SPRING RARE FLORA SURVEY FOR BEENUP HAUL ROAD IN SANSON AND SCOTT ROAD REALIGNMENT SECTIONS AND OF FIFTEEN MATERIALS PIT AREAS

Prepared for

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SUMMARY

This report describes spring rare flora surveys of two realignment sections and fifteen materials pit areas along the Beenup Haul Road route in November 1994, and their results. During the surveys an emphasis was placed on finding Declared Rare Flora (DRF) and Priority plants and identifying habitats where they would be likely to occur.

No DRF species was found during the surveys, but nine Priority taxa and one other significant species listed in the report's Table 1 were found. The Priority taxa, their conservation codes and the Sections and Areas in which they were found are:

o	*Acacia semitrullata*	P3	~ G29, Scott Road Section
o	*Astroloma* sp. Nannup	P1	Scott Road Section
o	*Lambertia multiflora* var. *darlingensis*	P3	G29
o	*Lambertia rariflora*	P4	Sanson Section, N and probably ENE of S15
o	*Leptomeria lehmannii*	P2	Sanson Section
o	*Melaleuca basicephala*	P4	Scott Road Section
o	*Pultenaea pinifolia*	P3	Sanson Section
o	*Pultenaea radiata*	P1	G29, Sanson Section
o	*Stylidium barleei*	P3	G25, S16, G26, S15

The other significant species found is a pending Priority species:

o	*Grevillea bronwenae*	Sanson Section

As determination of herbarium specimens collected during the field work continues, other significant taxa may be identified. Furthermore, a number of DRF and Priority species which were not in flower at the time of the surveys could could have been missed.

Nine of the ten, plus other potentially significant plants, were found in three of the project areas: the northern valley of the Sanson Section, the Scott Road Section, particularly in the area of the swamps, and Materials Pit Area G29. Each of the first two areas has at least three significant species, and the third area has relatively large numbers of one of the significant species. All three areas have several potentially significant species.

Consequently, the report recommends that

- the southeastern corner and the area covered by the large population of *Lambertia multiflora* var. *darlingensis* be excluded from Materials Pit Area G29,
- a causeway be constructed across the Sanson Section northern valley to minimise impeding above surface and subsurface water flow,
- disturbance to vegetation in the valley be minimised, and
- the alignment through the Scott Road Section avoid the eastern and western swamps.

It is also recommends that, if possible,

- a more disturbed area be substituted for Materials Pit Area S12's unlogged Jarrah forest.

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GLOSSARY

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SEPARATE FROM REPORT

Maps showing locations of significant flora in Sections and Areas

Folder of photographs of significant flora

SPRING RARE FLORA SURVEY FOR BEENUP HAUL ROAD IN SANSON AND SCOTT ROAD REALIGNMENT SECTIONS AND OF FIFTEEN MATERIALS PIT AREAS

1.0 INTRODUCTION

The haul road route for the Beenup mineral sands project runs north from Beenup along Scott River (or simply Scott) Road, east along Brockman Highway and north along Sues Road to Jalbarragup Road. The route then continues north, mainly away from existing roads and through State forest and private holdings, to the Ludlow Deviation, and along that to Capel. Part of the route through State forest between Jalbarragup Road and Sabina Road (the Sanson Section) has been realigned, and in the south the route is being realigned away from the north end of Scott Road to a route through the southeastern corner of the Brockman Highway - Scott Road intersection (the Scott-Brockman Section).

This report describes and discusses the results of spring rare flora surveys undertaken for Main Roads, Western Australia, Bunbury Division, in these two sections and in fifteen materials pit areas (sites) near Sues Road and Sabina Roads. These pit areas are:

Gravel: G10, G12, G15, G18, G23, G24, G25, G26, G27, G29
Sand: S12, S13, S14, S15, S16

The purpose of the surveys was to identify, mark and report the locations of any significant species which could be identified in any of the materials pit areas and realignment areas.

The field surveys were undertaken on 9, 10, 11, 12, 20 and 27 November 1994. During the surveys Declared Rare Flora, Priority Flora and other significant flora plants and likely habitats for them were searched for. The principal species searched for, and the ones found, are listed in Table 1.

Figure 1 shows the approximate locations of the areas surveyed, and photographs of significant species found during the field surveys are in an accompanying folder.

Locations where the significant species were found are shown on accompanying maps provided by Main Roads.

Appendix 1 provides definitions, explanations and background information on significant species.

2.0 PHYSICAL ENVIRONMENT

The southern end of the haul road route is on the Scott (Coastal) Plain, an area with many pools, swamps, winter-wet flats and significant species. South of Brockman Highway, the Scott Plain gives way to the higher, drier Nillup Plain.

The northern end of the route is on the Swan (Coastal) Plain, but the northern areas surveyed are on the escarpment bordering the Swan Plain, the Whicher Escarpment or Range. The Whicher Range and the few remaining uncleared winter-wet flats on the Swan Plain are also relatively rich in significant species.

The Blackwood Plateau, sometimes called the Donnybrook Sunklands, is the forested area between the Nillup Plain and the Whicher Range, a large area with a relatively low incidence of significant flora.

The majority of material pit sites surveyed for rare flora and the southern part of the Sanson Section are on the Blackwood Plateau. The northern part of the Sanson Section and the materials pit sites north of it are in the Whicher Range. The Scott-Brockman Section is mainly on the Nillup Plain, with the southernmost bit possibly being on the Scott Plain.

3.0 METHODOLOGY

3.1 PROCEDURE

The spring rare flora survey project was undertaken in the four, overlapping phases outlined below:

1. The initial, office-based phase -

   - o accumulation of information about species recorded in the survey area, and nearby or in similar habitats, from publications, reports, CALM rare flora database printouts, herbarium specimens in the Western Australian Herbarium and botanists familiar with the area,

   - o preparation of a working draft of Table 1, using the information accumulated; the table presents the basic set of information used during the field work to locate and identify significant species and is described in more detail below, and

   - o other preparation for field work.

2. The second, field work phase -

   - o searches for rare and otherwise significant flora by car and on foot of the fifteen materials pit areas as marked with pegs and flagging tape and indicated on drawings provided by Main Roads, around the perimeters of the areas and through them,

   - o searches for rare and otherwise significant flora in a strip 200m wide and 1200m long, as indicated on the map provided by Main Roads, of a realignment area between Jalbarragup Road and Sabina Road, in the Sanson Section; there were no pegs, flagging tape or other marks on the ground to indicate the location of the strip or its centreline,

   - o searches for rare and otherwise significant flora in the southeast corner of the Scott River Road - Brockman Highway intersection as shown on the aerial photo photocopy provided by Main Roads, and

   - o isolated individuals and representatives of populations of plants identified in the field as being or suspected of being significant were marked with pink and/or yellow flagging tape with the taxonomic name written on it, and photographs and herbarium specimens were taken.

3. The third, herbarium/identifiation phase -

   - o the plant specimens collected and pressed in the field were dried and fumigated in the Western Australian Herbarium; Greg Keighery tentatively identified many of the specimens before they were taken to the herbarium,

   - o after fumigation, the specimens were compared with named specimens in the herbarium collection to confirm or revise identifications, and

- o after being labelled, some of the specimens are being forwarded to authorities for selected groups, such as Terry Macfarlane, the authority on the *Pultenaea ericoides* group, for checking, and a set of labelled significant specimens will be given to the herbarium.

4. The fourth, analysis and report preparation phase.

A large proportion of the DRF and Priority taxa which have been recorded in the general area occur in a limited range of natural habitats associated with wetlands and semi-wetlands, wet ironstone and sandy soils on laterite. These are the types of habitats surveyed most intensively for significant flora.

The principal taxa sought during the rare flora surveys are those listed in Table 1, but any plant (or habitat) suspected of being unusual or rare was noted and its identification checked.

3.2 TABLE 1

Table 1 lists the 68 DRF and Priority taxa and other significant species having currently known distributions and habitats which include the project area, or which have been recorded within several kilometres of it. It was compiled from information on several lists provided by the Department of Conservation and Land Management (CALM) and supplementary information from several books, articles and reports, from labels on herbarium specimens in the Western Australian Herbarium, from discussions with botanists and from my own knowledge and records. The several books, articles and reports include Brittan (1987), Brooker and Kleinig (1990), Hoffman and Brown (1992), Hopper *et al.* (1990), Lowrie (1989), Marchant *et al.* (1987) and Monaghan Rooke and Robinson (1992).

The process of updating the list from earlier versions has resulted in some taxa being dropped and in others being added.

The table is a generous list, i.e. it includes not only all DRF and Priority species, varieties and subspecies judged from the literature, herbarium specimens and botanists consulted to be in or close to the project area, but also DRF and Priority taxa which may have been found in habitats of types occurring in the project area but which have not, themselves, been recorded there. For example, a large proportion of the species listed in the Scott Plains (**SP**) column occur near the project area but would not be expected to occur in it unless habitats for them are discovered there.

Table 1 lists the scientific names of the taxa alphabetically and gives information about their conservation status (**C**onservation **C**ode), flowering times (**Flwrs**) and distributions (**WR SR SP**) and other information (**Comments**) useful in locating and distinguishing the plants listed. A circle (o) in the **WR**, **SR** or **SP** column indicates that the plant has been recorded, respectively, in the **W**hicher **R**ange, on the Blackwood Plateau within several kilometres of **S**ues **R**oad or on the **S**cott **P**lains. As the project area barely includes the Scott Plains, if at all, it is unlikely that most of the Scott Plains species would be in the project area.

The numbers in the **CC** column refer to Priorities 1, 2, 3 and 4, the definitions of which are given in Appendix 1. 'R' refers to a Declared Rare Flora (DRF or R) plant. The meanings of other abbreviations, such as Ja, Je, Jl, Oc, lvs, fls, lfts, should be evident in their contexts.

The draft table used during the field work was updated during preparation of the report to indicate which species were found during the surveys. An 'x' in a distribution column indicates that the taxon was found in one of the project area sites there during the surveys.

The majority of rare or otherwise significant plants searched for during the rare flora survey are on six sets of lists. The first set is revised and printed annually in the Government Gazette and includes currently gazetted rare flora (DRF) taxa known to be extant (Part 1) and taxa presumed to be extinct (Part 2). The other sets are printouts from the Department of Conservation and Land Management (CALM) computer database of Declared Rare Flora and Priority taxa and WAHERB.

The databases are revised frequently, with some plants being added and others being deleted. Specifically, these sets of lists are:

- Wildlife Conservation (Rare Flora) Notice 1994 (Government Gazette, WA of 12 August 1994) Parts 1 (known extant) and 2 (presumed extinct),
- Declared Rare and Priority Flora List (W. A.), 14 September 1994,
- Declared Rare and Piority Flora List (Central Forest Region), 14 September 1994,
- Declared Rare and Piority Flora List (Whicher Range), 8 November 1994,
- Summary of Threatened Flora Data for: 33^10', 33^40', 115^20', 115^30', 8 November 1994, and
- Printout from WAHERB of DRF and P specimens in: 33^10', 33^40', 115^20', 115^30', 8 November 1994.

3.3 LIMITATIONS OF SURVEY

No single rare flora survey can be guaranteed to find all significant plants in the survey area, for a number of reasons. For instance,

- not all rare plants flower at the same time; although a majority may flower in spring others flower only in summer, autumn or winter, and
- the intensity of flowering of many species varies widely from year to year; some, such as *Diuris purdiei*, flower for only one season following a summer burn.

Some plants are fairly conspicuous and easy to identify even when not in flower, such as *Lambertia rariflora* and *Pultenaea pinifolia*. Others, such as *Pultenaea radiata*, look much like more common and widely distributed close relatives when not in flower. Yet others, such as orchids and a number of other herbaceous plants, are not visible at all, let alone identifiable, during most of the year. It is unlikely that any of the rare orchids would have been identifiable at the time of the surveys.

4.0 RESULTS

No DRF species was found during the surveys, but nine Priority taxa and one other significant species listed in Table 1 were found. The Priority taxa, their conservation codes (priority numbers) and the areas in which they were found are:

o *Acacia semitrullata*	P3	~ G29, Scott Road Section
o *Astroloma* sp. Nannup	P1	Scott Road Section
o *Lambertia multiflora* var. *darlingensis*	P3	G29
o *Lambertia rariflora*	P4	Sanson Section, N and probably ENE of S15
o *Leptomeria lehmannii*	P2	Sanson Section
o *Melaleuca basicephala*	P4	Scott Road Section
o *Pultenaea pinifolia*	P3	Sanson Section
o *Pultenaea radiata*	P1	G29, Sanson Section

o *Stylidium barleei* P3 G25, S16, G26, S15

The other significant species found is a pending Priority species:

o *Grevillea bronwenae* Sanson Section

Photographs of these species and the DRF species *Dryandra mimica* are in an accompanying folder.

As determination of herbarium specimens collected during the field work continues, other significant taxa may be identified.

In spite of the limitations referred to in Section 3.3, it is reasonable to assume no non-orchid DRF plants are in the areas surveyed, and it is unlikely that any of the DRF orchids are there.

Significant plants found during the surveys are discussed below, in the sections and areas where they were found. Places where they were found are shown separate from this report on maps provided by Main Roads.

4.1 SANSON [Realignment] SECTION

The part of the 200m wide Sanson Section surveyed is between the 17800m and 19500m lines shown on the 1:2,000 scale plan provided by Main Roads, a distance of 1,700m. No boundaries or centrelines were marked on the ground, but the plan shows the route, most existing tracks and contours at varying intervals of under 1m.

The northern part of the section is in the Whicher Range, and the southern is on the northern edge of the Blackwood Plateau.

The native vegetation is principally jarrah forest on the uplands and varied shrub and scattered eucalypt vegetation on the valley flats at the northern end of the section. A principal shrub in the valley vegetation is *Homalospermum firmum*, a species which is uncommon, if not rare, this far north of the south coast.

A large proportion of the area is covered in pine plantations, and a small part, north of Tallarack Road, has a small, derelict plotof eucalyptus trees.

Five identified significant species were found in the Sanson Section, three of them in the valley north of Tallarack Road and two of them in Jarrah forest within 200m of Tallarack Road.

The three significant species in the valley are *Lambertia rariflora* (Priority 4), *Pultenaea pinifolia* (Priority 3) and *Grevillea bronwenae* (Priority pending). The first two species occur as erect shrubs to over 3m tall, while the third is a more spreading shrub under 1m tall. The first was not yet in flower, the second had finished flowering, and the third was fully in flower. All three species are common, though patchy, on the northern side of the valley and even occur into the edge of the pine plantation that borders the valley. They are uncommon in the middle of the valley and on the southern side. Several plants of each species in the northern area are flagged.

The valley is unusual not only in having these three identified significant species in relativley large numbers but also in having other species which appear to be rare or uncommon, at least locally, but have no existing or pending conservation codes.

One rounded shrub-tree over 2m tall of *Leptomeria lehmannii* (Priority 2) was found about 100m north of Tallarack Road near the eastern edge of the 200m wide survey strip. It may not have been marked with flagging tape.

A diffuse population of the 0.5m tall shrub *Pultenaea radiata* (Priority 1), a species which is inconspicuous when not in flower, was found about 200m south of Tallarack Road near the centre of the strip. One typical plant about 25m south of the log lying into the track near the bend

is flagged and labelled. The species may be widespread locally. As the plants were past flowering by early November, the identification is somewhat tentative and awaits confirmation by a botanist who is specialising in the group.

4.2 AREA G29

Area G29 is 13.5ha in area and is 175m west of Kemp Road and 1100m north of Sabina Road, in the Whicher Range.

The vegetation is a low open forest dominated by Mountain Marri (*Eucalyptus haemotoxylon*), a small tree similar in appearance to its close relative Marri (*Eucalyptus calophylla*) but with smaller nuts and often redder leaves. It is, in general, uncommon and with a restricted distribution and was once coded as a Priority species.

Two currently coded Priority taxa, *Lambertia multiflora* var. *darlingensis* (Priority 4) and *Pultenaea radiata* (Priority 1), were identified in Area G29, and a third, *Acacia semitrullata* (Priority 3), was found a short distance distance west.

The *Acacia* is a diffuse, prickly shrub generally under 0.5m tall which is inconspicuous when not in flower; at the time of the survey it was well past flowering. It occurs scattered in the area west of G29 to at least as far as what is presumed to be the old Kemp Road, about 1.2km west of the current Kemp Road.

A few plants of the *Pultenaea radiata* were found in the southeast corner of Area G29 on sandy soil, along with fewer plants of another *Pultenaea*, now tentatively identified as *Pultenaea strobilifera*, one of which bears the flagging tape label of *Pulteaea ? radiata.* The two species are similar in appearance, especially when not in flower, and are under 0.5m tall. As the plants of both species were past flowering by early November, the identifications are somewhat tentative and await confirmation by a botanist who is specialising in the group.

Two small, inconspicuous subshrubs near the two Pultenaeas are identified as *Amperea ericoides*, a poorly collected species which appears to be widespread along the coast. Its occurrence in the project area may be significant for the reason that there are no inland collections in the Western Australian Herbarium.

Lambertia multiflora var. *darlingensis* is an abundant shrub between 0.5m and 1.5m tall in the western part of G29. The plants were easy to see and identify because they were in flower at the time of the surveys. This single, extensive population, estimated to comprise more than 2,000 plants, is virtually totally within Area G29, but there are a few other, small populations west of G29 and in the southeastern corner of G29 near the Pultenaeas. The westernmost population observed was a single plant next to the presumed old Kemp Road less than 100m south of a population of the DRF species *Dryandra mimica.* The only other known record of this *Lambertia* in the Whicher Range is an early collection by Alex George which is probably a little further west. Aside from one recently recorded small population of this yellow-flowered shrub on a ridge near Dardanup, this subspecies is known only from the Darling Range escarpment near Perth, to as far south as Serpentine.

The corners of the Area G29 large population of *Lambertia multiflora* var. *darlingensis* were marked and labelled with pink and/or yellow flagging tape and their locations were noted. A line drawn between the corners/locations encompasses the population. These locations and the compass bearings to them, beginning with the northwest corner of G29 and going southward, are as follows:

- From NW corner go along western boundary of G29 to a taped corner labelled 075S and E1.
- Go east more or less along existing yellow pink (and orange) taped line (but stay S of it) to about 30m west of peg labelled E5 and 250N.
- Go southwestward to a point about 50m east of a peg on the western boundary of G29 which is labelled 125S (this peg is north of a peg labelled 150S and HI, IH, 1H or H1)

- Continue southwestward to about 30m and 80^ from peg 175S on the western boundary; this point is GPS 33^46'26.8" x 115^25'37.5".
- Go southeast (135^) to a point about 20m and 100^ from the peg labelled J5 and 125N.
- Go about 70^ to GPS 33^46'31" x 115^25'42".
- Go about 55^ to a point that is about 15m and 80^ from peg F9 and 225N and about 20m and 210^ from a taped corner labelled "North East Corner".
- Go about 315^ to the track, fence and northern boundary of G29; the GPS for this point is 33^46'23" x 115^25'44".
- Go westward along northern boundary to the NW corner, for between 100m and 150m.

4.3 AREA G27

Area G27 is 8.75ha in area and borders the western side of Kemp Road about 50m north of Sabina Road, in the Whicher Range.

No significant plants were identified in Area G27, but a few plants of *Pultenaea ? radiata* were found south of the southern boundary.

4.4 AREA G25

Area G25 is about 60m northwest of Sabina Road and 2.6km northeast of Jalbarragup Road, in the Whicher Range.

One significant species, the triggerplant *Stylidium barleei* (Priority 3), was found in Area G25. The plants occur sporadically through the area but are most common on black gravel, especially along tracks and on other disturbed sites. The total number of plants of this species in Area G25 is estimated to exceed 5,000. One population of about 100 plants at a track junction, GPS 33^48'05" x 115^24'46", is labelled.

4.5 AREA S16

Area S16 is 2.5ha in area and borders the western side of Area G25, in the Whicher Range.

Area S16 is estimated to have more than 500 plants of the triggerplant *Stylidium barleei* (Priority 3). The plants are common on semi-open patches of sand.

4.6 AREA G26

Area G26 is 2.75ha in area and borders the western side of Area S16, in the Whicher Range.

Area G26 is estimated to have more than 2,000 plants of the triggerplant *Stylidium barleei* (Priority 3). The plants are most common on semi-open and disturbed patches of sand and gravel.

4.7 AREA S15

Area S15 is about 4.5ha in area and is about 50m northeast of an intersection of an unamed east-running track and Jalbarragup Road which is 870m northwest of the southern junction of Jalbarragup Road and Sues Road. For the purposes of this project, it is regarded as being in the Sues Road section.

The principal overstorey is unhealthy looking Jarrah, which is mainly in the southern part of the area. *Agonis parviceps* shrubs to 3m tall and a dense ground layer of sedges and sedge-like plants constitue the principal vegetation in the northern part and extend into the Jarrah forest as an understorey. *Jacksonia* sp. ?Yelverton plants to 2m tall are locally common.

One significant species, the triggerplant *Stylidium barleei* (Priority 3), was found in Area S15, mainly as scattered plants on firm sand in the longitudinal centre, away from the lowier-lying, sedgier areas. It is estimated that there are over 1000 of the triggerplants in Area S15.

Restio ustulatus, a species which was recently deleted from the Priority list, is abundant in the northcentral sedge area.

The Priority 4 tall shrub *Lambertia rariflora* occurs along the creek north of Area S15 and on the south side of the creek about 5m from S16's northern boundary. It may also occur eastnortheast of the Area, close to the haul road alignment.

4.8 AREA G24

Area G24 is about 7ha in area and is about 500m east of an intersection of an unamed east-running track and Jalbarragup Road which is 870m northwest of the southern junction of Jalbarragup Road and Sues Road. For the purposes of this project, it is regarded as being in the Sues Road section.

One significant species, the triggerplant *Stylidium barleei* (Priority 3), was found in Area G24, mainly on firm sand with a little gravel in the southern corner and on the western side next to the 'pit floor'. They were not seen on pure, undisturbed gravel.. It is estimated that there are over 1000 of the triggerplants in Area G24.

4.9 AREA G23

Area G23 is about 11ha in area and is about 400m southwest of the southern junction of Jalbarragup Road and Sues Road, in the Sues Road section.

Part of this area was burnt a few years ago, but it is likely that any significant species which might occur there would have recovered sufficiently to be identifiable.

No significant species was found. However, several dozen plants of *Dryandra bipinnatifida*, an apparently herbaceous plant seldom seen in flower, were found; none were in bud or flower.

4.10 AREA G18

Area G18 is about 6.5ha in area and is about 400m south of Margaret Road and 1.01km west of Sues Road, in the Sues Road Section.

The principal vegetation is Jarrah-Marri forest which was burnt one to two years ago but has recovered sufficiently for most significant species to be identifiable. It is, however, unlikely that Area G18 would be in an area or have any habitats that would have any of the significant species listed in Table 1.

No significant species was found, but *Patersonia ? humilis* and an unidentified *Thysanotus* were found in Area G18 and nowhere else in the project area.

4.11 AREA S14

Area S14 is about 8ha in area and is about 600m south of Margaret Road and 1.01km west of Sues Road, in the Sues Road Section. The dimensions of the Area are, according to the map, 225 x 350 x 225 x 350, but the peg in the southeast corner of the Area reads 350S 250W.

The principal vegetation is Jarrah-Marri forest which was burnt one to two years ago but has recovered sufficiently for most significant species to be identifiable. It is, however, unlikely that Area G18 would be in an area or have any habitats that would have any of the significant species listed in Table 1.

No significant species was found, but an unidentified *Thysanotus* was common in unburnt patches of shruby vegetation in Area S14, nearby and elsewhere along Sues Road but not in the burnt areas.

4.12 AREA S13

Area S13 is about 4ha in area and is about 250m southwest of a point on Sues Road 740m north of Mowen Road, in the Sues Road Section.

The principal vegetation is Jarrah-Marri forest which was burnt one to two years ago but has recovered sufficiently for most significant species to be identifiable.

No significant species was found.

4.13 AREA G15

Area G15 is about 4.75ha in area and is about 50m west of Sues Road and 2.55km south of Mowen Road, next to a previous gravel pit, in the Sues Road Section.

The principal vegetation is Jarrah(-Marri) forest, most of which was burnt this season. There are patches of unburnt vegetation within and near G15 which are sufficiently numerous and large to infer the nature of the preburn vegetation and the plants it contained.

It is unlikely that any of the species in Table 1 would occur in Area G15, and none was found.

4.14 AREA G12

Area G12 is about 2ha in area and is about 150m west of Sues Road and 350m north of Wapet Road, in the Sues Road Section.

The principal vegetation is Jarrah(-Marri) forest.

No significant species was found, nor is any likely to occur there.

4.15 AREA G10

Area G10 is about 5ha in area and is about 60m east of Sues Road and 880m north of Denny Road, in the Sues Road Section.

The principal vegetation is Jarrah-Marri forest with a dense, low ground layer of *Hibbertia hypericoides* in the western part and dense staznds of Blackboys and Kingias everywhere else except in the previous gravel pit and the steep, rocky slopes west of it.

No significant species was found.

4.16 AREA S12

Area S12 is about 10ha in area and is about 200m west of Sues Road and 610m south of Sues Bridge, in the Sues Road Section.

The principal vegetation is unlogged Jarrah forest, which has, however, been badly burnt in the past and has apparently been damaged by dieback. There are still some large trees in good condition.

No significant species listed in Table 1 was found, but *Amperea ericoides*, a poorly collected species which is widespread along the coast, appears to be common through the forest. Its occurrence in the project area may be significant for the reason that there are no inland collections in the Western Austrtalian Herbarium.

4.17 SCOTT ROAD [Realignment] SECTION

The Scott-Brockway Section is dealt with in two parts: the gravel reserve in the north, and the freehold land in the south. Transects were walked across the reserve, while the vegetation and condition of the southern part were checked from along the northern and western boundaries with the aid of a pair of binoculars.

Most of the uncleared area of the southern part has Jarrah forest on the higher ground and Moonah Paperbark forest on the lower ground, the understorey of all of which has been browsed or grazed.

The majority of the northern part is also Jarrah forest but with a large, eastern area of sedge and *Xyris* swamp that still has water in November and a much smaller, western area of paperbark, *Astartea*, *Pericalymma* and sedge swamp that does not.

The western swamp has a few wispy shrubs of the Priority 4 species *Melaleuca basicephala*, and the eastern swamp has *Villarsia lasiosperma*, a former Priority species, and, upslope from its margins, the Priority 3 species *Acacia semitrullata*. *Acacia semitrullata* is less common in the forest and in the semi-disturbed area northwest of the western swamp.

The semi-disturbed area northwest of the western swamp, through which a track runs, also has scattered *Astroloma* sp. Nannup (Priority 1) and a prior significant species, *Goodenia eatoniana*. The *Astroloma* also occurs sparingly in the Jarrah forest.

Although the forest understorey in the southern, freehold part has been damaged by livesltock, it is still likely that the *Acacia* occurs there and possible that the *Astroloma* also does. Both species appear to tolerate disturbance well.

5.0 DISCUSSION AND RECOMMENDATIONS

Ten of the significant species listed in Table 1 were found during the November rare flora surveys of the Beenup Haul Road in two realignment sections and fifteen materials pit areas. Nine of the ten, plus other potentially significant plants, were found in three of the project areas: the northern valley of the Sanson Section, the Scott Road Section, particularly in the area of the swamps, and Materials Pit Area G29. Each of the first two areas has at least three significant species, and the third area has relatively large numbers of one of the significant species. All three areas have several potentially significant species.

Consequently, it is recommended that

- the southeastern corner and area covered by the large population of *Lambertia multiflora* var. *darlingensis* be excluded from the pit area,
- a causeway be constructed across the Sanson Section northern valley to minimise impeding above-surface and subsurface water flow,
- disturbance to vegetation in the valley be minimised, and
- the alignment through the Scott Road Section avoid the eastern and western swamps.

It is also recommended that, if possible,

- a more disturbed area be substituted for Area S12's unlogged Jarrah forest.

6.0 ACKNOWLEDGEMENTS

The assistance of staff of the Western Australian Herbarium and, in particular, of Greg Keighery is gratefully acknowledged.

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GLOSSARY

extant	existing or living at the present time (in the original state, condition or place; i.e. not domesticated or cultivated)
taxa	plural of 'taxon'
taxon	in a broad sense: a taxonomic group of any rank, a taxonomic unitin the sense used here: species (sp.), subspecies (subsp., ssp.), variety (var.) or form (f.); the taxon may be formally named, such as *Dryandra mimica*, or unamed, such as *Dryandra* sp. 31 or *Dryandra montana* ms

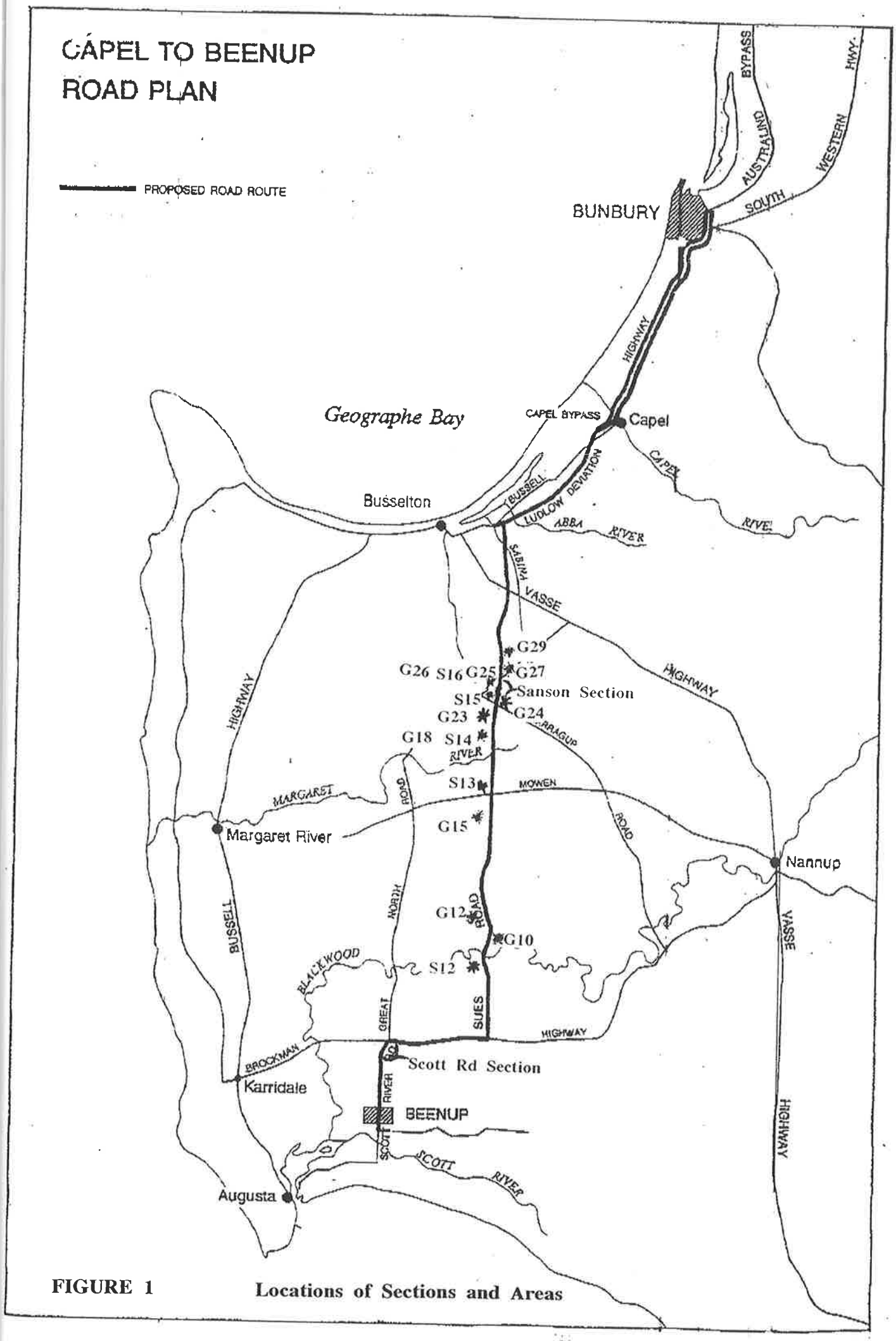

FIGURE 1 **Locations of Sections and Areas**

Table 1

Significant Flora Recorded in or near the Beenup Haul Road Route
(Conservation Codes (CC) as at 14 September 1994)

Species	CC	Flwrs	WR	SR	SP	Comments
Acacia flagelliformis	4	Jl-Sp	o	o	-	few seasonal, shallow swamps N side of WR & near N end of Sues Road; .5m, green, ~ lfless, fls yellow
Acacia inops	3	Oc-Nv	-	-	-	W of area (e.g.Osmington, Rosa Brook, Yallingup); swamps; thin stems, straggly, few lvs, fls white
Acacia mooreana	2	My-Oc	o	o	-	Whicher Rd, Sabina Rd, Rosa Brk; sand, woodland; prickly shrub to 1m tall, lvs deltoid, fls pale yellow
Acacia semitrullata	3	My-Ag	x	o	x	SR: Adelaide Rd; sand, near swamp edge & with *Euc. haemotoxylon*; prickly, to 0.7m tall, fls white
Acacia tayloriana	4	Dc	-	o	-	E side Sues Rd S of Blackwood R; mallee Jarrah, Marri; prostrate, rhizomatous shrub w. large lfts
Actinotus laxus	-	Nv-Ja	-	-	o	winter-wet flats; slender, straggly herb, heads small
Actinotus whicherae ms	2	Dc-Fb	o	-	-	white leached sand; Lvs trifurcate, mainly basal, heads dense, white, woolly
Adenanthos detmoldii	4	Ag-Nv	-	-	o	wet heath
Amperea micrantha	2	Sp-Oc	?	-	-	Sabina Rd, Yoongarillup; sand; erect subshrub, <0.2m
Amperea protensa	2	Dc-Ja	-	-	o	winter wet flats; prostrate to decumbent subshrub, <0.2m
Anthotium junciforme ssp. Scott R.	3	Dc-Mr	-	-	o	wet sands
Aotus carinata	4	Sp-Nv	-	-	o	wet heath; villous shrub to >1m, fls yellow and red
Aotus cordifolia	3	Ag-Dc	o	-	-	swamps on N side of WR; sprawling, long-stemmed shrub, lvs cordate, in whorls of 3
Aponogeton hexatepalus	R	Ag-Sp	-	-	-	N and E of project area; seasonal, open water; aquatic w floating lvs & emergent spikes of fls
Astartea sp. Scott River (DB 88233)	4	Dc-Ap	-	-	o	winter-wet flats; slender shrub to 0.5(-1)m
Astroloma sp. Nannup (RDR 3978)	1	Mr-Je	-	o	x	grey sand, clay, gravel, laterite, forest; dull green, prickly shrub to 0.3m tall, fls red, buds yellow
Banksia meisneri var. *ascendens*	4	Ap-Ag	-	-	o	SP & N of WR; low-lying sandy heath; low shrub
Brachysema modesta ms	R	Oc-Nv	o	-	-	Treeton Block; Jarrah forest near sandy swamp; prostrate/decumbent, spreading shrub to 0.5m tall, fls white to pale pink
Brachysema papilio ms	R	Oc?	o	-	-	WR: Williamson Rd, Willcox Block; winter-wet flats; dense clumps to 1.5m tall, lvs boomerang-like
Caladenia huegelii	R	Ag-Oc	-	-	o	Perth - Scott River; low-lying sites in woodlands
Caladenia uliginosa ssp. *patulens* ms	1	Sp-Oc	-	-	-	Harvey - Nannup; tall forest dense understorey
Calothamnus pallidifolius	1	Oc-Dc	o	-	-	WR: Hill Rd, Whicher Rd (to Yelverton); laterite; sparse shrub to 0.5m tall, lves pale, large,
Calothamnus sp. Scott R. (RDR84)	1	Ag-Ja	-	-	o	wet ironstone; similar to *C. lateralis*
Caustis sp. Boyanup (GSMcC 1706) (probably = *C. pentandra*)	1	Fb-Ap?	o	-	-	Whicher Nat. Res.; grey sand in Banksia (& Jarrah) woodland; large, 0.7m tall, rhizomatous herb
Chamelaucium erythrochlorum ms	R	Nv-Ja	o	o	-	especially Whicher Rd; Jarrah (-Marri) forest; sandy loam; shrub to 2m; fls red
Darwinia sp. Williamson (GJK 12717) (aff. *apiculata*)	1	Oc-Dc	o	-	-	Williamson Rd, Willcox Block; red clay/gravel; shrub upright, to 0.3m, fls in heads, green & red
Darwinia ferricola ms	R	Dc-Ja	-	-	o	wet ironstones; bush domed, to 1m, lvs pale green, recurved; fls greenish red, in heads
Diuris purdiei	R	Sp-Oc	-	-	-	N of WR; winter-wet swamps after summer burn
Drakaea elastica	R	Oc-Nv	-	-	-	S to Ruabon; deep sand under Spearwood near winter-wet swamps
Drakaea micrantha	R	Sp-Oc	-	o	-	Mowen Road W of Sues Rd; sand, with Spearwood
Drosera enodes (previously *D. omissa*)	3	Sp-Nv	-	-	o	also Jindong, Ambergate; winter-wet sites; pygmy, petals small, narrow, white
Dryandra mimica	R	Dc-Fb	o	-	-	Old Kemp Rd 1050 m W of Kemp Rd; prostrate, rhizomes, lvs erect, fls yellow, at ground level
Dryandra squarrosa ssp. *argillacea* ms	1	Jl-Oc	o	-	-	ironstones, edges of thicket-sedge seasonal swamps on N side of WR; tall, narrow, erect, prickly shrub

Eucalyptus lane-poolei var. Whicher	1	Dc?	o	-	-	N bank of Sabina River; straggly tree or mallee 3.5m tall
Franklandia triaristata	4	Ag-Oc	o	-	-	Williamson Rd; grey sand, usually low-lying
Grevillea brachystylis ssp. *australis*	2	Dc-Ja	-	-	o	swamps; erect to spreading red-flowered shrub, pollen presenter flat, red
Grevillea brachystylis ssp. *brachystylis*	2	Ag-Nv	-	o	-	generally prostrate, red-flowered shrub, pollen presenter red, flat
Grevillea bronwenae	-	Oc-Nv?	x	-	-	in and near swamps, clay, gravel; erect to spreading red-flowered shrub, pollen presenter black, not flat
Grevillea papillosa	3	Oc	-	-	o	Nillup; sprawling shrub 1m tall, lvs flat, narrow, 2-lobed, fls white
Hakea varia form	-	Sp-Ap?	o	-	-	leaves needle-like, flowers yellows
Hybanthus volubilis	2	Oc-Dc	-	o	o	riverine twiner
Hypocalymma sp. Scott R. (ASG11773)	4	Sp-Ja	-	-	o	winter-wet flats; slender, straggly, lvs small, cordate
Jacksonia sparsa ms	3	Fb	-	-	-	E of Busselton
Jansonia formosa	3	Sp-Jn	-	-	o	also Milyeannup; river banks; erect to prostrate shrub, fls red
Lambertia multiflora var. *darlingensis* ms	3	Oc-Nv	x	-	-	WR: ASG11736 Acton Park Rd; shrub to 1.5m tall, flowers yellow
Lambertia rariflora	4	Jn-Mr	x	x	-	creeklines; shrub to > 4m tall, flowers green
Leptomeria ericoides	1	Oc	-	-	-	Cowaramup, Willyung Hill; sand; ~leafless, virgate shrub to 0.5m, stems angled, fls small, brown
Leptomeria lehmannii	2	Sp-F?	x	-	-	Dryandra-Nillup-Ongerup; shrub to >2m, dk green
Lepyrodia heleocharoides	3	Oc-Dc	-	-	o	Warner Glen Road; peaty sand w. sedges
Leucopogon gilbertii	3	Sp-Nv	-	-	o	swampy winter-wet heath; slender, erect shrub to >0.5m, lvs narrow, erect, fls in terminal heads
Loxocarya magna ms	3	-	o	-	o	N side of WR seasonal swamps; creeklines; to 1.5m
Loxocarya sp. Rosa Brook(RDR2465)	3	Oc-Ap?	-	-	o	river banks, granite, swamps; to >1m tall
Melaleuca basicephala	4	Oc-Dc	-	o	x	(SR: Brockman Hwy) small shrub, fls pink, axillary
Meziella trifida	R	Oc	-	-	o	like small *Halorhagis*
Petrophile latericola ms	R	Oc-Nv	o	-	-	WR: Williamson Rd, Abba Block; *Banksia grandis* woodland, winter-wet flats; shrub 1m tall, lvs terete, rigid, pungent, erect, curved
Pultenaea pinifolia	3	Oc	x	o	-	moist loam, erect to >3m
Pultenaea radiata	1	Sp	x	-	-	Sabina Rd; sand/gravel; low wiry shrub, wings pink
Pultenaea skinneri	4	Jl-Jn	-	-	-	NE of project area; between forests and swamps
Reedia spathacea	4	-	-	-	-	Blackwood R, but mainly S & E of project area; creeklines; sedge, clumps erect to 4m tall
Restio gracilior	2	Sp-Ap?	-	o	o	also Yoongarillup; winter-wet black soil, sand; tussocks large, to 0.4m tall
Rhodanthe (Helipterum) pyrethrum	3	Sp-Oc	-	-	-	N of WR; winter-wet clay or sand/clay
Stylidium barleei	3	Oc	x	x	-	leaves sticky, flat, serrate; flowers white
Thysanotus formosus	1	Jn	-	o	-	clayey sand over clay; leaves terete, slightly > scape
Thysanotus glaucus	4	Nv-Fb	-	-	-	widespread; white sand (e.g. Acton Park); lvs many, glaucous, terete, <<scape
Verticordia lehmannii	4	Oc-Jc	-	-	o	winter-wet flats; shrub to 0.5m, fls pink-purple
Verticordia plumosa var. *vassensis*	1	Oc-Ap	-	-	-	N of WR (e.g. Fish Rd); winter-wet flats; fls pink
Villarsia submersa	4	Sp-Oc	-	-	-	N of WR (e.g. Yoongarillup, Fish Road); aquatic
Xyris aff. *lacera* (giant, 3.5m tall form)	-	Nv-Dc	-	o	-	creek with tall *Oxylobium lanceolatum*, dense clambering tall sedges, bracken

Legend

CC	Conservation Code
WR, WR	Whicher Range
SR, SR	Sues Road area (to several km east and west, on Blackwood Plateau)
SP, SP	Scott Plain
o	Previously recorded
x	Recorded in a materials pit area or realignment section in November 1994
~	More or less

ASW: 29.11.94

APPENDIX 1

DECLARED RARE FLORA, PRIORITY TAXA AND OTHER SIGNIFICANT SPECIES: BACKGROUND, DEFINITIONS AND DISCUSSION

Arthur S. Weston, PhD (Botany)

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GLOSSARY

DECLARED RARE FLORA, PRIORITY TAXA AND OTHER SIGNIFICANT SPECIES: BACKGROUND, DEFINITIONS AND DISCUSSION

Arthur S. Weston, PhD (Botany)

1.0 'SIGNIFICANT SPECIES' AND OTHER TAXA

The term 'significant species' as used in this report refers to species, infraspecific taxa and populations that are:

- given Priority listings or are gazetted as Declared Rare Flora,
- according to Department of Conservation and Land Management (CALM) botanists, likely to be given Priority listing or to be gazetted as DRF or are otherwise of special interest,
- rare, geographically restricted or apparently rare or restricted because they are poorly collected or recorded,
- at the limits of their ranges or in areas outside their normal ranges or habitats,
- particularly susceptible or vulnerable to environmental changes, especially ones caused by humans, either directly or indirectly,
- diminishing significantly in abundance or geographical range due to clearing and other environmental changes associated with agriculture, mining, recreation, urbanisation and provision of services,
- poorly represented in secure conservation reserves, or
- high quality or otherwise exceptional populations of the plants.

The term 'significant' is used in this report instead of 'vulnerable', 'threatened', 'depleted' or 'endangered' because these terms either are too limited in their scope or implications or, as Leigh, Boden and Briggs (1984) put it, "have become highly emotive through popular usage, making it difficult to develop objective criteria for use in ascribing species to various categories". Leigh, Boden and Briggs and Hopper *et al.* (1990) discuss appropriate teminology in more detail.

Some significant species are gazetted as rare or endangered taxa; most are not.

The following sections discuss significant taxa, particularly ones that are Conservation Coded, i.e. are gazetted as Declared Rare Flora (DRF, R) or are given the Priority numbers 1, 2,3 and 4 by CALM.

2.0 PUBLISHED LISTS

Australia-wide treatments of rare, geographically restricted and endangered species by Specht, Roe and Boughton (1974), Hartley and Leigh (1979), Leigh, Briggs and Hartley (1981) and Briggs and Leigh (1988) also contain Western Australian lists, which are based upon publications or other information provided by botanists in the various states. They cover presumably rare or threatened plants and poorly known and poorly collected taxa. The Briggs and Leigh 1988 Australia-wide list is reproduced in Kennedy (1990).

Extinct and Endangered Plants of Australia, by Leigh, Boden and Briggs (1984), lists endangered and presumably extinct species and presumed threats to the continued survival of endangered species. The book also describes and illustrates many endangered and extinct species, discusses the inconsistent use of terms to indicate various degrees of threat and rarity, and describes the system developed by Hartley and Leigh (1979) to classify rare, restricted and threatened species.

The first Western Australian publication on rare and restricted flora, by Marchant and Keighery (1979), is based upon the numbers of specimens of each native Western Australian species lodged in the Western Australian Herbarium and the geographical range of the collections for each species. Marchant and Keighery classify most of their 2,022 listed species as geographically restricted, presumably rare or poorly collected.

Four reports dealing with rare, restricted and threatened species were published by the Department of Fisheries and Wildlife. One, by Rye (1982), lists geographically restricted southwestern plants, and another, by Rye, Hopper and Watson (1980), is concerned with the distribution and conservation status of commercially exploited native plants. The first two lists of gazetted rare Western Australian flora are presented, and the listed species are described and illustrated, in Rye and Hopper (1981) and Patrick and Hopper (1982). Rye (1982) lists 527 species of southern Western Australian flowering plants that are geographically restricted, and she includes most, if not all, of the species gazetted in 1982 as rare.

The Rye and Hopper (1981) and Patrick and Hopper (1982) publications were superseded by CALM's **Western Australia's Endangered Flora** (Hopper *et al.* 1990), which lists and discusses DRF and Priority species. The book also has illustrations and brief descriptions of all of the 1989 DRF species and some of the Priority species.

CALM has produced three publications in a continuing series of Western Australian Wildlife Management Programs dealing with DRF and Priority flora in need of special protection and plans for managing them. The three are for the Metro Area (Kelly *et al.* 1993), the Merredin District (Mollemans, Brown and Coates 1993) and the Northern Forest Region (Kelly *et al.* 1990). They provide information about the plants covered and their habitats, distributions and flowering times.

3.0 COMPLETENESS AND ACCURACY OF LISTS

The completeness and accuracy of most earlier lists of significant Western Australian species are limited in that the intensity, uniformity and seasonal coverage of collecting and systematic surveying have been insufficient to distinguish between genuinely rare (and restricted) taxa and taxa which only appear to be rare (or restricted) because they have been poorly collected. Systematic surveying and collecting by Western Australian Wildlife Research Centre (WAWRC) and Western Australian Herbarium (WAH) botanists, and others, are correcting this deficiency.

In some cases, significant species are found in areas where they were not previously known to occur. For instance, *Acacia benthamii*, a P2 species related to *Acacia cochlearis*, was recorded only from Kings Park and the Wanneroo area until 1994, when it was found northeast of Mandurah. *Synaphea pinnata* and *Stachystemon axillaris* are plant species originally gazetted as rare (Government Gazette, WA, of 14 November 1980) which have since been found to be more common or widespread or better conserved than previously believed and are no longer gazetted.

In other cases, species are no longer found in areas where they have been previously recorded, often due to habitat destruction or alteration. However, there are many species which emerge and flower for only one or a few years after fire, then disappear until after the next burn. For example, populations of the gazetted rare orchids *Drakaea elastica* and *Diuris purdiei* recorded in the Metropolitan Area a few years ago have not been found recently.

Other sources of incompleteness and ambiguity in distribution and abundance information include:

- o insufficient locality information given on the labels which accompany herbarium specimens,
- o inaccurate identification of specimens, and
- o treatment of groups of species, or other taxa, as single units.

So little is known about the abundance, distribution and taxonomy of nonvascular plants that few such species are gazetted as rare flora or are included in lists of significant taxa, although many of them may also be rare or geographically restricted.

4.0 GAZETTED TAXA

In 1975, Western Australia's Fauna Conservation Act was retitled as the Wildlife Conservation Act, and in 1979 the Act was amended to provide protection for specified species of flora as well as of fauna. The first plant species to be declared by the Minister as protected rare flora under the Act were listed in the Government Gazette, WA, of 14 November 1980. Periodically, generally once a year, the Minister publishes notices in the Government Gazette, deleting and adding species to the list of protected flora. During the time a species, or other taxon, is gazetted as protected no-one is allowed to "gather, pluck, cut, pull up, destroy, dig up, remove or injure" a plant belonging to a wild population of that species without special written consent of the Minister (Rye and Hopper 1981; Hopper *et al.* 1990; Kelly *et al.* 1993). Fines may be imposed for breaching provisions of the Act.

The first list of Declared Rare Flora, gazetted in 1980, was based upon assessment of the Marchant and Keighery (1979) list, addition of newly described species and local botanists' knowledge of species distributions and abundance. Gazettal of a taxon is now generally preceded by relatively detailed searches made in the field to locate populations of the species proposed as rare.

The first list of gazetted flora comprises 100 named species, including a variety of one of the species. The current list of "Protected flora declared as rare flora", printed in the Government Gazette, WA, of 12 August 1994, has 313 taxa: 274 taxa known to be extant and 39 taxa presumed to be extinct. Although the majority of these taxa are named species, many are varieties and subspecies and many are not formally named. Some of the species first gazetted in 1980 are absent from the current list, generally because they have been found to be more abundant or wide-ranging than previously indicated by collections and records or because they appear to be well-protected in nature reserves and national parks.

In some cases a species is still on the list but under a name different to the one used previously. Two examples are the orchid *Drakaea elastica*, which was originally listed as *Drakaea jeanensis*, and the lily *Wurmbea calcicola*, which was previously listed as *Wurmbea* sp. Cape Naturaliste.

In general, species are gazetted or declared as rare flora (DRF, R) not only because they are rare or geographically restricted but also because their continued, long-term survival in the wild is believed to be threatened. Kelly *et al.* (1993) list criteria for adding taxa to the gazetted list and for deleting taxa from it.

Declared Rare Flora, also known as Gazetted rare species, Protected Flora and Endangered Flora (see Hopper *et al.* 1990; Kelly *et al.* 1993), are not the only Western Australian plants that are rare, geographically restricted, threatened or vulnerable. In fact, they probably constitute only a small proportion of such species. For example, Marchant and Keighery (1979) listed more than 2,000 species that were rare or poorly collected or were geographically restricted to a range of less than 160 kilometres, and the September 1994 state-widelist of Priority and Declared Rare Flora has more than 1700 taxa. A large proportion of the taxa on the 1994 list are not on the Marchant and Keighery list.

The current list (14 September 1994) concentrates on the southwestern part of Western Australia and particular groups of species, which have, in general, been studied in greater detail than others. For example, members of the families Proteaceae, Myrtaceae, Leguminosae and Orchidaceae account for more than half of the gazetted species on the current list. It is likely that in the southwest alone there are many more ungazetted rare and restricted species than gazetted ones.

The two lists of gazetted rare flora in Rye and Hopper (1981) and Patrick and Hopper (1982) comprise fewer than 150 species, and the 1990 list contains fewer than 250 species, probably only a small proportion of Western Australian plants that could be considered as rare. Another list, in Rye (1982), contains 527 species of southern Western Australian flowering plants that are geographically restricted and includes most, if not all, of the species gazetted at that time as rare. The Rye list is based principally upon investigations of Western Australian Herbarium (WAH) collections upon which the Marchant and Keighery (1979) list is based, taxonomic publications and rare plant records of the Western Australian Wildlife Research Centre (WAWRC).

Since the early 1980s WAWRC botanists have been compiling lists, descriptions, illustrations and records of significant species on a regional basis throughout Western Australia. The lists were originally compiled from herbarium records of the species listed in Rye (1982) and Marchant and Keighery (1979) and from taxonomic literature. These lists and records, along with relevant taxonomic studies, provide the basis for the lists of species proposed for gazettal and being considered for gazettal.

5.0 PRIORITY TAXA

The WAWRC and WAH have continuing programs of research on plants of uncertain conservation status to gather sufficient information upon which to base decisions on whether or not to recommend them for gazettal as Declared Rare Flora. These plants are on lists of Priority Taxa.

CALM now has lists for the entire state, and for the regions and districts into which CALM has divided the state for management purposes, of four categories of Priority Flora and two categories of Declared Rare Flora. These are:

- Priority One (P1) - taxa which are known from one or a few (generally <5) populations, which are under threat,
- Priority Two (P2) - 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,
- Priority Three (P3) - taxa which are known from several populations, at least some of which are not believed to be under immediate threat,
- Priority Four (P4) - taxa considered to have been adequately surveyed and, at least in Australia, to be rare but not currently threatened by any identifiable factors.
- R - Declared Rare Flora - known Extant Taxa
- X - Declared Rare Flora - Presumed Extinct Flora

Priority One, Two and Three species are under consideration for declaration as rare flora, pending the outcome of further survey work, which, in the case of P1 and P2 taxa, is urgently needed.

Priority Four taxa require monitoring every five to ten years.

These lists are modified and updated as relevant information and results of survey work become available. For instance, on the basis of new information about distribution and abundance some taxa are added to the lists and others are deleted from them. Many of the species deleted from the lists are, however, still significant. Other taxa may be moved from one Priority code to another.

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GLOSSARY

extant	existing or living at the present time (in the original state, condition or place; i.e. not domesticated or cultivated)
taxa	plural of 'taxon'
taxon	in a broad sense: a taxonomic group of any rank, a taxonomic unit in the sense used here: species (sp.), subspecies (subsp., ssp.), variety (var.) or form (f.); the taxon may be formally named, such as *Dryandra mimica*, or unamed, such as *Dryandra* sp. 31 or *Dryandra montana* ms

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