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FLORA CONSERVATION VALUES OF MUNDIJONG ROAD

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INTRODUCTION

This report details the flora conservation values of the southern side of Mundijong Road between Webb Road and Duck Pond Road, and including the water reserve at Duck Pond Road (Appendix 7).

BACKGROUND

This road preserves the only east-west vegetated sequence of the Pinjarra Plain in the area between Bunbury and Perth, and as such has been recognised as having significant conservation values in all recent reports on the flora of the Swan Coastal Plain or the Shire of Serpentine- Jarrahdale. That is:

1)Road Verge Report (Anon, 1992 Assessment of the Conservation Value of roadside Vegetation in the Shire of Serpentine-Jarrahdale, Roadside Conservation Committee).

2) Eastern Side of Coastal Plain Report (Keighery, B.J. and Trudgen, M.E., 1992 Remnant Vegetation on the Alluvial Soils of the Eastern Side of the Swan Coastal Plain. Unpublished Report to CALM for National Estate Program). For relevant sections of this report see Appendix 2.

3) Floristic Survey of the Southern Swan Coastal Plain, 1994. For relevant sections of this report see Appendix 1.

4) The verbal and written proceedings of the seminar on Environmental Management in the Shire of Serpentine-Jarrahdale held on July 9, 1994. See Appendix 6 for a copy of the written paper.

5) The occurrence of Declared Rare Flora at "Duck Pond" was notified to the relevant authority (CALM) in 1992, see Appendix 5.

6) Information relevant to Mundijong Road was supplied to the consultant responsible for the Environmental Audit of the South East Corridor in 1993, see Appendix 8.

7) Site information from the Swan Coastal Plain Survey was released to the Dept. of Planning and Urban Development for the Perth Environmental Plan in 1993. This was to enable them to utilise the floristic data in their study, and incorporate it in their findings. See Appendix 9 (Peel Maps 3.6 and 4.6).

The area has been frequently identified as having high conservation significance in numerous reports, seminars and correspondence over the past 3 years.

CURRENT

SWAN COASTAL PLAIN SURVEY DATA

Appendix 3 details the 251 plant species recorded at the quadrats established along Mundijong Road in 1992. From these data we have compiled Appendix 4.
The species listed also provide information which can be used to re-construct the composition of the understorey of the now destroyed *Casuarina obesa* fresh-water woodlands of the Pinjarra Plain in the Serpentine-Jarrahdale Shire.

Although the verge has been subject to serious local disturbance in the past allowing subsequent weed invasion, careful management will ensure the maintenance of this, as the only substantially natural east-west corridor of vegetation, on the coastal plain in the Shire

PLANT TAXA OF CONSERVATION SIGNIFICANCE PRESENT ALONG MUNDIJONG ROAD

Appendix 4 details 72 taxa from Appendix 3 which are of conservation significance along Mundijong Road.

One species of declared rare flora (*Aponogeton hexatepalus*) is known. The populations of *Verticordia plumosa* var *pleiobotrya* along Mundijong Road are the only known occurrences of this taxon, and it will be considered for gazettal as rare flora.

The only known occurrence of *Baekea tenuiflora* south of Gingin on the Swan Coastal Plain is found along Mundijong Road. Numerous taxa more commonly associated with the scarp and plateau are present in the area. The records of *Kennedia stirlingii*, *Opercularia apiciflora*, *Stypandra glauca* and *Trichocline spathulata* at "Duck Pond" are of considerable interest as they represent large disjunctions to the west in the ranges of species normally found on the scarp and plateau and rarely recorded on the plain.

There are 6 priority taxa currently recorded along Mundijong Road.

FUTURE

The vegetation of the Mundijong Road Verge between Webb Road and Duck Pond has been given interim protection by the EPA as part of the System Six update, based on the recommendations in the Swan Coastal Plain Report.

A complete report on the flora and vegetation of this area of Mundijong Road is being prepared as part of a National Estates Program Grant for 1995/96 to prepare publications on areas of significance on the Swan Coastal Plain. This report will be completed by the end of 1995.

SUMMARY

The Mundijong Road Verge preserves a sequence of plant communities, once common on the Pinjarra Plain south of Perth, but which have now been almost completely destroyed. This road verge is the only remaining remnant of one of these communities.

The plant species present along Mundijong Road are the only remaining record of the species and genetic composition of the understorey of the *Casuarina obesa* woodlands of the Serpentine-Jarrahdale Shire.

Many of the plant species present along Mundijong Road are of conservation significance because most of their habitat on the coastal plain has been cleared.

APPENDIX ONE

Extract from Floristics of the Southern Swan Coastal Plain

A Floristic Survey of the Southern Swan Coastal Plain

by

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Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., Lyons, M.N. (1994) *A Floristic survey of the southern Swan Coastal Plain.* Unpublished Report for the Australian Heritage Commission prepared by Department of Conservation and Land Management and the Conservation Council of Western Australia

This project was funded under the National Estate Program, a Commonwealth - financed grants scheme administered by the Australian Heritage Commission (Federal Government) and the Heritage Council of W. A. (State Government).

RECOMMENDATIONS

This study of the plant communities of the Swan Coastal Plain between Seabird and the foothills of the Whicher Range has lead to the following recommendations:

1) Eleven taxa should be proposed for listing as Declared Rare Flora and the priority listing for 13 taxa should be changed as detailed (Table 6).

2) The three most threatened community types need urgent reservation. The following areas should be declared as A class Nature Reserves for the protection of flora and fauna:

a) the southern ironstone communities from the five small areas of State Forest and the road and rail reserve east of Ruabon Nature Reserve. (This road and rail reserve is also of regional significance as it is one of the last two remaining continuous vegetated transects in the study area showing the catena of original vegetation types on the eastern side of the plain.)

b) the sedgeland in Holocene dune swales in the Point Becher area (M106) and the north west corner of Lake Walyungup (M103).

c) the eastern *Banksia attenuata* woodlands over species rich dense shrublands from Koondoola open space, Landsdale Rd, M12, and M 53.

3) Final selection of areas for reservation of the 10 poorly reserved community types should be made in conjunction with species reservation data currently being collected.

4) The road and drain reserve on the southern side of Mundijong Road be declared as an A class Nature Reserve. (This area is of regional significance being the second catena of vegetation types across the eastern side of the plain).

5) As a consequence of the small amount of remnant vegetation on the eastern side of the plain, all such remnants in the study area with the basic vegetation intact or able to be regenerated are of high conservation value.

6) A further analysis of reservation status is needed since the present definition does not consider the area of communities reserved.

7) A similar analysis needs to be undertaken to determine conservation values of remnants not covered in this study since floristic community types are not well correlated to presently available geomorphological or vegetation mapping.

8) Additional work on the Swan Coastal Plain is required to determine, more precisely, the nature of floristic variation in the seasonal wetlands (because of their high levels of heterogeneity).

occurring on the coastal plain will be the subject of a future report. General areas in which DRF and proposed DRF occur are shown in Table 7 and Figures 2 and 3.

Table 7. General areas in which DRF and proposed DRF was located in the present survey and their present vesting.

Area	Current Vesting
Austin Bay Nature Reserve	A-class Nature Reserve
Agriculture Protection Board Reserve	Vested in APB for conservation of flora
Brixton Street Wetlands	Homeswest
C53 (Coolup Reserves)	Local Government and Road Reserve
C58 (Reserve A23172)	Local Government
GinGin Road Reserve	Road Reserve
Ken Hurst Park	Local Government
Lake Bambun (Reserve 22831)	Local Government
Lake Muckenburra (Reserve 25431)	Local Government
M53 (Reserve C29880)	SECWA, Fires Board, Main Roads, WAWA
Meelon Nature Reserve	Proposed A-class Nature Res (vested in CALM)
Mundijong Road	Road and Drain Reserves
Southern Ironstones	State Forest
Talbot Road Reserve	Local Government
VCL South of Seabird (part Red Book 5.24)	Vacant Crown Land
Waterloo School Site	Local Government
Wonnerup Road Reserve	Road and Rail Reserve
Yalgorup National Park	A-class National Park
Yoongarillup Nature Reserve	A-class Nature Reserve

Comparison with Flora of Perth Region

The *Flora of the Perth Region* (Marchant *et al.* 1987) records some 2057 species (almost 2200 taxa in all) from an area of 10,500 square kilometres stretching from Guilderton to Boyanup and inland to cover the Darling Scarp and part of the Plateau (see Map 1 in Marchant *et al.* 1987). This area covers 80-90% of our study area and it is useful to compare our data with that of the Flora.

Some 792 taxa recorded in the *Flora of the Perth Region* were not encountered during the current survey (Table 8). Of these taxa 222 are restricted to the Darling Scarp and Plateau (areas not sampled). The present survey may have been expected to encounter the 525 taxa recorded as occurring on the coastal plain. Of these 525 taxa 183 were native and 342 were introduced. The most important families are the Poaceae, Papilionaceae, Asteraceae, Cyperaceae, Brassicaceae, Orchidaceae, Solanaceae and Iridaceae (Table 9).

Table 8. Geographic occurrence of 792 taxa recorded in the Flora of the Perth Region but not encountered in the present survey.

Habitat	Number of Taxa
Restricted to Coastal Plain	525
Restricted to Scarp or Plateau	222
Largely restricted to Scarp and Plateau	18
Taxonomic revisions (no longer in FPR area)	27
Total	792

maintain themselves in very good condition for long periods of time without disturbance. All forms of disturbance should be excluded from these critical threatened remnants until we have a much better understanding of community function.

Community type 19 (sedgeland in Holocene dune swales): This community type is only known from small linear wetlands in the Point Becher area (M106) and north west corner of Lake Walyungup (M103) (Figure 9b). Both of these areas are in proposed conservation areas. These reserves should be gazetted as A class Nature Reserves for conservation of flora and fauna. This endangered community type is very restricted and presently at risk from urban and infrastructure developments.

The eastern *Banksia attenuata* woodlands over species rich dense shrublands (type 20a): This community type is also considered endangered. It is also very restricted being recorded in this survey from only seven quadrats. This community is found at Koondoola open space, Landsdale Rd, M12 (a small reserve near Marangaroo Golf Course), M 53 (another System 6 recommendation), and the Agricultural Protection Board (APB) complex at Forrestfield. Koondoola, M12 and M 53 are proposed conservation reserves. The APB reserve has recently had the conservation of flora inserted into its purpose. All the other small remnants should be declared as A class Nature Reserves for the conservation of flora and fauna (Figure 9a). Urgent investigation of areas apparently affected by dieback at M12 need to be undertaken with implementation of any necessary control action.

Another area that should be vested as a Nature Reserve for the conservation of flora and fauna as a matter of priority is the road and drain reserve along Mundijong Rd (Figure 9b). Like the road east of Ruabon Nature Reserve this linear remnant covers the full catena of vegetation types across the alluvial soils of the coastal plain west of Mundijong. These two linear remnants are therefore of both regional and national significance depicting the vegetation sequences that elsewhere have been reduced to fragments or totally cleared. Road verges have long been considered important for conservation. The EPA (1976) has stated that it is of the opinion that all road verges should be protected. The regional importance of these two reserves require formal vesting for conservation purposes.

For the other 16 community types that are unreserved or poorly reserved a range of reservation strategies are possible to improve their reservation status. To optimally locate reserves, both species and community reservation status need to be considered. Species reservation data is presently being gathered in a concurrent project (G.J. Keighery, unpublished data). In a later report these data will be combined to allow an optimal reservation strategy to be developed. Table 24 shows possible areas for reservation that would improve the present reservation status of the remaining unreserved or poorly reserved community types.

It should be noted that many of the possible areas are already proposed National Parks, Nature Reserves or EPA red book recommendations or are presently being managed for conservation as one of their primary aims (eg. Garden Island, Ambergate Reserve, Trigg Reserve, Brickwood Reserve, Brixton Street). However their present vesting does not give them maximum protection under WA legislation. This table highlights the very high conservation values of these areas.

Table 24. Possible areas for reservation to improve community conservation status for the 15 non critical or endangered community types on the southern Swan Coastal Plain.

Type	Reservation status	Possible areas for conservation reserves.
1a	Unreserved	Areas of State Forest along base of Whicher Range, Payne Road Reserve
3a	Unreserved	Brixton Street, Brickwood Reserve, Mundijong Rd, C53, Lambert Lane
14	Unreserved	M5, Proposed Ridges extension to Yanchep N.P. (M4)
20c	Unreserved	Talbot Rd Reserve
23b	Unreserved	M5, Gnangara Water Reserve, Proposed Melaleuca Park NR (M9), Proposed Ridges extension to Yanchep N.P (M4), Lake Muckenburra Reserve, VCL north of M5

APPENDIX TWO

Extract from Keighery and Trudgen, 1992, Remnant Vegetation of the Eastern side of the Swan Coastal Plain

APPENDIX 2: Extracts from Keighery, B.J. and Trudgen, M.E. 1992 **Remnant Vegetation on the Alluvial Soils of the Eastern Side of the Swan Coastal Plain.** Unpublished report to the Department of Conservation and Land Management for the Heritage Commission.

SUMMARY

This survey was commissioned because of concern that clearing for agriculture and urban development had reduced the native vegetation of the eastern side of the Swan Coastal Plain between Pinjarra and GinGin to scattered small remnants. The concern was heightened by the apparent rapid loss and degradation of these remnants and the fact that very little was known about the vegetation and flora of the study area.

The field work, examination of aerial photographs and maps found that this concern was soundly based. In fact, so little of the remnant vegetation of this section of the Swan Coastal Plain remains that it is too late to adequately conserve the vegetation associations even if all remnants were protected. The study shows that we will never know for certain what the vegetation of the area was like as insufficient remains even for this purpose.

However the survey has shown that the vegetation associations of the eastern side of the Swan Coastal Plain between GinGin and Pinjarra are diverse both in structure and in the composition of the flora.

Because so little of this diverse flora and vegetation remains, all remnant vegetation with the basic structure intact, or able to be regenerated is considered of flora conservation value and recommendations made for its protection and management. Twenty two areas of remnant vegetation are the subject of specific recommendations. These recommendations would conserve the flora and landscape of the the alluvial soils of the eastern side of the Swan Coastal Plain within the limits of the remaining vegetation.

The characteristic vegetation of the heavy soils on the eastern side of the Swan Coastal Plain (the quintessential Pinjarra Plain) was found to have been:

Eucalyptus calophylla (Marri) Woodland to Open Forest
Casuarina obesa (Salt Water Sheoak) Woodland to Open Forest
Eucalyptus calophylla and *Eucalyptus wandoo* (Wandoo) Woodland to Open Forest
Eucalyptus wandoo Woodland to Open Forest
Eucalyptus rudis (Flooded Gum)Woodland to Forest
Ephemeral Wetlands, a complex mosaic of shrublands, heaths, sedgelands and herblands.

The woodlands and open forests are almost extinct having been reduced by clearing to a few small isolated pockets. That this has happened is an indictment on our natural conservation planning process in our state and indicate a degree of ignorance of the value of vegetation especially when compared to the resources and publicity given to the conservation of individual species.

The ephemeral wetlands show great diversity of vegetation association and flora. These wetlands are the centre of endemism on the eastern side of the Plain and contain many poorly known taxa. Of the vegetation association characteristic of the study area the wetlands remaining are comparatively extensive. A comprehensive flora conservation reserve network for these wetlands could and should be established.

The composition of the flora of these woodlands, forests and wetlands was found to be unusual, having a much closer relationship with the flora of the Darling Scarp than was previously recognised in the botanical literature.

The vegetation associations of the sandier soils of the eastern side of the Plain have close affinities with the vegetation of the Bassendean Sands to the west while still retaining a degree of affinity with the flora of the Darling Scarp. However an area of *Banksia* Woodland was identified, within the metropolitan area, that has close affinities with the flora of the Scarp and the northern sandplains and as such is a unique association in need of reservation.

Some important areas of remnant vegetation on the Ridge Hill Shelf are identified and recommendations made for their reservation. A rare vegetation type, *Eucalyptus lanepoolei* Woodland was identified in this area.

The need for a flora conservation reserve on the Dandaragan Plateau, south of GinGin also became apparent during the survey.

RECOMMENDATIONS

RECOMMENDATION 1
As a consequence of the small amount of remnant vegetation on the alluvial soils of the eastern side of the Swan Coastal Plain all such remnants in the study area with the basic vegetation structure intact or able to be regenerated (Poor or better condition) are of significant flora conservation value, regardless of the remnant's size.

RECOMMENDATION 2
All owners or managing authorities of land containing remnant vegetation should be contacted with information concerning the significance and nature of the remnant vegetation on the alluvial soils of the eastern side of the Swan Coastal Plain with particular reference to the vegetation on their land.

RECOMMENDATION 3
Local Government Authorities in co-operation with the appropriate bodies should develop a Remnant Vegetation Manual outlining guide-lines for the management of remnant bushland. Workshops on the application of the guide-lines should be held periodically with the appropriate management groups.

RECOMMENDATION 4
Immediate action should be taken to ensure that the twenty two areas of remnant vegetation subject to individual recommendations (see Section 6.3) are vested and managed for the conservation of flora as their main purpose, according to the specific recommendation for each area.

RECOMMENDATION 5
The remnant vegetation identified on the Reagan soil unit and Dandaragan Plateau south of GinGin should be urgently surveyed to determine the most suitable area to be acquired for a flora conservation reserve.

RECOMMENDATION 6
A local tree planting programme should be developed for the eastern side of the Swan Coastal Plain to preserve this unique treescapes of the area.

Extracts from Section 6 3 - Remnant Vegetation of High Conservation Value

Although it is considered that all remnant vegetation in Poor or better Condition in the study area is of conservation value some areas are of high conservation value.
The following factors were considered in assessing the conservation value of an area of remnant vegetation:

- size of the remnant
- condition of the vegetation associations present
- diversity of vegetation associations present
- distribution and extent of the vegetation associations both in the remnant and elsewhere
- representation of the vegetation associations in conservation reserves
- floristics of the association
- the variation found in the association.

On the basis of these factors recommendations are made to protect as good a representative of the vegetation of the study area as is reasonably practical. However it must be understood that these recommendations are made within the limits of the extant remnant vegetation.
The distribution of these recommendations according to the area of the remnant outlined below is of interest.

Area (ha)	Number of Recommendations
0 - 5	4
5 - 20	4

20 -40	3
40-60	4
>100	3 (includes all of Forrestdale Lake Reserve)

Roadside and Rail remnants, Recommendations for Areas 5 -8 are excluded.

Excluding the 3 larger areas, there are only 317 ha encompassed by 15 of the recommendations. This again highlights the paucity of remnant vegetation in the study area. Present Nature Reserves are not included in this assessment unless they were seen as part of a larger area recommended for flora conservation. The status of all Nature Reserves should be maintained. This study identifies the flora conservation values of the Nature Reserves in relation to the flora and vegetation of the study area. This information is contained in the Location Descriptions (Appendix 1) and the Sections on Flora (Section 4) and Vegetation (Section 5).These Reserves should be managed to maintain and enhance their flora conservation value.

6.3.1 Smaller Areas of Remnant Vegetation

All the areas identified below for special recommendations are very small in area, less than 5 ha in area. Normally such small areas would not be considered as areas suitable for flora conservation but these areas are significant representatives of vegetation associations identified by this study that are poorly conserved or not conserved at all. Some are the only remnants of the association extant.
Two main categories can be distinguished:

6.3.1a Woodlands to Open Forests

These woodlands to open forests have a extremely floristically rich shrub, herb and sedge flora. All are on lands with very little relief. None of these associations remain in large tracts. Several were apparently widespread, as is indicated by the extent of these associations in a Completely Degraded Condition in the study area. The others were probably restricted. These vegetation associations are

i) remnants of previously widespread associations

Area 1 - Marri Open Forest to Woodland, Pinjarra Plain
Duckpond and Mundijong Rd intersection, Serpentine - Jarrahdale, approx 3 ha (Location 16) - local government
Value - Vegetation. Map, p102.
Largest intact area of remnant of Marri Open Forest, other Marri Woodland to Open Forest is found in isolated nodes in larger locations
Significant taxa, 9 taxa:
Of interest are: 4#*Grevillea pilulifera*, 1,5#*Opercularia apiciflora*, 4#*Baeckea camphorosmae*, 4#*Hibbertia commutata*, 4#*Neurachne alopecuroidea*, 4#*Trichocline spathulata*, *Drosera macrantha* 'robust', 2,4#*Kennedia stirlingii*, 4#*Mesomelaena tetragona*.
Recommendation
CALM liaise urgently with the Local Government Authority to retain and manage the area for its flora conservation values

6.3.1b Roadside and Railway Remnants

Area 6 - Wetland Associations, Pinjarra Plain
Mundijong Rd, road and drain reserve to the south of road between Webb Rd and Lightbody Rd, Serpentine - Jarrahdale (Location 23) - local government, ?WAWA
Value
An E W transect of the vegetation associations of the heavy seasonally innundated soils of flats of the southern Pinjarra Plain; *Melaleuca* Shrubland, Mixed Low Heath, Herblands and

Sedgelands in Very Good to Completely Degraded Condition.
Significant taxa: >15, 2 priority species

Recommendation

CALM liaise urgently with the Local Government Authority to retain and manage the area for its flora conservation values, in accordance with the Management Guidelines recommended by the Roadside Conservation Committee for roads of High Conservation Value.

Extractx form Appendix 1: Location Descriptions

Table 1: Guide to the Location Descriptions
The Location Descriptions are of the following format
a) Number of Location and description geographic location. For example
Location 1 - Wetlands to the east of Forrestdale Lake. Location Map 11 and Vegetation Map Area 20, p 99.
b)A symbolized guide (Table 1) to the **vegetation associations** at the Location and the **condition of the vegetation.** For example
Veg: b LW, mb W, mi LHt & WM (mi Ht,me Ht,S & H)
Cond: Very Good to Good
c) General Comments
A general description of the vegetation at the Location and comments on adjacent vegetation. Areas quoted are approximate from aerial photographs. For example
GENERAL COMMENTS(Location 1)
A mosaic of associations are present at this location. etc
d) Description of the individual sites at each Location, the Site or 'Site'(descriptions of the general area, not area of 10 m x 10 m).
Each site description includes:

- **a vegetation description** (Table 1)
- a listing of the species considered of most interest at the site, with the following notations to indicate species of significance

*	Weed
1 #	New record in the Perth Region
2 #	Outside recorded range (Marchant et al, 1989)
3 #	Declared Rare Flora, Priority Species (Atkins 1991) or species of particular interest.
4 #	Confined to the Scarp and eastern side Plain (Table 4)
5 #	Confined to the eastern side of the Swan Coastal Plain in Perth Region and occurring in other regions(Table 5)
6 #	Confined to the eastern side of the Swan Coastal Plain (Table 6)
+	Voucher collected

- **condition assessment (Table 2).**
- **description of physical attributes, including**

Soil - observed soils and mapped soils (From Van Gool 1990, Wells & Hesp 1981, King & Wells 1990, Churchward & McArthur 1980 and McArthur 1987. Symbols for mapped soils preceded by a ? indicate that the area was not mapped and an extrapolation was made from the adjacent mapped soils or the boundaries were diffuse.)
Drainage - poor, moderate or well drained and presence and approx.depth of free water
Aspect - N, NE, E, SE, S, SW, W, & NW; steepness slope
Degraded Locations are described only with symbolic (For Example Location 6) and both symbolic and word descriptions (For Example Location 12).

Location 15 - **Duckpond and Mundijong Rd intersection.** Location Map 12. vegetation Map Area 2, p83.
Veg: m W & WM (me Sh, H & S) **Cond: Good to Completely Degraded**
GENERAL COMMENTS
This is one of the few areas of Marri Woodland found with an intact understorey, in Good Condition.
Much of the south eastern section of this Location is in Very Poor Condition or Completely Degraded due to clearing, too frequent burning and significant invasion by **Ehrharta calycina*, **Ehrharta latifolia*, **Briza maxima*, **Hypochaeris glabra* and * *Cynodon dactylon* (Couch).

Site 15 a

me Sh, H & S ***Melaleuca viminea*** **and** ***Hakea varia*** **Open Shrubland over Open Herbland and Open Sedgeland**

Comments: *Melaleuca viminea* occurs in a clump. In adjacent areas there are patches of Herbland and Sedgeland.

Shrubs: *Melaleuca viminea, Hakea varia*

Herbs: *Caesia micrantha, Triglochin procera, Tribonanthes ?australis, Drosera gigantea, Drosera* species, *Stylidium* species, 3#*Stylidium utricularioides*

Sedges: *Lepyrodia muirii, Cyathochaeta avenacea, Mesomelaena tetragona, Leptocarpus canus*

CONDITION

Rating **Good to Very Good**

Comments: Some of the plants appear to be rotting, innundation is probably greater than average, collects of the road.

Aerial Photo: Run 10.5051

Soil: Red loam , P3 (Van Gool 1990)

Drainage: poor, water to 25cm

Aspect: flat

Site 15b

m W Marri Woodland over Low Shrubland over Closed Herbland to Herbland and Open Sedgeland

Trees : *Eucalyptus calophylla*

Shrubs: *Jacksonia furcellata, Xanthorrhoea preissii, X. ?brunonis, Phyllanthus calycinus, Grevillea pilulifera, Dryandra sessilis, Opercularia vaginata,* 1#*Opercularia apiciflora, Baeckea camphorosmae, Hibbertia commutata, Astroloma ciliatum, Daviesia angulata*

Adjacent 2#*Grevillea bipinnatifida*

Grasses: *Neurachne alopecuroidea,* **Briza maxima*

Herbs: *Caesia micrantha, Trichocline spathulata, Sowerbaea laxiflora, Drosera macrantha , Dampiera* sp, *Arthropodium capillipes, Haemodorum* species, *Thysanotus multiflorus, Conostylis aculeata, Diuris longifolia,* 2#*Kennedia stirlingii,* **Romulea rosea,* **Hypochaeris glabra*

Sedges: *Mesomelaena tetragona, Loxocarya?flexuosa*

CONDITION

Rating **Good to Very Good**

Comments: There is no bare ground in the area, is this the the vegetatation of the "grassy plains" of the early European Settlers.

Aerial Photo: Run 10.5051

Soil: red brown loam, P3 (Van Gool 1990)

Drainage: poor, waterlogged

Aspect: gentle slope to south east

Location 24 - Mundijong Rd south side road between Webb Rd and Lightbody Rd. Location map 12.

Veg: me Ht, me Sh, m W, c W, mi Ht H & S Cond: Very good to Completely Degraded

GENNERAL COMMENTS

Throughout the area are scattered

Casuarina obesa-on poorly drained flats over *Melaleuca* Open Heath over Low Open Heath over Herbland and/or Sedgeland.

Eucalyptus rudis - along drainage lines

Eucalyptus calophylla - on the better drained rises over *Melaleuca* Open Heath over Low Open Heath over Herbland and/or Sedgeland.

The condition varies from Very Good to Completely Degraded.

This section of Mundijong Rd contains the greatest variety of associations in Good Condition that were probably representative of the vegetation of the Pinjarra Plain. The complete Location is in need of detailed survey. This roadside was identified by this study as an important conservation area and is to be surveyed in detail in the Swan Coastal Plain Survey. A separate publication on the vegetation and floristics of this Location will be prepared as part of the Swan Coastal Plain Survey.

General Vegetation Description for the road verge

me Ht ***Melaleuca*** **Open Heath over Low Open Heath over Herbland and/or Sedgeland.**

Site 24a

cnr Lightbody Rd and Mundijong Rd

me Sh ***Melaleuca*** **Shrubland with scattered** ***Casuarina obesa*** **and Marri over** ****Watsonia***

CONDITION
Rating **Completely Degraded**
Comments: Burnt too frequently, soil disturbed and weed invaded
Aerial Photo: Run 11 5045
Soil: P3 (Van Gool, 1990)
Drainage: poor, waterlogged
Aspect: flat

Site 24b

300 m W Kargotich Rd

mi Ht **Low Open Heath with scattered Marri and** ***Viminaria juncea*** **over Open Herbland and Open Sedgeland**

Trees: *Eucalyptus calophylla*
Shrubs: *Viminaria juncea, Melaleuca viminea, Hypocalymma angustifolium,* 4#*Kunzea micrantha, Allocasuarina humilis*
Herbs: *Borya* sp, 3# *Gonocarpus pithyoides*
Sedges: *Schoenus* sp
CONDITION
Rating **Very Good to Good**
Comments: A reassessment of Condition should be made when the area is less wet.
Aerial Photo: Run 11 5045
Soil: P4 (Van Gool, 1990)
Drainage: poor, waterlogged
Aspect: flat

Site 24c

300 m W Kargotich Rd

mi Ht, H, S **Low Open Heath with scattered** ***Actinostrobus*** **and** ***Melaleuca*** **over Open Herbland and Open Sedgeland**

Shrubs: *Actinostrobus pyramidalis, Viminaria juncea, Melaleuca viminea, M. pauciflora,* 4#*M. lateriflora, Hypocalymma angustifolium* , 4#*Kunzea micrantha*
Adjacent: 4#*Melaleuca lateritia,* 4#*M. uncinata,* ?6#*Baeckea tenuifolia,* 4#*Calothamnus hirsutus,* 6#*Verticordia plumosa ssp. pleiobotrya,* 6#*Petrophile media* var. *juncifolia,* 6#*Pimelea imbricata* ssp. *gracillima*
Herbs: 6#*Drosera bulbigena, Wurmbea* sp, *Tribonanthes australis, Borya* sp
Adjacent: 5#*Anthotium junciforme, Pogonolepis sp.*?
Sedges: *Schoenus brevisetis*
Adjacent: 4#*Harperia lateriflora*
CONDITION
Rating **Very Good to Good**
Comments: A reassessment of Condition should be made when the area is less wet.

Aerial Photo: Run 11 5045
Soil: P4 (Van Gool, 1990)
Drainage: poor, waterlogged
Aspect: flat

Site 24d

rise at 800 m E Kargotich Rd
m W Marri Open Woodland over Low Open Heath over Open Herbland and Open Sedgeland
CONDITION
Rating **Good**
Comments: A reassessment of Condition should be made when the area is less wet.
Aerial Photo: Run 11 5045
Soil: P4 (Van Gool, 1990)
Drainage: poor, waterlogged
Aspect: flat

Site 24e

W large drain Mundijong Rd
c W Casuarina Low Woodland over *_Watsonia_ Herbland
Condition
Rating **Very Poor to Completely Degraded**
Comments: Burnt too frequently, soil disturbed and weed invaded.
Aerial Photo: Run 11 5045
Soil: P4
Drainage: poor, waterlogged
Aspect: flat

APPENDIX THREE

Extract from Data base of plant species records from quadrats along Mundijong Road

APPENDIX 3: Site Based Flora List for Mundijong Rd
(extracted from the CALM Swan Coastal Plain database, Mud 1-7,9, Duck 1-3, 3/5/95)

Amaranthaceae
- Ptilotus drummondii

Anthericaceae
- Agrostocrinum scabrum
- Borya scirpoidea
- Caesia micrantha
- Caesia micrantha (Blue flowered form GJK 10857)
- Chamaescilla corymbosa
- Dichopogon capillipes
- Laxmannia ramosa
- Laxmannia squarrosa
- Sowerbaea laxiflora
- Thysanotus dichotomus
- Thysanotus manglesianus
- Thysanotus multiflorus
- Thysanotus patersonii
- Thysanotus sparteus
- Thysanotus thyrsoideus
- Tricoryne elatior
- Tricoryne humilis

Apiaceae
- Hydrocotyle callicarpa
- Hydrocotyle diantha
- Schoenolaena juncea

Aponogetonaceae
- Aponogeton hexatepalus

Asparagaceae
- * Myrsiphyllum asparagoides

Asteraceae
- Angianthus drummondii
- Brachyscome bellidioides
- Brachyscome iberidifolia
- * Conyza bonariensis
- Cotula cotuloides
- * Dittrichia graveolens
- Hyalosperma cotula
- * Hypochaeris glabra
- Olearia elaeophila
- Siloxerus humifusus
- * Sonchus oleraceus
- Trichocline spathulata
- * Ursinia anthemoides

Casuarinaceae
- Allocasuarina humilis
- Allocasuarina microstachya
- Casuarina obesa

Centrolepidaceae
- Aphelia cyperoides

Brizula nutans
Centrolepis aristata
Centrolepis humillima
Centrolepis inconspicua
Centrolepis mutica

Colchicaceae
Burchardia multiflora
Burchardia congesta

Crassulaceae
Crassula pedicellosa

Cuscutaceae
* Cuscuta epithymum

Cyperaceae
Baumea acuta
Chorizandra enodis
Cyathochaeta avenacea
* Cyperus tenellus
Isolepis oldfieldiana
Lepidosperma angustatum
Lepidosperma eastern terete (BJK&NG 232)
Lepidosperma leptostachyum
Mesomelaena tetragona
Schoenus bifidus
Schoenus brevisetis
Schoenus humilis
Schoenus nanus
Schoenus odontocarpus
Schoenus rigens
Schoenus sp. 2 (GJK 5739)
Schoenus sp. aff. breviculmis
Schoenus subflavus
Schoenus tenellus
Schoenus unispiculatus
Tetraria capillaris
Tetraria octandra
Tricostularia neesii var. neesii

Dasypogonaceae
Calectasia grandiflora
Kingia australis
Lomandra caespitosa
Lomandra micrantha
Lomandra suaveolens

Dilleniaceae
Hibbertia acerosa
Hibbertia commutata
Hibbertia hypericoides

Droseraceae
Drosera bulbosa
Drosera gigantea
Drosera heterophylla
Drosera macrantha

Drosera macrantha (Swan Coastal Plain form BJK & NG 228)
Drosera menziesii
Drosera menziesii subsp. menziesii
Drosera rosulata

Epacridaceae
Astroloma ciliatum
Leucopogon squarrosus

Euphorbiaceae
Phyllanthus calycinus

Gentianaceae
* Cicendia filiformis

Goodeniaceae
Anthotium humile
Dampiera alata
Dampiera linearis
Goodenia caerulea
Goodenia micrantha
Lechenaultia biloba
Lechenaultia expansa
Scaevola lanceolata
Scaevola phlebopetala

Haemodoraceae
Anigozanthos viridis
Conostylis aculeata
Haemodorum laxum
Haemodorum simplex
Haemodorum spicatum
Tribonanthes australis
Tribonanthes brachypetala
Tribonanthes violacea

Haloragaceae
Myriophyllum drummondii

Hydatellaceae
Trithuria bibracteata

Hypoxidaceae
Hypoxis occidentalis

Iridaceae
* Babiana disticha
* Gladiolus angustus
* Gladiolus caryophyllaceus
* Homeria flaccida
Patersonia occidentalis
Patersonia occidentalis (swamp form)
* Romulea rosea
* Sparaxis bulbifera
* Watsonia marginata

Isoetaceae
Isoetes drummondii

Juncaceae
* Juncus bufonius
* Juncus capitatus
Luzula meridionalis

Juncaginaceae
Triglochin procerum

Lauraceae
Cassytha flava
Cassytha glabella

Lentibulariaceae
Polypompholyx tenella

Lobeliaceae
Lobelia tenuior
* Monopsis debilis

Loganiaceae
Mitrasacme paradoxa

Loranthaceae
Nuytsia floribunda

Mimosaceae
Acacia lasiocarpa var. bracteolata (long peduncle form)
Acacia stenoptera

Myrtaceae
Astartea aff. fascicularis
Baeckea camphorosmae
Baeckea tenuifolia
Calothamnus hirsutus
Calytrix aurea
Eucalyptus calophylla
Eucalyptus rudis
Hypocalymma angustifolium
Kunzea micrantha
Kunzea recurva
Melaleuca lateriflora var. acutifolia
Melaleuca lateritia
Melaleuca leptoclada
Melaleuca uncinata
Melaleuca viminea
Pericalymma ellipticum
Regelia ciliata
Verticordia acerosa
Verticordia densiflora
Verticordia huegelii
Verticordia huegelii var. huegelii
Verticordia pennigera
Verticordia plumosa var. pleiobotrya

Orchidaceae
Caladenia paludosa
Diuris carinata

Diuris emarginata
Elythranthera emarginata
Microtis unifolia
* Monadenia bracteata
Thelymitra antennifera
Thelymitra crinita

Oxalidaceae
* Oxalis glabra

Papilionaceae
Daviesia angulata
Daviesia physodes
Eutaxia virgata
Gompholobium marginatum
Jacksonia sternbergiana
Kennedia stirlingii
* Lotus angustissimus
* Lotus suaveolens
Mirbelia spinosa
* Trifolium campestre
Viminaria juncea

Philydraceae
Philydrella drummondii
Philydrella pygmaea

Phormiaceae
Dianella revoluta
Dianella revoluta var. divaricata
Stypandra glauca

Poaceae
Agrostis preissii
* Aira caryophyllea
Amphipogon debilis
Amphipogon turbinatus
* Briza maxima
* Briza minor
Cynodon dactylon
Danthonia caespitosa
Danthonia pilosa
Dichelachne crinita
* Ehrharta calycina
* Ehrharta longiflora
Eragrostis elongata
* Hordeum leporinum
* Lolium rigidum
Neurachne alopecuroidea
* Pentaschistis airoides
Stipa campylachne
Stipa pycnostachya
* Vulpia myuros

Primulaceae
* Anagallis arvensis

Proteaceae
- Dryandra nivea
- Grevillea bipinnatifida
- Grevillea pilulifera
- Hakea ceratophylla
- Hakea incrassata
- Hakea marginata
- Hakea prostrata
- Hakea trifurcata
- Hakea varia
- Petrophile media scps var. juncifolius ms
- Petrophile seminuda
- Petrophile squamata
- Synaphea sp (Fine leaves BJK & NG 244)
- Synaphea aff. petiolaris

Restionaceae
- Hypolaena exsulca
- Lepidobolus preissianus
- Leptocarpus aff. crebriculmis scps (BJK&NG 236)
- Leptocarpus aristatus
- Leptocarpus canus
- Leptocarpus coangustatus
- Lepyrodia macra
- Lepyrodia muirii
- Loxocarya fasciculata
- Loxocarya flexuosa

Rubiaceae
- Opercularia apiciflora
- Opercularia vaginata

Rutaceae
- Eriostemon spicatus

Scrophulariaceae
- * Bellardia trixago
- Gratiola peruviana
- * Parentucellia viscosa

Stackhousiaceae
- Stackhousia monogyna
- Tripterococcus brunonis

Stylidiaceae
- Levenhookia pusilla
- Stylidium calcaratum
- Stylidium canaliculatum
- Stylidium dichotomum
- Stylidium divaricatum
- Stylidium inundatum
- Stylidium leptophyllum
- Stylidium mimeticum
- Stylidium petiolare
- Stylidium pulchellum
- Stylidium roseo-alatum
- Stylidium utricularioides

Thymelaeaceae
Pimelea imbricata var. major

Xanthorrhoeaceae
Xanthorrhoea preissii
Xanthorrhoea brunonis

APPENDIX FOUR

Plant species of Conservation Significance Recorded along Mundijong Road

APPENDIX 4: Plant Species of Conservation Significance along Mundijong Road

Key

Column 1 Family/taxon

Column 2
Conservation and Land Management Declared Rare Flora and Priority Taxa (Atkins 1994)
R = Declared Rare Flora
1 = Priority 1: Poorly Known Taxa
2 = Priority 2: Poorly Known Taxa
3 = Priority 3: Poorly Known Taxa
4 = Priority 4: Rare Taxa

Column 3 Ecological preferences
H = taxa characteristic of heavy soils on the eastern side of the Swan Coastal Plain
eE = taxa endemic to the eastern side of the Swan Coastal Plain

Column 4 Geographical Location (range ends)
N etc = populations at the northern etc limit of their known geographic range
D = populations disjunct from their known geographic range

Amaranthaceae				
Ptilotus drummondii		H		
Anthericaceae				
Agrostocrinum scabrum		H		
Borya scirpoidea		H		
Caesia micrantha				
Blue flowered form GJK 10857)		H		
Apiaceae				
Schoenolaena juncea		H		
Aponogetonaceae				
Aponogeton hexatepalus	R	eE		
Asteraceae				
Angianthus drummondii		H		
Brachyscome bellidioides		H		
Pogonolepis stricta 'long bract form'		H		
Trichocline spathulata		H	W	
Casuarinaceae				
Allocasuarina microstachya		H	D	
Casuarina obesa		H		
Centrolepidaceae				
Apelia cyperoides		H		
Brizula nutans		H		
Cyperaceae				
Mesomelaena tetragona		H		
Schoenus brevisetis		H		
Schoenus tenellus		H		
Dasypogonaceae				
Calectasia grandiflora		H	DS	Mundijong Rd
Kingia australis		H		
Droseraceae				
Drosera bulbosa		H		
Drosera macrantha				
(Swan Coastal Plain form BJK & NG 228)		eE		
Drosera rosulata		H		
Goodeniaceae				
Anthotium junciforme	4	H		
Lechenaultia biloba		H		
Scaevola lanceolata		H		

APPENDIX 4: Plant Species of Conservation Significance along Mundijong Road

Haemodoraceae			
Anigozanthos viridis		H	
Haemodorum simplex		H	
Tribonanthes brachypetala		H	
Tribonanthes violacea		H	
Haloragaceae			
Myriophyllum drummondii		H	
Hydatellaceae			
Trithuria bibracteata		H	
Hypoxidaceae			
Hypoxis occidentalis		H	
Iridaceae			
Patersonia occidentalis (swamp form)			
Isoetaceae			
Isoetes drummondii		H	
Lentibulariaceae			
Polypompholyx multifida		H	
Mimosaceae			
Acacia lasiocarpa			
var. bracteolata (Long peduncle form)	1	eE	
Myrtaceae			
Baeckea tenuifolia	1	H	S Mundijong
Calothamnus hirsutus		H	
Calytrix aurea		H	
Kunzea micrantha		H	N Perth
Melaleuca uncinata		H	
Melaleuca viminea		H	
Verticordia acerosa		H	
Verticordia pennigera		H	
Verticordia plumosa var. pleiobotrya	1	eE	only Mundijong
Orchidaceae			
Caladenia paludosa		H	
Diuris carinata		H	
Diuris emarginata		H	
Elythranthera emarginata		H	
Thelymitra antennifera		H	
Papilionaceae			
Kennedia stirlingii		H	DW
Philydraceae			
Philydrella drummondii		H	
Philydrella pygmaea		H	
Phormiaceae			
Stypandra glauca		H	DW
Poaceae			
Dichelachne crinita		?	
Proteaceae			
Grevillea bipinnatifida		H	
Grevillea pilulifera		H	
Hakea marginata		H	?S
Petrophile media var. juncifolius Ms		H	
Petrophile squamata		H	
Synaphea sp. (Fine leaves BJK & NG 233)		?	

APPENDIX 4: Plant Species of Conservation Significance along Mundijong Road

Restionaceae			
Leptocarpus aff. crebriculmis (BJK & NG 236)		?	
Rubiaceae			
Harperia lateriflora		H	
Opercularia apiciflora			DWN
Stylidiaceae			
Stylidium canaliculatum		H	N Pearce
Stylidium inundatum		H	
Stylidium longitubum	1	S	Mundijong Rd
Stylidium mimeticum	1	eE	
Stylidium roseo-alatum		H	
Stylidium utricularioides		H	
Thymelaeaceae			
Pimelea imbricata var. major		eE	

APPENDIX FIVE

Letter notifying occurrence of Declared Rare Flora at Duck Pond site

APPENDIX 5: COPY Letter prepared on 13th August 1992, received by CALM August 1992

Bronwen Keighery
Consultant Botanist
224 Hamersley Rd
SUBIACO 6008

Dear Ken,

Re: New Location for *Aponogeton hexatepalus*, DRF.

In the course of the work on the alluvial soils of the eastern side of the Swan Coastal Plain (Keighery and Trudgen, 1992) we identified an area of seasonally innundated Marri Woodland surrounding a small wetland along Mundijong Rd (see attached Location 15). This area is considered one of the few extant representatives of Marri Woodland/Forest that were once common on the eastern side of the Plain. Three permanent sites for the Swan Coastal Plain- GinGin to Busselton Bushland Survey are established at this location (Duckpond 1,2 &3). During work late last year on the Duckpond 3 quadrat the volunteers and I found leaves of a plant that appeared to be *Aponogeton hexatepalus*. We were not able to make a positive identification identification and Greg, Neil Gibson and myself resampled the site last week. Our suspicions were confirmed and there is a considerable population of *Aponogeton hexatepalus* in the small wetland. The population contains approximately 100 - 200 plants that are presently flowering. Voucher material was collected by Greg. A copy of the aerial photograph is enclosed indicating the position of the location.

This location is part of the Mundijong Rd transect (Location quadrats Mundijong 3-9) which is the most comprehensive reresentative of the variety of plant communities of this area of the eastern side of the Plain.
Yours sincerely

Bronwen Keighery.

Extracts from Keighery, B.J. and Trudgen,M.E. 1992 The Remnant Vegetation of the Eastern Side of the Swan Coastal Plain. A report to the Department of Conservation and Land Management for the National Estate Programme.

Appendix 1

Location 15 - Duckpond and Mundijong Rd intersection. Location Map 12. Vegetation Map Area 2, p83.
Veg: m W & WM (me Sh, H & S) **Cond: Good to Completely Degraded**
GENERAL COMMENTS
This is one of the few areas of Marri Woodland found with an intact understorey, in Good Condition.
Much of the south eastern section of this Location is in Very Poor Condition or Completely Degraded due to clearing, too frequent burning and significant invasion by **Ehrharta calycina*, **Ehrharta latifolia*, **Briza maxima*, **Hypochaeris glabra* and ** Cynodon dactylon* (Couch).

Site 15 a

me Sh, H & S over Open ***Melaleuca hamulosa* and *Hakea varia* Open Shrubland Herbland and Open Sedgeland**
Comments: *Melaleuca hamulosa* occurs in a clump. In adjacent areas there are patches of Herbland and Sedgeland.
Shrubs: *Melaleuca hamulosa*, *Hakea varia*
Herbs: *Caesia micrantha*, 6#*Aponogeton hexatepalus*, *Triglochin procera*, *Tribonanthes australis*, *Drosera gigantea*, *Drosera* species, *Stylidium* species, 6#*Stylidium utricularioides*
Sedges: *Lepyrodia muirii*, 4#*Cyathochaeta avenacea*, 4#*Mesomelaena tetragona*, *Leptocarpus canus*
CONDITION
Rating **Good to Very Good**
Comments: Some of the plants appear to be rotting, innundation is probably greater than average, collects of the road.
Aerial Photo: Run 10.5051
Soil: Red loam , P3 (Van Gool 1990)
Drainage: poor, water to 25cm
Aspect: flat

Site 15b

m W Marri Woodland over Low Shrubland over Closed Herbland to Herbland and Open Sedgeland
Trees : *Eucalyptus calophylla*
Shrubs: *Jacksonia furcellata*, *Xanthorrhoea preissii*, *X. ?brunonis*, *Phyllanthus calycinus*, 4#*Grevillea pilulifera*, *Dryandra sessilis*, *Opercularia vaginata*, 1,5#*Opercularia apiciflora*, 4#*Baeckea camphorosmae*, 4#*Hibbertia commutata*, *Astroloma ciliatum*, *Daviesia angulata*
Adjacent 2#*Grevillea bipinnatifida*
Grasses: 4#*Neurachne alopecuroidea*, **Briza maxima*
Herbs: *Caesia micrantha*, *Trichocline spathulata*, *Sowerbaea laxiflora*, *Drosera macrantha* , *Dampiera* sp, *Arthropodium capillipes*, *Haemodorum* species, *Thysanotus multiflorus*, *Conostylis aculeata*, *Diuris longifolia*, 2#*Kennedia stirlingii*, **Romulea rosea*, **Hypochaeris glabra*
Sedges: 4#*Mesomelaena tetragona*, *Loxocarya?flexuosa*

CONDITION
Rating **Good to Very Good**
Comments: There is no bare ground in the area, is this the the vegetatation of the "grassy plains" of the early European Settlers.
Aerial Photo: Run 10.5051
Soil: red brown loam, P3 (Van Gool 1990)
Drainage: poor, waterlogged
Aspect: gentle slope to south east

Recommendations, p26 & 29.

Area 1- Marri Open Forest to Woodland, Pinjarra Plain

Duckpond and Mundijong Rd intersection, Serpentine - Jarrahdale, approx 3 ha (Location 16) - local government

Value

Largest intact area of remnant of Marri Open Forest, other Marri Woodland is in isolated nodes in other larger locations
Significant taxa, 9 taxa:
Of interest are: 4#*Grevillea pilulifera*, 1,5#*Opercularia appisiflora*, 4#*Baeckea camphorosmae*, 4#*Hibbertia commutata*, 4#*Neurachne aleopecuroides*, 4#*Trichocline spathulata*, *Drosera macrantha* 'robust', 2,4#*Kennedia stirlingii*, 4#*Mesomelaena tetragona*.

Recommendation

CALM liase urgently with the Local Government Authority to retain and manage the area for its flora conservation values.

Area 6 - Wetaland Association, Pinjarra Plain

Mundijong Rd, road and drain reserve to the south of road between Webb Rd and Lightbody Rd, Serpentine - Jarrahdale (Location 23) - local government, ?WAWA

Value

An E-W transect of the vegetation associations of the heavy seasonally innundated soils of flats of the southern Pinjarrah Plain; *Melaleuca* Shrubland, Mixed Low Heath, Herblands and Sedgelands in Very Good to Completely Degraded Condition.
Significant taxa: >15, 2 priority species

Recommendation

CALM liase urgently with the Local Government Authority to retain and manage the area for its flora conservation values, in accordance with the Management Guidelines recommended by the Roadside Conservation Committee for roads of High Conservation Value.

APPENDIX SIX

Written Paper presented at Seminar on Environmental management in the Shire of Serpentine-Jarrahdale, July 9 1994

Flora of the Coastal Plain in the Serpentine-Jarrahdale Shire

Greg Keighery
Department of Conservation and Land Management
Wildlife Research Centre, P.O. Box 51
Wanneroo, 6065.

INTRODUCTION

For the purpose of discussing the native flora of the Shire of Sepentine-Jarrahdale, the shire can be conveniently divided into it's major geomorphic zones - the Darling Plateau,-the Darling Scarp and the Swan Coastal Plain. While the flora of the plateau and scarp are well reserved in State Forest, and at least a major proportion of the scarp vegetation is in Serpentine National Park,the story of the flora of the coastal plain is very different.The alluvial soils of the coastal plain were preferentially cleared for agriculture, and since this area contains a large percentage of such soils, little (under 2%) now remains. Most of the uncleared land is *Banksia* woodland on the infertile Bassendean Sands (although this is now the preferred site for urban development).

VEGETATION

The vegetation of the Swan Coastal Plain basically follows the soil changes that occur across the plain from the coast to the scarp. Essentially there are five major units,the Quindalup, Spearwoos and Bassendean wind blown sands,the alluvial loams and clays of the Pinjarra Plain and the colluvial soils of the Ridge Hill Shelf. Superimposed on this pattern are the rivers and wetlands. The first two are not present in the Shire.

Vegetation Types in the Shire

John Beard in his mapped of the vegetation of the area at a scale of 1:250,000 (Beard,1979).He delimited (from West to East), on the Bassendean sands, Banksia low woodland,dominated by *B.attenuata*, *B.menziesii*, *Allocasuarina fraserana* with *B.illicifolia* in lower sites. Freshwater swamps occur between the dunes dominated by *Melaleuca rhaphiophylla*, *Eucalyptus rudis* (River Gums)and sedges. The Pinjarra Plain, a low lying swampy plain was mapped as mosaic of *Melaleuca* woodlands and shrublands, Marri(*Eucalyptus calophylla*) woodlands, and on rises to the east Wandoo (*Eucalyptus wandoo*)woodland. The better drained sandy or lateritic soils of the Ridge Hill Shelf were mapped as low Jarrah, Mountain Marri or Butter Gum (*Eucalyptus lane-poolei*)woodlands. Rivers on the Ridge Hill Shelf are lined by Marri, Wandoo, and River Gums and/or River Gums elsewhere.

Further detailed work on the remnant vegetation of the alluvial soils in the Shire for CALM by Keighery and Trudgen (1992) generally recognised the same vegetation types, but highlighted the few remnants remaining, the generally good condition of these remnants and the need to conserve all such remnants. Also the complex nature of the floristically rich wetland communities and the close relationship between the flora of the alluvial soils and the scarp/plateau was highlighted.

Since 1991, CALM and the Conservation Council, aided by Commonwealth funding, have been undertaking a comprehensive survey of the flora of the Swan Coastal Plain from Gingin to Dunsborough. This has involved setting up and scoring all vascular plants (currently over 26,000 records of almost 1500 species) present in over 500 100m2 quadrats on public lands to obtain a baseline floristic analysis of the types, variation and conservation of plant communities. Concommitant with this project we have been compiling total flora lists for individual reserves and bushland areas to obtain a baseline record of the conservation status of individual species (about 2,000 species are involved). The first part of the project was completed in June,1994, and the second will conclude in 1995.Most of the rest of this presentation relies on these studies.

The study identified 43 plant communities present on the Swan Coastal Plain, and of these 14 occurred in the Shire on public lands.These are *Eucalyptus calophylla* (Marri) woodland over Kingia on winter wet clay(Type 1), Marri-Jarrah (*Eucalyptus marginata*) woodland on sandy clays (Type 2), Marri or Wandoo over *Xanthorrhoea* woodland (Type 3).Then follow a series of seasonal wetland communities, from the Bassendean sands, Shrub rich *Melaleuca preissiana* damplands (Type 4) and Mixed shrub damplands (*Melaleuca preissiana, Banksia ilicifolia* and *Actinostrobus pyramidalis*) (Type 5). The next three communities occur on heavy soils on the Eastern side of the coastal plain: Herb rich Shrublands in Clay pans (Type 6), Dense Shrublands on Clay Flats (Type 7)and Wet Forests and Woodlands of *Eucalyptus rudis/Melaleuca rhaphiophylla* (Type 8). The final wetland community represents deep wetlands (to 1m) dominated by *Eucalyptus rudis, Banksia littoralis* and/or *Melaleuca rhaphiophylla* scattered across the plain (Type 9).

Finally are the communities of sandy soils, *Banksia attenuata/Eucalyptus marginata* woodlands (Type 10) along the base of the scarp,which are species rich in shrubs and herbs. Then there are the woodlands of the Bassendean Sands, dominated by *Eucalyptus marginata, Banksia attenuata* and *B.menziesii*(Type 11), the true Banksia woodlands (Type 12). The wetter swales are dominated by *Banksia attenuata, B. menziesii* and *B. illicifolia* with a herb rich understory(Type 13), and finally, the seasonally

wet flats support *Banksia illicifolia/ B. attenuata* and *Melaleuca preissiana* (type 14).

Reserves in the Shire

There are 9 nature reserves,1 national park,1 conservation park and 5 shire reserves in the Shire. All the large reserves are on the plateau or scarp (a small area of Serpentine National Park is on the Ridge Hill Shelf). Banksia Road, Modong, Cardup and Brickwood are the only significant sized vested reserves on the plain. Other potentially significant flora areas on the plain include Mundijong Road verge, Punrack Road verge, Reserve 23012 east of Mundijong, identified in Keighery and Trudgen (1992), the Lowlands Property and any areas of Ridge Hill Shelf vegetation (99% cleared), or Pinjarra Plain (97% cleared).

These reserves are on the following geomorphic units and contain the following vegetation communities; Bassendean Sands:Banksia Road (Community types-9,11 and 14)and Modong Nature Reserves (Community types 8, 11, 12 and 13). Colluvial Sands of the Pinjarra Plain/Ridge Hill Shelf:Cardup Nature Reserve (Community Types-1, 2 and 10) and Brickwood Reserve (Community Types-3, 9, 10 and 14) Mundijong Road Reserve is on the Pinjarra Plain and has examples of Community Types-1, 3, 6, 7, and 8. Lowlands Property on the Pinjarra Plain and Bassendean sands has examples of Community Types 4, 5, 8, 11 and 13.

Rare and Poorly Reserved Plant Communities in the Shire

Since 97-99% of the Pinjarra Plain and Ridge Hill Shelf are cleared, several of plant communities known from the shire are extremely rare or completely destroyed.All occurences of *Casuarina obesa* open woodlands are now parkland cleared, with no understory remaining. *Eucalyptus lane-poolei* low woodland and *Eucalyptus marginata* low woodland are not present on public lands. An area of private land off Norman Road contains the largest remnant of the Southern Ridge Hill shelf vegetation, and excellent examples of these vegetation communities, Keighery and Keighery (1992).
Eucalyptus wandoo woodlands of the Ridge Hill Shelf are also very poorly reserved being only present on the unvested reserve 23012.

FLORA

Species Richness

The shire has a rich and diverse flora because of the large number of varied habitats present, and this is reflected in the large number of plant communities each with their distinctive plants.

However,on top of this community diversity,the richness of plants present in the Shire (and the Adjacent Shires of Armadale and Murray) are greatly influenced by two factors- the Darling Scarp and the end of the Bassendean sands.
The scarp provides the coastal plain with a higher effective rainfall (both by rain and run-off),and heavy soils (allowing a longer growing season) derived from the granites and laterites of the plateau.
This enables many moisture loving species normally found south of Perth to end their range here, eg *Actinodium cunninghamii* (Albany Swamp Daisy), *Eucalyptus haematoxylon* (Mountain Marri), *Xyris* unnammed species (Xyris) and *Boronia molloyae*. However, these are largely historical records, and we have not been able to re-collect most of these species.

Conversely the end of the sand sheets also provides the end of the range for many northern sandplain species, unable to pass the heavy soil barrier deposited by the Murray and Serpentine rivers and the Mandurah Inlet.Examples of these species include *Blancoa canescens* (Red Bugle), *Lysinema elegans*, *Dasypogon bromeliifolius*, *Hensmania turbinata* and *Arnocrinum preissii*.
Sandy swamps of the Bassendean sands also meet the clay swamps of the Pinjarra Plain in the Shire, and many species occurring in these areas also end their southern ranges in the Jandakot area, eg *Banksia telmatiea*,and *Byblis gigantea* (Rainbow Plant).

Rare and Endangered Plants

Currently 61 flowering plants appear to be confined to the Swan Coastal Plain. Since the Shire is not a natural region it is not suprising that few plants are confined (endemic) to it. Only *Johnsonia* aff. *pubescens* and *Verticordia plumosa* var *pleiobotrya* appear to be endemic to the Shire, and this could be the result of past clearing elsewhere.
However, because of the presence of the scarp with it's areas of open granite rich in restricted herbs and shrubs, and the largely cleared, heavy soils of the Pinjarra Plain brlow (where most of the Swan Coastal Plain endemics are found), the region contains many plant species of conservation significance.
Below is the current list of CALM's priority and Declared Rare (in bold) plant taxa from the Shire, with a brief note on their habitat.
Acacia horridula-Scarp
Acacia lasiocarpa var nov.-Swamps
Acacia oncinophylla ssp. *oncinophylla*-Scarp
Acacia oncinophylla ssp. *patulifolia*-Scarp
Anthocercis gracilis-Scarp
Anthotium junciforme-Swamps

Aponogeton hexatepalus-Swamps
Aristida ramosa-Scarp,Ridge Hill Shelf
Boronia capitata ssp.*gracilis*-Swamps
Boronia tenuis-Scarp
Caladenia huegelii-sand
Calothamnus graniticus ssp. *leptophyllus*-Scarp, Ridge Hill Shelf
Centrolepis caespitosa-Swamps
Diuris purdiei-Swamps
Drakea elastica-Swamps
Drosera occidentalis-Swamps
Eryngium pinnatifidum ssp. *palustris*-Swamps
Eucalyptus graniticola-Scarp
Eucalyptus marginata ssp. *elegantella*-Scarp, Ridge Hill Shelf
(*Eucalyptus* x *mundijongensis*)-Rare hybrid
Grevillea manglesii ssp. *ornithopoda*-Scarp, Rivers
Haloragis tenuifolia-Swamps
Isolepis hookeriana-Swamps
Lambertia multiflora var. *darlingensis*-Scarp, Ridge Hill Shelf
Lasiopetalum bracteatum-Scarp
Lasiopetalum glabratum-Scarp
Mitrasacme palustris-Swamps
Myriophyllum echinatum-Swamps
Parsonsia diaphanophleba-Rivers
Rhodanthe pyrethrum-Swamps
Schoenus benthamii-Swamps
Schoenus capillifolius-Swamps
Schoenus natans-Swamps
Senecio leucoglossus-laterite
Stylidium mimeticum-Swamps
Templetonia drummondii-Scarp
Tetraria australiensis-Swamps
Thysanotus fastigiatus-laterite
Verticordia lindleyi ssp. *lindleyi*-Swamps
Verticordia plumosa ssp. *anaeneotes*-Swamps
Verticordia plumosa ssp. *pleiobotrya*-Swamps
Villarsia submersa-Swamps

As well as this impressive list of 34 priority taxa and 8 declared rare flora,our studies on the Coastal plain can add some more
**Gnephosis* aff *angianthoides*-Only record Serpentine River.
**Johnsonia* aff. *pubescens*-Cardup to Lowlands
Dillwynia dillwynioides-Swamps of Swan Coastal Plain
**Baeckea tenuifolia*-Only Coastal Plain population Mundijong Road
Chamaescilla spiralis ssp. nov.-Clay swamps from Wanneroo to Gingin
Eremaea asterocarpa ssp. *brachyclada*-One population on Ridge Hill Shelf
Trichocline sp. nov.-Clay Swamps Perth to Busselton
Drosera macrantha ssp. nov.-Clay Swamps Perth to Capel

Finally two varieties of *Billardiera* (*B. drummondii* var *collina* and *B. parviflora* var *guttata*) are confined to the Darling Scarp largely within the Shire, and these are proposed to be added to the CALM priority list.

The Shire has a rich and diverse flora created by it's location and geomorphology. Because of these factors a significant proportion of this flora has a restricted range, and subsequent clearing has caused many of them to require listing as rare or priority flora.
The diverse flora of the Shire is also shown in the large numbers of plants recorded in the small reserves of the coastal plain. Currently our studies have undertaken detailed flora lists on:

Cardup Nature Reserve (322 species)
Modong Nature Reserve* (197 species)
Banksia Road Nature Reserve* (155 species)
Brickwood Reserve (333 species)
Lowlands property* (331 species)

*:Survey partially completed,number will increase.

Corridors
Keighery and Trudgen (1992) recommended local tree plantings to help preserve the attractive treescapes in this area, particularly Wandoo, Marri, Butter-Gum and Saltwater Sheoak along Kargotich Road.In the past rivers and wetlands were major corridors, and revegetation of many of these can be undertaken and is needed (Siemon *et al*,1993). Now several road reserves are very significant corridors for flora, especially Mundijong and Punrack rd, but others are known (Anon,1992). Another very significant corridor is the Perth-Bunbury rail reserve. Brcause of the amount of past clearing almost any remnant on the Ridge Hill Shelf and Pinjarra Plain can have conservation significance. Integrated land management strategies are required in this complex area.

Conclusion
The Shire has a rich and diverse native flora on the coastal plain, which is now restricted to a few small remnants of public and private land. To keep this wonderful array of plants the management of both needs to be integrated. The array of native plants as part of the heritage of the Shire deserves wider publicity. A list of the flora by plant community/geomorphology could be prepared from these studies to guide re-vegetation projects.

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REGISTRATION FORM

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GISTRATION FEE $20.00

registration fee includes
rning and afternoon tea/coffee
d lunch.

quiries & payments to:

Cr. Jan Star
Shire of Serpentine-Jarrahdale
6 Paterson Street
Mundijong 6202

al date for replies -
30th June, 1994.

ited registration may be available on the
y - lunch not included.

further enquiries: Jan Pascall - 5255949,
Harington - 3970181, Nancy Scade - 5251324

COME AND FIND OUT

SATURDAY 9TH JULY, 1994

You will be most welcome.

SERPENTINE • JARRAHDALE WATER WATCHERS

invite you to attend
a
Seminar
on
Environmental Management in the Shire of Serpentine-Jarrahdale

Saturday 9th July, 1994
at
Tumbulgum Farm, Southwest Highway,
Mundijong.

Registration at 8.45 am
seminar commences at 9.15 am.

The seminar is being presented specifically to assist landowners in the Shire of Serpentine-Jarrahdale and adjacent Shires with similar environmental problems.

There will also be displays by the following:

Shire of Serpentine-Jarrahdale
Shire of Serpentine-Jarrahdale L.C.D.C.
Alcoa of Australia Limited
Greening Australia
Peel Inlet Management Authority
Peel Development Commission
Community Catchment Centre, Pinjarra
Selby Scientific Instruments

Surrey Beatty & Sons, Publishers

APPENDIX EIGHT

Material supplied to C.Semeniuk for environmental Audit of South East Corridor

APPENDIX 8: Material supplied to C. Semeniuk by B.J. Keighery for the environmental audits.

- Findings of the the survey work for Keighery and Trudgen (1992) were discussed with C. Semeniuk in 1991 and the report was available for use in 1992.
- A copy of the report was loaned to C. Semeniuk for the audit process with additional comments on four locations (see Table 1).
- In January 1993 a day was spent in the field with C. Semeniuk in the area of the south-east corridor.

Table 1

Location 15
Rare flora site - *Aponogeton hexatepalus*

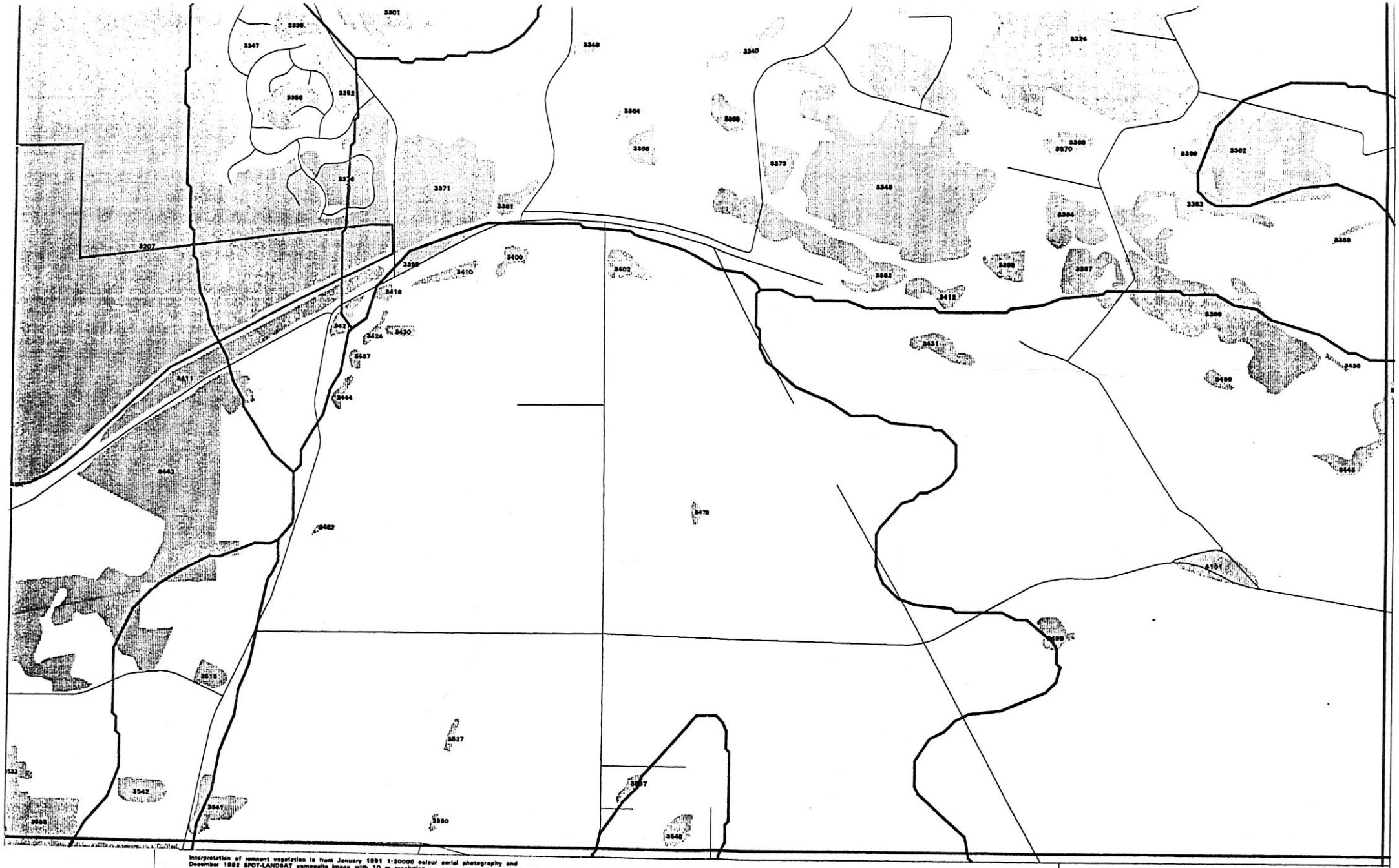
Mundijong Road (Locations 15 and 24, C. Semeniuk labelled as Y)
The southern side of Mundijong Road has become increasingly important having a cross-section of the flora of the Pinjarra Plain not found elsewhere ie the cross-section one of the few areas with understorey associated with *Casuarina obesa*.

Location 18
This is private land, minimally surveyed in the report. Andrew Brown (CALM - Wildlife) has a report of a rare orchid from the here.

Location 54
The area is proposed addition to the Ellis Brook Reserve (Shire of Gosnells). Margaret Robertson is doing work on the area to support its inclusion. She is also working on the Ellis Brook Reserve which is a very important reserve on the Scarp.

APPENDIX NINE

PEP Maps for Mundijong Road
Note: No remnant Vegetation shown along Mundijong Road.
Sites shown east of Kargotich Road but not at Duck Pond Road



Interpretation of remnant vegetation is from January 1991 1:20000 colour aerial photography and December 1992 SPOT-LANDSAT composite image with 10 m resolution.
Photographs and imagery were provided by Department of Land Administration and were interpreted by Catherine Keenan, Perth Environment Project (Jan-June 1994), whilst on loan from the National Trust of Australia (W.A.). Department of Agriculture and Water Authority mapping were used in some instances to assist interpretation

This plot has been produced for the purpose of ground truthing that interpretation. The Perth Environment Project would be pleased to receive advice as to the accuracy of the boundaries shown, and information regarding the composition and condition of each bushland entity.

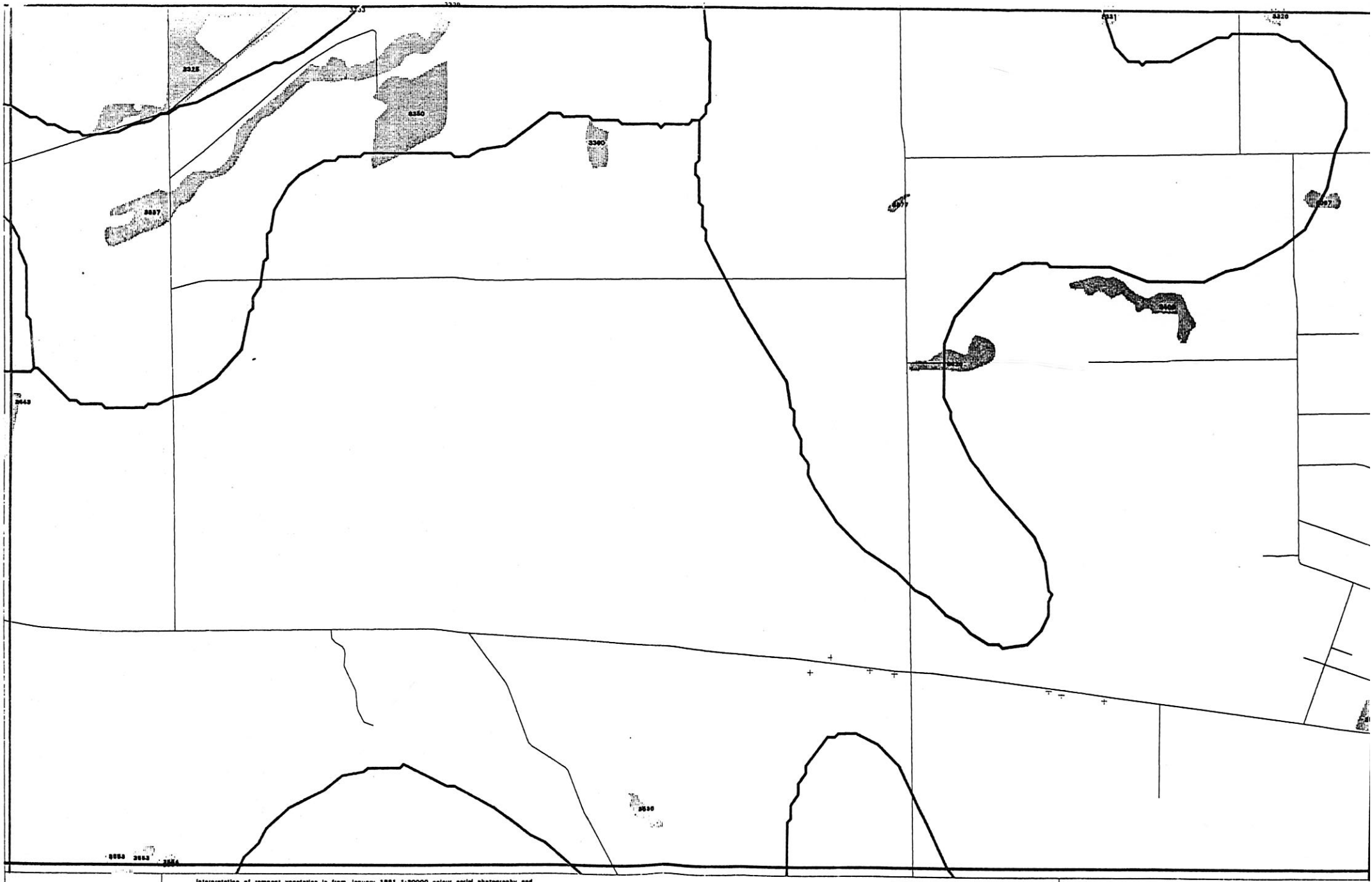
The definition of bushland is that by Chambers and Walker (1984): 'Land on which there is vegetation which is either a remainder of the natural vegetation of the land, or if altered, is still representative of the structure and floristics of the natural vegetation and provides the necessary habitat for native fauna (National Trust, 1993)'.

to ident: map140

PEEL 3.6

SCALE 1:20000

DATE: September 21, 1994



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PEEL 4.6