasuarina campestris</i>	KK 374, CP 173
<i>Allocasuarina humilis</i>	KK 368, 370
<i>Allocasuarina microstachya</i>	CP 330
<i>Casuarina obesa</i>	KK 322

PROTEACEAE

<i>Conospermum brownii</i>	CP 290
<i>Conospermum stoechadis</i>	CP 190
<i>Dryandra ?armata</i>	CP 242
<i>Grevillea armigera</i>	-
<i>Grevillea didymobotrya</i>	CP 245
<i>Grevillea eriostachya</i>	CP 247
<i>Grevillea eryngioides</i>	CP 280
<i>Grevillea petrophiloides</i>	CP 253
<i>Grevillea tridentifera</i>	KK 369
<i>Grevillea</i> sp.	CP 265
<i>Hakea meisneriana</i>	CP 348, KK 385
<i>Hakea platysperma</i>	CP 207
<i>Hakea sulcata</i>	KK 376
<i>Hakea</i> sp.	CP 349
<i>Isopogon divergens</i>	KK 336
<i>Isopogon drummondii</i>	CP 273
<i>Petrophile ericifolia</i>	KK 319
<i>Petrophile media</i>	CP 267, CP 198
<i>Petrophile seminuda</i>	CP 203

Petrophile striata	CP 205
SANTALACEAE	
Santalum acuminatum	CP 223
POLYGONACEAE	
Muehlenbeckia adpressa	CP 328
CHENOPODIACEAE	
Enchylaena lanata	KK 388, CP 302
Halosarcia pergranulata	KK 326, CP 295, 306
Maireana carnosae	KK 373
Maireana georgei	CP 293
AMARANTHACEAE	
Ptilotus declinatus	CP 229
Ptilotus polystachyus	KK 318
Ptilotus spathulatus	KK 383
Ptilotus stirlingii	KK 364
Ptilotus sp.	KK 359
Ptilotus sp.	CP 363
AIZOACEAE	
* Mesembryanthemum nodiflorum	CP 209, KK 358
CARYOPHYLLACEAE	
* Spergularia rubra	CP 219, 305
LAURACEAE	
Cassytha aurea var. hirta	CP 278
Cassytha glabella	CP 197
Cassytha ?pubescens	CP 277
Cassytha sp.	CP 257
DROSERACEAE	
Drosera leucoblasta	CP 320
Drosera parvula	CP 325

PITTOSPORACEAE

Billardiera sp. CP 214

MIMOSACEAE

Acacia drewiana ssp. minor CP 354
 Acacia erinacea CP 291, KK 353
 Acacia filifolia CP 189
 Acacia multispicata KK 377
 Acacia resinosa CP 210, 312, 235
 Acacia saligna CP 225

PAPILIONACEAE

Chorizema aciculare KK 316
 Daviesia euphorbioides -
 Daviesia pachyphylla KK 356
 Gastrolobium calycinum CP 208
 Gastrolobium glaucum CP 194
 Gastrolobium hamulosum -
 Gastrolobium spinosum KK 323
 Gompholobium asperulum CP 193
 Gompholobium tomentosum CP 269
 Jacksonia lehmannii KK 314
 Jacksonia ?sericea CP 188, 244
 Jacksonia spinosa KK 372
 * Trifolium arvense CP 232

POLYGALACEAE

Comesperma calymega KK 367
 Comesperma volubile CP 211

CELASTRACEAE

Psammomoya choretroides CP 196

STACKHOUSIACEAE

Stackhousia huegelii KK 332, CP 315
 Stackhousia scoparia CP 343
 Tripterococcus brunonis CP 246

SAPINDACEAE

Dodonaea viscosa KK 328

RHAMNACEAE

Cryptandra pomaderroides CP 255

MALVACEAE

Alyogyne hakeifolia KK 384

STERCULIACEAE

Keraudrenia integrifolia CP 250

Lysiosepalum rugosum CP 252

DILLENACEAE

Hibbertia acerosa CP 275

Hibbertia glomerata CP 238

Hibbertia huegelii CP 260

Hibbertia rostellata CP 341

Hibbertia rupicola CP 185

Hibbertia sp. CP 313

Hibbertia sp. CP 266

THYMELAEACEAE

Pimelea brevistyla CP 334

Pimelea imbricata CP 187

MYRTACEAE

Baeckea crispiflora CP 179, 284, 311, 319

Beaufortia bracteosa KK 302

Beaufortia elegans CP 268

Calothamnus quadrifidus CP 182

Calytrix angulata CP 183, 309

Calytrix sapphirina KK 340

Calytrix sp. CP 327

Chamelaucium drummondii ssp. *drummondii* CP 258

Darwinia purpurea KK 355

Eremaea pauciflora CP 264

Eucalyptus erythronema var. *marginata* CP 294, 333

<i>Eucalyptus pyriformis</i>	CP 243
<i>Eucalyptus</i> aff. <i>rigidula</i>	CP 224
<i>Eucalyptus celastroides</i> ssp. <i>virella</i>	CP 292
<i>Eucalyptus semivestita</i> (ms)	CP 249
<i>Leptospermum oligandrum</i>	KK 307
<i>Melaleuca acuminata</i> ssp. <i>websteri</i>	KK 352
<i>Melaleuca conothamnoides</i>	CP 215
<i>Melaleuca</i> aff. <i>cordata</i>	CP 181
<i>Melaleuca coronicarpa</i>	
ssp. <i>coronicarpa</i> (ms)	CP 228
<i>Melaleuca laxiflora</i>	KK 349, CP 256
<i>Melaleuca pentagona</i>	CP 192, KK 379
<i>Melaleuca radula</i>	CP 227
<i>Melaleuca scabra</i>	CP 272, 286, 314
<i>Melaleuca scabra</i> var. <i>tuberculata</i>	KK 378
<i>Melaleuca uncinata</i>	CP 213, KK 337
<i>Melaleuca</i> sp.	CP 285
<i>Micromyrtus racemosa</i>	KK 357, CP 332
<i>Scholtzia drummondii</i>	KK 308
<i>Thryptomene</i> ? <i>prolifera</i>	CP 287
<i>Verticordia acerosa</i> ssp. <i>preissii</i>	CP 191
<i>Verticordia eriocephala</i>	KK 339
<i>Verticordia pritzelii</i>	KK 303, 341, 348
<i>Verticordia</i> sp.	KK 345
<i>Verticordia</i> sp.	CP 357
HALORAGACEAE	
<i>Glischrocaryon aureum</i>	KK 311
EPACRIDACEAE	
<i>Astroloma serratifolium</i>	CP 184, 321
<i>Leucopogon tamminensis</i> var. <i>tamminensis</i>	CP 259
PRIMULACEAE	
* <i>Anagallis arvensis</i> var. <i>caerulea</i>	KK 334
LOGANIACEAE	
<i>Logania flaviflora</i>	CP 323, KK 347

GENTIANACEAE

- * *Centaurium* sp CP 289

CONVOLVULACEAE

- Wilsonia humilis* CP 336

LAMIACEAE

- Hemiandra coccinea* CP 263
Hemigenia westringioides KK 346, CP 339
Hemigenia sp. CP 296
Microcorys obovata CP 338
Microcorys sp. CP 282

SOLANACEAE

- * *Solanum hystrix* KK 371

PLANTAGINACEAE

- * *Plantago coronopus* ssp. *commutata* KK 382

RUBIACEAE

- Opercularia vaginata* CP 180

LOBELIACEAE

- Isotoma hypocrateriformis* CP 218, 230
Lobelia rarifolia CP 216

GOODENIACEAE

- Brunonia australis* CP 326
 ?*Dampiera helmsii* CP 279
Dampiera lavandulacea CP 271
Dampiera spicigera CP 262
Dampiera teres CP 322, KK 329
Dampiera wellsiana CP 248
Dampiera sp. CP 346
Goodenia caerulea CP 185, 241, KK 365
Lechenaultia biloba CP 261
Scaevola arenaria CP 212

Verreauxia reinwardtii

CP 281

STYLIDIACEAE

Levenhookia stipitata

CP 236

Stylidium bulbiferum

CP 217, 288, 307

Stylidium calcaratum

CP 361

Stylidium leptophyllum

CP 283

Stylidium macrocarpum

CP 274, 351

Stylidium sp.

CP 233

Stylidium sp.

CP 321

Stylidium sp.

CP 335

Stylidium sp.

CP 356

ASTERACEAE

Blennospora drummondii

CP 299

Brachycome bellidioides

CP 298

Erymophyllum ramosum

KK 387

Gnephosis tenuissima

CP 226

Hyalosperma cotula

CP 237

Pogonolepis stricta

CP 220

Waitzia acuminata

CP 195

Waitzia paniculata

CP 240

APPENDIX 5 - SPECIES LIST FOR VEGETATION ASSOCIATIONS
FOUND ON WATER RESERVE NO. 16416 AND REMNANT BUSHLAND ON RESERVE NO. 18672

***Ws Eucalyptus salmonophloia* (salmon gum) Woodland**

Acacia acuminata	Hyalosperma glutinosum
Acacia aestivalis	Maireana carnosae
Acacia erinacea	Melaleuca acuminata
Acacia ligustrina	Melaleuca adnata
Acacia orbifolia	Melaleuca coroncarpa
Arthropodium capillipes	Melaleuca uncinata
Borya sphaerocephala	Melaleuca undulata
Cephalopterum drummondii	Olearia ?revoluta
Crassula colorata	Opercularia vaginata
Dianella revoluta	Podolepis lessonii
Dodonaea inaequifolia	Rhagodia drummondii
* Ehrharta calycina	Rhagodia preissii
Enchylaena lanata	Santalum acuminatum
Eremophila lehmanniana	Scaevola spinescens
Erymophyllum tenellum	Stackhousia monogyna
Eucalyptus celastroides	Templetonia sulcata
Eucalyptus loxophleba	Trachymene cyanopetala
Eucalyptus salmonophloia	Trachymene ornata
Gastrolobium parviflorum	

* Introduced species

Wsg *Eucalyptus salmonophloia*/*Eucalyptus salubris* Woodland

<i>Acacia acuminata</i>	<i>Eucalyptus sheathiana</i>
<i>Acacia dura</i>	<i>Fumaria muralis</i>
<i>Acacia erinacea</i>	<i>Grevillea huegelii</i>
<i>Acacia jacksonii</i>	<i>Helichrysum lindleyi</i>
<i>Acacia ligustrina</i>	<i>Helipterum manglesii</i>
<i>Acacia orbifolia</i>	<i>Hyalosperma glutinosum</i>
<i>Amyema</i> sp.	<i>Melaleuca acuminata</i>
<i>Astroloma serratifolium</i>	<i>Melaleuca adnata</i>
* <i>Bromus diandrus</i>	<i>Melaleuca coroncarpa</i>
<i>Chamaescilla corymbosa</i>	<i>Melaleuca ctenoides</i>
<i>Chleilanthus austrotenuifolia</i>	<i>Melaleuca undulata</i>
<i>Chthonocephalus pseudevax</i>	<i>Olearia muelleri</i>
<i>Daucus glochidiatus</i>	<i>Podolepis lessonii</i>
<i>Dodonaea pinifolia</i>	<i>Podotheca gnaphalioides</i>
<i>Enchylaena lanata</i>	<i>Rhagodia drummondii</i>
<i>Eremophila decipiens</i>	<i>Rhagodia preissii</i>
<i>Eucalyptus arachnaea</i>	<i>Santalum acuminatum</i>
<i>Eucalyptus celastroides</i>	<i>Senecio glomeratus</i>
<i>Eucalyptus loxophleba</i>	<i>Stylidium periscelanthum</i>
<i>Eucalyptus myriadena</i>	<i>Templetonia sulcata</i>
<i>Eucalyptus pluricaulis</i>	<i>Thysanotus patersonii</i>
<i>Eucalyptus salmonophloia</i>	<i>Trachymene cyanopetala</i>
<i>Eucalyptus salubris</i>	<i>Trachymene ornata</i>
<i>Eucalyptus semivestita</i>	<i>Wilsonia humilis</i>

* Introduced species

Ww *Eucalyptus wandoo* Woodland

Acacia acuminata	Helipterum verecundum
Acacia fragilis	Hibbertia rupicola
* Aira cupaniana	Lepidosperma sp.
Allocasuarina campestris	Loxocarya aspera
* Anagallis arvensis	Melaleuca uncinata
Angianthus tomentosus	* Mesembryanthemum nodiflorum
Astroloma serratifolium	Muehlenbeckia adpressa
Baeckea ?crispiflora	* Parentucellia latifolia
Blennospora drummondii	* Petrorhagia velutina
Borya sphaerocephala	Podolepis canescens
Caladenia flava	Podolepis lessonii
Caladenia roei	Podotheca angustifolia
Calothamnus sp. 3459	Santalum acuminatum
Cyanicula gemmata	Scholtzia drummondii
Dianella revoluta	Trachymene cyanopetala
Diplolaena microcephala	* Ursinia anthemoides
Ecdeiocolea monostachya	Waitzia acuminata
Eucalyptus loxophleba	Waitzia citrina
Eucalyptus wandoo	

* Introduced species

W1 *Eucalyptus loxophleba* (York gum) Woodland

<i>Acacia acuminata</i>	<i>Gnephosis tenuissima</i>
<i>Acacia ?chrysella</i>	<i>Grevillea petrophiloides</i>
<i>Acacia jacksonioides</i>	<i>Helichrysum lindleyi</i>
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i>	<i>Helipterum manglesii</i>
<i>Acacia leptospermoides</i>	<i>Helipterum splendidum</i>
<i>Acacia ligustrina</i>	<i>Helipterum verecundum</i>
<i>Acacia orbifolia</i>	<i>Hyalosperma glutinosum</i>
<i>Allocasuarina campestris</i>	<i>Lepidosperma ?letophyllum</i>
<i>Astroloma serratifolium</i>	<i>Melaleuca adnata</i>
* <i>Avena sativa</i>	<i>Melaleuca lateriflora</i>
<i>Borya sphaerocephala</i>	<i>Melaleuca radula</i>
* <i>Briza maxima</i>	<i>Melaleuca uncinata</i>
<i>Caladenia roei</i>	<i>Melaleuca undulata</i>
<i>Chamaescilla corymbosa</i>	<i>Mitrasacme paradoxa</i>
<i>Comesperma integerrimum</i>	<i>Podolepis lessonii</i>
<i>Crassula colorata</i>	<i>Ptilotus spathulatus</i>
<i>Dampiera lavandulacea</i>	<i>Rhagodia drummondii</i>
<i>Dianella revoluta</i>	<i>Rhagodia preissii</i>
<i>Dodonaea pinifolia</i>	* <i>Romulea rosea</i>
<i>Dodonaea viscosa</i>	<i>Spartochloa scirpoidea</i>
<i>Enchylaena lanata</i>	<i>Templetonia sulcata</i>
<i>Erodium cygnorum</i>	<i>Thysanotus dichotomus</i>
<i>Erymophyllum tenellum</i>	<i>Trachymene cyanopetala</i>
<i>Eucalyptus arachnaea</i>	<i>Trachymene ornata</i>
<i>Eucalyptus erythronema</i>	<i>Waitzia acuminata</i>
<i>Eucalyptus loxophleba</i>	<i>Waitzia aurea</i>
<i>Eucalyptus salmonophloia</i>	

* Introduced species

W1a *Eucalyptus loxophleba* Woodland over *Acacia acuminata*

<i>Acacia acuminata</i>	<i>Hakea preissii</i>
<i>Acacia erinacea</i>	<i>Helichrysum lindleyi</i>
<i>Acacia ?multispicata</i>	<i>Helipterum manglesii</i>
* <i>Aira cupaniana</i>	<i>Hibbertia rupicola</i>
<i>Allocasuarina campestris</i>	<i>Lepidosperma ?letophyllum</i>
<i>Allocasuarina huegeliana</i>	<i>Loxocarya aspera</i>
* <i>Anagallis arvensis</i>	<i>Melaleuca ?radula</i>
* <i>Arctotheca calendula</i>	<i>Neurachne alopecuroidea</i>
<i>Arthropodium capillipes</i>	<i>Opercularia vaginata</i>
<i>Astroloma serratifolium</i>	* <i>Oxalis</i> sp.
* <i>Avena</i> sp.	<i>Podolepis canescens</i>
<i>Borya sphaerocephala</i>	<i>Podolepis capillaris</i>
* <i>Briza maxima</i>	<i>Podolepis lessonii</i>
* <i>Bromus diandrus</i>	<i>Ptilotus spathulatus</i>
<i>Chamaescilla corymbosa</i>	<i>Ptilotus stirlingii</i>
<i>Chleianthes austrotenuifolia</i>	<i>Rhagodia drummondii</i>
<i>Conostylis prolifera</i>	<i>Rhagodia preissii</i>
<i>Cyanicula gemmata</i>	<i>Santalum acuminatum</i>
<i>Dampiera oligophylla</i>	<i>Scaevola tortuosa</i>
<i>Daucus glochidiatus</i>	<i>Stackhousia monogyna</i>
<i>Dianella revoluta</i>	<i>Thelymitra antennifera</i>
<i>Drosera ?glanduligera</i>	<i>Trachymene cyanopetala</i>
<i>Erodium cygnorum</i>	<i>Trachymene ornata</i>
<i>Erymophyllum tenellum</i>	<i>Tribonanthes longipetala</i>
<i>Eucalyptus loxophleba</i>	* <i>Ursinia anthemoides</i>
<i>Eucalyptus salmonophloia</i>	<i>Waitzia acuminata</i>
<i>Glischrocaryon aureum</i>	<i>Waitzia aurea</i>
<i>Grevillea paniculata</i>	

* Introduced species

Wa *Acacia acuminata* Woodland

<i>Acacia acuminata</i>	<i>Hakea lissocarpa</i>
<i>Acacia restiacea</i>	<i>Helichrysum lindleyi</i>
<i>Acacia saligna</i>	<i>Hibbertia rupicola</i>
* <i>Arctotheca calendula</i>	<i>Hypocalymma angustifolium</i>
* <i>Aira cupaniana</i>	<i>Lepidosperma</i> sp.
<i>Allocasuarina campestris</i>	<i>Loxocarya aspera</i>
<i>Astroloma serratifolium</i>	<i>Melaleuca radula</i>
* <i>Avena species</i>	<i>Mirbelia ramulosa</i>
<i>Borya sphaerocephala</i>	<i>Podolepis canescens</i>
* <i>Briza maxima</i>	<i>Podolepis lessonii</i>
<i>Burchardia umbellata</i>	<i>Santalum spicatum</i>
<i>Calytrix depressa</i>	<i>Solanum oldfieldii</i>
<i>Chamaescilla spiralis</i>	<i>Stylidium calcaratum</i>
<i>Chleianthes austrotenuifolia</i>	<i>Stypandra glauca</i>
<i>Chorizema genistoides</i>	<i>Trachymene cyanopetala</i>
<i>Cyanicula gemmata</i>	<i>Trachymene ornata</i>
<i>Dianella revoluta</i>	<i>Tribonanthes longipetala</i>
<i>Drosera macrantha</i>	* <i>Ursinia anthemoides</i>
<i>Drosera subhirtella</i>	<i>Verticordia chrysanthella</i>
<i>Erymophyllum tenellum</i>	<i>Waitzia acuminata</i>
<i>Glischrocaryon ?aureum</i>	<i>Waitzia aurea</i>
<i>Grevillea paniculata</i>	

Mm Mallee over *Melaleuca uncinata*

<i>Acacia bidentata</i>	<i>Hakea meisneriana</i>
<i>Acacia ericksonii</i>	<i>Helichrysum lindleyi</i>
<i>Acacia jacksonioides</i>	<i>Helipterum manglesii</i>
<i>Acacia leptospermoides</i>	<i>Hibbertia rostellata</i>
<i>Acacia orbifolia</i>	<i>Hypocalymma angustifolium</i>
<i>Allocasuarina campestris</i>	<i>Lepidosperma ?letophyllum</i>
<i>Astroloma serratifolium</i>	<i>Leptospermum erubescens</i>
<i>Billardiera erubescens</i>	<i>Leucopogon gracillimus</i>
<i>Bossiaea eriocarpa</i>	<i>Lysiosepalum rugosum</i>
<i>Callitris canescens</i>	<i>Melaleuca acuminata</i>
<i>Cassytha melantha</i>	<i>Melaleuca adnata</i>
<i>Cryptandra leucophracta</i>	<i>Melaleuca coronicarpa</i>
<i>Cyanicula gemmata</i>	<i>Melaleuca ctenoides</i>
<i>Daviesia</i> sp. 2956	<i>Melaleuca laxiflora</i>
<i>Diuris</i> aff. <i>corymbosa</i>	<i>Melaleuca scabra</i>
<i>Dodonaea bursariifolia</i>	<i>Melaleuca spicigera</i>
<i>Dodonaea pinifolia</i>	<i>Melaleuca uncinata</i>
<i>Dodonaea viscosa</i>	<i>Microcorys obovata</i>
<i>Drosera macrophylla</i>	<i>Olax benthamiana</i>
<i>Drosera macrantha</i>	<i>Persoonia scabrella</i>
<i>Eucalyptus arachnaea</i>	<i>Phebalium ambiguum</i>
<i>Eucalyptus erythronema</i>	<i>Phebalium filifolium</i>
<i>Eucalyptus flocktoniae</i>	<i>Phebalium tuberculatum</i>
<i>Eucalyptus hypoclamydea</i>	<i>Pimelea leucantha</i>
<i>Eucalyptus pluricaulis</i> ssp. <i>pluricaulis</i>	<i>Podolepis capillaris</i>
<i>Eucalyptus rigidula</i>	<i>Podolepis lessonii</i>
<i>Eucalyptus semivestita</i>	<i>Santalum acuminatum</i>
<i>Eucalyptus sheathiana</i>	<i>Stylidium crassifolium</i>
<i>Eucalyptus subangusta</i>	<i>Stylidium leptophyllum</i>
<i>Gastrolobium parviflorum</i>	<i>Thryptomene racemulosa</i>
<i>Grevillea hakeoides</i> ssp. <i>stenophylla</i>	<i>Trachymene cyanopetala</i>
<i>Grevillea paniculata</i>	<i>Waitzia acuminata</i>
<i>Hakea ?coriacea</i>	

* Introduced species

Mc Mallee over *Melaleuca coronicarpa*

Acacia ?bidentata	Eucalyptus erythronema
Acacia ?fragilis	Eucalyptus pluricaulis ssp. pluricaulis
Acacia orbifolia	Eucalyptus semivestita
Acacia sulcata var. platyphylla	Eucalyptus ?subangusta
Allocasuarina acutivalvis	Gastrolobium parviflorum
Astroloma serratifolium	Gastrolobium spinosum
Baeckea ?preissiana	Hibbertia rostellata
Callitris canescens	Hypocalymma angustifolium
Comesperma volubile	Melaleuca adnata
Diuris aff. corymbosa	Melaleuca coronicarpa
Dodonaea bursariifolia	Melaleuca ctenoides
Dodonaea aff. microzyga	Melaleuca pentagona
Dodonaea pinifolia	Melaleuca sclerophylla
Dodonaea viscosa	Melaleuca uncinata
Drosera macrophylla	Melaleuca undulata
Drosera subhirtella	Phebalium filifolium
Eucalyptus celastroides	Phebalium tuberculatum
Eucalyptus eremophila	

Me Mallee over *Melaleuca*

Acacia sulcata var. platyphylla	Eucalyptus sheathiana
Allocasuarina acutivalvis	Eucalyptus subangusta
Astroloma serratifolium	Gastrolobium parviflorum
Callitris canescens	Melaleuca acuminata
Dodonaea bursariifolia	Melaleuca adnata
Dodonaea pinifolia	Melaleuca coronicarpa
Eucalyptus arachnaea	Melaleuca uncinata
Eucalyptus pluricaulis	Melaleuca undulata
Eucalyptus semivestita	

Kdt *Dryandra/Petrophile shuttleworthiana* Thicket

Acacia drewiana ssp. minor	Grevillea eryngioides
Acacia jacksonioides	Grevillea petrophiloides
Acacia restiacea	Hakea ?circumalata
Acacia semicircinalis	Hakea gilbertii
Actinostrobilus arenarius	Hakea meisneriana
Allocasuarina acutivalvis	Hakea scoparia
Allocasuarina campestris	Hemigenia viscida
Allocasuarina drummondiana	Hibbertia acerosa
Astroloma serratifolium	Hibbertia exasperata
Beaufortia bracteosa	Hibbertia huegelii
Beaufortia interstans	Isopogon divergens
Caladenia flava	Isopogon scabriusculus
Calytrix leschenaultii	Loxocarya aspera
Chamelaucium drummondii	Lysinema ciliatum
Chorizema aciculare	Melaleuca aff. cordata
Comesperma drummondii	Melaleuca conothamnoides
Conostylis androstemma	Melaleuca holosericea
Cryptandra leucophracta	Melaleuca platycalyx
Cyanostegia angustifolia	Melaleuca pungens
Dampiera lindleyi	Melaleuca scabra
Dampiera oligophylla	Melaleuca sclerophylla
Daviesia aff. daphnoides	Melaleuca uncinata
Daviesia nudiflora	Microcorys obovata
Drosera macrophylla	Mirbelia dilatata
Dryandra comosa	Nemcia obovata
Dryandra purdieana	Opercularia vaginata
Eucalyptus ?hypoclamydea	Persoonia quinquenervis
Eucalyptus pyriformis	Petrophile media
Eucalyptus semivestita	Petrophile shuttleworthiana
Eucalyptus subangusta	Phebalium filifolium
Exocarpos sparteus	Platysace ?maxwellii
Gastrolobium calycinum	Santalum acuminatum
Gastrolobium glaucum	Scholtzia drummondii
Gastrolobium spinosum	Stylidium coroniforme
Glischrocaryon aureum	Stylidium repens
Goodenia pinifolia	Synaphea sp.
Grevillea armigera	Verticordia chrysantha

Kdh *Dryandra* Low Heath

Acacia jacksonioides	Hakea ?circumalata
Acacia leptospermoides	Hakea cygna
Acacia semicircularis	Hakea gilbertii
Actinostrobus arenarius	Hakea platysperma
Allocasuarina acutivalvis	Hakea scoparia
Allocasuarina campestris	Hibbertia exasperata
Baeckea ?preissiana	Hibbertia huegelii
Baeckea sp. 9	Isopogon scabriusculus
Beaufortia interstans	Lasiopetalum molle
Calytrix leschenaultii	Lysinema ciliatum
Chamelaucium drummondii	Melaleuca aff. cordata
Conostylis androstemma	Melaleuca conothamnoides
Cryptandra leucophracta	Melaleuca holosericea
Dampiera oligophylla	Melaleuca pungens
Daviesia aff. daphnoides	Melaleuca scabra
Drosera macrophylla	Olex benthamiana
Drosera subhirtella	Petrophile media
Dryandra purdieana	Petrophile shuttleworthiana
Eucalyptus flocktoniae	Santalum acuminatum
Eucalyptus pyriformis	Scholtzia drummondii
Eucalyptus ?rigidula	Stylidium ?nungarinense
Exocarpos sparteus	Stylidium repens
Glischrocaryon aureum	Synaphea species
Grevillea armigera	Thryptomene racemulosa
Grevillea integrifolia ssp. shuttleworthiana	Verticordia chrysantha
Grevillea petrophiloides	Verticordia eriocephala
Guichenotia micrantha	Verticordia picta

Kh Scrub Heath

<i>Acacia drewiana</i> ssp. <i>minor</i>	<i>Grevillea</i> ? <i>tridentifera</i>
<i>Acacia multispicata</i>	<i>Grevillea uncinulata</i>
<i>Acacia nigripilosa</i> ssp. <i>nigripilosa</i>	<i>Hakea cygna</i> ssp. <i>cygna</i>
<i>Acacia phaeocalyx</i>	<i>Hakea erecta</i>
<i>Acacia semicircinalis</i>	<i>Hakea gilbertii</i>
<i>Actinostrobos arenarius</i>	<i>Hakea incrassata</i>
<i>Allocasuarina campestris</i>	<i>Hakea lissocarpa</i>
<i>Allocasuarina humilis</i>	<i>Hakea trifurcata</i>
<i>Anigozanthos humilis</i>	<i>Hibbertia exasperata</i>
<i>Baeckea</i> ? <i>preissiana</i>	<i>Hibbertia huegelii</i>
<i>Beaufortia elegans</i>	<i>Hibbertia hypericoides</i>
<i>Beaufortia interstans</i>	<i>Isopogon divergens</i>
<i>Boronia coerulescens</i>	<i>Isopogon dubius</i>
<i>Bossiaea eriocarpa</i>	<i>Isopogon scabriusculus</i>
<i>Calothamnus quadrifidus</i>	<i>Jacksonia fasciculata</i>
<i>Calothamnus sanguineus</i>	<i>Leptospermum erubescens</i>
<i>Calytrix violacea</i>	<i>Leucopogon conostephioides</i>
<i>Cassytha</i> ? <i>pubescens</i>	<i>Loxocarya myrioclada</i>
<i>Chamelaucium drummondii</i>	<i>Loxocarya parthenica</i>
<i>Chorizema aciculare</i>	<i>Lysinema ciliatum</i>
<i>Comesperma drummondii</i>	<i>Melaleuca</i> aff. <i>cordata</i>
<i>Conospermum stoechadis</i>	<i>Melaleuca conothamnoides</i>
<i>Conostylis setigera</i>	<i>Melaleuca pungens</i>
<i>Crassula colorata</i>	<i>Melaleuca scabra</i>
<i>Cryptandra pungens</i>	<i>Mirbelia floribunda</i>
<i>Dampiera oligophylla</i> ssp. <i>junceae</i>	<i>Olax benthamiana</i>
<i>Daviesia</i> aff. <i>daphnoides</i>	<i>Persoonia</i> ? <i>coriacea</i>
<i>Daviesia hakeoides</i>	<i>Petrophile ericifolia</i>
<i>Daviesia nudiflora</i>	<i>Petrophile media</i>
<i>Drosera macrophylla</i>	<i>Petrophile shuttleworthiana</i>
<i>Dryandra purdieana</i>	<i>Santalum acuminatum</i>
<i>Eremaea pauciflora</i>	<i>Stylidium repens</i>
<i>Eucalyptus eudesmioides</i>	<i>Synaphea constricta</i>
<i>Eucalyptus pyriformis</i>	<i>Thysanotus patersonii</i>
<i>Eucalyptus rigidula</i>	* <i>Ursinia anthemoides</i>
<i>Exocarpos sparteus</i>	<i>Verticordia chrysantha</i>
<i>Gompholobium obcordatum</i>	<i>Verticordia eriocephala</i>
<i>Grevillea armigera</i>	<i>Verticordia picta</i>

Kt *Allocasuarina campestris* Thicket

<i>Acacia ericksonii</i>	<i>Drosera glanduligera</i>
<i>Acacia fragilis</i>	<i>Drosera macrophylla</i>
<i>Acacia lasiocalyx</i>	<i>Drosera pilos</i>
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i>	<i>Drosera subhirtella</i>
<i>Acacia restiacea</i>	<i>Ecdeiocolea monostachya</i>
<i>Acacia sulcata</i> var. <i>platyphylla</i>	<i>Elythranthera brunonis</i>
<i>Allocasuarina campestris</i>	<i>Eremophila lehmanniana</i>
<i>Allocasuarina microstachya</i>	<i>Eucalyptus ?hypoclamydea</i>
<i>Angianthus tomentosus</i>	<i>Eucalyptus loxophleba</i>
<i>Arthropodium capillipes</i>	<i>Eucalyptus pyriformis</i>
<i>Astroloma serratifolium</i>	<i>Gompholobium obcordatum</i>
<i>Baeckea ?crispiflora</i>	<i>Grevillea acerosa</i>
<i>Baeckea ?preissiana</i>	<i>Grevillea integrifolia</i> ssp. <i>shuttleworthiana</i>
<i>Borya sphaerocephala</i>	<i>Grevillea tridentifera</i>
<i>Bossiaea eriocarpa</i>	<i>Haemodorum</i> sp.
<i>Burchardia umbellata</i>	<i>Hakea incrassata</i>
<i>Caladenia flava</i>	<i>Hakea meisneriana</i>
<i>Callitris canescens</i>	<i>Hakea scoparia</i>
<i>Calothamnus quadrifidus</i>	<i>Halgania</i> sp.
<i>Calytrix depressa</i>	<i>Helichrysum lindleyi</i>
<i>Calytrix leschenaultii</i>	<i>Helipterum manglesii</i>
<i>Chamaescilla corymbosa</i>	<i>Helipterum splendidum</i>
<i>Chamaescilla spiralis</i>	<i>Hemigenia sericea</i>
<i>Chleianthus austrotenuifolia</i>	<i>Hibbertia exasperata</i>
<i>Comesperma volubile</i>	<i>Hibbertia glomerosa</i>
<i>Conostylis androstemma</i>	<i>Hibbertia huegelii</i>
<i>Conostylis prolifera</i>	<i>Hibbertia rostellata</i>
<i>Cryptandra leucophracta</i>	<i>Hyalosperma cotula</i>
<i>Cyanicula gemmata</i>	<i>Hypocalymma angustifolium</i>
<i>Dampiera lavandulacea</i>	<i>Isotoma hypocrateriformis</i>
<i>Dampiera oligophylla</i> ssp. <i>junceae</i>	<i>Lepidosperma ?letophyllum</i>
<i>Darwinia purpurea</i>	<i>Leptospermum erubescens</i>
<i>Daviesia hakeoides</i>	<i>Leucopogon gracillimus</i>
<i>Dianella revoluta</i>	<i>Leucopogon ?planifolius</i>
<i>Diuris</i> aff. <i>corymbosa</i>	<i>Loxocarya aspera</i>
<i>Dodonaea divaricata</i>	<i>Lysinema ciliatum</i>

Melaleuca adnata
 Melaleuca conothamnoides
 Melaleuca platycalyx
 Melaleuca radula
 Melaleuca scabra
 Melaleuca uncinata
 Mesomelaena preissii
 Microcorys obovata
 Mirbelia spinosa
 Opercularia vaginata
 Petrophile media
 Petrophile seminuda
 Phebalium tuberculatum
 Podolepis canescens
 Podolepis lessonii
 Psammomoya choretroides

Santalum acuminatum
 Scholtzia drummondii
 Spartochloa scirpoidea
 Stylidium breviscapum
 Stylidium calcaratum
 Stylidium neglectum
 Thelymitra antennifer
 Thysanotus ?patersonii
 Trachymene ornata
 * Ursinia anthemoides
 Verticordia acerosa ssp. preissii
 Verticordia brachypoda
 Verticordia chrysantha
 Verticordia picta
 Waitzia acuminata
 Waitzia aurea

Ka *Allocasuarina campestris*/Calothamnus aspera Thicket

Acacia lasiocalyx
 Acacia ulicina
 Allocasuarina campestris
 Astroloma serratifolium
 Calothamnus aspera
 Chamaescilla corymbosa
 Chleianthes austrotenuifolia

Diuris sp.
 Dodonaea ?divaricata
 Drosera macrophylla
 Hakea scoparia
 Melaleuca radula
 Spartochloa scirpoidea

Kg *Allocasuarina campestris*/Hakea meisneriana Thicket

Acacia sulcata var. platyphylla
 Allocasuarina campestris
 Beaufortia bracteosa
 Conostylis androstemma
 Cryptandra leucophracta
 Darwinia purpurea
 Dryandra purdieana
 Ecdeiocolea monostachya
 Gastrolobium calycinus
 Haemodorum sp.
 Hakea circumalata

Hakea incrassata
 Hakea meisneriana
 Hakea scoparia
 Hemigenia westringioides
 Hibbertia exasperata
 Melaleuca conothamnoides
 Melaleuca aff. cordata
 Melaleuca scabra
 Petrophile media
 Petrophile seminuda
 Petrophile shuttleworthiana

Ky2 *Allocasuarina campestris*/*Hakea erecta* Heath

(unburnt)

Acacia filifolia	Hibbertia exasperata
Actinostrobos arenarius	Isopogon scabriusculus
Allocasuarina campestris	Jacksonia macrocalyx
Astroloma serratifolium	Lechenaultia biloba
Baeckea ?preissiana	Melaleuca conothamnoides
Boronia coerulescens	Melaleuca aff. cordata
Comesperma scoparium	Melaleuca platycalyx
Conospermum brownii	Mesomelaena preissii
Conospermum stoechadis	Mirbelia spinosa
Conostylis wonganensis	Opercularia vaginata
Cryptandra glabriflora	Patersonia sp.
Dampiera oligophylla	Petrophile ericifolia
Darwinia purpurea	Psammomoya choretroides
Daviesia nudiflora	Santalum acuminatum
Drosera ?spilos	Stylidium repens
Dryandra purdieana	Thysanotus patersonii
Elythranthera brunonis	Trachymene cyanopetala
Grevillea didymobotrya	Trachymene ornata
Grevillea eriostachya	Verticordia chrysantha
Hakea circumalata	Verticordia eriocephala
Hakea erecta	Verticordia picta
Hakea platysperma	

Kyl *Allocasuarina campestris*/*Hakea erecta* Heath

(burnt)

<i>Acacia acuminata</i>	<i>Dryandra purdieana</i>
<i>Acacia filifolia</i>	<i>Ecdeiocolea monostachya</i>
<i>Acacia latipes</i>	<i>Elythranthera brunonis</i>
<i>Acacia leptospermoides</i>	<i>Glischrocaryon aureum</i>
<i>Acacia multispicata</i>	<i>Grevillea armigera</i>
<i>Acacia restiacea</i>	<i>Grevillea didymobotrya</i>
<i>Actinostrobus arenarius</i>	<i>Grevillea eryngioides</i>
<i>Allocasuarina campestris</i>	<i>Grevillea ?teretifolia</i>
<i>Allocasuarina microstachya</i>	<i>Grevillea uncinulata</i>
<i>Andersonia lehmanniana</i>	<i>Hakea circumalata</i>
<i>Baeckea ?crispiflora</i>	<i>Hakea cygna</i>
<i>Baeckea aff. preissiana</i>	<i>Hakea erecta</i>
<i>Beaufortia bracteosa</i>	<i>Hakea incrassata</i>
<i>Beaufortia interstans</i>	<i>Hakea platysperma</i>
<i>Boronia coerulescens</i>	<i>Hakea scoparia</i>
<i>Borya sphaerocephala</i>	<i>Hibbertia drummondii</i>
<i>Burchardia umbellata</i>	<i>Isopogon scabriusculus</i>
<i>Calothamnus quadrifidus</i>	<i>Jacksonia fasciculata</i>
<i>Calytrix gracilis</i>	<i>Laxmannia grandiflora</i>
<i>Calytrix leschenaultii</i>	<i>Lepidosperma sp.</i>
<i>Chamelaucium drummondii</i>	<i>Leucopogon hamulosum</i>
<i>Chorizema aciculare</i>	<i>Leucopogon ?planifolius</i>
<i>Conospermum stoechadis</i>	<i>Melaleuca conothamnoides</i>
<i>Conostylis setigera</i>	<i>Melaleuca aff. cordata</i>
<i>Conostylis wonganensis</i>	<i>Melaleuca platycalyx</i>
<i>Cryptandra glabriflora</i>	<i>Mesomelaena preissii</i>
<i>Cryptandra spinescens</i>	<i>Mirbelia spinosa</i>
<i>Dampiera lavandulacea</i>	<i>Opercularia vaginata</i>
<i>Dampiera oligophylla</i>	<i>Persoonia ?striata</i>
<i>Darwinia purpurea</i>	<i>Petrophile ericifolia</i>
<i>Daviesia nudiflora</i>	<i>Petrophile media</i>
<i>Dianella revoluta</i>	<i>Petrophile seminuda</i>
<i>Drosera pilos</i>	<i>Petrophile shuttleworthiana</i>
<i>Drosera subhirtella</i>	<i>Pimelea brevifolia</i>
<i>Dryandra fraseri</i>	<i>Psammomoya choretroides</i>

Scholtzia drummondii
 Stylidium repens
 Stypandra glauca
 Synaphea sp.
 Thysanotus patersonii

Trachymene cyanopetala
 Trachymene ornata
 Verticordia chrysantha
 Verticordia eriocephala
 Verticordia picta

Kv *Allocasuarina acutivalvis* Thicket

Allocasuarina acutivalvis
 Allocasuarina campestris
 Astroloma serratifolium
 Cryptandra leucophracta
 Cyanicula gemmata
 Dianella revoluta
 Dodonaea ?divaricata
 Drosera pilos
 Drosera subhirtella
 Elythranthera brunonis
 Grevillea didymobotrya
 Grevillea petrophiloides
 Hakea incrassata
 Hakea scoparia

Hibbertia exasperata
 Hibbertia rostellata
 Hypocalymma angustifolium
 Isopogon scabriusculus
 Leucopogon sp.
 Melaleuca conothamnoides
 Melaleuca coronicarpa
 Melaleuca uncinata
 Psammomoya choretroides
 Thryptomene racemulosa
 Verticordia chrysantha
 Waitzia acuminata
 Waitzia paniculata

Km *Melaleuca uncinata* Thicket

<i>Acacia ericksonii</i>	<i>Isotoma hypocrateriformis</i>
<i>Acacia</i> sp. 3458	<i>Lepidosperma</i> sp.
<i>Allocasuarina acutivalvis</i>	<i>Leptospermum erubescens</i>
<i>Allocasuarina campestris</i>	* <i>Lolium rigidum</i>
* <i>Avena</i> sp	<i>Loxocarya aspera</i>
<i>Baeckea</i> ?preissiana	<i>Melaleuca acuminata</i>
<i>Borya sphaerocephala</i>	<i>Melaleuca adnata</i>
* <i>Briza maxima</i>	<i>Melaleuca coronicarpa</i>
* <i>Bromus diandrus</i>	<i>Melaleuca ctenoides</i>
<i>Callitris canescens</i>	<i>Melaleuca hamulosa</i>
<i>Calytrix depressa</i>	<i>Melaleuca lateriflora</i>
<i>Comesperma volubile</i>	<i>Melaleuca laxiflora</i>
<i>Cotula coronopifolia</i>	<i>Melaleuca platycalyx</i>
<i>Dampiera lavandulacea</i>	<i>Melaleuca scabra</i>
<i>Dodonaea</i> ?divaricata	<i>Melaleuca spicigera</i>
<i>Dodonaea viscosa</i>	<i>Melaleuca uncinata</i>
<i>Ecdeiocolea monostachya</i>	<i>Melaleuca undulata</i> ssp. <i>undulata</i>
<i>Enchylaena lanata</i>	* <i>Mesembryanthemum nodiflorum</i>
<i>Eucalyptus</i> ?eremophila	<i>Petrophile shuttleworthiana</i>
<i>Gastrolobium parviflorum</i>	<i>Podolepis lessonii</i>
<i>Glischrocaryon</i> ?aureum	<i>Rhagodia drummondii</i>
<i>Hakea coriacea</i>	<i>Santalum acuminatum</i>
<i>Hakea scoparia</i>	<i>Spartochloa scirpoidea</i>
<i>Halosarcia</i> ?lepidosperma	<i>Stylidium</i> ?repens
<i>Halosarcia</i> ?pergranulata	<i>Stypandra glauca</i>
<i>Helichrysum lindleyi</i>	* <i>Ursinia anthemoides</i>
<i>Hibbertia rostellata</i>	<i>Waitzia acuminata</i>
<i>Hypocalymma angustifolium</i>	

Kc *Melaleuca scabra* Heath

<i>Acacia fragilis</i>	<i>Hemigenia westringioides</i>
<i>Acacia leptospermoides</i>	<i>Hibbertia exasperata</i>
<i>Acacia semicircinalis</i>	<i>Hypocalymma angustifolium</i>
<i>Acacia sulcata</i> var. <i>platyphylla</i>	<i>Isopogon scabriusculus</i>
<i>Actinostrobos arenarius</i>	<i>Kunzea limnicola</i>
<i>Allocasuarina acutivalvis</i>	<i>Lepidosperma ?letophyllum</i>
<i>Allocasuarina campestris</i>	<i>Melaleuca conothamnoides</i>
<i>Baeckea ?preissiana</i>	<i>Melaleuca coronicarpa</i>
<i>Beaufortia bracteosa</i>	<i>Melaleuca holosericea</i>
<i>Beaufortia interstans</i>	<i>Melaleuca platycalyx</i>
<i>Caladenia flava</i>	<i>Melaleuca scabra</i>
<i>Callitris canescens</i>	<i>Melaleuca sclerophylla</i>
<i>Comesperma volubile</i>	<i>Melaleuca uncinata</i>
<i>Conostylis androstemma</i>	<i>Micromyrtus racemosa</i>
<i>Cryptandra glabriflora</i>	<i>Persoonia striata</i>
<i>Cryptandra leucophracta</i>	<i>Petrophile media</i>
<i>Dampiera oligophylla</i>	<i>Petrophile seminuda</i>
<i>Dodonaea ?divaricata</i>	<i>Petrophile shuttleworthiana</i>
<i>Drosera glanduligera</i>	<i>Phebalium tuberculosum</i>
<i>Drosera macrophylla</i>	<i>Pimelea sulphurea</i>
<i>Drosera subhirtella</i>	<i>Platysace ?maxwellii</i>
<i>Dryandra purdieana</i>	<i>Psammomoya choretroides</i>
<i>Eucalyptus hypoclamydea</i>	<i>Santalum acuminatum</i>
<i>Eucalyptus pyriformis</i>	<i>Scholtzia drummondii</i>
<i>Exocarpos sparteus</i>	<i>Stylidium breviscapum</i>
<i>Gastrolobium calycinum</i>	<i>Stylidium nungarinense</i>
<i>Goodenia pinifolia</i>	<i>Stylidium petiolare</i>
<i>Grevillea paniculata</i>	<i>Thomasia molle</i>
<i>Hakea coriacea</i>	<i>Thryptomene racemulosa</i>
<i>Hakea gilbertii</i>	<i>Thysanotus patersonii</i>
<i>Hakea meisneriana</i>	<i>Verticordia chrysantha</i>
<i>Hakea scoparia</i>	

KI *Melaleuca sclerophylla* Heath

Acacia lasiocarpa var. bracteolata

Acacia pulchella ssp. goadbyi

Andersonia sp.

Beaufortia bracteosa

Calytrix sp.

Chamaescilla corymbosa

Comesperma volubile

Dampiera lindleyi

Dodonaea ?pinifolia

Drosera glanduligera

Dryandra purdieana

Elythranthera brunonis

Gastrolobium calycinus

Glischrocaryon ?aureum

Grevillea tridentifera

Hakea erinacea

Hakea marginata

Hakea scoparia

Hibbertia exasperata

Isopogon scabriusculus

Kunzea limnicola

Lysinema ciliatum

Melaleuca coronicarpa

Melaleuca scabra

Melaleuca sclerophylla

Melaleuca uncinata

Nemcia obovata

Petrophile media

Petrophile seminuda

Santalum acuminatum

Stylidium nungarinense

Stylidium ?repens

Verticordia chrysantha

Verticordia ?picta

Ke *Eremaea* Heath

Acacia acuaria	Glischrocaryon ?aureum
Acacia phaeocalyx	Grevillea armigera
Acacia restiacea	Grevillea eriostachya
Actinostrobilus arenarius	Grevillea ?integrifolia ssp. biformis
Adenanthos drummondii	Grevillea tridentifera
Allocasuarina campestris	Grevillea uncinulata
Allocasuarina humilis	Hakea erecta
Allocasuarina microstachya	Hakea incrassata
Anigozanthos humilis	Hakea lissocarpa
Baeckea ?crispiflora	Hakea trifurcata
Beaufortia elegans	Halgania sp.
Borya sphaerocephala	Hibbertia acerosa
* Briza maxima	Isopogon divergens
Brunonia australis	Jacksonia fasciculata
Burchardia umbellata	Jacksonia macrocalyx
Caladenia flava	Lechenaultia biloba
Calothamnus quadrifidus	Leptospermum erubescens
Calothamnus sanguineus	Leucopogon conostephioides
Calytrix violacea	Loxocarya myrioclada
Chamaescilla spiralis	Loxocarya parthenica
Chorizema aciculare	Lysinema ciliatum
Comesperma scoparium	Melaleuca aff. cordata
Conospermum stoechadis	Melaleuca scabra
Conostylis setigera	Opercularia vaginata
Conostylis villosa	Petrophile ericifolia
Dampiera lavandulacea	Petrophile media
Dampiera oligophylla	Petrophile seminuda
Dampiera spicigera	Petrophile shuttleworthiana
Daviesia nudiflora	Petrophile striata
Dicrastylis velutina	Pileanthus peduncularis
Drosera subhirtella	Platysace ?maxwellii
Dryandra fraseri	Podolepis canescens
Ecdeiocolea monostachya	Santalum spicatum
Elythranthera brunonis	Scholtzia drummondii
Eremaea pauciflora	Stylidium repens
Eucalyptus pyriformis	Synaphea sp.

Thysanotus ?patersonii
 Trachymene ornata
 * Ursinia anthemoides
 Verticordia chrysantha

Verticordia densiflora
 Verticordia eriocephala
 Verticordia wonganensis
 Waitzia aurea

Kb *Beaufortia* Heath

Acacia ?filifolia
 Acacia ?fragilis
 Actinostrobilus arenarius
 Allocasuarina campestris
 Baeckea ?preissiana
 Baeckea sp. "9"
 Beaufortia interstans
 Beaufortia squarrosa
 Calytrix sapphirina
 Conospermum stoechadis
 Conostylis androstemma
 Dryandra purdieana
 Eucalyptus pyriformis
 Glischrocaryon ?aureum
 Grevillea armigera
 Grevillea didymobotrya
 Grevillea eriostachya
 Grevillea eryngioides

Grevillea integrifolia ssp. shuttleworthiana
 Grevillea paniculata
 Hakea cygna
 Hakea erecta
 Hibbertia huegelii
 Isopogon scabriusculus
 Jacksonia sp.
 Melaleuca conothamnoides
 Melaleuca aff. cordata
 Petrophile ericifolia
 Petrophile media
 Petrophile seminuda
 Platysace ?maxwellii
 Verticordia chrysantha
 Verticordia eriocephala
 Verticordia monadelpha
 Verticordia venusta

Ks Sedges/Heath

<i>Acacia filifolia</i>	<i>Drosera macrantha</i>
<i>Acacia jacksonioides</i>	<i>Drosera spilos</i>
<i>Acacia ligustrina</i>	<i>Drosera subhirtella</i>
<i>Actinostrobilus arenarius</i>	<i>Dryandra purdieana</i>
<i>Allocasuarina campestris</i>	<i>Ecdeiocolea monostachya</i>
<i>Allocasuarina microstachya</i>	<i>Elythranthera brunonis</i>
* <i>Arctotheca calendula</i>	<i>Eucalyptus pyriformis</i>
<i>Astroloma serratifolium</i>	<i>Exocarpos sparteus</i>
<i>Baeckea ?crispiflora</i>	<i>Gastrolobium calycinum</i>
<i>Baeckea aff. crispiflora A.</i>	<i>Gastrolobium glaucum</i>
<i>Baeckea ?preissiana</i>	<i>Gastrolobium hamulosum</i>
<i>Beaufortia bracteosa</i>	<i>Glischrocaryon aureum</i>
<i>Boronia coerulescens</i>	<i>Grevillea armigera</i>
<i>Borya sphaerocephala</i>	<i>Grevillea didymobotrya</i> ssp. <i>didymobotrya</i>
<i>Burchardia umbellata</i>	<i>Grevillea eriostachya</i>
<i>Calothamnus quadrifidus</i>	<i>Grevillea eryngioides</i>
<i>Calytrix ?leschenaultii</i>	<i>Grevillea teretifolia</i>
<i>Chamaescilla corymbosa</i>	<i>Grevillea uncinulata</i>
<i>Chamaescilla spiralis</i>	<i>Hakea erecta</i>
<i>Chorizema aciculare</i>	<i>Hakea incrassata</i>
<i>Comesperma scoparium</i>	<i>Hakea lissocarpha</i>
<i>Conospermum incurvum</i>	<i>Hakea meisneriana</i>
<i>Conospermum stoechadis</i>	<i>Hakea platysperma</i>
<i>Conostylis wonganensis</i>	<i>Hakea scoparia</i>
<i>Cryptandra glabriflora</i>	<i>Halgania</i> sp. 3466
<i>Cryptandra pungens</i>	<i>Hemigenia westringioides</i>
<i>Cyanicula amplexans</i>	<i>Hibbertia exasperata</i>
<i>Cyanicula gemmata</i>	<i>Isopogon scabriusculus</i>
<i>Dampiera lavandulacea</i>	<i>Jacksonia</i> sp.
<i>Dampiera lindleyi</i>	<i>Laxmannia grandiflora</i>
<i>Dampiera oligophylla</i>	<i>Lepidosperma ?letophyllum</i>
<i>Darwinia purpurea</i>	<i>Leucopogon hamulosum</i>
<i>Daviesia hakeoides</i>	<i>Lysinema ciliatum</i>
<i>Daviesia nudiflora</i>	<i>Melaleuca conothamnoides</i>
<i>Diuris ?setacea</i>	<i>Melaleuca aff. cordata</i>
<i>Dodonaea divaricata</i>	<i>Melaleuca holosericea</i>

Melaleuca scabra
Melaleuca sclerophylla
Mesomelaena preissii
Mirbelia spinosa
Petrophile ericifolia
Petrophile media
Petrophile seminuda
Platysace ?maxwellii
Podotheca angustifolia
Prasophyllum cyphochilum
Psammomoya choretroides
* Raphanus raphanistrum
Santalum acuminatum
Spartochloa scirpoidea
Stylidium breviscapum

Stylidium repens
Stypandra glauca
Synaphea sp.
Thelymitra campanulata
Thryptomene racemulosa
Thysanotus patersonii
Trachymene cyanopetala
Trachymene ornata
* Ursinia anthemoides
Verticordia acerosa ssp. preissii
Verticordia brachypoda
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Kn *Nytsia floribunda* Heath

Acacia acuminata	Hyalosperma cotula
Acacia filifolia	Jacksonia sp.
Acacia lasiocarpa	Lepidobolus chaetocephalus
Allocasuarina campestris	Leptospermum oligandrum
Allocasuarina humilis	Leucopogon hamulosum
Allocasuarina microstachya	Melaleuca aff. cordata
Astroloma serratifolium	Melaleuca scabra
Baeckea aff. crispiflora A.	Mesomelaena preissii
Beaufortia bracteosa	Microcorys ericifolia
Boronia coerulescens	Mirbelia spinosa
Borya sphaerocephala	Nemcia obovata
Burchardia umbellata	Neurachne alopecuroidea
Calothamnus quadrifidus	Nuytsia floribunda
Calothamnus sanguineus	Persoonia quinquenervis
Calytrix depressa	Petrophile seminuda
Chamaescilla corymbosa	Podolepis canescens
Chamaescilla spiralis	Podotheca angustifolia
Chorizema aciculare	Podotheca gnaphalioides
Conostylis wonganensis (edge)	Psammomoya choretroides
Cryptandra pungens	Ptilotus polystachyus
Dampiera lavandulacea	Stylidium leptophyllum
Dampiera oligophylla	Stylidium repens
Daviesia ?hakeoides	Stypandra glauca
Daviesia nudiflora	Thysanotus patersonii
Dodonaea divaricata	Trachymene ornata
Ecdeiocolea monostachya	* Ursinia anthemoides
Elythranthera brunonis	Verticordia acerosa
Gastrolobium glaucum	Verticordia brachypoda
Glischrocaryon ?aureum	Verticordia chrysantha
Goodenia trichophylla	Verticordia densiflora
Grevillea uncinulata	Verticordia huegelii
Hakea incrassata	Verticordia picta
Hakea trifurcata	Waitzia acuminata
Hibbertia ?enervia	Waitzia paniculata

Ku *Borya* Herbs/Sedges

Acacia acuminata	Ecdeiocolea monostachya
Acacia ericksonii	Glischrocaryon ?aureum
Acacia latipes	Hakea incrassata
Acacia ?pulchella	Helipterum manglesii
Acacia restiacea	Hibbertia exasperata
Allocasuarina campestris	Lepidobolus ?chaetocephalus
Allocasuarina microstachya	Loxocarya aspera
Astroloma serratifolium	Melaleuca uncinata
Baeckea ?preissiana	Mesomelaena preissii
Borya sphaerocephala	Nemcia obovata
* Briza maxima	Opercularia vaginata
Burchardia umbellata	Podolepis lessonii
Caladenia roei	Prasophyllum cyphochilum
Chorizema aciculare	Psammomoya choretroides
Chorizema genistoides	Santalum spicatum
Cryptandra pungens	Stylidium neglectum
Cyanicula gemmata	Stylidium periscelanthum
Dampiera oligophylla	Stypandra glauca
Dianella revoluta	Trachymene cyanopetala
Diuris laxiflora	Trachymene ornata
Drosera subhirtella	Verticordia acerosa ssp. preissii

G Granite

Acacia acuminata
Acacia lasiocalyx
* *Aira cupaniana*
Allocasuarina campestris
Allocasuarina huegeliana
Alyogyne hakeifolia
Arthropodium capillipes
Astroloma serratifolium
* *Avena sativa*
Baeckea sp. 2776
Blennospora drummondii
Borya laciniata
Borya sphaerocephala
* *Briza maxima*
Bulbine semibarbata
Caladenia dimidia
Caladenia microchila
Caladenia roei
Calandrinia sp.
Calothamnus quadrifidus
Calothamnus sp. 2774
Calytrix depressa
Chamaescilla corymbosa
Chleianthes austrotenuifolia
Cyanicula gemmata
Dianella revoluta
Diplolaena microcephala
Diuris aff. *corymbosa*
Diuris picta
Dodonaea viscosa ssp. *angustissima*
Drosera glanduligera
Drosera macrantha
Drosera subhirtella
Ecdeiocolea monostachya
Elythranthera brunonis

* *Erhartia calycinus*
Eucalyptus loxophleba
Glischrocaryon ? *aureum*
Guichenotia micrantha
Hakea petiolaris
Hakea scoparia
Helichrysum lindleyi
Helipterum manglesii
Hibbertia glomerosa
Hibbertia rostellata
Hibbertia rupicola
Isotoma hypocrateriformis
Kunzea pulchella
Lepidosperma ? *letophyllum*
Leptospermum erubescens
Leptospermum oligandrum
Loxocarya aspera
Melaleuca fulgens
Melaleuca platycalyx
Melaleuca radula
Melaleuca uncinata
Millotia myosotidifolia
* *Parentucellia latifolia*
* *Pentaschistis airoides*
Pimelea imbricata var. *piligera*
Podolepis lessonii
Podotheca gnaphalioides
Prasophyllum ringens
Santalum acuminatum
Spartochloa scirpoidea
Stackhousia monogyna
Stylidium breviscapum
Stylidium ? *calcaratum*
Stylidium neglectum
Stylidium nungarinense
Stypandra glauca

Thelymitra antennifera
Thryptomene australis
Thysanotus ~~dichotomus~~
Thysanotus ?patersonii

Tribonanthes longipetala
Verticordia chrysanthella
* Wahlenbergia capensis
Waitzia acuminata

Samphire

Allocasuarina campestris
Halosarcia lepidosperma
Melaleuca uncinata

Rhagodia drummondii
Scaevola helmsii

