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Flora and Vegetation Survey of

Florida Bushland

SB Tile 413

UBD 2006

Map 553 '07

See Fig 1 in report

(Map 817)

Ocean Rd / Dunesville
bypass

**Prepared for the
City of Mandurah**

by

Brian Morgan

January 2005

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EXECUTIVE SUMMARY

This survey was conducted in an area of about 3 hectares of bushland at Florida, about 2 kilometers south of the Dawesville Cut. The purpose of the survey was to assess the flora and vegetation conservation values of the study area to assist with development planning.

The Florida survey area was on the north-eastern edge of that part of the flat plain of the Yoongarillup landform unit that extends south from near the Dawesville Cut. The Spearwood Dune geomorphological element was immediately to the east.

The vegetation was described at sites and mapped. Plant species present at each site were recorded as part of the vegetation descriptions and the flora was also recorded opportunistically throughout the survey area. A vegetation unit map, a vegetation condition map and a flora list were prepared for the survey area. The vegetation data was databased and used in a floristic analysis which compared the vegetation units of the survey area with a standard data set from sites across the Swan Coastal Plain (Gibson *et al.*, 1994). The database of Swan Coastal Plain sites has previously been analysed and sites grouped into Floristic Community Types (Gibson *et al.* 1994), a number of which have subsequently been identified as Threatened Ecological Communities of high conservation value.

Seventy seven (77) native species were recorded in the survey area. No Declared Rare Flora or Priority flora were found in the survey area.. No other species of particular conservation significance were recorded.

The survey area vegetation ranged from *Acacia rostellifera* open to closed scrub (over *Melaleuca systema* and *Hibbertia hypericoides* open shrubland and low heath) to *Banksia attenuata* and *Allocasuarina fraseriana* low open woodland over *Acacia rostellifera* high shrubland to open scrub.

The condition of the vegetation in the survey area was in the range 'Excellent' to 'Excellent to Pristine', with low to moderate weed cover and a good number of native species in the different strata of vegetation.

The PATN analysis assigned the Florida site (F1) to Floristic Community Type (FCT) 25 with some affinity to FCT 21a. Neither of these FCT's are TEC's. However, because of

the diversity of the vegetation on the Yoongarillup landform unit, the restricted distribution and area of that landform unit, the small part of that landform unit vegetation that is secured and the Excellent condition of the survey area vegetation, the vegetation of the entire survey area is considered to have high conservation value.

No habitat trees of particular interest were recorded. Only low trees occurred in the area. No Osprey nests were observed and no nesting hollows recorded.

1.0 INTRODUCTION

1.1 Background

The City of Mandurah plans to develop an area of bushland in Florida and wishes to know the vegetation and flora values present and their distribution in the bushland, to more effectively plan the location of future developments in the area.

1.2 Aims of this study

The aim of this study was to describe and assess the flora and vegetation conservation values of the Florida study area. Specifically, this study had the following aims:

1. Determine if there was any flora in the bushland of special conservation significance, such as rare and priority species.
2. Determine if there were vegetation units of special conservation significance and their distribution.
3. Assess the condition of the vegetation in the study area.
4. Record any habitat trees in the study area, with particular interest in any trees with Osprey nests.

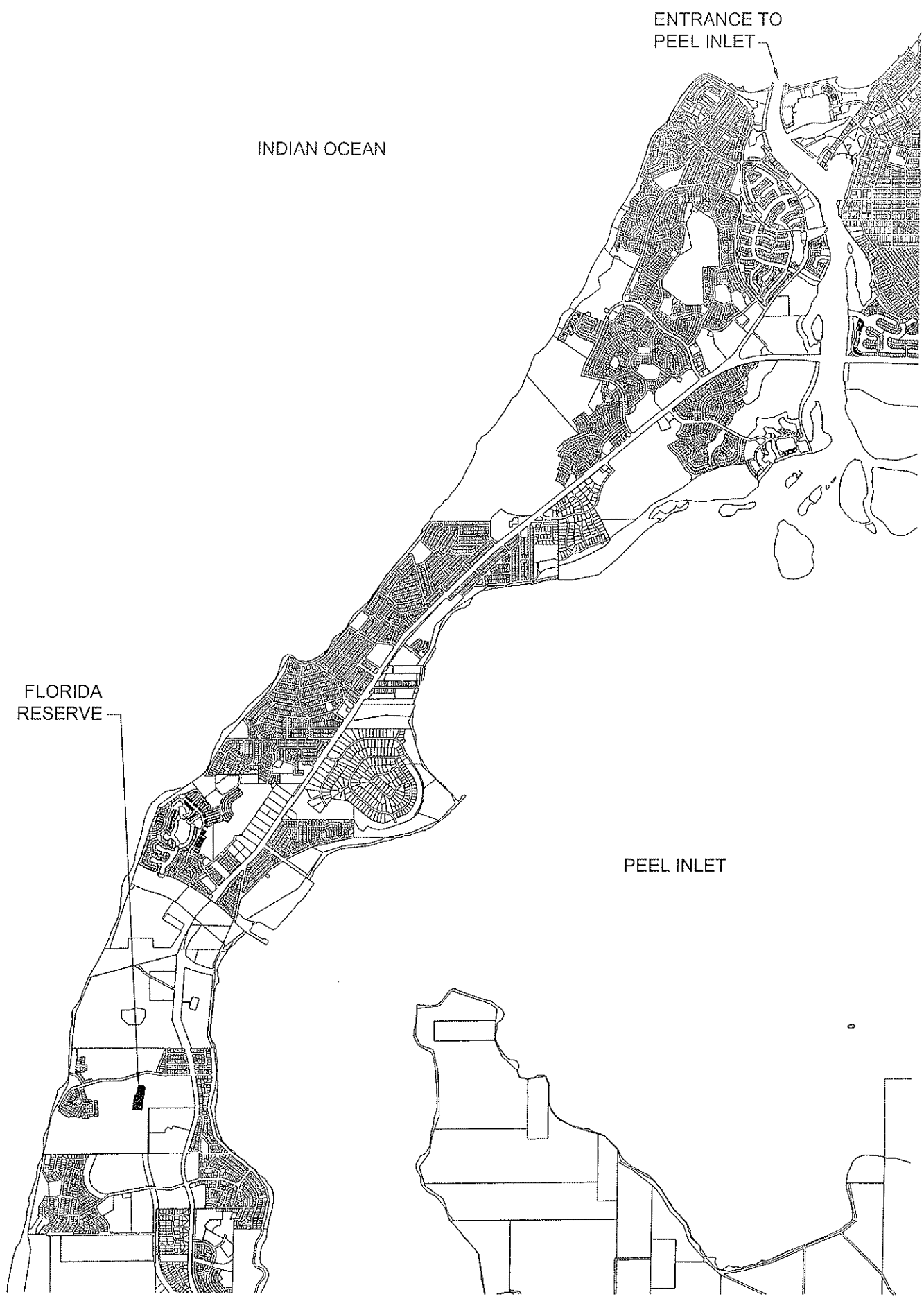
1.3 The survey area

The survey area is about 280 metres long and about 90 to 110 metres wide (about 3 hectares) and lies in the Florida area, between Ocean Rd, Dawesville Bypass and the Ocean Rd Primary School. The area is about 2 kilometers south of the Dawesville Cut (see Figure 1).

1.4 The geomorphology of the survey area

The Swan Coastal Plain consists of a series of geomorphological elements which are sub-parallel to the present coastline (McArthur and Bettenay, 1960). Each of these geomorphic elements has distinctive geology, vegetation, topography and soils.

The Florida survey area lies near the northern eastern boundary of the Yoongarillup landform unit that is usually in association with the Spearwood Dunes element and which has been built up from marine or estuarine deposits (Churchwood and McArthur, 1980). The Yoongarillup unit consists of plains with low ridges and swales, with shallow yellow and brown sands over marine limestone (Churchwood and McArthur, 1980). Immediately to the east is the Cottesloe unit of the Spearwood Dunes element.



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ACN:685 475 149
 Level 6, 12 St Georges Terrace
 PERTH WA 6000
 Tel:(08) 9323 5900 Fax:(08) 9323 5901

FLORIDA
 LOCALITY PLAN

Project Number:	Figure Number:
36413	FIGURE 1

1.5 Regional botanical context

Beard (1980) defined boundaries for botanical provinces, districts and subdistricts for Western Australia on the basis of his vegetation mapping of the State. In this framework, the study area lies in the Drummond Botanical Subdistrict (more or less equivalent to the Swan Coastal Plain and part of the Dandaragan Plateau) of the Darling Botanical District of the South Western Botanical Province of Western Australia.

Heddle *et al* (1980) mapped the vegetation of part of the Drummond Botanical Sub-district at a very broad scale, describing a series of vegetation complexes. These are related groups of vegetation associations found on particular landform-soil units (geomorphic elements, see above). They mapped a total of 38 vegetation complexes on the Swan Coastal Plain. The vegetation of the Florida survey area belongs to one of these, the Yoongarillup Complex. This complex is dominated by an extensive tuart woodland, often over peppermint (*Agonis flexuosa*).

More recently, an alternative analysis of the plant assemblages on the Swan Coastal Plain south of Gingin Brook was carried out using a floristic approach (Gibson *et al.*, 1994) and was extended in 2000. This work identified 66 floristic community types in four floristic 'Super Groups' for the southern Swan Coastal Plain. These units are defined at a similar level of synthesis to that of Heddle *et al.* (1980) (Trudgen, 1999). The four 'super groups' of sites correlate closely with the major geomorphological elements on the Swan Coastal Plain (and also to rainfall), with the exception of one group which contained the seasonal wetlands, which includes sites across all geomorphological groups (Gibson *et al.*, 1994).

1.6 Threatened Ecological Communities (TEC's)

The Department of Conservation and Land Management has developed a procedure for identifying 'Threatened Ecological Communities' (Department of Environmental Protection 2000; English and Blythe 1997). Threatened ecological communities (TEC's) are assigned to one of four categories: 'Presumed Totally Destroyed', 'Critically Endangered', 'Endangered' or 'Vulnerable' (Department of Environmental Protection, 2000).

On the Swan Coastal Plain, twenty five potential threatened ecological communities, delineated by a number of floristic and other studies, have been assessed for threatened

ecological community status. Of these, twenty four have been confirmed as 'threatened' (Department of Environmental Protection 2000). Sixteen of these Threatened Ecological Communities are floristic community types as identified by Gibson *et al.* (1994).

2.0 METHODS AND LIMITATIONS

2.1 Flora survey methods

2.1.1 Methods of the flora survey

The Florida flora survey was conducted on the 22nd and 23rd of October, 2004. The flora in the study area was surveyed during the process of recording vegetation sites in the study area and while walking between the vegetation recording sites, vegetation mapping or during general flora searches in the study area.

All plant species present were recorded at each vegetation recording site (sites F1 and F2, Figure 2 below). Where a plant species was not well known, a specimen was collected and allocated a specimen number.

Plant species were recorded elsewhere in the study area if they had not been recorded at the vegetation sites or if they were of particular interest. Again, where a plant species was not well known, a specimen was collected and allocated a specimen number. GPS coordinates were recorded whenever it was considered there was a possibility that the plant species may be of special interest.

The specimens collected were pressed, dried and identified. The identifications were made by comparison to specimens in the reference and research collections of the Western Australian Herbarium, by the use of keys in various papers and books and by relevant experts on various groups of flora of the Swan Coastal Plain (see the acknowledgments section below).

The CALM Declared Rare and Priority Flora List (Atkins 2003; definitions in Appendix 1) was consulted as required to confirm the occurrence of any listed plant species in the survey area.

2.1.2 Limitations of the flora field survey

The major limitation of the flora survey is that any such survey is a sampling procedure of a variable environment with plant populations of variable growth habit, life span and flowering season. Some species, including annuals, are only available for collection for part of the year. This means that to locate all species that grow in an area is a substantial task, the success of which is related to the time available and the size and diversity of habitat in the survey. Consequently, it is possible that there are species present on the

subject land that were not recorded during this survey as they have only low abundance on the land, or were not flowering at the time of the survey.

Given the limitations of the flora survey, it is likely that this survey recorded more than 85% to 90% of the vascular flora in the survey area. That is, while the flora survey is relatively thorough, it is possible that some species occurring in the survey area have not been recorded.

2.2 Vegetation survey methods: selection and recording of site relevés

2.2.1 Methods of the vegetation survey

To assess the conservation status of vegetation units in the study area it was necessary to select a representative site in a selection of the vegetation units, describe the sites and record the plant species present at those sites. This data was collected for later analysis to determine the Gibson *et al* (1994) floristic community to which those vegetation units would belong (be most similar to) and hence if they were Threatened Ecological Communities.

At each site, the vegetation was described over an area of approximately 10 meters by 10 meters (the dimensions used in the Gibson *et al* (1994) study). The sites were not pegged or measured out with a measuring tape. The coordinates (WGS84) of each sites central point were recorded, using a Garmin Etrex GPS unit. Each site was then photographed and a site description made which included the site location, habitat (landform and aspect), surface soil texture and colour, any rock outcropping (including rock type), an estimate of the time since the site was last burnt and the vegetation condition. The vegetation structure was described using a modification by Mr M Trudgen (*pers comm.*) of Aplin's (1979) modification of Specht's vegetation description table (Appendix 2). All plant species occurring in the site area were recorded along with their height, percentage cover and specimen number if necessary.

The condition of vegetation at each site was recorded using the same scale outlined in Bush Forever Volume 2 (see Appendix 3; Department of Environmental Protection, 2000).

The information recorded for each vegetation unit was consistent with the templates developed as part of the Perth Biodiversity Project and should enable completion of the templates if that is desired.

2.2.2 Limitations of the vegetation survey

There is a limit to the accuracy of the assignment of the different strata in the vegetation descriptions to structural units (eg., low open woodland, low woodland, low open forest, open shrubland, shrubland etc.). Referral of a stratum to a structural category depends on assessment of its cover. Such estimation is imprecise and it is not unusual for different observers to give quite different estimates of the cover of a species, or stratum in a stand. However, descriptive exercises such as that carried out for this report require only a moderate level of accuracy.

The cover estimate of each plant species recorded in the quadrats was based on estimating species canopy cover. The assumption was made that for most species, canopy cover and projected foliar cover are reasonably similar, or that the difference is less than the level of accuracy of the estimates.

2.3 Methods of mapping vegetation attributes in the study area

2.3.1 Methods for mapping vegetation units in the survey area

Vegetation units were recorded generally between plant community and plant association level. The vegetation unit boundaries were drawn on a computer generated aerial photograph while traversing the study area. The aerial photograph was at a scale of 1:1000, colour, orthorectified and overlain with the UTM coordinate grid (GDA94 datum). The orthorectified aerial photography was supplied by the City of Mandurah and SMEC Australia PL compiled and printed the field maps. GPS coordinate readings were used to confirm placement of vegetation boundaries on the map.

The vegetation mapping unit descriptions were based on the vegetation site descriptions. For those units where detailed vegetation site descriptions had not been recorded, brief mapping unit descriptions were recorded.

2.3.2 Methods for mapping vegetation condition in the study area

The vegetation condition was mapped using the vegetation condition assessment at each of the relevés as a starting point. Generally the vegetation condition described at a site was representative of the vegetation condition throughout the vegetation. Where vegetation condition boundaries varied from that of the vegetation units, the mapping methods outlined in section 2.3.1 above were used.

2.4 Floristic analysis

2.4.1 Data storage and handling

The Florida vegetation site data was entered into a specially designed computer database developed by E. A. Griffin using Microsoft Access.

2.4.2 Floristic analysis methods

2.4.2.1 Introduction

The floristic analysis carried out was based on species presence/absence data collected from the one detailed Florida site recorded, combined in a database with the 509 sites from Gibson *et al.* (1994).

2.4.2.2 Data preparation and compatibility

To conduct the analysis on the data from the Florida survey area and Gibson *et al.* (1994) datasets, it was first necessary to reconcile the flora species. This step was necessary because of changes in the nomenclature over the last ten years and the potential for survey specific variations in the application of names (Griffin and Trudgen, 2004). The reconciliation involved reducing some infra-specific names to the relevant species name, combining some taxa where confusion is known to have occurred in field observations and identifications and omitting some names (mostly where a taxon had only been identified to genus).

It should be noted that the Florida data was compatible with the Gibson *et al.* (1994) data. Both datasets were based on data collected from sites of similar sizes, with the Gibson *et al.* (1994) sites being 10 metre by 10 metre quadrats and the Florida site being a releve of estimated 10 metre by 10 metre area. Gibson *et al.* (1994) visited their sites twice to record plant species present, including a spring visit, compared to the single recording of the Florida site. However, the single Florida recording took place during the spring season (when most plant species are most easily observed). Weed species were included in both the Gibson *et al.* (1994) and Florida datasets.

2.4.2.3 PATN analysis

The PATN modules used were ASO (calculation of similarity matrix), FUSE (classification), DEND (representation of classification) and NNB (determination of sites most similar to each site) (Griffin and Trudgen, 2004). The results of the analyses were imported into a database so that site characteristics and previous classifications (eg

Floristic Community Types derived in earlier classifications) could be associated with them.

Two types of PATN analysis were used. The first method (using the PATN ASO, FUSE and DEND modules) ran an analysis of the combined Florida and Gibson *et al.* (1994) data sets to produce a classification of the sites vegetation in the form of a dendrogram of the combined data sets, with the Floristic Community Types defined by Gibson *et al.* (1984) assigned to the Gibson *et al.* (1994) sites. The appropriate floristic community type to assign to the Florida site could then be interpreted by the relative position of that site to the Gibson *et al.* sites in the dendrogram.

The second method (Nearest Neighbours method) used the NNB module of PATN to investigate which 20 sites in the combined data set were most similar to the Florida site.

A final assignment of a Floristic Community Type was then made to the Florida site taking into account the results of both methods and the fact that the dendrogram relationships can be 'spread out' and less easily interpretable.

2.4.3 Floristic analysis limitations

It has been found in other floristic analysis that the addition of new sites to the Gibson *et al.* (1994) data set to produce a combined classification may disrupt the original classification of sites (Griffin and Trudgen, 2004). The more data that is added, the higher the level of disruption. If this occurs it can make it difficult to assign the new sites to the Floristic Community Types of Gibson *et al.* (Griffin and Trudgen, 2004).

Another limitation in conducting a PATN floristic analysis using the above methods may arise depending on the degree of success in reconciling the two data sets. A further limitation may arise from any significant differences in data collection methods between the two surveys. This is unlikely to have caused a material difference in the results as the data collection methods were similar.

2.5 Identification of Threatened Ecological Communities (TEC)

Once the Florida site was assigned to a Floristic Community Type, a table of Floristic Community Types on the Swan Coastal Plain and their TEC status (Department of Environmental Protection, 2000) was consulted to determine if the Florida site was a TEC. No new TEC's have been assessed for the western part of the Swan Coastal Plain

(which includes the survey area) since the publication of Bush Forever Vol 2 (B.J. Keighery, *pers. comm.*).

2.6 Recording habitat trees

2.6.1 Methods for recording habitat trees in the study area

The study area was traversed and the trees examined, to determine if any of the trees were Osprey nesting trees or had branch hollows suitable for nesting birds such as Black Cockatoos. The observation of the trees did not attempt to determine if there had been activity (eg nesting activity) in the hollows. The base of tree trunks were also examined for possum markings (bark scratchings).

A pair of 8x21mm binoculars were used to search the tree canopies for nests and hollows.

3.0 FLORA IN THE SURVEY AREA

3.1. Flora list for the survey area

A total of one hundred plant species were recorded in the Florida study area.

Seventy-seven (77) of these species were native to the area, including 76 species of native flowering plants and one native cycad (the Zamia Palm, *Macrozamia riedlei*).

Twenty-three (23) weed species were recorded in the survey area. A list of all the species recorded from the survey area is provided in Appendix 4.

Of the native flowering species recorded, twenty one (21) were monocotyledons and fifty five (55) were dicotyledons.

3.2 No declared rare flora species were recorded from the survey area

No Declared Rare Flora were recorded in the Florida survey area.

3.3 Priority flora species recorded from the survey area

No priority flora were recorded in the Florida survey area

3.4 Other species of conservation significance recorded from the survey area

No other species of conservation significance was recorded in this survey.

4.0 VEGETATION OF THE SURVEY AREA

4.1 Vegetation units mapped in the survey area

4.1.1 Introduction to vegetation descriptions

The description of vegetation units occurring in the Florida survey area is set out in Appendix 5. These vegetation descriptions are the basis of the vegetation mapping units described below.

The vegetation units are considered to be mostly described at the plant community to vegetation association level. Some areas assigned to a particular unit on the vegetation map (Figure 2), while having similar vegetation to the description of that unit, are variable in either structure, species dominance or floristics. Some stands of some of the vegetation units occurring in the areas mapped for vegetation units were quite small and as a result were not shown on the vegetation map.

4.1.2 Abbreviations used for species in the vegetation unit codes

The codes that discriminate the vegetation units are shown on the vegetation map (Figure 2). The codes are derived from the generic and species names of the more abundant genera or species in the different strata present in the unit. Where there is more than one species in the genus, or where two genera have the same initial, a lower case letter is used to distinguish which species is being referred to (see Table 1).

Table 1. Abbreviations for species names used in codes for the vegetation units mapped for the survey area.

Code	Species name	Code	Species name
Af	<i>Allocasuarina fraseriana</i>	Ba	<i>Banksia attenuata</i>
Ar	<i>Acacia rostellifera</i>	Ms	<i>Melaleuca systema</i>

4.1.3 Description of the vegetation mapping units in the Florida study area

Two vegetation units were mapped in the Florida survey area (Figure 2).

AfBa

Allocasuarina fraseriana, *Banksia attenuata* low open woodland over *Acacia rostellifera* tall shrubland to high open scrub over *Melaleuca systema* open shrubland to shrubland over *Hibbertia hypericoides* open heath over *Trachymene pilosa*, *Podolepis lessonii* open hermland.

Habitat and soil: flat plain. Pale yellow-brown sand. Some limestone outcropping

Notes: This unit was represented by site F2. See Photograph 1 below.

ArMs

Banksia attenuata scattered low trees over *Acacia rostellifera*, *Spyridium globosum* open to closed scrub over *Melaleuca systema* open shrubland (in open areas) over *Hibbertia hypericoides* low shrubland to low open open heath over *Trachymene pilosa*, *Podolepis lessonii* open herbland.

Habitat and soil: flat plain. Fine to medium grained pale yellow-brown siliceous sand with a small amount of calcium carbonate (Spearwood sand).

Notes: This unit was represented by site F1 (see Photograph 2 below). This unit would probably fall into Trudgen's category of 'Integrades, Limestone to Spearwood Dunes – Ar₃' (Trudgen, 1991).

4.2 Vegetation units in the survey area

Only two vegetation units were described for the Florida survey area (see Figure 2).

Vegetation unit ArMs, at the western end of the survey area, was an *Acacia rostellifera* open to closed scrub (typically interspersed with small open areas of *Melaleuca systema* and *Hibbertia hypericoides* shrubland between the dense patches of *Acacia rostellifera*), with some scattered *Banksia attenuata*. Vegetation unit AfBa was a fairly variable unit with *Banksia attenuata* and *Allocasuarina fraseriana* forming a low open woodland. A similar suite of species occurred in the two units.

4.3 Vegetation condition in the survey area

Vegetation condition was 'Excellent to Pristine' in the survey area (see Figure 3, definitions in Appendix 3). Weed cover was low to moderate in the survey area and a good list of species were present in the different vegetation strata including the vulnerable herb layer.

Some areas of deaths of tall *Acacia rostellifera* shrubs occurred in parts of the survey area. Some small areas of physical disturbance occurred, notably a track into the survey area from the south-east corner of the Florida PS with a number of small piles of building

rubbish. The northern edge of the survey area, adjacent to Ocean Rd and the Dawesville Bypass, was also disturbed (see Figure 3).



Photograph 1. *Allocasuarina fraseriana*, *Banksia attenuata* low open woodland over *Acacia rostellifera* tall shrubland to open scrub (unit AfBa) at site F2.



Photograph 2. *Acacia rostellifera*, (*Spyridium globulosum*) open to closed scrub over *Melaleuca systema* open shrubland (unit ArMs) at site F1.

5.0 FLORISTIC COMMUNITIES AND THREATENED ECOLOGICAL COMMUNITIES IN THE SURVEY AREA

5.1 Determination of Floristic Community Types (FCT) by classification

The results of the PATN analysis of the combined data set of the Florida survey area site (F1) and Gibson *et al.* (1994) Swan Coastal Plain sites (Figure 4) are shown in Figure 4 (dendrogram), Table 2 (nearest neighbours) and summarised in Table 3, below.

The dendrogram analysis (Figure 4) assigned site F1 to FCT 25 ('Southern *Eucalyptus gomphocephala*-*Agonis flexuosa* woodlands'). However, the nearest neighbour analysis showed that site F1 was most similar (dissimilarity coefficient of 0.58), to an FCT 21a ('Central *Banksia attenuata*-*Eucalyptus marginata* woodlands') site (PAGA-7) and an FCT 25 site (MEAL-1) (Table 2 below). Of site F1's 10 nearest neighbours, six were FCT 25 sites. The nearest neighbour analysis is more easily interpreted and reliable (Ted Griffin, *pers. comm.*) and its assignment to FCT's is given more weight here. Site F1 could therefore best be described as an FCT 25 site with affinities with FCT 21a (Table 3 below).

Table 2. Ten 'Nearest Neighbours' for the Florida site (F1)

Column headings:

site: next most similar sites 1 to 10;

dc: dissimilarity coefficient for next most similar site;

f: Floristic Community Type of next most similar site.

Neighbour	Site	Dissimilarity coefficient	FCT
1 st	MS4	0.56	
2 nd	PAGA-7	0.58	21a
3 rd	MEAL-1	0.58	25
4 th	C71-4	0.60	25
5 th	CORON-2	0.60	25
6 th	MINN-3	0.60	25
7 th	MINN-1	0.60	25
8 th	MS2	0.62	
9 th	MINN-2	0.62	25
10 th	MS5	0.62	

Gibson *et al.*'s FCT 21a grouped sites that were centred on, but not exclusive to, the Bassendean Dune landform element, with significant occurrences also on the Spearwood Dune element. FCT 25 almost exclusively grouped sites from the Spearwood and

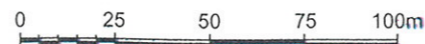
Quindalup Dunes landform elements. The Florida survey area was on the edge of the Yoongarillup unit (a different landform unit again), with the Spearwood Dune element occurring immediately to the east (see section 1.4 above).

Table 3. Assignment of Floristic Community Type to Florida sites giving consideration to both dendrogram and nearest neighbour analysis.

Florida Site	From Dendrogram	From Nearest Neighbour	Floristic Community Types Assigned
F1	25	21a/25	25/21a



NOTES: F1, F2 = VEGETATION RECORDING SITES
 AfBa, ArMs = VEGETATION UNITS



SMEC
 ACN 085 475 149
 Level 6, 12 St Georges Terrace
 PERTH WA 6000
 Tel (08) 9323 5000 Fax (08) 9323 5001

FLORIDA
 VEGETATION UNIT MAP

Project Number: 36413
 Figure Number: FIGURE 2



LEGEND: P = PRISTINE
 E = EXCELLENT
 VG = VERY GOOD
 G = GOOD
 D = DEGRADED
 CD = COMPLETELY DEGRADED



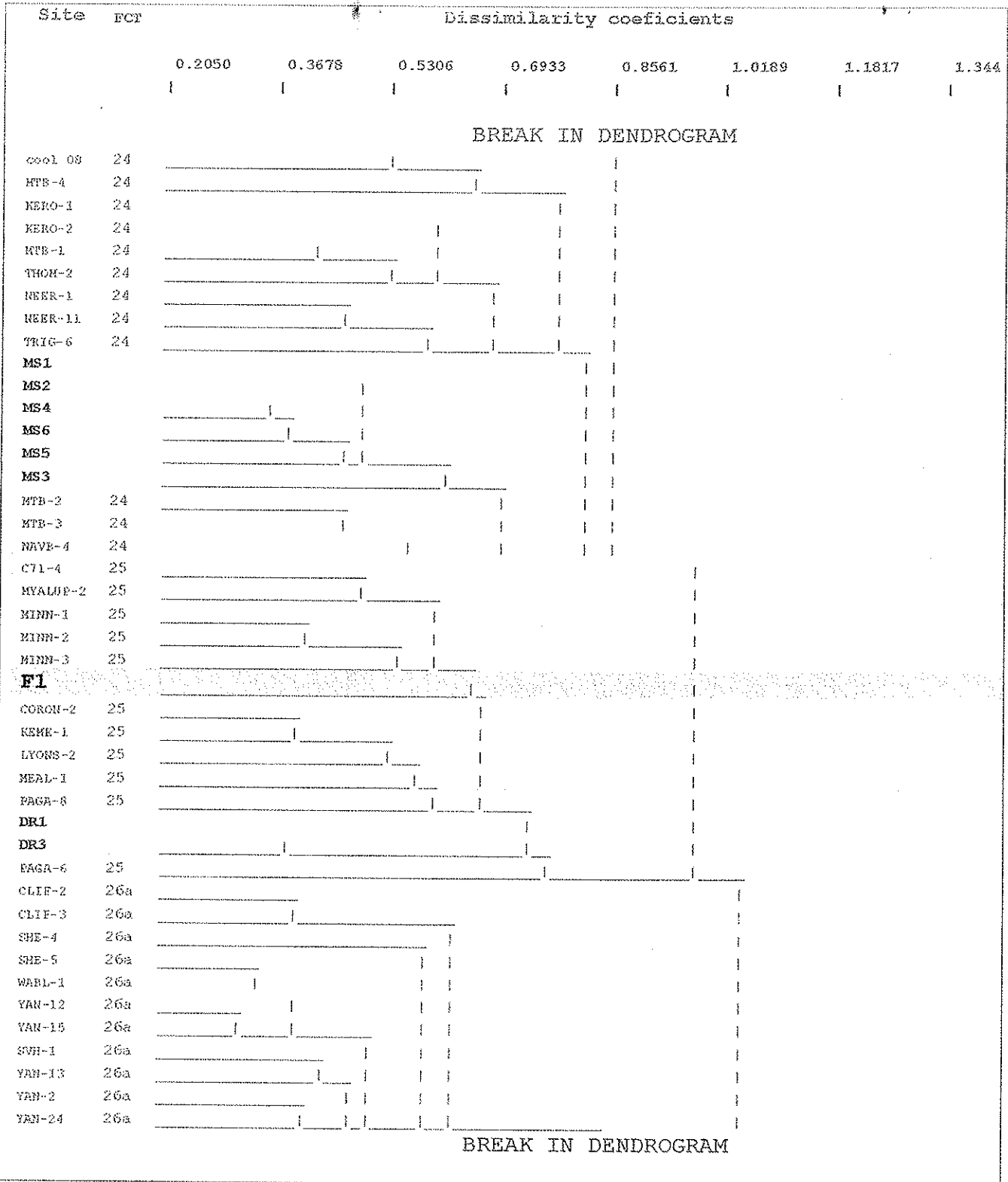
ACN:065 475 149
 Level 6, 12 St Georges Terrace
 PERTH WA 6006
 Tel:(08) 9323 5900 Fax(08) 9323 5901

FLORIDA
 VEGETATION CONDITION MAP

Project Number: 36413
 Figure Number: FIGURE 3

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Figure 4. Sections of the dendrogram produced from the classification of the Florida site with the Gibson *et al.* (1994) sites.



6.0 VEGETATION CONSERVATION VALUES

6.1 Assessment for Threatened Ecological Communities (TEC) in the survey area

The Florida site, F1, was closest to the Floristic Community Type 25 with affinities to FCT 21a. Neither of these FCT's have been classified as Threatened Ecological Communities (Department of Environmental Protection, 2000).

6.2 Other conservation values of the Florida survey area vegetation

Trudgen (1991) assessed the conservation values of the vegetation along a 45 kilometres coastal strip between Singleton (10 kilometres north of Mandurah) and the southern boundary of the City of Mandurah. He concluded that the vegetation of the limestone areas (including the limestones of the Yoongarillup plain) were of high conservation value because of the diversity of different vegetation types found there and 'the generally good condition of the vegetation of the limestone areas'. The Florida survey area is on the edge of these limestone areas of the Yoongarillup plains.

The Yoongarillup landform unit is a coastal unit associated with the Spearwood Dunes and occurs from near Singleton in the north to the Bunbury area. The original ('pre-1750') extent of the Yoongarillup (vegetation) Complex was estimated to be about 24,767 hectares, of which it is estimated 11,140 hectares remains as remnant vegetation (EPA, 2003). Of that remaining remnant vegetation, 3,449 hectares (13.9%) is in secure tenure (EPA, 2003). However, it is likely a significant part of this remnant vegetation is not in good condition (Trudgen, *pers comm.*).

In conclusion, the vegetation of the survey area has high conservation value because of the diversity of the vegetation on that landform unit, the restricted distribution and area of that landform unit, the small part of that landform unit vegetation that is secured and the Excellent condition of the survey area vegetation.

7.0 HABITAT TREES

Only low trees (*Banksia attenuata* (about 4 to 6 metres high), *Allocasuarina fraseriana* (up to 6 to 7 metres high) and scattered low *Eucalyptus marginata* subsp. *marginata*) occurred in the survey area (see Photograph 2).

No Osprey nests or nesting hollows were observed in the trees in the survey area.

8.0 ACKNOWLEDGEMENTS

City of Mandurah provided the ortho-corrected aerial photography from which SMEC Australia PL prepared aerial photograph base maps for the vegetation mapping.

Mr Ted Griffin ran the PATN analysis and gave advice on the interpretation of the results.

Thanks to Mr Andrew Brown for his assistance with the identification of the orchids and Mr Bruce Maslin for his examination of the *Acacia* aff. *rostellifera* specimens. Thanks also to Mr Malcolm Trudgen and Mr Mike Hislop for some general assistance with some other identifications.

9.0 REFERENCES

- Aplin, T.E.H. (1979) 'The Flora' IN: *Environment and Science*, B.J. O'Brien (ed.). University of WA Press, Perth.
- Atkins, K.J. (2003) *Declared Rare and Priority Flora List for Western Australia..* Department of Conservation and Land Management, Woodvale.
- Beard, J. S. (1980). A new phytogeographic map of Western Australia. *Western Australian Herbarium Research Notes* 3, 37-58.
- Churchwood, H. M. and McArthur, W. M. (1980). Landforms and soils of the Darling System, Western Australia. *In* Atlas of Natural Resources Darling System Western Australia. Dept of Conservation and Environment. University of Western Australia Press.
- Department of Environmental Protection (2000) *Bush Forever Vol. 2 Directory of Bush Forever Sites.* Dept of Environmental Protection, Perth.
- English, V., and Blyth, J. (1997) *Identifying and conserving threatened ecological communities (TECs) in the South West Botanical Province.* ANCA National Reserves System Cooperative Program: Project Number N702, Australian National Conservation Agency, Canberra.
- Environmental Protection Authority. (2003). *Guidance for the assessment of environmental Factors (In accordance with the Environmental Protection Act 1986).* No. 10. January 2003. Western Australia.
- Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., and Lyons, M.N. (1994) *A Floristic Survey of the Southern Swan Coastal Plain.* Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc).
- Griffin, T. and Trudgen, M. (2004). *Floristic analysis of quadrat data from remnant native vegetation at Pearce RAAF Airbase.* (Unpublished report prepared for Ecoscape (Australia) Pty Ltd).

Hedde, E.M., Loneragan, O.W., and Havel, J.J. (1980) 'Vegetation complexes of the Darling System, Western Australia.' In: *Atlas of Natural Resources, Darling System Western Australia.*, M.J. Mulcahy (ed.) pp37-76 and accompanying map. Department of Conservation and Environment, Perth.

McArthur, W. M. and Bettenay, E. (1960). The development and distribution of the soils of the Swan Coastal Plain, Western Australia. Soil Publication No. 16. CSIRO. Melbourne.

Trudgen, M. (1991). A flora and vegetation survey of the coast of the City of Mandurah. Unpublished report. Department of Planning and Urban development, Western Australia.

Trudgen, M. (1999). A flora and vegetation survey of Lots 46 and 47 Maralla Road and Lexia Avenue, Ellenbrook. Unpublished report prepared by M.E.Trudgen and Associates for The Crown Solicitors Office, Government of Western Australia.

APPENDIX 1. The Department of Conservation and Land Management Priority Flora Categories

Definition of CALM Declared Rare and Priority Flora categories (from Atkins 2003).

Declared Rare Flora - Extant Taxa

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

Declared Rare Flora - Presumed Extinct Flora

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

Priority One - Poorly Known Taxa.

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

Priority Two - Poorly Known Taxa.

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

Priority Three - Poorly Known Taxa.

Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally > 5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further study.

Priority Four - Rare Taxa.

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

APPENDIX 2. Vegetation structural table of Trudgen based on Aplin's (1979) modification of Specht's classification

Life form and height of tallest stratum	Projective foliage cover of tallest stratum as %	Description
Trees over 30 metres	70 -100	High closed forest
	30 -70	High open forest
	10 - 30	high woodland
	2 -10	high open woodland
	under 2	Scattered tall trees
Trees 10 - 30 metres	70 -100	Closed forest
	30 -70	Open forest
	10 - 30	Woodland
	2 -10	Open woodland
	under 2	Scattered trees
Trees under 10 metres	70 -100	Low closed forest
	30 - 70	Low open forest
	10 - 30	Low woodland
	2 -10	Low open woodland
	under 2	Scattered low trees
Shrubs over 2 metres	70 - 100	Closed scrub
	30 - 70	Open scrub
	10 - 30	High shrubland
	2 -10	High open shrubland
	under 2	Scattered tall shrubs
Shrubs 1 - 2 metres	70 - 100	Closed heath
	30 - 70	Open heath
	10 - 30	Shrubland
	2 -10	Open shrubland
	under 2	Scattered shrubs
Shrubs under 1 metre	70 - 100	low closed heath
	30 - 70	low open heath
	10 - 30	low shrubland
	2 -10	Low open shrubland
	under 2	Low scattered shrubs
Herbs/Sedges/Grasses	70 - 100	Closed herb, sedge, grassland
	30 - 70	Herb, sedge, grassland
	10 - 30	Open herb, sedge, grassland
	2 -10	Very open herb, sedge, g'land
	under 2	Scattered herbs sedges, grasses

Grasslands then divided into:

Tussock grasslands (perennial tussock species, e.g. *Eragrostis* species);

Hummock grasslands (*Triodia* and *Plectrachne* species that form hummocks)

Curly spinifex grassland (*Plectrachne pungens*, which does not form hummocks) (follows J.S. Beard).

Annual tussock grassland (e.g. annual *Sorghum* species).

APPENDIX 3 Vegetation condition scale and descriptions

(from Keighery 1994, reproduced in Department of Environmental Protection 2000b)

Pristine (1) : Pristine or nearly so, no obvious signs of disturbance

Excellent (2) : Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

Very Good (3) : Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

Good (4) : Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Degraded (5) : Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

Completely Degraded (6) : The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX 4. Flora list for the Florida survey area.

Notes:

1. The numbers in front of the plant families are the numbers for families used at the Western Australian Herbarium.
2. An asterisk (*) beside the taxon name indicates an introduced species (weed).
3. The priority status column shows the conservation code of any rare or priority plants in the list.

FAMILY/TAXA	COMMON NAMES	PRIORITY STATUS
GYMNOSPERMAE		
016A ZAMIACEAE		
<i>Macrozamia riedlei</i>	Zamia	
ANGIOSPERMAE (flowering plants)		
MONOCOTYLEDONS		
031 POACEAE (grasses)		
<i>Austrostipa flavescens</i>		
* <i>Briza maxima</i>	Blowfly grass	
* <i>Briza minor</i>		
* <i>Bromus diandrus</i>	Great brome grass	
* <i>Ehrharta longiflora</i>	Annual veldt grass	
* <i>Holcus setiger</i>	Annual fog grass	
* <i>Lolium multiflorum</i>	Italian rye grass	
<i>Poa drummondiana</i>		
* <i>Vulpia myuros</i> var. <i>myuros</i>	Silver grass	
032 CYPERACEAE (sedges)		
<i>Schoenus clandestinus</i>		
039 RESTIONACEAE (rushes)		
<i>Desmocladus asper</i>		
<i>Desmocladus flexuosus</i>		
054B ASPARAGACEAE		
* <i>Asparagus asparagoides</i>	Bridal creeper	
054C DASYPGONACEAE		
<i>Lomandra maritima</i>		
054D XANTHORRHOEACEAE		
<i>Xanthorrhoea preissii</i>	Grass tree	
054E PHORMIACEAE		

Dianella revoluta var. *divaricata*

054F ANTHERIACEAE

<i>Caesia micrantha</i>	Pale grass lily
<i>Dichopogon capillipes</i>	
<i>Sowerbaea laxiflora</i>	Purple tassels
<i>Thysanotus manglesianus</i>	Fringed lily
<i>Thysanotus sparteus</i>	
<i>Tricoryne elatior</i>	Yellow autumn lily

054J COLCHICACEAE

<i>Burchardia umbellata</i>	Milkmaids
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055 HAEMODORACEAE

<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	Prickly Conostylis
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060 IRIDACEAE (Iris family)

* <i>Homeria</i> sp.	Cape tulip
<i>Patersonia occidentalis</i>	Purple flag

066 ORCHIDACEAE (orchids)

<i>Caladenia latifolia</i>	Pink fairy orchid
<i>Caladenia longicauda speciosa</i>	Common white spider orchid
<i>Thelymitra crinita</i>	Blue lady orchid

DICOTYLEDONS

070 CASUARINACEAE

<i>Allocasuarina fraseriana</i>	Sheok
<i>Allocasuarina humilis</i>	Dwarf sheok

088 URTICACEAE

<i>Parietaria debilis</i>	
---------------------------	--

090 PROTEACEAE

<i>Banksia attenuata</i>	Slender banksia
<i>Dryandra lindleyana</i> var. <i>lindleyana</i>	
<i>Dryandra sessilis</i>	Parrot bush
<i>Grevillea preissii</i> subsp. <i>preissii</i>	
<i>Hakea lissocarpha</i>	
<i>Hakea prostrata</i>	Harsh hakea

092 SANTALACEAE

<i>Exocarpos sparteus</i>	
<i>Santalum acuminatum</i>	Quandong

105 CHENOPODIACEAE

- Rhagodia baccata subsp. baccata
- 106 AMARANTHACEAE
Ptilotus drummondii var. drummondii
- 108 GYROSTEMONACEAE
Tersonia cyathiflora
- 111 PORTULACACEAE
Calandrinia liniflora Parakeelya
- 113 CARYOPHYLLACEAE
*Petrohragia dubia Velvet pink
- 119 RANUNCULACEAE
Clematis linearifolia
- 138 BRASSICACEAE
*Heliophila pusilla
Stenopetalum gracile
- 143 DROSERACEAE
Drosera erythrorhiza subsp. erythrorhiza Red ink sundew
Drosera pallida Pale rainbow
Drosera stolonifera subsp. stolonifera Leafy sundew
- 149 CRASSULACEAE
Crassula colorata
- 163 MIMOSACEAE
Acacia cochlearis Rigid wattle
Acacia pulchella var. glaberrima Prickly moses
Acacia rostellifera Summer scented wattle
- 165 PAPILIONACEAE
Daviesia divaricata subsp. divaricata
Hardenbergia comptoniana Native Wisteria
Isotropis cuneifolia subsp. cuneifolia Granny bonnets
Jacksonia furcellata Grey stinkwood
Jacksonia sternbergiana Stinkwood
Templetonia retusa Cockies tongue
*Trifolium campestre var. campestre
- 175 RUTACEAE
Philotheca spicata Pepper and salt

185 EUPHORBIACEAE	
<i>Phyllanthus calycinus</i>	False Boronia
215 RHAMNACEAE	
<i>Spyridium globulosum</i>	Basket bush
226 DILLENIACEAE	
<i>Hibbertia hypericoides</i>	Yellow buttercups
243 VIOLACEAE	
<i>Hybanthus calycinus</i>	Wild violet
263 THYMELAEACEAE	
<i>Pimelea calcicola</i>	
273 MYRTACEAE	
<i>Eucalyptus decipiens</i>	Red heart
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	Jarrah
<i>Melaleuca systema</i>	Coastal honeymyrtle
281 APIACEAE	
<i>Daucus glochidiatus</i>	Australian carrot
<i>Eryngium pinnatifidum</i>	Blue devils
<i>Homalosciadium homalocarpum</i>	
<i>Trachymene coerulea</i> subsp. <i>coerulea</i>	Blue laceflower
<i>Trachymene pilosa</i>	Native parsnip
288 EPACRIDACEAE	
<i>Leucopogon parviflorus</i>	Coast beard-heath
293 PRIMULACEAE	
* <i>Anagallis arvensis</i> var. <i>caerulea</i>	Pimpernel
302 LOGANACEAE	
<i>Phyllangium paradoxum</i>	
307A CUSCUTACEAE	
* <i>Cuscuta epithymum</i>	Lesser dodder
315 SOLANACEAE	
* <i>Solanum nigrum</i>	Deadly nightshades
316 SCROPHULARIACEAE (snapdragon family)	
* <i>Bartsia trixago</i>	White bartsia
* <i>Parentucellia latifolia</i>	Red bartsia

- 320 OROBANCHACEAE
 **Orobanche minor* Lesser broomrape
- 334 VALERIANACEAE
 **Centranthus macrosiphon* Pretty betsy
- 340 LOBELIACEAE
Lobelia tenuior Slender lob
- 343 STYLIDIACEAE (trigger plant family)
Levenhookia stipitata
Stylidium piliferum subsp. *piliferum* Common butterfly trigger plant
Stylidium schoenoides Cow kicks
- 345 ASTERACEAE
 **Arctotheca calendula* Capeweed
Asteridea pulverulenta
 **Hypochaeris radicata* Flat weed
Lagenifera huegelii
Milotia myosotidifolia
Olearia axillaris Coastal daisy bush
Podolepis lessonii
Rhodanthe citrina
 **Sonchus oleraceus* Common sowthistle
 **Ursinia anthemoides*

APPENDIX 5. Site descriptions and species lists for the Florida study area

Mandurah-City of Site F1

Described by BRM Date 22/10/2004

Location Bush land just east of Florida Primary School

Air Photo Photo 11 on Roll BM5(2004) Video N E Photo

Photo Notes

AMG Zone 50 371709mE, 6389498mN.

Habitat Small flat inter-dunal plain.

Soil Fine to medium grained pale yellow-brown siliceous sand with a small amount of calcium carbonate (Spearwood sand). (Sample SF1).

Rock Type

Vegetation Banksia attenuata scattered low trees over Acacia rostellifera, (Spyridium globosum) open to closed scrub over Melaleuca systema open shrubland (in open areas) over Hibbertia hypericoides low shrubland to low open open heath over Trachymene pilosa, Podolepis lessonii open hermland

Veg Condition (BF) Excellent. Good species list but moderate weed cover.

Fire Age

Notes Relieve over approximately 10x10 area around the GPS point.

Rock Pile

Species List:

Quad	Name	Cove	C Class	Height	Specimen	Notes
	Acacia rostellifera	40	33.3-50%	2.5-3m	F1-1	
	Anagallis arvensis var. caerulea	+	<1 %	10cm		*blue flr
	Austrostipa flavescens	+	<1 %	90cm	F1-16	
	Banksia attenuata	+	<1 %	4-5m	F1-22	
	Briza maxima	+	<1 %	20cm		
	Briza minor	+	<1 %	20cm		
	Bromus diandrus	+	<1 %	40cm		
	Burchardia umbellata	+	<1 %	60cm		
	Caladenia latifolia	+	<1 %	35cm	F1-7	
	Caladenia longicauda	+	<1 %	20-30cm		Photo BM5-11
	Calandrinia liniflora	+	<1 %	10cm	F1-20	terete leaf
	Clematis linearifolia	+	<1 %	20cm	F1-23	herb
	Daucus glochidiatus	3-5	1-5%	12-20	F1-14	herb fine lobe
	Desmocladus asper	+	<1 %	15-20cm	F1-17	
	Dichopogon capillipes	2-3	1-5%	20cm		
	Dryandra lindleyana var. lindleyana	+	<1 %	15cm		
	Ehrharta longiflora	+	<1 %	35cm		
	Eryngium pinnatifidum	+	<1 %	25-40cm	F1-18	
	Hardenbergia comptoniana	+	<1 %	3.5m		
	Heliophila pusilla	+	<1 %	15-20cm		*white flr
	Brassicaceae					
	Hibbertia hypericoides	50-60	50-75%	50-90cm		
	Holeus setiger	+	<1 %	30cm	F1-9	*grass
	Hybanthus calycinus	+	<1 %	15-20cm	F1-8	
	Hypochoeris radicata	+	<1 %	20cm	F1-12	
	Lobelia tenuior	+	<1 %	15-20cm	F1-6	
	Macrozamia riedlei	+	<1 %	1.3m		
	Melaleuca systema	2-3	1-5%	1.1m	F1-3	
	Olearia axillaris	+	<1 %	35cm	F1-27	grey leaf

<i>Orobanche minor</i>	+	<1 %	15cm	F1-19	
<i>Parentucellia latifolia</i>	+	<1 %	10cm	(=MS2-)	*
<i>Parietaria debilis</i>	+	<1 %	30cm	F1-15	red stem
<i>Petrohragia dubia</i>	+	<1 %	30cm	(=MS1-)	*pink fir
weed					
<i>Phyllanthus calycinus</i>	+	<1 %	45cm		
<i>Poa drummondiana</i>	+	<1 %	45cm	F1-10	grass
<i>Podolepis lessonii</i>	1-2	1-5%	10cm	F1-5	
<i>Ptilotus drummondii</i> var. <i>drummondii</i>	+	<1 %	35cm	F1-25	
<i>Schoenus clandestinus</i>	+	<1 %	5cm	F1-24	grass
<i>Sonchus oleraceus</i>	+	<1 %	35cm	F1-11	
<i>Sowerbaea laxiflora</i>	+	<1 %	30cm		
<i>Spyridium globulosum</i>	+	<1 %	1.4m	F1-2	
<i>Thysanotus manglesianus</i>	+	<1 %	1.4m		climber
<i>Trachymene pilosa</i>	10-15	10-25%	15-20cm	F1-4	
<i>Trifolium campestre</i> var. <i>campestre</i>	1-2	1-5%	10-12cm	F1-13	*
<i>Vulpia myuros</i> var. <i>myuros</i>	+	<1 %	40cm	F-121	grass weed

Mandurah-City of Site F2

Described by BRM **Date** 23/10/2004

Location Bush land just east of Florida Primary School

Air Photo **Photo** 17 **on Roll** BM5(2004) **Video** N **E Photo**

Photo Notes

AMG Zone 50 371686mE, 6389350mN

Habitat Small flat inter-dunal plain.

Soil Pale yellow-brown sand

Rock Type Some limestone outcropping

Vegetation *Allocasuarina fraseriana*, *Banksia attenuata* low open woodland over *Acacia rostellifera* tall shrubland to high open scrub over *Melaleuca systema* open shrubland to shrubland over *Hibbertia hypericoides* open heath over *Trachymene pilosa*, *Podolepis lessonii* open herbland.

Veg Condition (BF) Excellent to Pristine

Fire Age >7-10 years since burnt.

Notes Incomplete sp list.

Releve over approximately 10x10 area around the GPS point.

Area of old dead *Acacia rostellifera* nearby.

Rock Pile

Species List:

Quad	Name	Cove	C Class	Height	Specimen Notes
	<i>Acacia rostellifera</i>	35-50			F2-2,F2-1
	<i>Allocasuarina fraseriana</i>	5-8			
	<i>Banksia attenuata</i>	30-40			
	<i>Burchardia umbellata</i>	+			
	<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	+			F2-5
	<i>Dichopogon capillipes</i>	+			
	<i>Hardenbergia comptoniana</i>	+			
	<i>Hibbertia hypericoides</i>	60-70			
	<i>Lagenifera huegelii</i>	+			
	<i>Lobelia tenuior</i>	+			=F1-
	<i>Macrozamia riedlei</i>	+			
	<i>Melaleuca systema</i>	5-10			
	<i>Phyllanthus calycinus</i>	+			

Podolepis lessonii	1-2	F2-4	
Santalum acuminatum	+		
Spyridium globulosum	+		
Trachymene pilosa	3-5	F2-3	
Trifolium campestre var. campestre	+	=F1-	Trifolium
camp			
Xanthorrhoea preissii	+		



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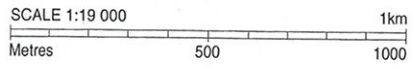
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JOINS MAP 543



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JOINS MAP 563



PRIMARY RECTANGLE MURRAY BF32
 PRIMARY RECTANGLE MURRAY BG32

FREEWAY	[Symbol]	PARK, RESERVE, OVAL	[Symbol]	AMBULANCE STATION	[Symbol]	CAR PARK	[Symbol]
PROPOSED FREEWAY	[Symbol]	SCHOOL, HOSPITAL	[Symbol]	BARBECUE	[Symbol]	COLLEGE - PRIVATE ..	[Symbol]
HIGHWAY or MAIN ROUTE ..	[Symbol]	MISCELLANEOUS AREA	[Symbol]	BOAT RAMP	[Symbol]	COLLEGE - PUBLIC	[Symbol]
ALTERNATE ROUTE	[Symbol]	MALL, PLAZA	[Symbol]	BOWLING CLUB/GREEN	[Symbol]	CYCLEWAY	[Symbol]
TRAFFICABLE ROAD	[Symbol]	SWAMP	[Symbol]	CAMPING AREA	[Symbol]	DISTANCE FROM GPO ..	[Symbol]
PROPOSED ROAD	[Symbol]			CARAVAN PARK	[Symbol]	EMERGENCY TELEPHO	[Symbol]