PART XIII: FLORISTICS OF THE NEERABUP NATIONAL PARK.

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FLORISTICS OF RESERVES AND BUSHLAND AREAS IN THE PERTH REGION (SYSTEM 6) PART XIII: FLORISTICS OF THE NEERABUP NATIONAL PARK (PART M 6)

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ABSTRACT

The Neerabup National Park contains a distinctive landscapes of limestone ridges and ridge slopes clothed in dense shrublands interspersed with wooded valleys. Five principal plant communities are present in the area: shrublands or heaths, Tuart (*Eucalyptus gomphocephala*) Woodlands, Jarrah (*E. marginata*) Woodlands, *Banksia attenuata* and *B. menziesii* Woodlands and *Jacksonia sternbergiana* Woodlands. Four regional floristic community types are represented in the Reserve: 24 (Northern Spearwood shrublands and woodlands), floristic community types 26b (Woodlands and mallees on limestones), 27 (Species poor mallees and shrublands on limestones) and type 28 (Spearwood *Banksia attenuata* or *Banksia - Eucalyptus* woodlands). The Park contains a vascular flora of 377 taxa; 311 are natives and 66 weeds. One of these taxa is a non - flowering plant, 116 are monocotyledons (97 natives and 19 weeds) and 260 are dicotyledons (214 natives and 46 weeds). Four rare taxa are found in the Park. Twelve taxa are characteristic of shallow soils over limestone and 36 taxa are confined to coastal areas. Neerabup National Park is very significant regional conservation area as it contains relatively large areas of the regional floristic community types typical of the Spearwood Dunes, a diverse flora typical of the Spearwood Dunes and is a bushland link between conservation reserves or proposed conservation reserves to the north, south and west. Increasingly Neerabup National Park is becoming surrounded by urban development and to maintain the area's substantial conservation value there is a need for sensitive and creative management of roads and urban - bushland interface in the area.

INTRODUCTION

Neerabup National Park stretches for approximately 12 kilometres along the west side of Wanneroo Road north of Perth (Map 1). At its broadest the Park is three kilometres wide but in places it is as little as half a kilometre wide. The Park has a critical role to play in nature conservation in the north west corridor, being the central link in a north - south and east - west corridors. Neerabup National Park links Yelagonga Regional Park and Yanchep National Park and links to the coast through the Tamala Tip and the area north of Burns Beach Road. These values were recognised in the System 6 study (Department of Conservation and Environment 1983: M 6 Neerabup National Park), the area being described as "..open space of regional significance because of its high conservation values and its proximity to Perth residential areas.". The long narrow shape of the Park was recognised as causing difficulties for management and the additions proposed to the south - east (between Neerabup National Park and Wanneroo Road) and south - west (through what is now the Tamala Tip area) were proposed to "..partially alleviate these problems.." and give the Park "..improved representation of local ecosystems.". It is planned that the south - east area will be added to the Park, but since 1983, the south - west connection has been eroded by the formation of the Tamala Tip and the Park itself narrowed even further to accommodate the freeway reserve. However while the Park is rapidly becoming a suburban National Park surrounded by houses and whittled away by services for these houses, the flora of the Park has not been documented nor a

management plan prepared.

SURVEY METHOD

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

Ten $100m^2$ study sites were located in Neerabup National Park to sample the range of plant communities identified using aerial photographs and limited field interpretation. The location of these sites is shown on Map 2 and the sites are described in Appendix 1. Each of these sites, were permanently located using four steel pegs. Groups of conservation volunteers from the Swan Coastal Plain Survey group, each led by a botanist, recorded information in a set format on physical location, vegetation structure and density and the total flora of the permanent study sites (Keighery, Keighery and Gibson 1995). The sites were sampled on two occasions.

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

Opportunistic plant collections, that is collections from outside the sites, were made during foot and vehicular transects of the bushland areas at various times of the year over the three years of survey. Identification of plant collections was made by the volunteers and the coordinators and verified at the W.A. Herbarium. A field herbarium has been prepared for the area. It is considered that approximately 90% of the flora has been documented.

GEOMORPHOLOGY AND SOILS

The Neerabup National Park is located entirely on the Spearwood Dune System. Within the Spearwood Dunes in the Park two main landforms can be distinguished. These are a series of low Tamala Limestone ridges and associated soils (LS1, Gozzard 1982 a&b; Cottesloe soils, Churchward and McArthur 1980) interspersed with undulating hills of sand derived from the Tamala Limestone (S7, Gozzard 1982 a&b; the Karrakata soils, Churchward and McArthur 1980). To the east of the Park is a chain of wetlands in the depression between ridges of Tamala Limestone.

VEGETATION

The Vegetation Map

The vegetation map (Map 2) shows the distribution of the principal vegetation associations. The distribution of the associations is based on the structural units described (Appendix 1). The vegetation is very dependant on the soils. Shrublands or heaths are found on the Tamala Limestone ridges and associated soils and woodlands on the deeper sands.

Shrublands or Heaths (Map 2: H, Appendix 2: H)
In the areas with exposed Tamala Limestone and shallow soils there is a series of dense shrublands dominated by *Xanthorrhoea preissii, Hakea trifurcata, Calothamnus quadrifidus, Melaleuca acerosa, Dryandra sessilis, Melaleuca huegelii* and *Acacia lasiocarpa.* One or all of the species may be dominant in different areas, forming a mosaic of shrubland and heath communities. These communities are not mapped, as the dominants, vary over small distances, and the type and density of the dominants is closely related to the time since the last fire. A series of sedges and herbs are also characteristic of these communities, including *Conostylis aculeata, Mesomelaena pseudostygia* and *Loxocarya flexuosa.*

Woodlands
A series of trees are characteristic of these woodlands: Tuart (*Eucalyptus gomphocephala*), Jarrah (*E. marginata*), *Banksia attenuata, B. menziesii, Allocasuarina fraseriana* and *Jacksonia sternbergiana.* Marri (*E. calophylla*) is also present but is less common than the other species. These woodlands are mapped according to the dominant tree species (Map 2, Appendix 1).

Jacksonia sternbergiana Low Forest (Map 2: sLF, Appendix 2: not distinguished)
While this community is not widespread it is a distinctive structural formation with *Jacksonia* trees to six metres. Floristically this unit is not distinguishable from *Banksia* Woodland.

Banksia Woodlands (Map 2: bW, Appendix 2: B)
Banksias attenuata , B. menziesii, Allocasuarina fraseriana and *Nuytsia floribunda* are the most common trees in these woodlands. The understorey is characterised by species such as *Xanthorrhoea preissii, Macrozamia riedlei, Hakea trifurcata, Hibbertia hypericoides, Leucopogon polymorphus, Daviesia divaricata* and *Allocasuarina humilis. Mesomelaena pseudostygia* and *Loxocarya flexuosa* are also characteristic. Most of the Park is mapped as *Banksia* Woodland. While Tuart and Jarrah are scattered through much of the area their cover is generally low.

Jarrah Woodlands to Forest over *Banksia* Woodland (Map 2: jbW, Appendix 1: J, Jm, Jb)
Jarrah (*Eucalyptus marginata*) generally occurs as an emergent over the two *Banksia* species and *Allocasuarina fraseriana.* Rarely the Jarrah is a co -dominant with Marri. However in some areas Jarrah is the only tree and it forms a Jarrah Woodland or Forest. The areas of Jarrah and

Jarrah/Marri Woodland to Forest are scattered and not readily mapped. The principal understorey shrubs are similar to those in the *Banksia* Woodlands, being *Xanthorrhoea preissii*, *Macrozamia riedlei*, *Hibbertia hypericoides* and *Daviesia triflora*. The sundew, *Drosera erythrorhiza*, is common in the understorey, as is *Mesomelaena pseudostygia*.

Tuart Woodland (Map 2: tW, Appendix 2: T)
In a series of areas Tuart occurs at great enough density to form a woodland to forest. Associated understorey species are *Jacksonia sternbergiana*, *Grevillea vestita*, *Macrozamia riedlei* and *Xanthorrhoea preissii*.

Floristic Community Types

The regional study of the floristic variation of the Swan Coastal Plain by Gibson *et al.* (1994) identified two floristic community types in the Neerabup National Park (Table 1): type 24 (Northern Spearwood shrublands and woodlands) and type 28 (Spearwood *Banksia attenuata* or *Banksia* - *Eucalyptus* woodlands). While no other floristic community types were identified, it is likely that floristic community types 26b (Woodlands and mallees on limestones) and 27 (Species poor mallees and shrublands on limestones) could occur in the limestone heath areas. Floristic community type 26a (*Melaleuca huegelii* and *Melaleuca acerosa* shrublands of limestone ridges) is unlikely to occur as this type is generally confined to massive limestone ridges.

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

Vegetation Mapping Unit	Site	Floristic Community Type
Woodlands		
Jacksonia Low Forest	Site 5	28 (Spearwood *Banksia attenuata* or *Banksia* - *Eucalyptus* woodlands)
Banksia Woodland	Sites 2, 6 & 8	28 (Spearwood *Banksia attenuata* or *Banksia* - *Eucalyptus* woodlands)
Jarrah Woodland	Sites 3&4	28 (Spearwood *Banksia attenuata* or *Banksia* - *Eucalyptus* woodlands)
Tuart Woodland	Sites 1 & 11	24 (Northern Spearwood shrublands and woodlands)
Shrublands/Heaths	Sites 7, 9 & 10	24 (Northern Spearwood shrublands and woodlands)

FLORA

The bushland contains a vascular flora of 377 taxa (Appendix 2). Of these, 311 are natives and 66 weeds. One taxon is a non-flowering vascular plant, 116 are monocotyledons (97 natives and 19 weeds) and 260 are dicotyledons (214 natives and 46 weeds). The Proteaceae (24 natives), Papilionaceae (23 natives, 8 weeds), Orchidaceae (23 natives), Asteraceae (19 natives, 11 weeds), Myrtaceae (17 natives), Cyperaceae (16 natives), Epacridaceae (12 natives), Poaceae (10 natives, 15 weeds), Haemodoraceae (11 natives), Anthericaceae (11 natives), Stylidiaceae (9 natives) and the Mimosaceae (9 natives) are the most species rich families.

Significant Flora

Four rare taxa (priority taxa, that is taxa in consideration for declaration as Declared Rare Flora, Atkins 1996), *Hibbertia spicata* subsp. *leptotheca*, *Jacksonia sericea*, *Lepidium pseudohyssopifolium* and *Stylidium maritima* ms were found in the Park.

Significant flora of particular interest

Lepidium pseudohyssopifolium (Brassicaceae)
This poorly known herb is relatively inconspicuous and is found throughout southern Australia. In Western Australia it has only been found on limestone surfaces on the Nullarbor and the Swan Coastal Plain. This is rare species (Priority 1, Atkins 1996).

Conostylis candicans subsp. *calcicola* (Haemodoraceae)
A small taxon of *Conostylis* found growing on near coastal calcareous sands from Dongara to Bunbury.

Hibbertia spicata subsp. *leptotheca* (Dilleniaceae)
This is one of the taxa characteristic of and endemic to Tamala Limestone ridges, growing from Yalgorup to Wedge Island. This taxon has a several forms; the typical form grows in Neerabup National Park. Another form occurs at Burns Beach (Keighery 1992). It has a low, almost prostrate growth form, shiny, short succulent leaves and small pale yellow flowers with reflexed petals. This is rare species (Priority 3, Atkins 1996).

Astroloma microcalyx (Epacridaceae)
This red flowered low spreading shrub grows on limestone ridges from Fremantle to Leeman. A closely related species grows on the Darling Plateau. This is a limestone endemic confined to the Swan Coastal Plain.

Ricinocarpus glaucus (Euphorbiaceae)
This erect low shrub forms a white ball of flowers in spring. This taxon is confined to the Spearwood Dunes on the Plain but occurs from Perenjori to the Stirling Ranges. In the Perth

region this is one of the group of taxa that grow on the western side of the Plain and the on the Plateau.

Hemiandra pungens Dune form (GJK 12,794) (Lamiaceae)
A series of taxa are presently grouped as *Hemiandra pungens*. This variant is a prostrate glabrous plant, with short ovate pungent leaves and purple flowers that grows on coastal calcareous dunes from Wanneroo to Seabird.

Alyogyne huegelii var. *glabrata* (Malvaceae)
This taxon has broad pinnate leaves and white to pale pink maroon centred flowers that open narrowly to form a tube, in contrast with *Alyogyne huegelii* var. *huegelii* that has terete pinnate leaves and lilac flowers that open fully. *Alyogyne huegelii* var. *glabrata* grows on calcareous sands, that are generally associated with limestone ridges. *Alyogyne huegelii* var. *glabrata* grows from Yalgorup to Dongara.

Acacia lasiocarpa (Mimosaceae)
Two varieties of this taxon occur in the study area. *Acacia lasiocarpa* var. *lasiocarpa* is found in near coastal areas generally on Tamala surfaces but is also characteristic of the Beach Ridge Plain at Becher Point.

Baeckea robusta subsp. nov. (Myrtaceae)
The Flora of the Perth Region (Marchant *et al.* 1987) considers this taxon, that grows on limestone ridges, as a distinct local variant of a widespread species, however, M.E.Trudgen (pers. comm.) who is revising the genus is not certain that this form is sufficiently distinct to warrant recognition as a separate subspecies.

Eucalyptus foecunda (Myrtaceae)
This mallee grows on limestone ridges from Yalgorup to Lancelin. It is a limestone endemic.

Caladenia longicauda subsp. *calcigena* ms (Orchidaceae)
This a recently recognised taxon of limestone hills and ridges. Found from Lancelin to Bunbury, it is a limestone endemic.

Jacksonia sericea (Papilionaceae)
This prostrate shrub is a rare species (Priority 3 Atkins 1996) confined to the Perth area between Golden Bay and Neerabup National Park.

Nemcia reticulatum (coastal form) (Papilionaceae)
This erect large flowered form of *Nemcia reticulatum* is found growing on coastal calcareous dunes from Yalgorup to Northampton.

Grevillea crithmifolia (Proteaceae)
This prostrate *Grevillea* with pink buds and white flowers is found growing on limestone ridges and calcareous sands from Yalgorup to Dongara.

Grevillea preissii (Proteaceae)
This attractive red flowered low shrub grows on limestone ridges from Yalgorup to Leeman. It is a limestone endemic.

Hakea lissocarpha (Proteaceae)
While *Hakea lissocarpha* is found on both the Plain and the Darling Plateau it is confined to near coastal sands associated with limestone on the Plain. This species is found from Kalbarri to Israelite Bay.

Persoonia comata (Proteaceae)
This species grows on sand in heath and woodlands from Yanchep to Eneabba and is at the southern end of its range in Neerabup National Park.

Petrophile serruriae subsp. nov. (Proteaceae) (Keighery 1992)
This is a pink flowered variant of a normally yellow flowered species of the Darling Range. This subspecies is apparently disjunct between Bunbury and Hamelin Bay, a pattern also found in *Trachymene coerulea*. This taxon grows on limestone ridges from Cervantes to Bunbury (Hamelin Bay).

Trymalium ledifolium subsp. *ledifolium* (Rhamnaceae)
This taxon was previously referred to as *T. albicans* (Keighery 1992, Gibson *et al.* 1994). A limestone endemic, this erect low shrub is found from Yalgorup to N of Jurien.

Leptomeria empetriformis (Santalaceae)
A low erect shrub found on limestone ridges from Dongarra to Yalgorup. This matches the form of the type of the species, which has been confused with *Leptomeria cunninghamii*.

Diplopeltis huegelii var. *huegelii* (Sapindaceae)
Diplopeltis huegelii has several varieties, with the type variety being endemic to limestone ridges between Yalgorup and Dongara. The Darling Range form of this species has been named *D. lehmanii* but it is planned that it will be combined with *Diplopeltis huegelii* and both will be described as subspecies of *D. huegelii*.

Stylidium maritima ms (Stylidiaceae)
This species is related to *Stylidium affine* but occurs in near coastal locations on calcareous soils and limestone on the coastal plain from Cliff Head to Yalgorup. Although it can be common over small areas, populations are not common and much of its habitat between Cliff Head and Yalgorup

has been cleared or degraded and it should be considered uncommon. This is a rare taxon (Priority 3).

Stylidium junceum (limestone variant) (Stylidiaceae)
A distinct variant of *Stylidium junceum* grows on limestone ridges from Yalgorup to Cliff Head.

Pimelea calcicola (Thymeliaceae)
Pimelea calcicola is an erect white or pink flowered low shrub found on limestone ridges between Yalgorup and Lancelin. It is a limestone endemic.

VEGETATION CONDITION

General Condition

The majority of Neerabup National Park is in very good condition. In general the limestone heaths and the *Banksia* and Jarrah Woodlands are in the best condition, while the Tuart Woodlands are the most disturbed. Disturbance associated with roads, past grazing (particularly along the old stock route adjacent to Wanneroo Road), wood collecting, rubbish dumping and frequent fires has led to degradation, particularly in areas adjacent to roads. Site 1 in Tuart Woodland illustrates these disturbances. All of the Tuarts are quite young and appear to be regrowth after a hot fire while Jarrah trees in the site have been felled for firewood. Sixteen different weed species were recorded for the site, with herbaceous weeds forming a dense layer in the vegetation.

The Spearwood and Quindalup Dunes over their entire range have been subject to grazing in the past and, to some extent, the grazing pressure continues to this day, through grazing by kangaroos and rabbits. The average condition score for the sites scored by Gibson *et al.* (mean condition score of 3) reflect this disturbance, floristic community type 24 having the one of the highest levels of disturbance. There are probably no areas of Spearwood Dunes in the metropolitan area that do not have a history of disturbance associated with grazing. The impacts of this grazing has been greatest in the Tuart Woodlands which are generally in protected locations and were a focus for resting cattle. The limestone areas were the least affected as the cattle avoided these areas.

As a consequence of the past and present disturbance, areas of Spearwood Dunes, need careful management to allow for natural regeneration of the communities. In an area such as the Neerabup National Park with a large perimeter to area ratio particular attention must be given to managing these boundaries, especially now that the area is becoming surrounded by housing. Also for Neerabup to be managed as a link between other major conservation areas to the north, south and west the number and design of roads through and adjacent to the area needs to be addressed. Such roads, if they have to built, should be designed to allow movement of animals

across the road and have speed limits that recognise that the area is a conservation area for the protection of wildlife.

Weeds

Over 50 species of weeds are found in Neerabup National Park. While most species have relatively little impact and are confined to areas of high levels of disturbance a series of species are of great concern as they are known to spread into areas that are not significantly disturbed (Keighery 1995). These are Cape Tulip (*Homeria flaccida*), Asparagus Creeper (*Myrsiphyllum asparagoides*) and Geraldton Carnation Weed (*Euphorbia terracina*). *Myrsiphyllum asparagoides* is not as yet widespread or well established and therefore should be the subject of immediate control. A further species of concern is *Sparaxis bulbifera* (Iridaceae). This is often a serious weed in heavy soils on the eastern side of the Plain (Dixon and Keighery 1995). It is rarely found elsewhere, but like Arum Lilies that have established themselves on Quindalup Dunes, this is able to persist and spread into Spearwood Dunes.

DISCUSSION

Vegetation

The most recent regional study of the flora of the Swan Coastal Plain (Gibson *et al.* 1994), based on detailed sampling of the plant communities of the Plain, identified two floristic community types in the study area (Table 1). Both of these floristic community types are found in 'super group 4' which is typical of Spearwood and Quindalup Dunes. Types 24 and 28 are typical of the Spearwood Dunes but sometimes occur on Quindalup Dunes adjacent to the mapped interface of the two dune systems. Types 26b and 27 which may also occur in the area are also in this super group.

The two community types recorded in the study area are both reserved, being found in two or more Nature Reserves or National Parks (Gibson *et al.* 1994, Table 2). However, floristic community type 24 has a restricted distribution on the Plain, being virtually confined to the Perth Metropolitan area, with a single atypical outlier to the north of the Perth Metropolitan Area (Map 3a, Department of Environmental Protection 1994 -1996). Neerabup National Park contains a highly significant area of this community type and, the areas in best condition. Community type 28 extends north from inland of Kwinana (Leda conservation area) to the Moore River (Map 3b). Again, Neerabup contains significant areas of this community type, especially in association with the more restricted community type 24.

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

Floristic Community Type	Reservation Status#	Conservation Status
Shrublands and Woodlands to Forests		
24 (Northern Spearwood shrublands and woodlands)	Present in two or more Cons. Reserves	Susceptible
28 (Spearwood *Banksia attenuata* or *Banksia - Eucalyptus* woodlands)	Present in two or more Cons. Reserves	Low risk

Conservation Reserves are National Parks or Nature Reserves

While the diversity of floristic community types in Neerabup National Park is not great, the diversity of structural formations is high. Floristic community types 24 and 28 have some of the highest levels of structural unit diversity of the different community types, Gibson *et al.* (1994) recording 14 and 10 different structural units respectively in these two types.

Flora

Twelve taxa present in Neerabup National Park are characteristic of the shallow soils over Tamala Limestone and many of these are generally confined to these land surfaces (Appendix 2). Another 36 are confined to coastal areas. Of these, *Astroloma microcalyx* and *Jacksonia sericea* are endemic to the Swan Coastal Plain and others are endemic to limestone surfaces (Appendix 2). Of these 48 taxa over ten are also found on the eastern side of the Plain or the Darling Scarp and Plateau. Most of these taxa have distinctive forms on the coastal limestones and some are taxonomically distinct. Four of these taxa, *Eucalyptus foecunda, E. decipiens, Melaleuca huegelii* and *Dodonaea aptera*, are found on a series of limestone deposits (Muchea Limestones) on the eastern side of the Plain (Keighery and Keighery 1995).

The flora of Neerabup National Park is typical of the Spearwood Dunes and has a significant representation of taxa that are typical of, and in many cases restricted to, limestone surfaces. The presence of outcropping and underlying limestone and associated sands contributes to the diversity of the communities, floristic communities 24 and 28 having mean species richness of 41.8 and 55.2 respectively in standard $100m^2$ areas (Gibson *et al.* 1994). When compared with other areas of bushland on similar soils containing the same floristic community types the Park has the most diverse flora however; it is also the largest in area (Table 3).

Table 3: Diversity of flora and bushland areas principally located on Spearwood Dunes.

Bushland Area	Area (ha)	Native Flora	Floristic Community Type[a].	Soil[b] (L, Q, S, T, B).
Hepburn Heights/Pinnaroo	43	196[1]	2	S, T
Trigg/Karrinyup Reserves	120	175[2]	4	Q, S, T
Marangaroo (Res 20091)	30 (e)	130 (e)[3]	1	S
Neerabup National Park	1,111	307	2	S, T
Star Swamp	100	191[4]	3	L, S, T
Woodvale Nature Reserve	44	170[5]	1	S
Thompson's Lake	509	199[7]	3 (e)	L, S, B
Blackwell Reach	15[8]	100[8]	1	L, S
Shenton Bushland	20	100[9]	1	S
Kings Park	465	290[10]	1	S, T
Bold Park	221	221[11]	4	Q, S, T
M91	56	86[12]	2	S, T

a Gibson *et al.* (1994)
b L = wetlands (principally lakes), Q = Quindalup Dunes, S = Spearwood Dunes (sands), T = Tamala Limestones, B = Bassendean Dunes
(e) estimate of value
1 Keighery (1991b)
2 G. Keighery pers. comm.
3 estimate from knowledge of the area
4 Bell *et al.* (1984)
5 Keighery and Langley (1994)
6 Weston and Clay (1980)
7 Crook and Evans (1981)
8 Keighery (1991a)
9 Ecoscape (1994)
10 Bennet in Kings Park Bushland Management Plan (1995)
11 Keighery, Harvey and Keighery (1990)
12 Keighery and Keighery (1993)

CONCLUSION

The Spearwood Dunes of Neerabup National Park with their outcropping Tamala Limestone form distinctive landscapes of ridges and ridge slopes clothed in dense shrublands interspersed with wooded valleys. A variety of tree species contribute to a series woodlands and forest in these valleys.

Neerabup National Park is a very significant regional conservation area as it contains:

- relatively large areas of the regional floristic community types typical of the Spearwood Dunes
- a diverse flora typical of the Spearwood Dunes
- a bushland link between conservation reserves or proposed conservation reserves to the north, south and west.

Increasingly Neerabup National Park is becoming surrounded by urban development and to maintain the area's substantial conservation value there is a need for sensitive and creative management of roads and urban - bushland interface in the area.

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Appendix 1: Vegetation Descriptions and Condition

General Information

Broad mapping units are used for the vegetation mapping (Map 2). The determination of these units is based on vegetation descriptions from the sites. The actual location of the sites is indicated on the map. The vegetation descriptions for each of the mapped units are from the areas considered to best illustrate these units, being 'typical' and in the best condition.

Sites are grouped on the basis of the mapping units and the floristic community type. An * indicates that the floristic community type for the unit and/or site has been inferred from the floristics.

Keys to the terminology used for the vegetation descriptions and specific condition ratings are given in Keighery (1994).

Site Descriptions

Floristic Community Type 28

Mapping Unit - bw Banksia Woodland

Site NEER 2
Banksia attenuata , *B. menziesii* and *Allocasuarina fraseriana* Low Open Forest over *Xanthorrhoea preissii* Open Shrubland over *Hibbertia hypericoides* Open Low Heath over mixed Herbland and *Mesomelaena pseudostygia* Sedgeland.
Condition Rating Very good to excellent
Comments: Frequent fires and past grazing are considered to be the most likely cause of the exotic herbs. *Homeria flaccida* which is widespread in the Park is also present.
Soil: brown sand over yellow/orange sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the east

Site NEER 6
Scattered emergent Tuart over *Banksia attenuata* Very Open Low Woodland over *Grevillea vestita* and *Macrozamia riedlei* Shrubland over *Xanthorrhoea preissii* and *Hibbertia hypericoides* Open Low Heath over *Drosera erythrorhiza* Very Open Herbland and *Mesomelaena pseudostygia* and *Loxocarya flexuosa* Open Sedgeland.
Condition Rating Very good
Comments: Frequent fires and past grazing are considered to be the most likely cause of the occurrence of exotic herbs. *Homeria flaccida* which is widespread in the Park is also present.
Soil: yellow sand over yellow/orange sand, S7 (Gozzard 1982)
Drainage: well Aspect: flat

Site NEER 8
Banksia attenuata , *Nuytsia floribunda* and *Allocasuarina fraseriana* Low Open Woodland over *Daviesia divaricata* and *Allocasuarina humilis* Tall Open Shrubland over *Hakea trifurcata* Open Shrubland over *Leucopogon polymorphus* and *Hibbertia hypericoides* Open Low Heath over mixed Herbland and *Mesomelaena pseudostygia* Very Open Sedgeland.
Condition Rating Very good to excellent
Comments: Frequent fires and past grazing are considered to be the most likely cause of the of the significant cover of *Hypochaeris glabra.*
Soil: brown sand over yellow/orange sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the north east

Mapping Unit - jbW Jarrah Woodland over *Banksia* Low Woodland and/or Open Low Heath

Site NEER 3
Jarrah, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland over *Xanthorrhoea preissii* and *Macrozamia riedlei* Shrubland over *Hibbertia hypericoides* and *Daviesia triflora* Open Low Heath over *Briza maxima* Very Open Grassland, *Drosera erythrorhiza* Very Open Herbland and *Mesomelaena pseudostygia* Very Open Sedgeland.
Condition Rating Very good
Comment: Jarrah in the site has been cut for firewood.
Soil: grey sand over yellow/brown sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the west

Site NEER 4
Jarrah Open Forest over *Xanthorrhoea preissii* Shrubland over mixed Open Low Heath over Very Open Grassland and *Drosera erythrorhiza* Herbland.
Condition Rating Excellent
Soil: brown sand over orange sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the north

Mapping Unit - sLF *Jacksonia sternbergiana* Low Open Forest

Site NEER 5
Jacksonia sternbergiana Low Open Forest over *Hibbertia hypericoides* Low Open Shrubland over mixed Herbland.
Condition Rating Very good to good
Comment: Young Tuarts are scattered through the site the absence of large Tuarts is possibly the result of a past very hot fire over (over 15 years ago).
Soil: grey sand over orange sand, S7 (Gozzard 1982)
Drainage: well Aspect: flat

Floristic Community Type 24

Mapping Unit - tW Tuart Woodland

Site NEER 1
Tuart Closed Forest over *Xanthorrhoea preissii* Shrubland mixed exotic Herbland.
Condition Rating Degraded
Comments: Frequent fires and past grazing are considered to be the most likely cause of the reduced cover of the natives in the understorey and the presence of the dense exotic herb layer. Also all of the Tuarts are quite young, perhaps as regrowth after a past fire. Jarrah had been present in the site but these had been felled for firewood. While sixteen different weed species were recorded for the site several species are of great concern: *Homeria flaccida*, which is widespread and *Myrsiphyllum asparagoides*, which is relatively uncommon. *Myrsiphyllum asparagoides* should be the subject of immediate control as it is not yet well established.
Soil: brown sand over yellow sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the west

Site NEER 11 (opposite Neerabup National Park in the Lake Nowergup Nature Reserve)
Tuart Woodland over *Jacksonia sternbergiana* and *Grevillea vestita* over *Macrozamia riedlei* and *Xanthorrhoea preissii* Open Shrubland over *Ehrharta longiflora* Grassland and *Homeria flaccida* Herbland.
Condition Rating Very good to good
Comments: Past grazing and frequent fire has had a significant impact on the herb and grass layer. *Homeria flaccida* is widespread in the area.
Soil: brown sand over yellow orange sand, LS1 (Gozzard 1982)
Drainage: well Aspect: gentle to the north east

Mapping Unit - H Heaths

Site NEER 7

Xanthorrhoea preissii and *Hakea trifurcata* Shrubland over *Calothamnus quadrifidus*, *Melaleuca acerosa* and *Dryandra sessilis* Open Low Heath over *Conostylis aculeata* Open Herbland and *Mesomelaena pseudostygia* and *Loxocarya flexuosa* Sedgeland.
Condition Rating Very good to excellent
Comments: Rabbit grazing has had a significant impact on the herb layer and *Ursinia anthemoides* and *Hypochaeris glabra* are common.
Soil: red brown sand, S7 (Gozzard 1982)
Drainage: well Aspect: gentle to the north east

Site NEER 9

Melaleuca huegelii, *Calothamnus quadrifidus*, *Melaleuca acerosa* and *Acacia lasiocarpa* Open Low Heath over *Lomandra maritima* Very Open Herbland and mixed Sedgeland.
Condition Rating Very good to excellent
Soil: grey sand over limestone, exposed in places, LS1 (Gozzard 1982)
Drainage: well Aspect: gentle to the south west

Site NEER 10

Melaleuca huegelii Shrubland over *Acacia truncata* and *Templetonia retusa* Open Low Heath over Very Open Herbland and *Loxocarya flexuosa* Sedgeland.
Condition Rating Very good to excellent
Soil: grey loamy sand over limestone, LS1 (Gozzard 1982)
Drainage: well Aspect: steep to the south east

Appendix 2: Flora List

Key

Column 1: Family, Conservation Status and Regional distributions

Conservation Status
Conservation and Land Management Declared Rare Flora and Priority Taxa (Atkins 1996)
R = Declared Rare Flora
1 = Priority 1: Poorly Known Taxa
2 = Priority 2: Poorly Known Taxa
3 = Priority 3: Poorly Known Taxa
4 = Priority 4: Rare Taxa

Regional distributions
Regional ecological preferences
L = taxa characteristic of skeletal soils over Tamala limestone
C = coastal calcareous sands (Quindalup Dunes and Spearwood Dunes)
E = eastern side of the Swan Coastal Plain and Darling Scarp and Plateau
e = endemic to the limestone surface

Geographical Location (range ends)
N = population at the northern limit of their known geographic range
S = population at the southern limit of their known geographic range

Column 2: Taxon

Names follow Gibson *et al.* (1994) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. A * preceding the name indicates a weed. An "ms" after the name indicates that this is a manuscript name which is yet to be published. Names followed by (DP) have been added by David Pike.

Columns 3 - 9: Plant Communities (comparable unit on Map 2)

J	= Jarrah Woodland	(Map 2: jbW)
H	= Shrublands or Heaths	(Map 2: H)
T	= Tuart Woodland	(Map 2: tW)
D	= Disturbed	(Map 2: not mapped, principally track edges)
B	= *Banksia* Woodland	(bW)
Jm	= Jarrah and Marri Woodland	(jbW)
Jb	= Jarrah and *Banksia* Woodland	(jbW)

		J	H	T	D	B	Jm	Jb
Aizoaceae								
*	Carpobrotus edulis	•		•	•	•		
	Carpobrotus modestus (DP)		•					
Amaranthaceae								
	Ptilotus drummondii					•	•	
	Ptilotus manglesii					•		
	Ptilotus polystachyus		•			•		
	Ptilotus stirlingii		•					
Anthericaceae								
	Arthropodium capillipes			•			•	
	Caesia micrantha						•	
	Chamaescilla corymbosa	•				•	•	
	Corynotheca micrantha			•				
	Sowerbaea laxiflora	•					•	
C E	Thysanotus arenarius		•					
	Thysanotus manglesianus	•						
	Thysanotus multiflorus	•	•				•	
	Thysanotus sparteus	•				•	•	
	Thysanotus patersonii			•		•		
	Tricoryne elatior	•	•	•		•		
Asparagaceae								
*	Myrsiphyllum asparagoides	•		•	•			
Apiaceae								
	Daucus glochidiatus		•	•				
	Eryngium pinnatifidum	•				•		
	Homalosciadium homalocarpum	•				•		
	Hydrocotyle blepharocarpa		•					
	Hydrocotyle callicarpa	•				•		
	Hydrocotyle diantha		•					
	Hydrocotyle hispidula		•			•		
	Trachymene coerulea		•					
	Trachymene pilosa		•			•		
	Xanthosia huegelii	•						
Asteraceae								
*	Arctotheca calendula				•			
	Asteridea pulverulenta					•		
	Brachyscome iberidifolia	•						
*	Carduus pycnocephalus				•			
*	Centaurea melitensis				•			
*	Cirsium vulgare				•			
*	Conyza albida			•				
	Gnaphalium sphaericum			•				
*	Hedypnois rhagadioloides			•				
	Hyalosperma cotula		•					
*	Hypochaeris glabra			•	•	•		
	Lagenifera huegelii			•		•	•	
	Millotia myosotidifolia					•	•	
	Olearia axillaris		•					
	Olearia rudis (DP)		•					
	Ozothamnus cordatus (DP)	•					•	

		J	H	T	D	B	Jm	Jb
	Podolepis gracilis					•	•	
	Podotheca angustifolia					•		
	Podotheca chrysantha (DP)	•	•				•	
	Pterochaeta paniculata (= Waitzia paniculata Gibson *et al.*)		•					
	Quinetia urvillei			•		•	•	
	Senecio lautus	•	•					
	Siloxerus humifusus	•				•	•	
*	Sonchus asper				•			
	Sonchus hydrophilus		•	•				
*	Sonchus oleraceus			•	•			
*	Urospermum picroides			•				
*	Ursinia anthemoides					•		
	Waitzia citrina					•		
	Waitzia suaveolens			•		•		
Brassicaceae								
*	Brassica tournefortii			•	•			
*	Heliophila pusilla	•	•		•	•		
1	Lepidium pseudohyssopifolium			•				
	Lepidium rotundum		•					
*	Raphanus raphanistrum				•	•		
	Stenopetalum gracile		•					
Campanulaceae								
*	Wahlenbergia capensis					•		
	Wahlenbergia preissii					•		
Caryophyllaceae								
*	Cerastium glomeratum			•	•			
*	Minuartia mediterranea				•			
*	Petrorhagia velutina				•			
*	Sagina apetala		•					
*	Silene gallica	•		•	•			
Casuarinaceae								
	Allocasuarina fraseriana					•	•	
	Allocasuarina humilis		•					
Centrolepidaceae								
	Centrolepis aristata	•						
	Centrolepis drummondiana					•		
Chenopodiaceae								
	Rhagodia baccata subsp. baccata		•	•				
Colchicaceae								
	Burchardia congesta (= B. umbellata Gibson *et al.*)	•		•		•		•
L	Wurmbea monantha		•					
Convolvulaceae								
	Dichondra repens			•				
Crassulaceae								
	Crassula colorata		•			•		
	Crassula pedicellosa	•					•	

		J	H	T	D	B	Jm	Jb
Cuscutaceae								
*	Cuscuta epithymum		•					
Cyperaceae								
	Carex preissii			•				
	Isolepis cyperoides		•					
	Isolepis nodosa		•					
	Lepidosperma angustatum		•			•		
	Lepidosperma leptostachyum	•						
	Lepidosperma 'coastal terete' (BJK & NG 231)			•				
	Isolepis cernua		•					
	Isolepis marginata		•					
	Mesomelaena pseudostygia	•						
	Schoenus brevisetis	•				•		
	Schoenus clandestinus	•		•		•		
	Schoenus curvifolius	•				•	•	
	Schoenus discifer	•						
	Schoenus grandiflorus	•		•				
Le	Schoenus lanatus		•					
	Tetraria octandra						•	
Dasypogonaceae								
	Acanthocarpus preissii		•					
	Calectasia cyanea					•		
	Dasypogon bromeliifolius		•			•		
	Lomandra caespitosa						•	
	Lomandra hermaphrodita	•				•		
C	Lomandra maritima		•			•		
	Lomandra preissii	•		•				•
	Lomandra sericea					•		
	Lomandra suaveolens		•			•		
Dilleniaceae								
	Hibbertia aurea					•		
	Hibbertia hypericoides		•			•	•	
	Hibbertia racemosa		•			•		
3 Le	Hibbertia spicata subsp. leptotheca		•					
	Hibbertia subvaginata					•		
Droseraceae								
	Drosera erythrorhiza		•			•		
	Drosera glanduligera		•					
	Drosera macrantha	•						
	Drosera menziesii subsp. penicillaris	•	•					
	Drosera pallida					•		
	Drosera stolonifera						•	
Epacridaceae								
	Andersonia lehmanniana							
	Astroloma ciliatum	•		•				
Le	Astroloma microcalyx							
	Astroloma pallidum		•			•		
	Conostephium pendulum					•		
	Leucopogon aff. nutans (GJK 11159)		•					

		J	H	T	D	B	Jm	Jb
	Leucopogon australis					•		
	Leucopogon parviflorus	•	•			•		
	Leucopogon polymorphus	•				•	•	•
	Leucopogon propinquus		•					
	Leucopogon sprengelioides		•			•		
	Lysinema ciliatum		•			•		
Euphorbiaceae								
*	Euphorbia peplus			•	•			
*	Euphorbia terracina		•		•			
	Phyllanthus calycinus		•				•	
	Poranthera microphylla					•		
	Ricinocarpos glaucus	•						
Fumariaceae								
*	Fumaria capreolata			•	•			
Gentianaceae								
*	Centaurium erythraea		•					
Geraniaceae								
*	Erodium cicutarium	•	•	•	•			
*	Geranium molle	•			•			
	Geranium retrorsum	•		•				
	Pelargonium australe	•						
*	Pelargonium capitatum			•		•		
	Pelargonium littorale	•		•				
Goodeniaceae								
C E	Lechenaultia linarioides		•					
	Scaevola canescens	•						
	Scaevola repens var. repens							
	Scaevola thesioides		•					
Gyrostemonaceae								
	Gyrostemon ramulosus		•			•		
C	Tersonia cyathiflora		•					
Haemodoraceae								
	Anigozanthos humilis		•			•		
	Anigozanthos manglesii					•		
	Conostylis aculeata	•						
	Conostylis aculeata x candicans	•						
C	Conostylis candicans subsp. calcicola	•						
	Conostylis preissii					•		
	Conostylis setigera		•					
	Haemodorum laxum	•						
	Haemodorum paniculatum	•				•		
	Haemodorum spicatum	•						
	Phlebocarya ciliata							
Haloragaceae								
	Glischrocaryon aureum					•		
Iridaceae								
*	Gladiolus caryophyllaceus	•					•	•
*	Homeria flaccida			•	•			

		J	H	T	D	B	Jm	Jb
	Orthrosanthus laxus					•	•	
	Patersonia occidentalis					•		
*	Romulea rosea	•		•	•	•		
*	Sparaxis bulbifera	•			•			
Juncaginaceae								
	Triglochin calcitrapum		•	•				
	Triglochin centrocarpum	•	•	•				
	Triglochin trichophorum		•					
Lamiaceae								
	Hemiandra pungens					•		
Lauraceae								
	Cassytha flava		•					
	Cassytha glabella		•	•				
	Cassytha racemosa	•		•				
Lobeliaceae								
	Isotoma hypocrateriformis	•				•		
	Lobelia gibbosa		•					
	Lobelia tenuior			•		•		
Loganiaceae								
	Logania vaginalis			•				
Loranthaceae								
	Amyema miquelii	•		•				
	Nuytsia floribunda					•		
Malvaceae								
L	Alyogyne huegelii var. glabrata			•				
Mimosaceae								
	Acacia cochlearis	•	•					
	Acacia cyclops			•			•	
	Acacia huegelii						•	
C	Acacia lasiocarpa subsp. lasiocarpa		•					
	Acacia pulchella	•						
	Acacia rostellifera		•					
	Acacia saligna	•						
C	Acacia truncata		•					
	Acacia willdenowiana	•						
Myoporaceae								
C	Eremophila glabra subsp. albicans	•						
Myrtaceae								
C S	Baeckea robusta		•					
C E	Calothamnus quadrifidus		•					
	Calothamnus sanguineus	•	•			•		
	Calytrix flavescens					•		
	Eremaea asterocarpa subsp. asterocarpa					•		
	Eremaea pauciflora					•		
	Eucalyptus calophylla						•	
C E	Eucalyptus decipiens		•					
C E	Eucalyptus foecunda		•					

		J	H	T	D	B	Jm	Jb
	Eucalyptus gomphocephala	•		•		•		
	Eucalyptus marginata	•						
	Eucalyptus todtiana					•		
	Hypocalymma robustum	•						
S	Leptospermum spinescens					•		
	Melaleuca acerosa		•					
C E	Melaleuca huegelii		•					
	Scholtzia involucrata					•		
Olacaceae								
	Olax benthamiana		•					
Orchidaceae								
	Caladenia arenicola					•		
	Caladenia flava	•					•	
	Caladenia latifolia			•				
Le	Caladenia longicauda subsp. calcigena ms		•					
	Caladenia georgei		•	•				
	Caladenia reptans (DP)	•						
	Cyanicula gemmata (DP)		•					
	Cyrtostylis reniformis ms		•	•				
	Diuris corymbosa	•				•		
	Elythranthera brunonis	•						
	Eriochilus dilatatus					•		•
	Leporella fimbriata	•	•			•		
	Leptoceras menziesii (DP)	•						
	Prasophyllum fimbria					•		
	Prasophyllum parvifolium		•					
L	Pterostylis aspera		•					
	Pterostylis brevisepala		•	•				
	Pterostylis nana	•	•					
	Pterostylis recurva	•						
	Pterostylis sanguinea	•		•				
	Pterostylis vittata	•						
	Pyrorchis nigricans					•		
	Thelymitra campanulata (DP)	•		•				
Orobanchaceae								
*	Orobanche minor			•		•		
Oxalidaceae								
	Oxalis perennans			•				
*	Oxalis pes-caprae	•		•	•			
Papilionaceae								
	Bossiaea eriocarpa	•						
	Daviesia decurrens	•				•		
	Daviesia divaricata		•					
	Daviesia nudiflora	•						
	Daviesia triflora	•				•		
	Gompholobium aristatum	•						
	Gompholobium knightianum (DP)					•		
	Gompholobium marginatum						•	
	Gompholobium tomentosum		•			•		
	Hardenbergia comptoniana					•	•	
	Hovea pungens		•					

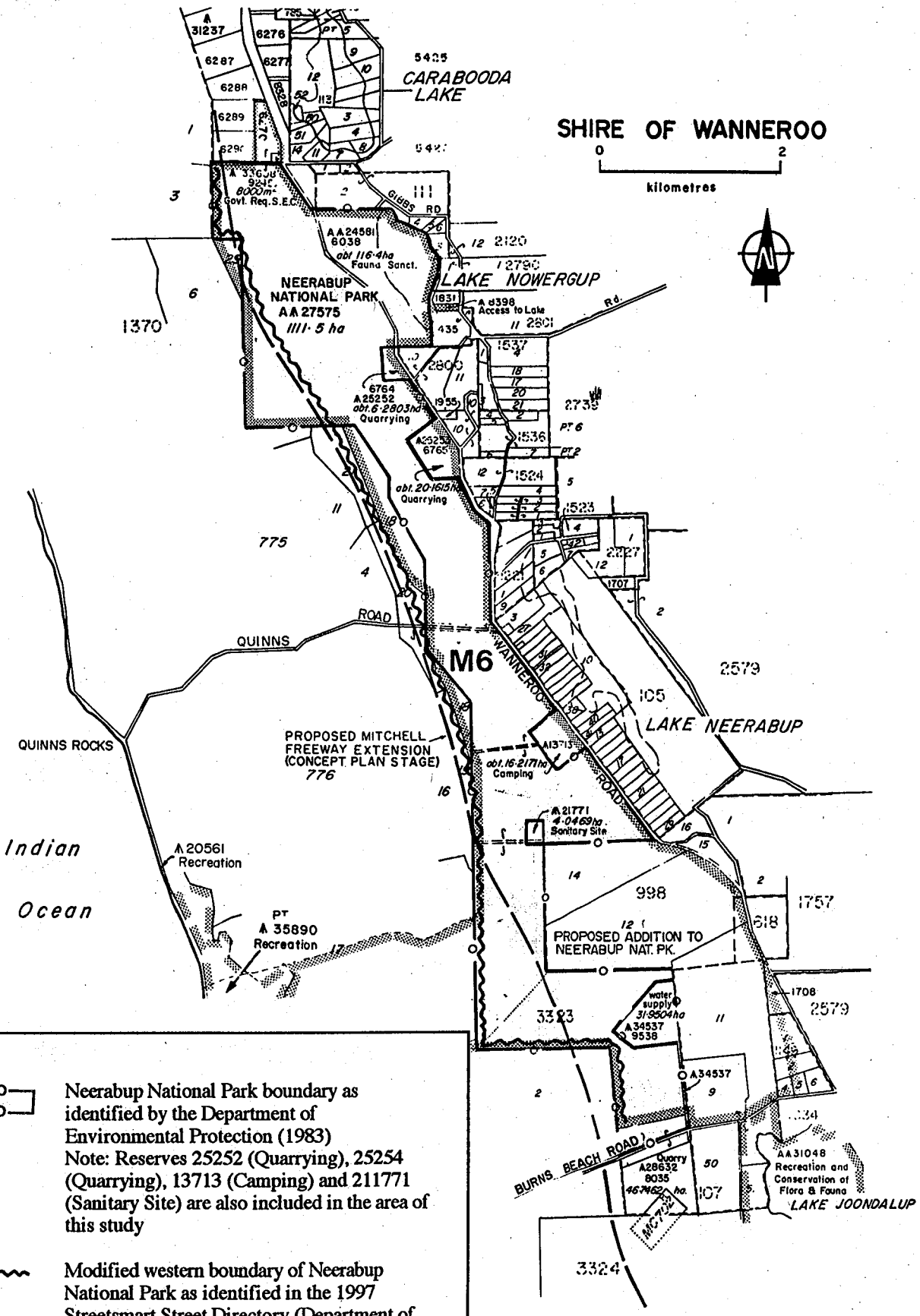
		J	H	T	D	B	Jm	Jb
	Hovea trisperma var. trisperma	•				•		
	Isotropis cuneifolia	•						
C S	Jacksonia calcicola ms (= J. stricta Gibson *et al.* 1994)		•					
	Jacksonia furcellata					•		
3 Ce N	Jacksonia sericea					•		
	Jacksonia sternbergiana	•						
	Kennedia prostrata	•						
*	Lupinus cosentinii			•	•		•	
S	Mirbelia trichocalyx		•					
	Nemcia capitata	•						
	Nemcia reticulata		•					
*	Ornithopus compressus				•			
	Sphaerolobium medium (DP)		•					
C	Templetonia retusa		•					
*	Trifolium arvense			•	•			
*	Trifolium campestre				•		•	
*	Trifolium cernuum			•	•			
*	Trifolium glomeratum				•			
*	Trifolium scabrum				•			
*	Vicia sativa			•				
Phormiaceae								
	Dianella revoluta	•				•		
Phytolaccaceae								
*	Phytolacca octandra				•			
Pittosporaceae								
	Billardiera variifolia						•	
Plantaginaceae								
	Plantago exilis		•					
Poaceae								
*	Aira caryophyllea			•		•		
	Amphipogon turbinatus	•				•		
*	Avena barbata			•	•			
*	Briza maxima			•	•			
*	Briza minor					•		
*	Bromus diandrus				•			
	Catapodium rigidum		•		•			
*	Cynodon dactylon				•			
	Danthonia occidentalis					•		
*	Dichelachne crinita						•	
*	Ehrharta calycina			•	•			
*	Ehrharta longiflora		•	•	•			
*	Holcus setigera						•	
*	Lagurus ovatus			•				
*	Lolium rigidum				•			
	Microlaena stipoides	•		•				
	Neurachne alopecuroidea						•	
*	Pentaschistis airoides							
	Poa drummondiana		•					
C	Poa porphyroclados							
	Stipa compressa	•		•		•		

			J	H	T	D	B	Jm	Jb
		Stipa elegantissima		•					
C	E	Stipa flavescens		•					
	*	Vulpia bromoides			•	•			
	*	Vulpia myuros			•	•			
Polygalaceae									
		Comesperma calymega	•				•		
		Comesperma confertum		•					
Polygonaceae									
		Muehlenbeckia adpressa			•				
Portulacaceae									
		Calandrinia brevipedata		•			•		
		Calandrinia corrigioloides			•		•		
		Calandrinia liniflora		•					
Primulaceae									
	*	Anagallis arvensis var. arvensis		•		•			
Proteaceae									
		Adenanthos cygnorum					•		
		Banksia attenuata					•		
		Banksia grandis					•		
		Banksia menziesii					•		
		Conospermum triplinervium	•				•		
		Dryandra lindleyana (= D.nivea in Gibson *et al.*)	•				•		
		Dryandra sessilis		•					
C		Grevillea crithmifolia		•					
Le		Grevillea preissii		•					
C	E	Grevillea vestita					•		
		Hakea candolleana		•					
		Hakea costata		•			•		
C	E	Hakea lissocarpha	•	•			•		
		Hakea prostrata					•	•	
		Hakea ruscifolia					•		
		Hakea trifurcata		•			•		
S		Persoonia comata		•					
		Persoonia saccata	•						
		Petrophile brevifolia		•					
		Petrophile linearis					•	•	
		Petrophile macrostachya					•		
Le		Petrophile serruriae subsp. nov. (GJK 11421)		•					
		Stirlingia latifolia	•				•		
		Synaphea spinulosa		•					
Ranunculaceae									
		Clematis microphylla		•	•				
		Ranunculus pumilio		•					
Restionaceae									
		Alexgeorgea nitens	•				•		
		Hypolaena exsulca					•		
		Loxocarya cinerea	•						
		Loxocarya flexuosa		•					

		J	H	T	D	B	Jm	Jb
	Lyginia barbata					•		
Rhamnaceae								
	Cryptandra glabriflora					•		
C	Cryptandra mutila		•					
	Cryptandra pungens		•					
	Spyridium globulosum		•					
	Spyridium tridentatum							
Le	Trymalium ledifolium subsp. ledifolium (= T. albicans Gibson *et al.*)		•					
Rubiaceae								
*	Galium murale		•					
	Opercularia vaginata					•	•	
Rutaceae								
	Eriostemon spicatus		•			•		
Santalaceae								
	Exocarpos sparteus		•					
	Leptomeria empetriformis		•					
	Leptomeria preissiana		•					
C	Leptomeria spinosa		•					
	Santalum acuminatum		•					
Sapindaceae								
Le	Diplopeltis huegelii var. huegelii		•					
C E N	Dodonaea aptera		•	•				
Scrophulariaceae								
*	Bellardia trixago							
*	Dischisma arenarium			•	•			
*	Verbascum virgatum				•			
Solanaceae								
C	Anthocercis ilicifolia		•					
*	Solanum nigrum			•	•			
*	Solanum sodomeum				•			
Stackhousiaceae								
	Stackhousia monogyna (DP)		•			•		
	Tripterococcus brunonis	•				•		
Sterculiaceae								
	Thomasia cognata		•					
	Thomasia triphylla			•				
Stylidiaceae								
	Levenhookia pusilla		•			•		
	Levenhookia stipitata	•						
	Stylidium brunonianum	•				•		
	Stylidium calcaratum	•				•		
	Stylidium diuroides					•		
C E	Stylidium junceum		•					
3 Ce	Stylidium maritima ms		•					
	Stylidium macrocarpum (DP)		•					
	Stylidium piliferum					•		

		J	H	T	D	B	Jm	Jb
	Stylidium repens					•		
	Stylidium schoenoides	•						
Thymelaeaceae								
	Pimelea argentea			•			•	
Le	Pimelea calcicola		•					
	Pimelea rosea			•				
Urticaceae								
	Parietaria debilis		•					
Violaceae								
	Hybanthus calycinus		•			•	•	
Xanthorrhoeaceae								
	Xanthorrhoea preissii	•				•		•
Zamiaceae								
	Macrozamia riedlei	•				•		

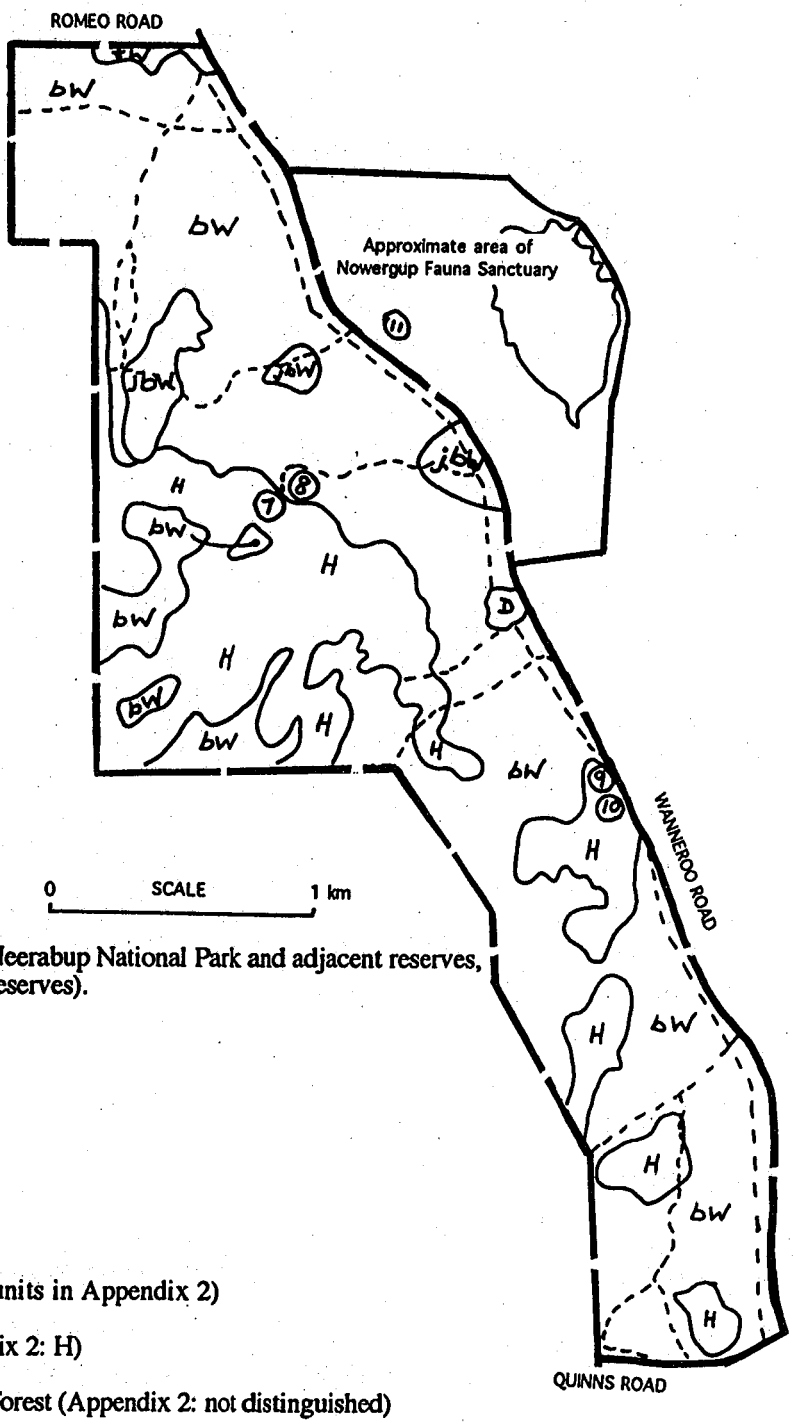
Map 1: Neerabup National Park Location.
(Map modified from Fig 78, Department of Environmental Protection 1983)



Key

- Neerabup National Park boundary as identified by the Department of Environmental Protection (1983) Note: Reserves 25252 (Quarrying), 25254 (Quarrying), 13713 (Camping) and 211771 (Sanitary Site) are also included in the area of this study
- Modified western boundary of Neerabup National Park as identified in the 1997 Streetsmart Street Directory (Department of Land Administration, WA)
- M 6 Boundary

Map 2: Neerabup National Park Vegetation Map



Key.

Boundary of the study area - Neerabup National Park and adjacent reserves, (see Map 1 for details of adjacent reserves).

plant community boundary

Principal tracks

Roads

③ Site location

Mapped Plant Communities (comparable units in Appendix 2)

H = Shrublands or Heaths (Appendix 2: H)

sLF = *Jacksonia sternbergiana* Low Forest (Appendix 2: not distinguished)

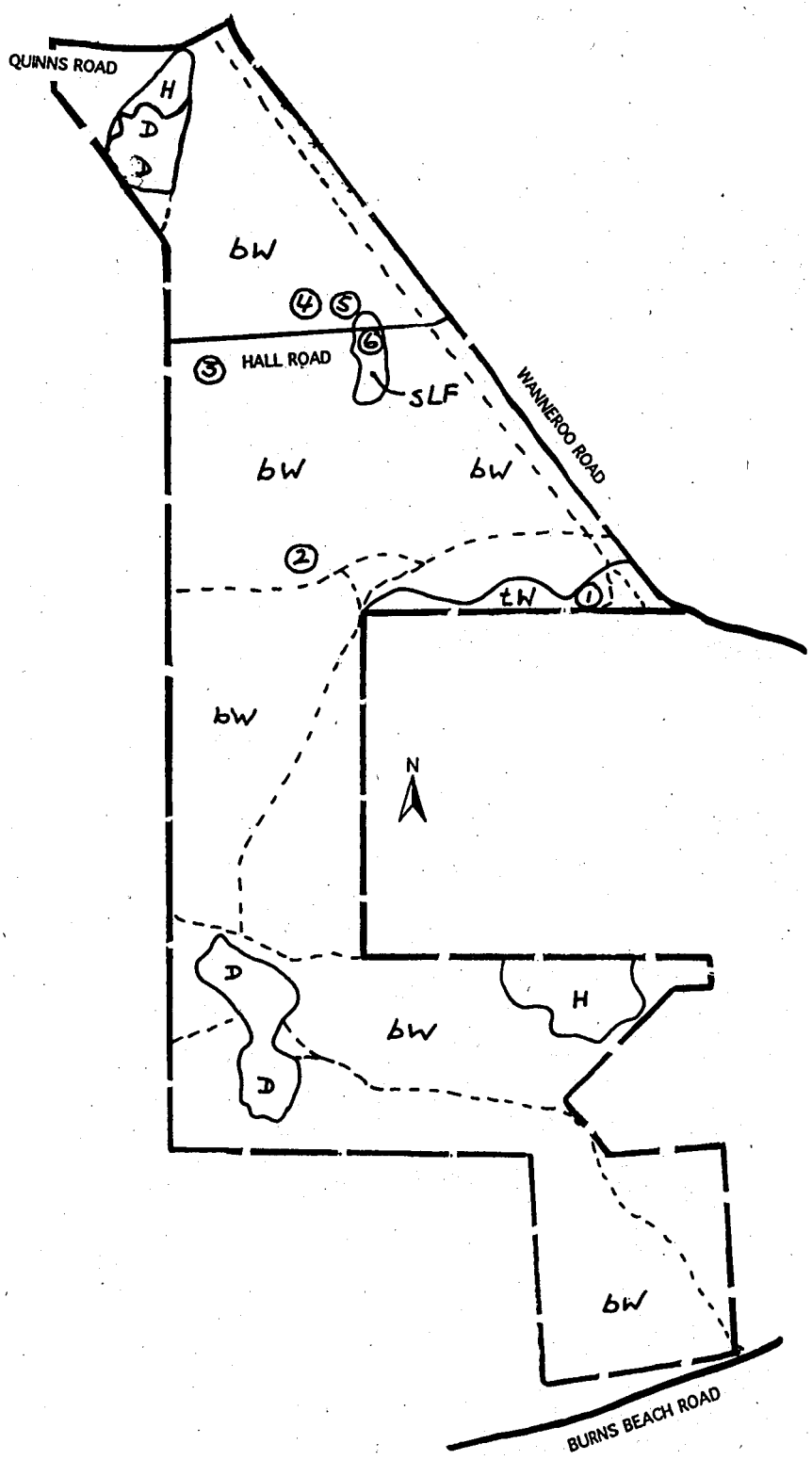
bW = *Banksia* Woodland (Appendix 2: B)

jbW = Jarrah Forest to Woodland over *Banksia* Woodland (Appendix 2: Jb and Jm)

tW = Tuart Woodland (Appendix 2: T)

D = Disturbed (limestone quarries)

Map 2: Map 2: Neerabup National Park Vegetation Map



Map 3: Distribution of the Floristic Community Types (Gibson *et al.*) 1994)