Chapter 5

FLORA

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Abstract

James Drummond in 1850 noted the exceptional richness of the flora, particularly of proteaceous genera and of locally endemic species. Subsequent work this century commencing with C.A. Gardner and N.H. Speck reaffirmed Drummond's observations. A.J.M. Hopkins and E.A. Griffin started a comprehensive study of the flora and vegetation in the late 1970s, providing much of the data on which the present review is based.

The present study supports earlier views on plant diversity in the Lesueur Area. It has 821 taxa of vascular plants, representing approximately 10% of the State's known flora, and a third of the taxa found in the Irwin Botanical District. Moreover, the Lesueur Area has seven species of Declared Rare Flora, nine endemic taxa, 111 regionally endemic taxa, and 81 taxa at their northern or southern limits. The numbers of Declared Rare Flora, endemics and taxa at the end of their geographical ranges are the highest of any area in the Irwin Botanical District. The Lesueur Area has been and will continue to be an important refugium for species from wetter climates.

A rapid replacement of species is notable. Even within the same vegetation type, moving as little as 0.5 km may reduce the number of species in common to less than 40%. When species richness is measured at the scales of landscape unit or within stands, diversity in the Lesueur Area is comparable with that in the Fitzgerald River and Stirling Range National Parks. The Lesueur Area ranks as one of the three most important areas for flora conservation in southern Western Australia.

5.1 INTRODUCTION

The Eneabba - Mt Lesueur area has long been recognised as an extremely rich area for flowering plants (Drummond 1853; Gardner 1947; Speck 1958). However, this richness has not been comprehensively documented until recently, and the lack of comparative data from other sites in south-western Australia has hampered appreciation of the northern kwongan flora's exceptional richness.

This chapter provides a brief historical review of the acquisition of floristic knowledge on Lesueur, and then discusses the floristic list, endemism and species of special conservation value.

5.2 BOTANICAL HISTORY

Apart from records of "blackboy trees", *Macrozamia*, *Eucalyptus calophylla*, *E. wandoo* and "a variety of the poison plant" (presumably *Gastrolobium bidens* and *G. oxyloboides*) in the journals of explorers Grey (1841) and A.C. Gregory (de Burgh 1986), Drummond (1853) provided the first botanical account of the Lesueur flora in a published letter to Sir William Jackson Hooker in Kew. The account was based on collections made in the winter and spring of 1850. Drummond's enthusiasm for the flora of the northern kwongan was evident. He had observed and collected so much of interest that only plants of special note were mentioned:

"Having lately travelled from the Moore River to the Murchison (Lat. 27.5 South) and taken excursions to the east and west of Dandaragan, I send you some account of the plants I met with, promising that I shall principally confine my observations to plants which I suppose to belong to new, or to species of such known genera as may be interesting to botanists for their rarity, to florists for the beauty of their blossoms, or to the public generally as characteristic of the country...".

In this context, plants from the Lesueur Area were mentioned more than 20 times in the letter. Drummond's brief descriptions were sufficiently diagnostic for most plants to enable their current names to be ascribed with reasonable certainty (Table 5.1). Species of Proteaceae figured prominently among the Lesueur plants mentioned. Drummond clearly had a keen eye for both the commonplace and rare plants.

Table 5.1
Descriptions of plants from the proposed Lesueur National Park in Drummond's (1853) published letter to Hooker arising from collections made in 1850.

Alyogyne ?huegelii

"The first new species (of *Hybiscus*) I met with in the deep rocky gully which runs into "Cockleshell Plains", this species grows 2' high with trifid deeply indented leaves, the divisions linear and indented at their edges. The flowers are rose coloured, marked with deep crimson spots at the base of the petals; this beautiful species grows also in the Valley of the Lakes and at Champion Bay, where it was first found by Lieutenant Elliot, the officer in command of the troops there; the plant is known by the name of Elliot's Hibiscus."

Asterolasia drummondii

"The Natural Order Rutaceae, is not common in the country passed over, but I met with two plants which I suppose belong to the new genera; one is a small shrub, about 2 feet high, with round heavy leaves about half an inch diameter; the flowers have no calyx. They consist of 5 petals which expand in a star like form; they are of a greyish-green colour outside and pure white inside; they soon fall off and leave only the 2 celled capsule; the cells are placed opposite, with lengthened recurved points; they each contain a single seed. This plant grows sparingly by the side of a watercourse on the east side of Mount Lesueur."

Banksia candolleana

"The sandplains to the west of Dandaragan and those to the east and west of Hill River produce a curious *Banksia*; it grows in broad patches with stems creeping underground and leaves from a foot to a foot and a half in length, and about 0.75" in breadth pinnatifid; the lobes are beautifully nerved, the stems grow about 2' high and terminate in flowers; the flowers are the size and form of *B. dryandroides* but the follicles are larger than they are in any described species. Most of the branches die after perfecting their seeds, and their place is supplied by fresh shoots from the stems underground; only some of the stronger branches throw out shoots, which again terminate in flowers, when they also perish and others take their place; this species is one of importance to the natives who congregate in numbers to feed upon the honey of its flowers which they call "Mangite", a name they give to the flowers of *B. grandis* and various other species."

Banksia elegans

"In travelling to the north (from the Hill River), the next *Banksia* which makes its appearance near the road (i.e. the old stock route between Perth and Geraldton) is a remarkable species with globe shaped flowers of a metallic green colour; the leaves are pinnate and resemble in length and breadth those of *B. prionotes*. The remains of the flowers fall off, leaving the follicles exposed; they are verrucose, the warts formed of a white wax like substance. This species was first shown to me by Mr Henry Gregory, but I afterwards met with it in many places in the Valley of the Lakes; it grows to be a small tree with a small trunk a foot or 18" in diameter."

Banksia tricuspis

"The flat summit of Mount Lesueur and other hills of Gairdner's Range, produce a remarkable *Banksia*, that has, when growing, a considerable resemblance to a Scotch Fir; the leaves are about 3" long, very narrow, the edges entire and rolled back, they end in three very minute teeth; the flowers bear a considerable resemblance to those of *B. verticillata*, and they are followed by similar seed vessels."

Daviesia epiphyllum

"A very curious *Daviesia* with broad plank-like leaves repeatedly branched in the form of a stag's horn, grows on Mt Lesueur and other hills of Gairdner's Range; the flowers were past in September; the seed vessels found on the plant were like those of *Daviesia*, but larger than they usually occur in the genus."

Drosera menziesii

"I found another very remarkable species, agreeing with *D. macranthum* in size, climbing habit and the form of its leaves, but having smaller and deeper rose coloured flowers, and instead of glands, the flower stalks and sepals are covered with long grey hairs; this plant grows in a swamp near the Yandyait springs, where the roots were under water when I found it; it also appears near the base of Mount Lesueur. This species and the following differ remarkably from other droseras in their roots, which are naked white bulbs growing two together as in some orchidaceous plants; that is a new bulb forms by the side of the flowering one, destined to flower the following season."

Drosera ?gigantea

"The other double rooted species alluded to appears on the banks of all the rivers and brooks from the Hill often growing on their banks with its roots under water when the plants is in flower, but only in situations where ..."

Cont'd...

Eucalyptus erythrocorys

"... a beautiful yellow flowered *Eucalyptus* grows on the limestone hills to the west of the Valley of the Lakes; it grows to a tree from 20 - 30 feet high, the leaves resemble those of a Red Gum, they are hispid on the young shoots, glabrous on the flowering branches, they are always opposite in vigorous growth. Sometimes alternate on old stunted trees, the cups are of a bright scarlet colour, and have a verrucose appearance; when the capsule expands in a quadrangular form, the angles carry with them the stamens in 4 divisions. The seed vessels are nearly as large as those of the Red Gum. The scarlet cups, fine yellow flowers and opposite shining leaves of this tree make it one of the finest species of the genus."

Grevillea

"A new *Grevillea* of the *Manglesia* section, grows near the first spring on the Hill River, on the same hill with the *Adenanthos*-like *Isopogon*, its leaves in the barren branches are round, strongly nerved with large teeth between the nerves. The leaves in the flowering branches are deeply trifid with narrow pungent divisions, its flowers are of the same character as the other species of this section of the genus."

Hakea neurophylla

"I found a fine red flowered species, with leaves resembling *H. loranthifolia* in shape, but they are larger and the veins different; it grows abundantly on the east side of Mount Lesueur, near the top."

Hakea megalosperma

"The flat summit of Mount Lesueur produces sparingly another remarkable *Hakea*; the leaves are glabrous, with very entire edges, broadly spathulate; the seed vessels are about 2" long and 1.5" in breadth and only 1.5" in thickness; the flowers I have not seen."

Hypocalymma xanthopetalum

" ... of *Hypocalymma*, a yellow coloured species, growing from 18" to 2' in height, with leaves about an inch long and a quarter of an inch wide, first makes its appearance on the sandplain and ironstone hills near Dandaragan and I saw it in abundance in similar situations as far to the north as Mount Lesueur; it produces an abundance of fine yellow flowers in the axils of the leaves."

Hypocalymma angustifolium

"A narrow leaved plant like *H. angustifolium*, but growing sparingly near the Diamond Spring, ..."

Isopogon linearis

"The ironstone hills to the north of Dandaragan, and most of the hills of Gairdner's Range, produce (but very sparingly) a new *Isopogon*, with linear leaves; it grows about a foot high, and bears large rose-coloured heads of flowers; this species resembles *I. latifolius* in its flowers but the foliage is altogether different."

Petrophile inconspicua

"On the same hills (i.e. Dandaragan - Gairdner Range), I found another new species of *Isopogon* near *I. asper* of Mr Brown, but it differs from it in the following characters:- *I. asper* has unbranched stems, the new species has numerous branches; *I. asper* has smooth anther tubes, in the new species they are covered with white hairs; the scales also which surround the flowers are hairy and bent inwards, in *I. asper* the scales which surround the flowers have glabrous recurved points."

Isopogon adenanthoides

"An ironstone hill to the west of the river near the first spring on the Hill, yields (sparingly) a very curious *Isopogon*, in habit and foliage so like *Adenanthos sericea* that when not in flower it may be easily passed over for that plant."

Isopogon tridens

"I also met with a new trifid-leaved *Isopogon* with much broader leaves; it is a rare plant, and seen only in one spot, on the great sandplain to the north of the Diamond Spring."

Lambertia multiflora

"The ironstone hills to the west of Dandaragan and as far to the north as Gairdner's Range extends produce a fine red flowered *Lambertia*, nearly answering to Mr Brown's description of *L. formosa* but without the recurved margins to the leaves; this species bears its flowers in clusters of seven; when not in flower it is so like *L. multiflora* I cannot tell one from the other by their leaves."

Pileanthus filifolius

"Of Labillardiere's genus *Pileanthus* I gathered two species ... The first is a species with large purple flowers growing in corymbs, not unlike a purple Sweet William. This species grows on the limestone hills to the north of the Spring Diamond of the Desert, ..."

Verticordia argentea

"A new lilac flowered *Verticordia* with glaucous, heartshaped, indented leaves, with several unbranched stems from the same root, which terminate in small corymbs of flowers, appears sparingly about 9 miles to the north of the Hill River, and also near the base of Mount Lesueur;"

Some of Drummond's collections from Lesueur were used as Type specimens by Carl Meissner, Professor of Botany at Basle in Switzerland, for formal descriptions of new taxa published in 1855, e.g. *Banksia tricuspis* (Table 5.2). Type specimens and the localities from which they were collected are of great importance in modern botany as a means of ensuring the validity and stability of names of plants. The Lesueur Area has had several such Type specimens collected from it (Table 5.2).

Diels (1906) did not visit the Lesueur Area. He mentioned Mt Lesueur only when reviewing Drummond's collecting trips. However, Diels noted the richness and high endemism of his Irwin Botanical District (i.e. the northern kwongan), in which 811 species were known at the time. Of this total, Diels estimated that 37% were endemic, the highest level of endemism then known for any botanical district in the State.

Diels and Pritzel collected in the Dandaragan area in 1901, and subsequently named *Acacia forrestiana* from hills to the west of Dandaragan (possibly Mt Misery). This wattle is now a Declared Rare Flora species known only from the Type area and Lesueur Area.

Gardner (1947) provided a narrative of his botanical explorations in the Lesueur Area based on trips in June 1935, January 1941 and October 1946. He was able to relocate all the species found by Drummond except *Asterolasia drummondii*, as well as discover a new species of *Xanthosia*, *X. tomentosa*, and collect but not recognise as new the type specimen of *Diploloena ferruginea* (Table 5.2). Returning again in August 1949, Gardner and party finally found Drummond's *Asterolasia* as well (Perry 1971).

N.H. Speck undertook a Ph.D. research program in the 1950s at the University of Western Australia, and paid special attention to the area in the immediate vicinity of Mt Lesueur. Speck's (1958) thesis highlighted the importance of Lesueur vegetation and flora (Figure 2.3), and provided quantitative substantiation of Drummond's observation that the Lesueur Area was especially rich in species of the Proteaceae (Figure 5.1a). Speck made a substantial number of plant collections in the Lesueur Area additional to the Proteaceae, including the Type of *Conostylis crassinerva* (Table 5.2). Because of the large size of his study area (the Irwin Botanical District), Speck was unable to compile a complete inventory of the flora of Mt Lesueur.

The Lesueur Area was visited sporadically by botanists over the next two decades, but it was not until the late 1970s that the comprehensive floristic and vegetation studies by A.J.M. Hopkins and E.A. Griffin were initiated. Preliminary summaries of data were provided by George *et al.* (1979), Hopkins *et al.* (1983) and Hopkins and Griffin (1984). Detailed data on the flora and vegetation of Mt Lesueur itself were presented by Griffin and Hopkins (1985a). The present publication provides the first full list and analysis of the flora of the whole Lesueur Area

5.23 Methods

The species list (Appendix 1) was compiled from a variety of sources. It was based primarily on a list commenced in 1979 by Griffin and Hopkins (unpublished) and added to by Martinick and Associates (1988), and on miscellaneous observations made by a variety of people including E.A. Griffin, S. van Leeuwen, A.P. Brown, S.D. Hopper, G.J. Keighery, D.J. Coates and A.S. George. Additional species were added to the list from the records of the Western Australian Herbarium during the assessment of the geographic distribution of species in the Irwin Botanical District.

For an assessment of regionally endemic species and Declared Rare Flora we have updated the list of Griffin (1981). Additional information has come from recently published taxonomic revisions, herbarium records and from personal communication with botanists. This gave a list of taxa confined or substantially confined to the northern kwongan between the Moore and Irwin Rivers, west of the Midlands Highway. Only one species of Declared Rare Flora (*Thelymitra stellata*) is more wide-ranging than the study area. All the rest are endemic to the northern kwongan. The distribution of each taxon on the list was mapped on a 1:1 000 000 base using localities obtained from specimens at the Western Australian Herbarium and from sight records from reliable observers (e.g. CALM records for Declared Rare Flora, Banksia Atlas records (Taylor and Hopper 1988), observations on *Dryandra* by E.A. Griffin, *Conostylis* and *Eucalyptus* by S.D. Hopper, *Stylidium* by A.H. Burbidge, *Eremaea* by D.J. Coates, *Verticordia* by A.S. George and members of the *Verticordia* Study Group, and *Beaufortia* by A.A. Burbidge).

The following data were then derived from each map:

- Maximum geographic range scored as:

1 less than 50 km (very geographically restricted)

2 50-160 km (geographically restricted)

3 more than 160 km (widespread regional endemic)

Table 5.2.
Plant taxa described from Type specimens collected in the proposed Lesueur National Park.

Taxon, author, place of publication (date)	Collector	Locality	Date of type collection
Asterolasia drummondii Paul G. Wilson, Nuytsia 6:8 (1987)	J. Drummond	n.l.*	1850
Banksia tricuspis Meissner, Hooker's J. Bot. Kew Gard. Misc. 7:119 (1855)	J. Drummond	n.l.	1850
Banksia micrantha A.S. George, Nuytsia 3:422-426 (1981)	A.S. George	5 km W of Mt Lesueur	27 March 1979
Conostylis crassinerva J.Green, Proc Linn. Soc. New South Wales 85:361 (1961)	N.H. Speck	Mt Lesueur	n.d.**
Conostylis latens Hopper, Fl. Australia 45:461 (1987)	S.D. Hopper	Mt Michaud	21 Sept. 1982
Diplolaena ferruginea, Paul G. Wilson, Nuytsia 1:198 (1971)	C.A. Gardner	Mt Lesueur	16 Oct. 1946
Eucalyptus lateritica Brooker & Hopper, Nuytsia 5:346-351 (1986)	S.D. Hopper	Mt Michaud	2 April 1982
Genetyllis (= Darwinia) helichrysoides Meissner, J. Linn. Soc. 1:37 (1857)	J. Drummond	n.l.	1850
Haemodorum venosum T. Macfarlane, Fl. Australia 45:464 (1987)	E.A. Griffin	Mt Peron	17 Oct. 1984
Hakea megalosperma Meissner, Hooker's J.Bot Kew Gard. Misc. 7:17 (1855)	J. Drummond	n.l	1850
Hakea neurophylla Meissner, Hooker's J.Bot Kew Gard. Misc. 7:17 (1855)	J. Drummond	n.l	1850
Isopogon tridens F. Muell., Fragm. Phyt. Austral. 6:239 (1868)	J. Drummond	Diamond of the Desert Spring	1850
Leucopogon plumuliflorus F. Muell., Fragm. Phyt. Austral. 6:29-30 (1867)	J. Drummond	n.l.	1850
Walteranthus erectus G.J. Keighery, Bot. Jahb. Syst. 106:110-112 (1985)	G.J. Keighery	2-3 km S of Green Head	n.d.
Xanthosia tomentosa A.S. George, J. & Proc. Roy. Soc. Western Australia (1967)	A.S. George	2 miles N of Cockleshell Gully	Sept. 1966

*n.l. = no locality given on Type specimen

**n.d. = no date given on Type specimen

Table 5.3

Total number of species in the major families and major genera in the proposed Lesueur National Park and other areas. Percentages are of totals in each area.

	Lesueur	Irwin District	Eneabba	Eneabba laterites	Stirling Range	Fitzgerald River	Tutanning	Wongan Hills
Total area (km^2)	275	39656	20	**	1157	2428	21	18
Total species	821	2153*	429	317	1262	1748	663	405
Total genera	268	524	162	125	355	433	258	196
Total families	76	120	50	38	90	91	77	76
Families								
Proteaceae	99 (12%)	146	71 (17%)	61 (19%)	133 (11%)	130 (7%)	56 (8%)	38 (9%)
Myrtaceae	93 (11%)	257	55 (13%)	37 (12%)	128 (11%)	222 (13%)	55 (8%)	61 (15%)
Papilionaceae	57 (7%)	149	27 (6%)	30 (9%)	110 (9%)	134 (8%)	44 (7%)	13 (3%)
Orchidaceae	56 (7%)	67	9 (2%)	4 (1%)	61 (5%)	86 (5%)	42 (6%)	18 (4%)
Liliaceae	47 (6%)	88	31 (7%)	19 (6%)	40 (3%)	48 (3%)	36 (5%)	11 (3%)
Asteraceae	46 (6%)	141	11 (3%)	3 (1%)	69 (6%)	108 (6%)	62 (9%)	41 (10%)
Cyperaceae	35 (4%)	45	30 (7%)	17 (5%)	44 (4%)	97 (6%)	34 (5%)	5 (1%)
Mimosaceae	33 (4%)	92	7 (2%)	12 (4%)	30 (2%)	79 (5%)	19 (3%)	31 (8%)
Goodeniaceae	30 (4%)	96	16 (4%)	10 (3%)	31 (3%)	54 (3%)	26 (4%)	13 (3%)
Haemodoraceae	29 (4%)	68	16 (4%)	8 (3%)	17 (1%)	15 (1%)	9 (1%)	2 (0%)
Epacridaceae	26 (3%)	43	19 (4%)	15 (5%)	62 (5%)	89 (5%)	21 (3%)	6 (1%)
Stylidiaceae	25 (3%)	48	15 (3%)	10 (3%)	32 (3%)	30 (2%)	28 (4%)	10 (2%)
Restionaceae	19 (2%)	15	19 (2%)	7 (2%)	26 (2%)	26 (1%)	11 (2%)	2 (0%)
Poaceae	19 (2%)	84	11 (3%)	1 (0%)	45 (4%)	66 (4%)	32 (5%)	7 (2%)
Dilleniaceae	15 (2%)	15	6 (1%)	10 (3%)	12 (1%)	21 (1%)	8 (1%)	7 (2%)
Apiaceae	15 (2%)	25	6 (1%)	7 (2%)	23 (2%)	27 (2%)	13 (2%)	6 (1%)
Droseraceae	12 (1%)	25	13 (3%)	7 (2%)	14 (1%)	15 (1%)	10 (2%)	9 (2%)
Rutaceae	11 (1%)	30	7 (3%)	7 (2%)	16 (1%)	37 (2%)	5 (0%)	6 (1%)
Genera								
Acacia	33 (4%)	89	7 (2%)	12 (4%)	30 (2%)	79 (5%)	19 (3%)	31 (8%)
Stylidium	22 (3%)	44	15 (3%)	9 (3%)	29 (2%)	26 (1%)	24 (4%)	8 (2%)
Hakea	21 (3%)	38	16 (4%)	17 (5%)	20 (2%)	34 (2%)	12 (2%)	9 (2%)
Melaleuca	20 (3%)	43	7 (2%)	5 (2%)	24 (2%)	66 (4%)	12 (2%)	15 (4%)
Eucalyptus	16 (2%)	52	7 (2%)	2 (1%)	28 (2%)	50 (3%)	12 (2%)	18 (4%)
Schoenus	15 (2%)	15	8 (2%)	4 (1%)	14 (1%)	31 (2%)	11 (2%)	1 (0%)

Table 5.3 *(cont'd)*

	Lesueur	Irwin District	Eneabba	Eneabba laterites	Stirling Range	Fitzgerald River	Tutanning	Wongan Hills
Hibbertia	15 (2%)	15	6 (1%)	10 (3%)	12 (1%)	21 (1%)	8 (1%)	7 (2%)
Caladenia	14 (2%)	25	1 (0%)	0 (0%)	30 (2%)	29 (2%)	18 (3%)	8 (2%)
Thysanotus	13 (2%)	16	11 (3%)	8 (3%)	12 (1%)	11 (1%)	7 (1%)	2 (0%)
Banksia	13 (2%)	27	10 (2%)	4 (1%)	20 (2%)	16 (1%)	3 (0%)	2 (0%)
Dryandra	13 (2%)	19	9 (2%)	15 (5%)	24 (2%)	14 (1%)	11 (2%)	6 (1%)
Petrophile	13 (2%)	18	8 (2%)	9 (3%)	14 (1%)	9 (1%)	9 (1%)	4 (1%)
Daviesia	13 (2%)	21	9 (2%)	12 (4%)	15 (1%)	19 (1%)	8 (1%)	4 (1%)
Conostylis	12 (2%)	35	11 (3%)	5 (2%)	6 (0%)	10 (1%)	3 (0%)	1 (0%)
Drosera	12 (2%)	25	13 (3%)	6 (2%)	14 (1%)	15 (1%)	10 (2%)	9 (2%)
Grevillea	12 (2%)	na	9 (2%)	2 (1%)	10 (1%)	17 (1%)	5 (1%)	9 (2%)
Leucopogon	11 (2%)	29	10 (2%)	8 (3%)	34 (3%)	54 (3%)	10 (2%)	2 (0%)
Verticordia	11 (1%)	26	10 (2%)	4 (1%)	8 (1%)	21 (1%)	7 (1%)	6 (1%)
Scaevola	9 (1%)	20	5 (1%)	2 (1%)	3 (0%)	11 (1%)	1 (0%)	3 (1%)
Isopogon	9 (1%)	9	3 (1%)	5 (2%)	12 (1%)	8 (0%)	4 (1%)	2 (0%)
Jacksonia	9 (1%)	19	4 (1%)	3 (1%)	9 (1%)	14 (1%)	8 (1%)	2 (0%)
Astroloma	9 (1%)	7	5 (1%)	4 (1%)	8 (1%)	9 (1%)	6 (1%)	3 (1%)
Aliens	24 (3%)	nd	4 (1%)	1 (0%)	74 (6%)	104 (6%)	43 (6%)	6 (1%)

nd - not determined
na - not available
** - not a contiguous area
* - does not include Grevillea

Sources of data: Irwin: R.J. Hnatiuk, (pers. comm.); Eneabba: Hnatiuk and Hopkins (1981); Eneabba laterites: Griffin et al. (1983); Stirling Range: G.J. Keighery (unpubl.); Fitzgerald River: Chapman & Newbey (1987); Tutanning: A.J.M. Hopkins (unpubl.); Wongan Hills: Kenneally (1977)

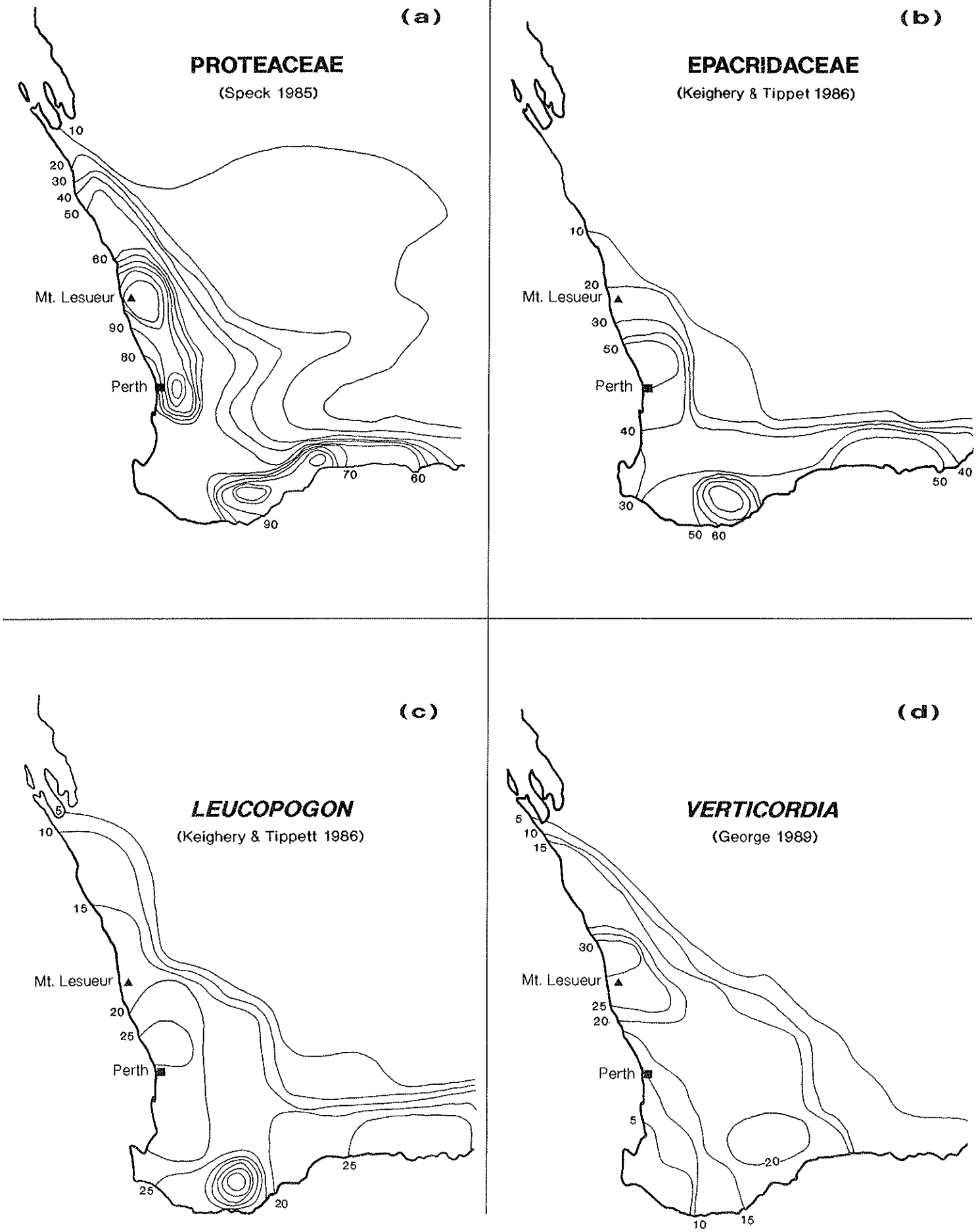

Figure 5.1

Isoflor maps of (a) Proteaceae, (b) Epacridaceae, (c) *Leucopogon* and (d) *Verticordia*

- Presence in the physiographic regions of Playford *et al.* (1976; Figure 3.2).

In addition, for endemics recorded in the Lesueur Area, their presence was noted in three main geomorphic sectors:

- coastal plain (Quindalup, Spearwood and Bassendean Dunes)
- western uplands (Peron Slopes, Lesueur and Gairdner Dissected Uplands)
- eastern uplands (Banovich Uplands and Bitter Pool Rises)

For these species, additional data recorded were:

- total number of known populations
- number of populations on existing conservation reserves (i.e. excluding the Lesueur Area)
- number of populations in the Lesueur Area
- number of populations in the eastern uplands.

Species were categorised as to:

- whether or not the taxon was declared as Rare Flora under the Wildlife Conservation Act,
- whether it was formally described or undescribed, and
- whether or not it was included on CALM's Reserve Flora List for taxa which have been or are being considered for gazettal as Declared Rare Flora. These taxa require further survey for addition to the Schedule, or have been adequately surveyed and are not considered to be under threat but require monitoring to ensure that they do not become so (Hopper, van Leeuwen and Brown in prep.).

The schedule of Declared Rare Flora is reviewed annually, and taxa (not including hybrids) may be added to the schedule if they satisfy the following criteria:

- the taxon (species, subspecies, variety) is well-defined, readily identified and represented by a voucher specimen in a State or National Herbarium;
- the taxon has been searched for thoroughly in the wild by competent botanists during the past five years, according to guidelines approved by the Executive Director of CALM;
- such searches have established that the plant in the wild is either *rare* (less than a few thousand adult plants exist in the wild), *in danger of extinction* (the taxon is in serious risk of disappearing from the wild state within one or two decades if present land use and other causal factors continue to operate), or *deemed to be threatened and in need of special protection* (the taxon is not presently in danger of extinction but is at risk over a longer period through continued depletion, or largely occurs on sites likely to experience changes in land use which would threaten its survival in the wild).

Five priorities have been assigned to taxa on CALM's Reserve List according to the following criteria.

Priority one: high priority species which are known from only one or a few localities on lands under threat, e.g. road verges, urban areas, active mineral leases, grazing by feral animals, etc. These species are under consideration for declaration but urgently require further survey.

Priority two: high priority species known from one or a few localities on land not under immediate threat, e.g. nature reserves, national parks, vacant Crown land, water reserves etc. These species are under consideration for declaration but are in need of urgent further survey.

Priority three: known from several localities, some of which are on lands not under immediate threat. These species are under consideration for declaration but are in need of further survey.

Priority four: taxa presumed extinct, (i.e. which have not been collected or reliably observed over the past 50 years, or whose total known wild population has been destroyed more recently.)

Priority five: taxa for high priority monitoring (i.e. which are considered to have been adequately surveyed and not endangered or in need of special protection, but could be if present circumstances change. These species are usually represented on reserves.)

Species in categories 1 to 3 are considered "poorly known".

The distribution of endemics in the study area was summarised by counting the number of taxa in all 10' latitude x 10' longitude grid squares. Using computer generated contouring on distributions partitioned in a 10 km grid, separate isoflor maps showing patterns of species richness were compiled for the three categories

of maximum geographic range, for Declared Rare Flora, and for all regional endemics.

A number of species have been recorded at Lesueur as being at the limit of their geographic range (e.g. Griffin and Hopkins 1985a). That study only considered the flora of Mt Lesueur. The distribution of species considered most likely (on the basis of extensive field surveys in the northern kwongan) at either their northern or southern limits was assessed by comparison with the records of the Western Australian Herbarium. Species were categorised as being:

- at the northern limit of a more or less continuous distribution
- at the northern limit with a disjunct distribution
- at the southern limit of a more or less continuous distribution
- at the southern limit with a disjunct distribution.

5.4 SPECIES RICHNESS

The total number of flowering plant taxa (species, subspecies and varieties) in the Lesueur Area presently stands at 821 (Table 5.3, Appendix 1), approximately 10% of the State's known flora (Green 1985), and a third of the taxa in the Irwin Botanical District (R. Hnatiuk pers. comm.).

The 821 taxa belong in 268 genera and 76 families. Undescribed taxa represent 5.5% (45) of the total. Alien species are relatively poorly represented (24 species) and only occur in limited areas. Typical of kwongan, the families Proteaceae, Myrtaceae and Papilionaceae are the richest in species (Table 5.3). Genera with the most species are *Acacia* (33 species), *Stylidium* (22), *Hakea* (21) and *Melaleuca* (20) (Table 5.3).

The vascular flora of the Lesueur Area is large in absolute terms and also when considered in relation to other important nature conservation areas (Table 5.3). Both the Stirling Range National Park and the Fitzgerald River National Park have greater numbers of species. However, they are also very much larger in size and have been studied much more intensively by botanists.

The richness of the Lesueur Area at the landscape unit scale, or gamma diversity, can be attributed to a number of factors, foremost of which must be the wealth of habitats present. In particular, the dissected area between the Lesueur and Warradarge Faults (i.e. the Gairdner Dissected Uplands, Banovich Uplands and Bitter Pool Rises) with its varied topography and range of geological substrates appears to contribute much to the total species complement. In the context of the relatively subdued topography of the northern kwongan, the relief in the Lesueur Area is outstanding. This relief can be regarded as indicative of high habitat diversity.

Only gamma diversity of the similar South African Cape fynbos vegetation (Kruger and Taylor 1979) is higher than for kwongan of south-western Australia (Lamont *et al.* 1984). This is attributed to the greater relief of the Cape.

At smaller scales, the kwongan of the Lesueur Area is also notable. Quadrats of 100 m^2 have been sampled throughout the Lesueur Area. Hopkins and Griffin (1984) reported that the Lesueur lateritic uplands were on average richer than others in the Jurien to Eneabba area studied by Griffin *et al.* (1983). Kwongan on laterite in the central Wheatbelt (Brown and Hopkins 1983) is only about 40% to 60% as rich as that in the Lesueur Area.

While superficially uniform in structure, the vegetation of the Lesueur Area is floristically heterogeneous. There is a rapid geographical replacement of species, even on the same vegetation type. Adjacent quadrats on laterite may have as few as 60% of species in common (Hopkins and Griffin 1984; Figure 5.2). Moving as little as 0.5 km within the same vegetation type (e.g. laterite) can reduce this to less than 40%. When sites on different soils are compared, the floristic differences become even more marked. This floristic variation or beta diversity is a feature of the kwongan vegetation generally, but it appears to be pronounced in the Lesueur Area.

A study of species/area relationships conducted on the top of Mt Lesueur itself revealed that over half the species occurring in any quadrat are likely to be relatively uncommon or sparse; that is they occur at very low population densities (Hopkins and Griffin 1984). This feature has much to do with the low dominance of species which allows them to persist at low densities.

The high species richness values reported for kwongan, particularly in the nodes of richness at Mt Lesueur and the Stirling Range - Fitzgerald River area (George *et al.* 1979) has prompted some writers to suggest a comparison of species diversity with tropical rainforest vegetation (e.g. Lamont *et al.* 1977). When samples of 1000 m^2 or less are compared, the kwongan is certainly the richer of the two vegetation types. At scales of 1 to 2 hectares, the rainforests are generally richer (Lamont *et al.* 1984). At the scale of landscape units the comparisons have not been made in detail but it seems that richness values might be similar.

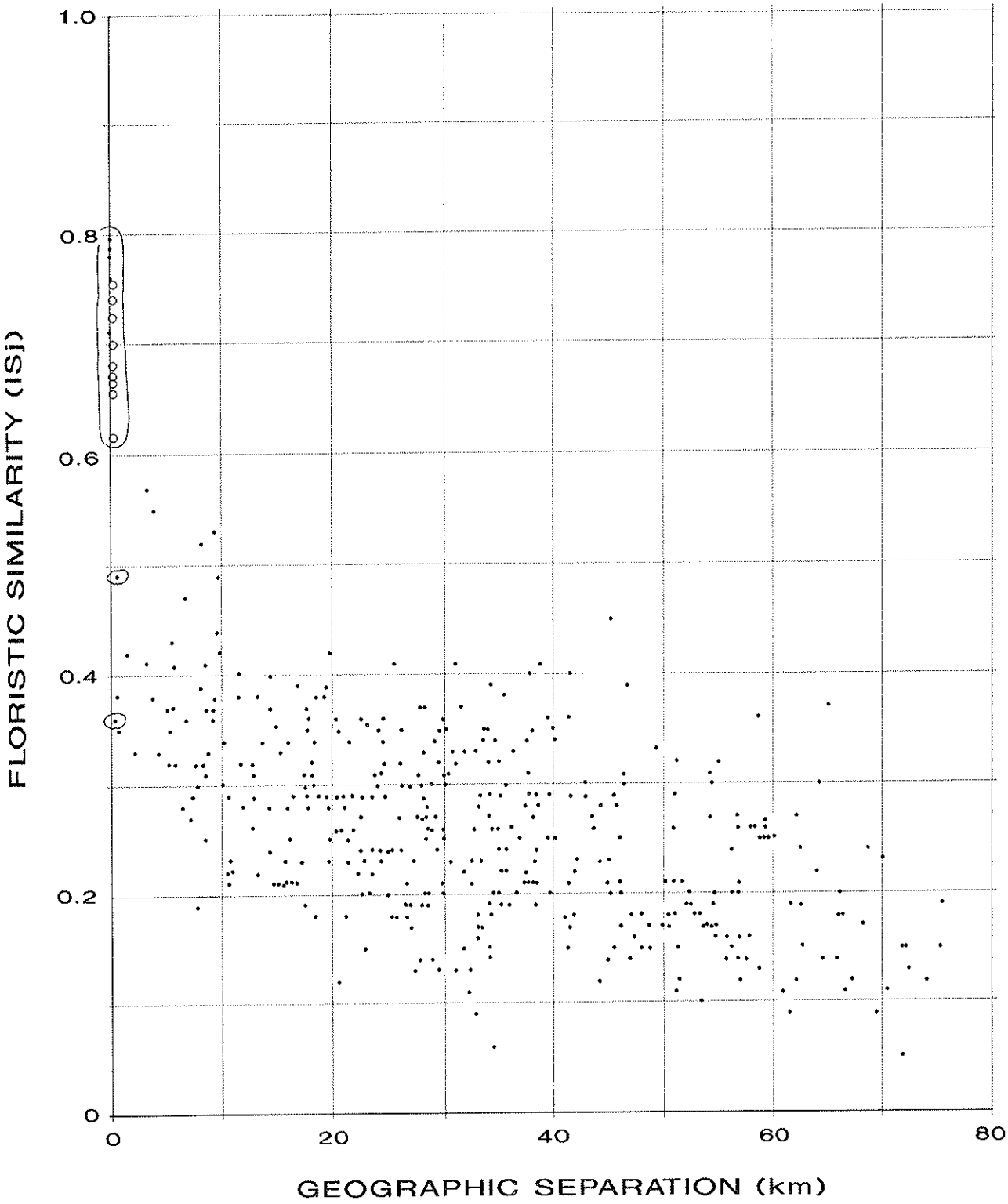

Figure 5.2

Relationship between floristic similarity (Jaccard coefficient) and geographic separation of lateritic upland heath quadrats, from Griffin *et al.* (1983) and Griffin and Hopkins, unpublished data from Mt Lesueur. Within-stand comparisons are ringed.

Currently the International Union for Biological Sciences is examining a proposal to establish a programme of international collaborative research on Biodiversity. One of the propositions encapsulated in this proposal is that studies of the dynamics of species in kwongan will provide insights into processes operating in rainforests. The Lesueur Area is the likely site for these studies.

5.5 BIOGEOGRAPHY OF SELECTED FAMILIES AND GENERA

The Lesueur Area is especially important for many famililies and genera. For example Speck (1958) plotted known distributions based on herbarium collections of 426 members of the family Proteaceae on a map of south-western Australia. The map was subdivided by 45 km^2 grid squares, the number of taxa present in each grid square was counted and lines (isoflors) drawn to join grid squares of equal species richness.

The resultant map (Figure 5.1a) showed two areas of high species richness: the Stirling Range-Fitzgerald River National Park southern kwongan area, and a second node in the northern kwongan centred on the Mt Lesueur-Eneabba area. The intervening, high rainfall, forested country between these two nodes of species richness had relatively few species of Proteaceae, as did the eastern wheatbelt and arid zone beyond. This pattern had been noted but not quantified in earlier works by Diels (1906) and Gardner (1944), and was also discussed by Burbidge (1960) and Marchant (1973).

In contrast, Hopper and Maslin's (1978) study of *Acacia* indicated that Lesueur was peripheral to the main south-western belt of species richness between Moora and Ravensthorpe, a pattern that held in subsequent research on updated data a decade later (Hnatiuk and Maslin 1988).

Suprisingly for the northern kwongan, therefore, *Acacia* was the genus with the most species in the Lesueur Area (33; Table 5.3). Although the coastal physiographic regions contributed some species (six confined to them), the eastern area (the Arrowsmith Region) still has more species than any other genus present. *Melaleuca, Eucalyptus,* and *Caladenia* are similarly richer in the Lesueur Area than at Eneabba, an area more typical of the northern kwongan.

Hopper (1979) showed that *Eucalyptus* and the Rutaceae were relatively poor in species in the northern kwongan, each displaying greatest richness in the southern kwongan and mallee. Other genera, however, are clearly concentrated in the northern kwongan, as George *et al.* (1979) and George (1989) demonstrated for *Verticordia* (Figure 5.1d).

Over the past ten years, many other genera and families have been mapped in this way (Hopper 1979; Rye 1980; Keighery 1984; Morrison 1987; Coates pers. comm.; e.g. Epacridaceae and *Leucopogon*, Figure 5.1). Such studies highlight the importance of Lesueur as a major potential conservation reserve for diverse genera of plants in the region. For instance, Lesueur genera now known to be richest in species in the northern kwongan include: *Astroloma, Conostylis, Eremaea, Haemodorum, Hypocalymma, Lechenaultia, Leptocarpus, Patersonia, Schoenus, Scholtzia* and *Verticordia.*

In addition, a number of genera have a bimodal pattern of species richness, with peaks in both the northern and the southern kwongan (e.g. *Andersonia, Anigozanthos, Banksia, Beaufortia, Calothamnus, Calytrix, Conospermum, Darwinia, Dryandra, Gompholobium, Grevillea, Hakea, Isopogon, Jacksonia, Leptospermum, Petrophile, Phebalium, Regelia, Restio, Thelymitra* and *Thysanotus*). A few are concentrated in the northern kwongan and the adjacent wheatbelt (e.g. *Gastrolobium, Micromyrtus, Thryptomene*). Some are rich in an extensive arc from the northern kwongan through the wheatbelt to the southern kwongan (e.g. *Baeckea, Melaleuca, Acacia*).

Most of the genera mentioned above are in the Lesueur Area, many in greater number of species than for any other northern kwongan conservation reserve (Appendix 1).

Mapping of genera in more detail than that available from herbarium records has occurred in some instances. The recently published *Banksia Atlas* (Taylor and Hopper 1988) is an example where sight records of many volunteer contributors have been used to gain a better understanding of exact distributions. This approach has facilitated the recognition of new localised taxa and has substantiated the biogeographical patterns derived from herbarium records. For instance, in the case of the Lesueur Area, observations that *Banksia tricuspis* is almost entirely confined to the Gairdner Range, and that *B. ilicifolia, B. grandis* and *B. littoralis* are at the northern limit of their ranges have been verified by many observers.

A number of other prominent northern kwongan genera have been surveyed thoroughly by botanists interested in taxonomy, evolution or biogeography, e.g. *Conostylis* (Hopper 1978; Hopper *et al.* 1987), *Verticordia* (George 1989), *Dryandra* (Griffin 1985) and *Eucalyptus* (Brooker 1972; Brooker and Blaxell 1978; Brooker and Hopper 1986). Biogeographical patterns

elucidated for these genera similarly are well substantiated.

Accurate mapping of this kind has yet to be undertaken for the majority of species of the northern kwongan. From a different perspective, however, a few areas in the south west have been studied intensively (Table 5.3). This enables a quantitative comparison of the species richness of families and genera in Lesueur with that in some other well known areas. These studies confirm Speck's (1958) observation that the northern and southern kwongan are both richer in Proteaceae than the wheatbelt. Myrtaceae is relatively high in all areas while Papilionaceae and Epacridaceae (Figure 5.1b) appear to be higher in the southern kwongan. Haemodoraceae are richer in the northern kwongan. Typically, kwongan, especially in the north, is poorer than the wheatbelt in Asteraceae and Orchidaceae. Suprisingly the Lesueur Area is much richer in both these families than the kwongan of Eneabba. This is probably due to the greater habitat diversity in the Lesueur Area and especially to the significant areas of clay soils.

Over one third of the species noted for the Irwin Botanical District occur in the Lesueur Area (Table 5.3). Certain families are proportionally much better represented at Lesueur. Almost all the Irwin Restionaceae and Dilleniaceae and well over half the Proteaceae, Orchidaceae, Cyperaceae, Epacridaceae, and Apiaceae occur in the Lesueur Area. Several genera are very well represented, for example *Schoenus, Thysanotus, Hibbertia, Dryandra, Petrophile, Isopogon* and *Astroloma*.

Sympatry (or co-occurrence of species of the same genus) is a factor contributing to the high species richness of some genera. Particularly on laterite, *Hakea* and *Dryandra* are commonly represented by as many as five species in one stand. Other genera with significant sympatry include *Stylidium, Schoenus, Hibbertia, Banksia, Daviesia, Conostylis* and *Leucopogon.* Although rich in species, *Acacia, Melaleuca* and *Eucalyptus* have only low levels of sympatric occurrence. These three genera contrast with most others in the northern kwongan in being represented in a wide range of soil types. The richness of these genera in particular reflects the great diversity of vegetation and soils in the Lesueur Area.

5.6 SPECIES RICHNESS OF VEGETATION TYPES

George *et al.*(1979) documented the richness of some of the kwongan of southwestern Australia and showed that the samples richest in species (as measured in an area of 500 m^2) were concentrated in the reputed nodes of richness (Stirling Range - Fitzgerald River area and the Lesueur - Eneabba area). Although their single sample from Mt Lesueur was not as rich as those at Eneabba, many subsequent samples demonstrated that the Lesueur Area contains vegetation types with richness equal to the richest reported in southwestern Australia (Hopkins and Griffin 1984).

Table 5.4 shows just how diverse most vegetation types in this area are. Most have over 80 species per 100 m^2 quadrat, and this may increase by as many as 10 species just after a fire. (This is richer than in Martinick and Associates' (1988) data because detailed monitoring in the fire regeneration study found plants not obvious to those workers).

The richest areas are on sandstones and some lateritic soils. Suprisingly, some of the vegetation types on clayey soil (*Petrophile seminuda* Heath and *Melaleuca platycalyx* Heath) are also very rich. Their richness is due mainly to the relatively high number of annual species present.

Because of the great turnover of species as mentioned in Section 5.4, the richness of a vegetation type is several times that of an individual 100 m^2 quadrat (Figure 4.4). How great an increase depends partly on how precisely the vegetation type is defined. Figure 4.4 shows that all the major heath vegetation types (on sand, gravel, sandstone and laterite) are very similar in richness at this level. Detailed comparison of the richness of vegetation subtypes is not possible and must await their precise definition (cf Section 4.15.).

A distinct relationship between soil type and species richness was recognised by George *et al.* (1979). Sandy soils associated with laterite were richer in species than deep sand for example. Hopkins and Hnatiuk (1981) and Froend (1987) found that ecotonal areas between the extremes of laterite and deep sand were richer than other types examined. Table 5.4 supports this view. Lateritic Slope Heath was at least 10% richer than either Lateritic Heath or Sand Heath.

5.7 ENDEMISM

Although many authors have discussed northern kwongan endemism in general reviews (e.g. Drummond 1853; Diels 1906; Gardner 1944; Burbidge 1960; Marchant 1973; Hopper 1979; George *et al.* 1979; Hopkins *et al.* 1983; Lamont *et al.* 1984; Hopper and Muir 1984), the first detailed analysis of endemism was by Griffin (1981). On the basis of herbarium and literature records and field observations, Griffin identified and mapped herbarium records of 84 geographically restricted taxa confined to the northern kwongan between the Moore and Irwin Rivers. He listed only formally described taxa, but noted that an

Table 5.4

Mean species richness sampled in 100m^2 quadrats for all species and for annual species alone before and one year after fire within different vegetation types (Vegetation codes and names from Martinick and Associates 1988).

Code	Vegetation Type Name	No of Quads	Pre-fire All	Pre-fire Annual	Post-fire All	Post-fire Annual
K	*Eucalyptus wandoo* Woodland	3	36.0	9.3	40.6	12.3
F	*Hakea erinacea* Heath	1	66.0	14.0	70.0	16.0
E	*Ecdeiocolea* Heath	1	68.0	11.0	72.0	14.0
D	Gravel Heath	6	76.0	4.3	84.4	7.8
B2	Laterite Heath 2	2	80.0	3.5	87.5	7.5
A	Sand Heath	6	82.5	4.8	91.5	10.2
J1	*Calothamnus quadrifidus* Heath	1	83.0	25.0	92.0	31.0
B1	Laterite Heath 1	8	86.6	0.9	92.4	3.4
G	*Melaleuca platycalyx* Heath	1	87.0	23.0	92.0	27.0
H	*Petrophile seminuda* Heath	3	91.6	27.0	103.0	28.0
B3	Laterite Slope Heath	4	95.3	4.0	101.8	3.9
C	Sandstone Heath	3	103.7	1.0	112.0	3.7

additional 66 apparently undescribed taxa were known from the Eneabba-Mt Lesueur area and most of these were probably geographically restricted as well.

Over the past eight years, Griffin's surmise on undescribed taxa has been substantiated. Many northern kwongan endemics have been described recently, and many more still await formal description (e.g. 45 taxa in the Lesueur Area are undescribed).

A total of 259 taxa, including 92 undescribed (36%), are currently known to be regional endemics and/or Declared Rare Flora of the northern kwongan between the Moore and Irwin Rivers west of the Midlands Highway (Appendix 2). Of the 259, 117 (45%) are Very Geographically Restricted with a known range of less than 50km. A similar number (114) are Geographically Restricted with a range of between 50 and 160km. The other 28 (11%) have ranges greater than 160km.

The majority of these regional endemics occur in the Arrowsmith Physiographic Region with its lateritic uplands and sandy plains, (190 (78%) out of 243 (data excluding *Verticordia* which is undergoing taxonomic revision)). The Coastal Belt and the Bassendean Dunes each had only 12% and 14% respectively of the regional endemics even though they occupy a similar combined area to the Arrowsmith Region. Similarly, the Dandaragan Plateau (39%) and the Yarra Yarra Region (25%) had only moderate proportions of the regional endemics. On a unit area basis, the small Eneabba Plain was the richest in endemics, with an average of 10 taxa per 100km^2. The Arrowsmith Region had 3 per 100 km^2 and the others about 1 (Table 5.5).

The regional endemics are concentrated in the Lesueur Area, which has 111 (43%) of the 259 taxa. Moreover, the 10' x 10' grid cell covering the eastern part (Gairdner Dissected Uplands, Banovich Uplands and Bitter Pool Rises) contains 104 of these endemics. The second richest cell with 82 taxa was immediately to the north covering the species-rich Eneabba Plain. Mt Lesueur and the southern part of the Gairdner Range were in the third richest cell (78), while the Peron Slopes were in the fourth richest cell with 77 taxa. Numbers of endemics per cell declined with distance from Mt Lesueur and the Eneabba Plain. There is a minor node of richness (37 taxa) in the Cataby area.

Computer-generated isoflors of these data derived from species numbers within 10 km x 10 km grid cells provide a graphic demonstration of the concentration of regional endemics in the Lesueur Area (Figure 5.3). There is a secondary node of richness just south of Eneabba, with moderately rich "ridges" trailing south-east from Lesueur down Brand Highway to Badgingarra, and east of Brand Highway towards Alexander Morrison National Park. A minor node is found near Cataby.

It is important to note that the summit of the node in the Lesueur Area is considerably smaller than the 10 km grid from which the isoflors were derived (Figure 5.3, cf. scale bar). The precision implied by the narrow peak is an artefact of the contouring algorithm used. However, it can be said with certainty that the eastern uplands of the Lesueur Area overall have the richest concentration of regional endemics in the northern kwongan between the Moore and Irwin Rivers.

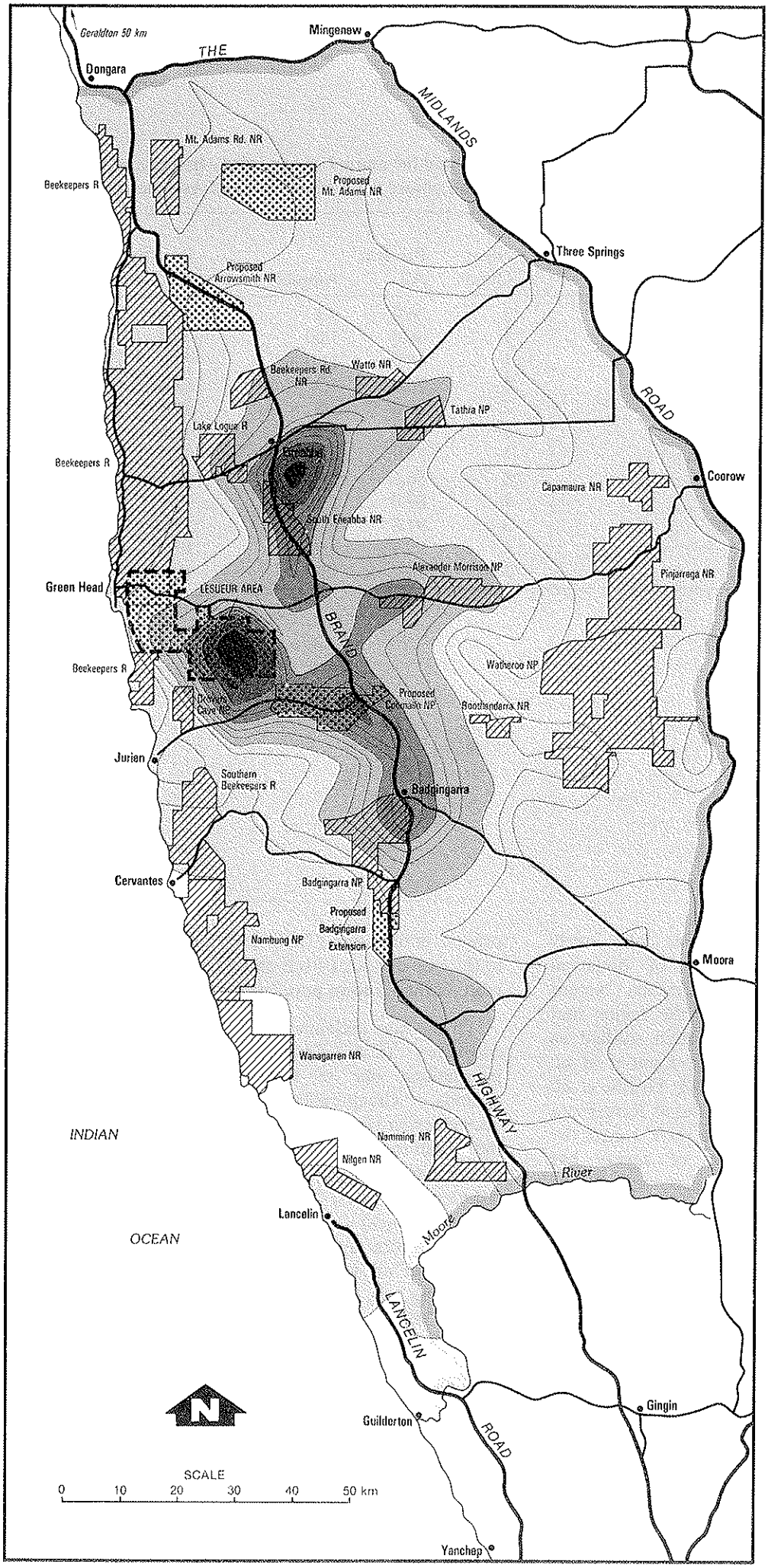

Figure 5·3
ISOFLOR MAP OF 259 REGIONAL TAXA OF THE NORTHERN KWONGAN

LEGEND

- Major Road
- Minor Road
- Study Area
- Existing National Park, Nature Reserve
- Existing "other" Conservation Reserve
- Proposed National Park, Nature Reserve
- Lesueur Area

Frequency of TAXA Occurrence*

60
45
30
15
0

Isoflor Interval = 5

* *Interpreted from data within 10 km X 10 km grid squares over the study area*

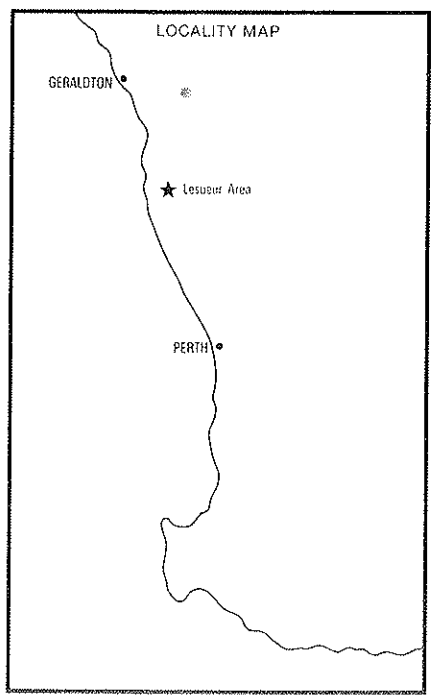

Table 5.4

Mean species richness sampled in 100m^2 quadrats for all species and for annual species alone before and one year after fire within different vegetation types (Vegetation codes and names from Martinick and Associates 1988).

Code	Vegetation Type Name	No of Quads	Pre-fire All	Pre-fire Annual	Post-fire All	Post-fire Annual
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D	Gravel Heath	6	76.0	4.3	84.4	7.8
B2	Laterite Heath 2	2	80.0	3.5	87.5	7.5
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J1	*Calothamnus quadrifidus* Heath	1	83.0	25.0	92.0	31.0
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H	*Petrophile seminuda* Heath	3	91.6	27.0	103.0	28.0
B3	Laterite Slope Heath	4	95.3	4.0	101.8	3.9
C	Sandstone Heath	3	103.7	1.0	112.0	3.7

While some of the detail in Figures 5.3-5.7 may reflect imbalances in the intensity of botanical collecting, places such as South Eneabba Nature Reserve, lateritic uplands throughout the region and the verges of Brand Highway have been studied as intensively as the Lesueur Area (e.g. Lamont *et al.* 1977, 1984; Hnatiuk and Hopkins 1981; Griffin *et al.* 1982, 1983). Moreover, species of Declared Rare Flora have been searched for throughout their ranges by many workers, and this intensity of survey has reinforced the view that the general pattern in Figure 5.3 is real.

The pattern in Figure 5.3 is repeated with only minor variations when the endemics are divided into Declared Rare Flora (Figure 5.4), Very Geographically Restricted taxa (Figure 5.5), Geographically Restricted taxa (Figure 5.6), and widespread regional endemics (Figure 5.7).

The precise distribution of most regional endemics within the Lesueur Area is only sparingly known. On present information (Table 5.6), nine taxa are endemic to the Lesueur Area itself and a further 25 have 50% or more of their known populations in the area.

Of the nine endemic (Table 5.6), *Hypocalymma* aff. *ericifolium* (E.A. Griffin 1972) has two known populations, one of which occurs in the eastern uplands. Comparable figures for *Eucalyptus* aff. *haematoxylon* (E.A. Griffin 2451) are 7 overall with 3 in the eastern uplands, *Persoonia nudis*, *Grevillea thelemanniana* spp. *delta* and *Gompholobium* aff. *polymorphum* (E.A. Griffin 2304) each have 3 (1 in the eastern uplands) and *Leucopogon plumuliflorus* has 6 (1 in the eastern uplands). None of the two known populations of *Andersonia longifolia*, 5 of *Phebocarya pilosissima* ssp. *teretifolia* nor the one of *Restio* sp. (Briggs 7473 and Johnson) are known to occur in the eastern uplands.

There are 26 very geographically restricted taxa (maximum range 50 km) that occur in the eastern uplands. Twenty of these 26 taxa are not known on

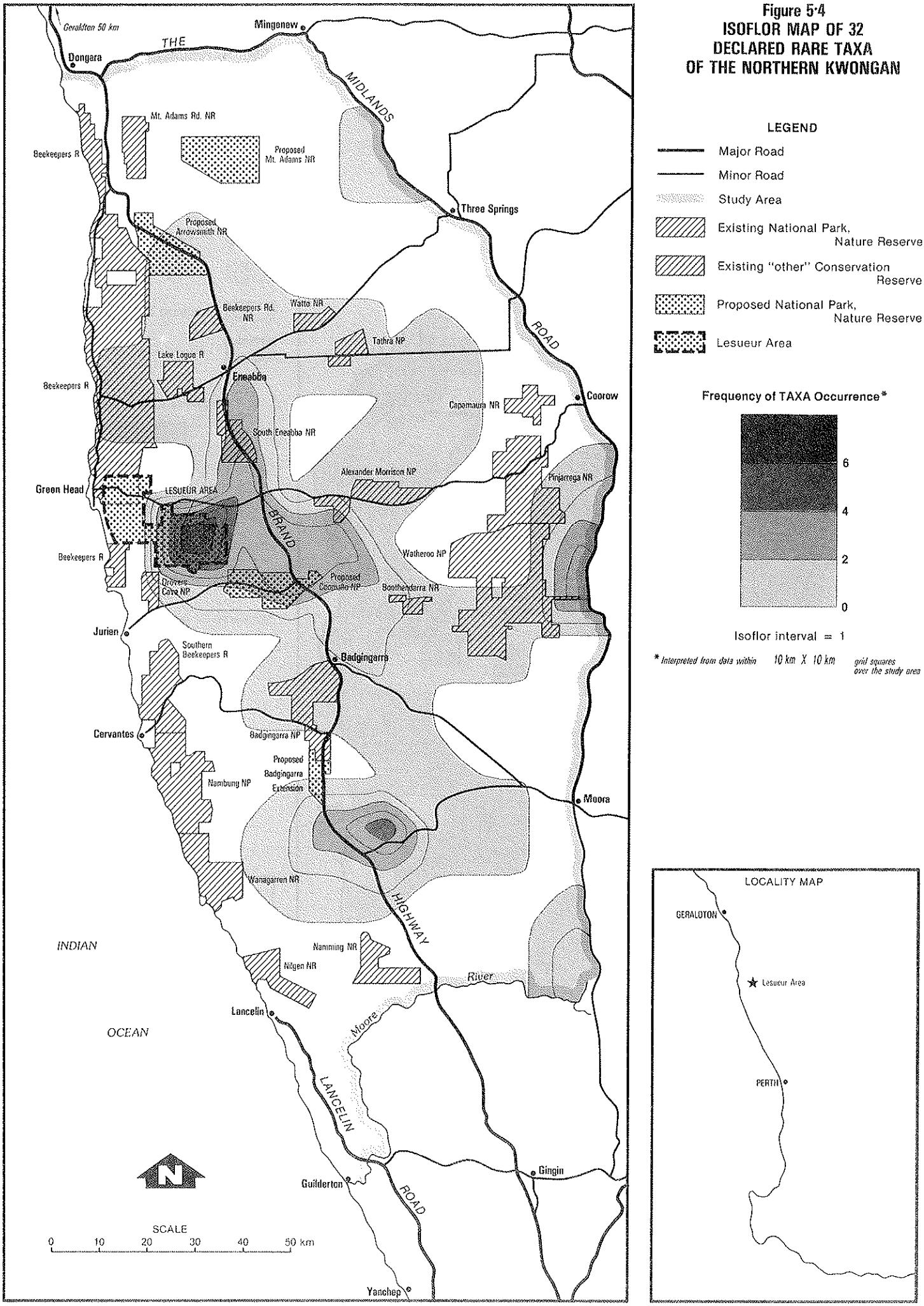

Figure 5·4
ISOFLOR MAP OF 32 DECLARED RARE TAXA OF THE NORTHERN KWONGAN

LEGEND

- Major Road
- Minor Road
- Study Area
- Existing National Park, Nature Reserve
- Existing "other" Conservation Reserve
- Proposed National Park, Nature Reserve
- Lesueur Area

Frequency of TAXA Occurrence*

6
4
2
0

Isoflor interval = 1

* *Interpreted from data within 10 km X 10 km grid squares over the study area*

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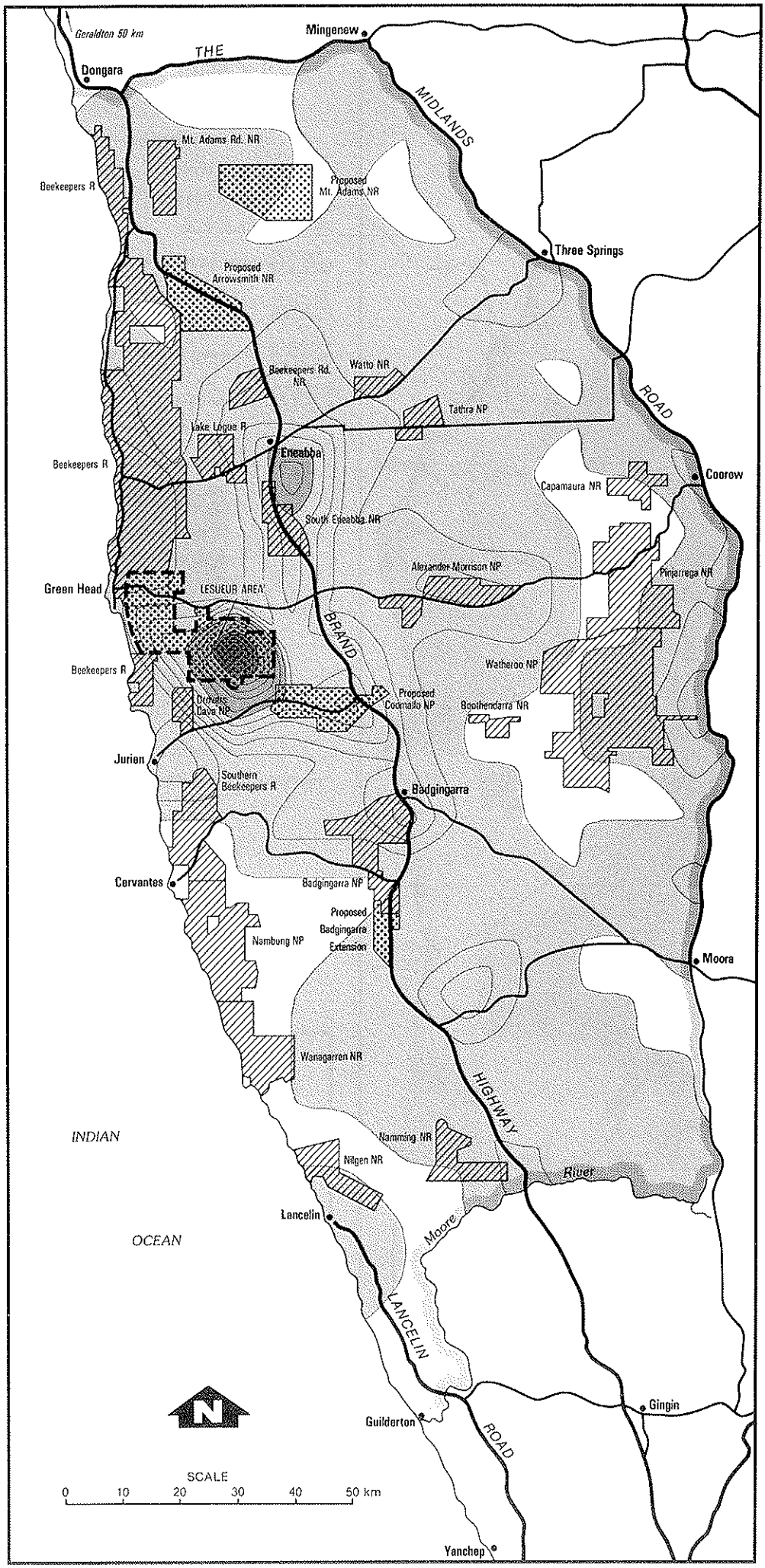


Figure 5·5
ISOFLOR MAP OF 117 VERY GEOGRAPHICALLY RESTRICTED TAXA OF THE NORTHERN KWONGAN
Maximum Geographical Range <50 km**

LEGEND

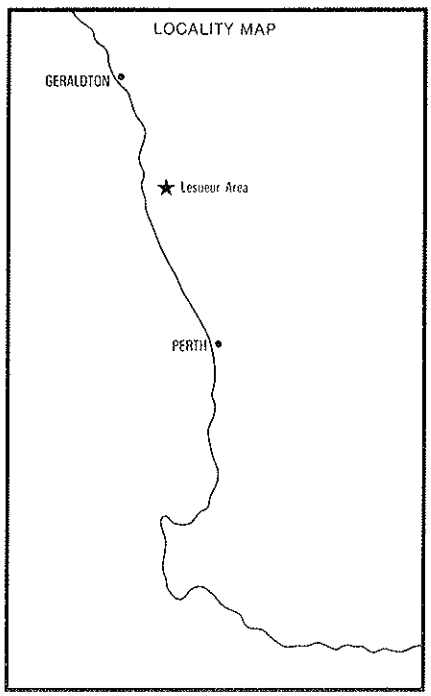
- Major Road
- Minor Road
- Study Area
- Existing National Park, Nature Reserve
- Existing "other" Conservation Reserve
- Proposed National Park, Nature Reserve
- Lesueur Area

Frequency of TAXA Occurrence*

Isoflor Interval = 2

* *Interpreted from data within 10 km X 10 km grid squares over the study area*

** *Maximum range at which any of the above taxa will occur*



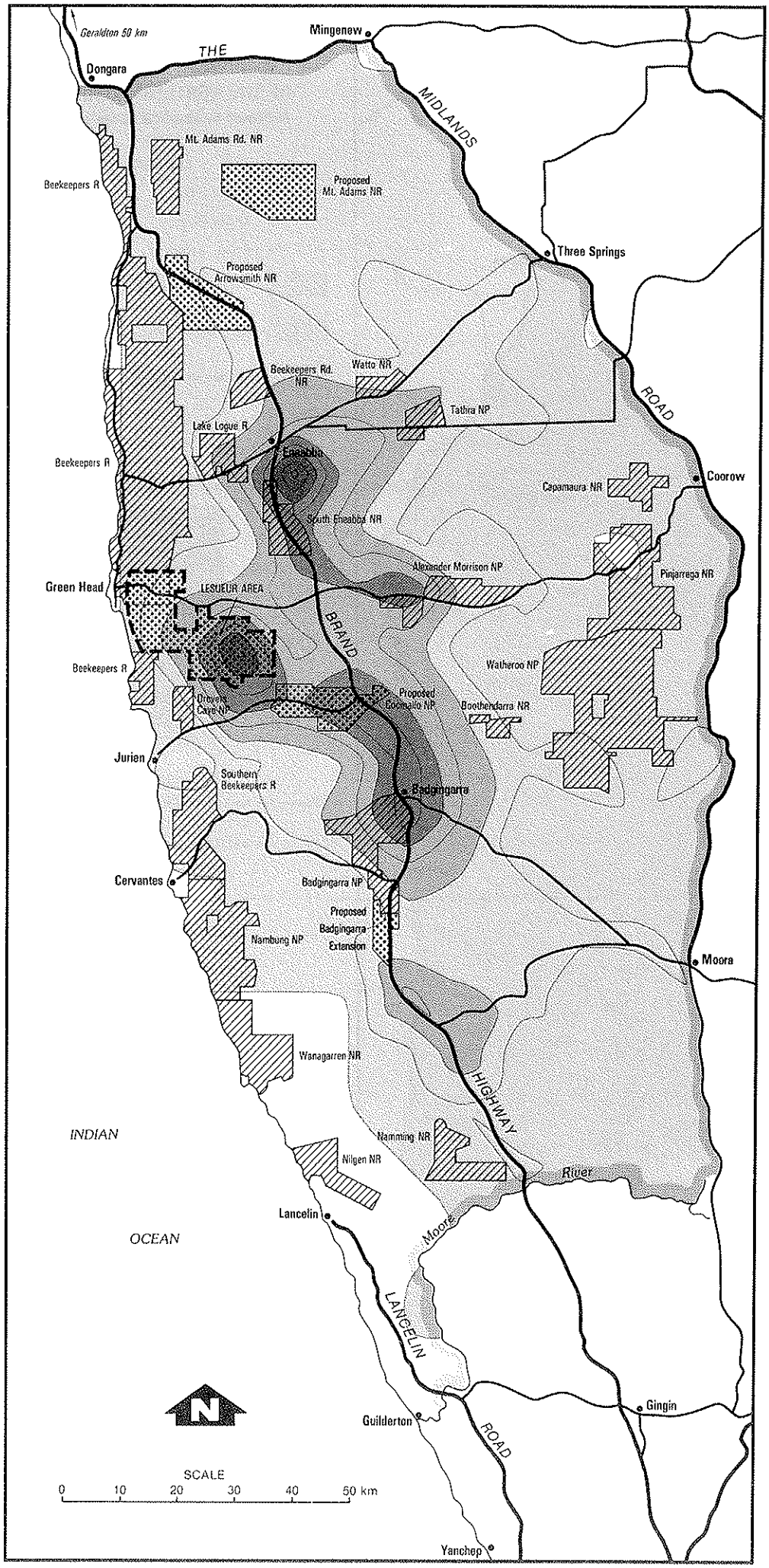


Figure 5·6
ISOFLOR MAP OF 114 GEOGRAPHICALLY RESTRICTED TAXA OF THE NORTHERN KWONGAN
Maximum Geographical Range 50–160 km**

LEGEND

- Major Road
- Minor Road
- Study Area
- Existing National Park, Nature Reserve
- Existing "other" Conservation Reserve
- Proposed National Park, Nature Reserve
- Lesueur Area

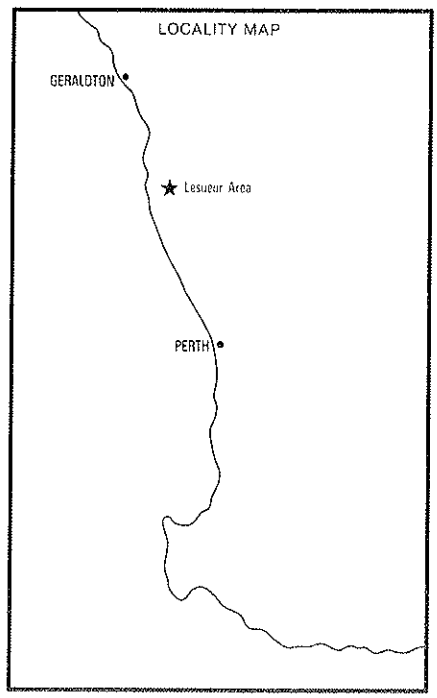
Frequency of TAXA Occurrence *

30
20
10
0

Isoflor interval = 5

* *Interpreted from data within 10 km X 10 km grid squares over the study area*

** *Maximum range at which any of the above taxa will occur*



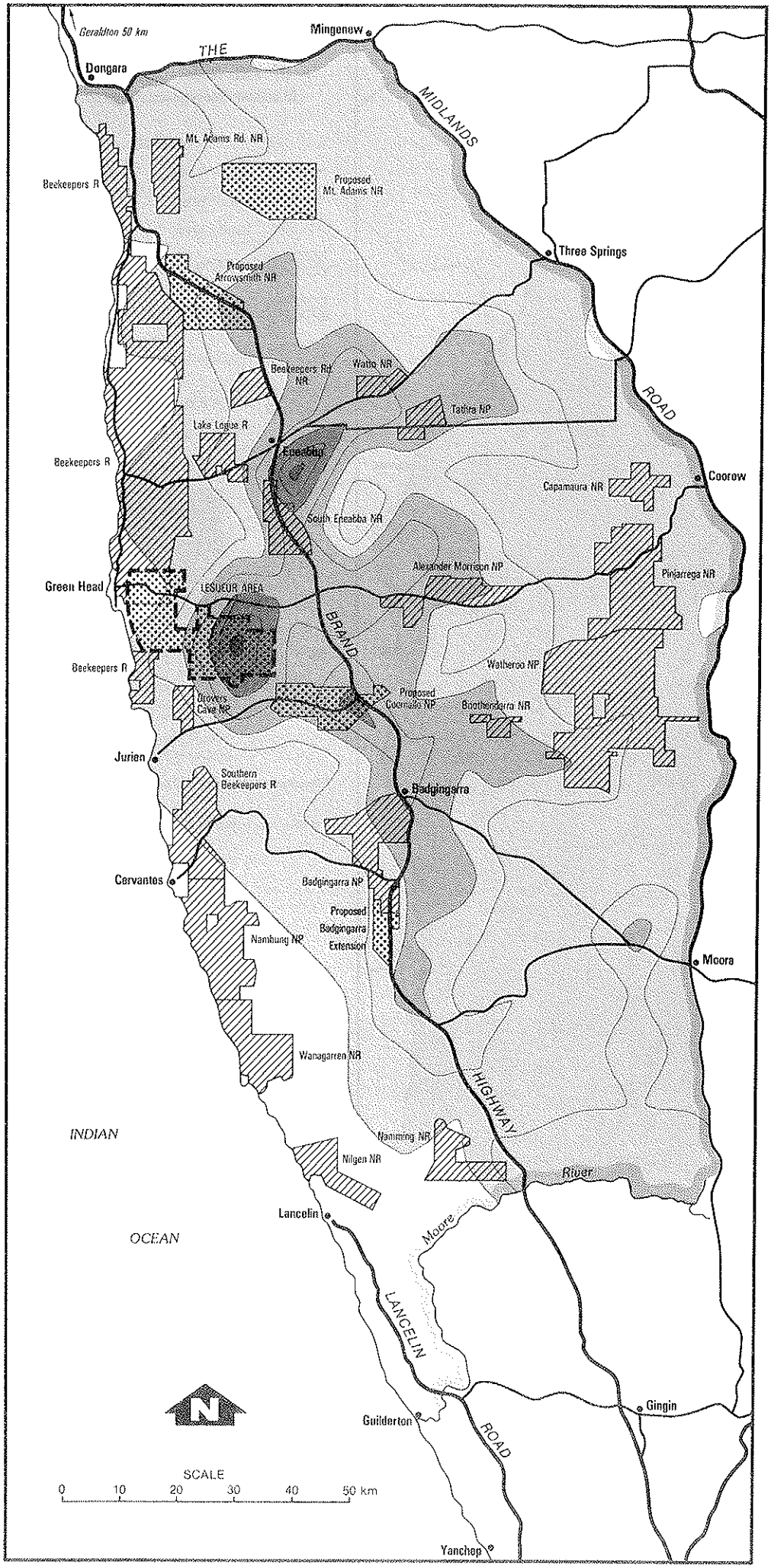


Figure 5·7
ISOFLOR MAP OF 28 WIDESPREAD REGIONAL ENDEMIC TAXA OF THE NORTHERN KWONGAN

Maximum Geographical Range >160 km**

LEGEND

- Major Road
- Minor Road
- Study Area
- Existing National Park, Nature Reserve
- Existing "other" Conservation Reserve
- Proposed National Park, Nature Reserve
- Lesueur Area

Frequency of TAXA Occurrence*

12
8
4
0

Isoflor interval = 2

* *Interpreted from data within 10 km X 10 km grid squares over the study area*

** *Maximum range at which any of the above taxa will occur*

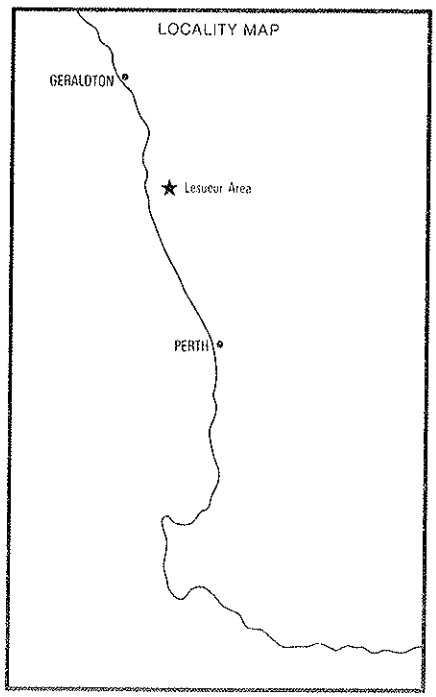


Table 5.6

Statistics on the 111 regional endemics and Declared Rare Flora occurring in the Lesueur Area (A, per centage of known populations in the Lesueur Area ; B, per centage of known populations in the eastern uplands of the Lesueur Area; C, per centage of known populations occurring within conservation reserves; D, number of known populations mapped separately at 1: 1000 000 scale.) Data extracted from herbarium records. * indicates no data available,

Taxon	A	B	C	D
Andersonia longifolia	100	0	0	2
Eucalyptus aff. *haematoxylon* (E.A. Griffin 2481)	100	43	0	7
Gompholobium aff. *polymorphum* (E.A. Griffin 2306)	100	33	0	3
Grevillea thelemanniana ssp. *delta*	100	0	0	2
Hypocalymma aff. *ericifolium* (E.A. Griffin 1972)	100	50	0	2
Leucopogon plumuliflorus	100	16	0	6
Persoonia rudis	100	33	0	3
Phlebocarya pilosissima ssp. *teretifolia*	100	100	0	5
Restio sp. (Briggs 7473 & Johnson)	100	0	0	1
Banksia tricuspis	90	64	0	72
Asterolasia drummondii	88	50	0	8
Stylidium aeonioides	83	17	16	6
Acacia forrestiana	80	40	0	5
Hakea neurophylla	80	20	0	10
Darwinia helichrysoides	78	11	0	9
Thysanotus vernalis	75	25	0	4
Eucalyptus suberea	73	27	0	11
Hypocalymma xanthopetalum var. nov. (C.A. Gardner 9096)	67	0	0	3
Thysanotus anceps	67	0	0	3
Xanthosia tomentosa	67	13	0	15
Hakea auriculata var. *spathulata*	66	33	0	3
Patersonia argyrea	66	33	0	3
Thysanotus sp. (E.A. Griffin 2511)	66	33	0	3
Acacia retrorsa	63	13	12	8
Hakea erinacea var. *longiflora*	63	13	12	8
Eucalyptus lateritica	62	23	0	13
Hakea megalosperma	54	36	10	11
Acacia aff. *myrtifolia* (R.J. Cranfield 33)	50	17	0	6
Daviesia sp. (M.D. Crisp 5429)	50	0	0	8
Daviesia epiphyllum	50	25	0	4
Goodenia xanthotricha	50	0	0	2
Grevillea acrobotrya ssp. *uniforma*	50	17	0	6
Tetratheca remota	50	0	0	2
Trymalium aff. *wichurae* (E.A. Griffin 2234)	50	25	0	4
Grevillea olivacea	44	0	44	9
Acacia plicata	43	29	0	7
Restionaceae Genus aff. *Ecdeiocolea* (E.A. Griffin 2157)	43	14	28	7
Daviesia sp. (M.D. Crisp 6213)	40	20	20	5
Haemodorum loratum	40	20	0	5
Hakea conchifolia	40	20	20	5
Restio sp. (Briggs 6293)	40	20	20	5
Strangea cynanchocarpa	39	13	9	23
Comesperma acerosum	38	13	12	8

cont'd ...

Taxon	A	B	C	D
Hemigenia curvifolia	38	13	0	8
Thelymitra variegata var. *apiculata*	38	25	0	8
Acacia volubilis	36	9	0	11
Darwinia sanguinea	36	5	18	22
Acacia epacantha	33	8	0	12
Banksia micrantha	33	6	18	33
Guichenotia sp. (E.A. Griffin 858)	33	0	16	6
Tricoryne sp. (E.A. Griffin 1451)	33	0	0	3
Conospermum crassinervum	32	0	16	19
Oxylobium reticulatum var. *gracile*	32	16	16	6
Diplolaena ferruginea	31	6	6	16
Macropidia fuliginosa	31	6	6	16
Petrophile inconspicua	31	4	17	23
Thelymitra stellata	30	30	0	10
Astroloma sp. (E.A. Griffin 1022)	28	14	14	7
Eucalyptus wandoo ssp. (M.I.H. Brooker 9885 & C. Souness)	27	9	0	11
Gastrolobium bidens	27	7	0	30
Hakea flabellifolia	27	9	27	11
Lepidobolus sp. (E.A. Griffin 2093)	27	9	0	11
Dasypogon obliquifolius	25	12	25	8
Loxocarya sp. (B. Briggs 7481)	25	0	0	4
Phlebocarya filifolia	23	8	23	13
Darwinia neildiana	21	3	15	39
Petrophile chrysantha	21	4	17	24
Astroloma microdonta	20	0	20	20
Stylidium inversiflorum	20	0	20	10
Walteranthus erectus	20	0	40	5
Astroloma sp. (N. Marchant s.n.)	17	0	0	6
Hensmania stoniella	17	0	0	6
Olax scalariformis	17	0	17	6
Conospermum nervosum	16	3	22	32
Allocasuarina grevilleoides	15	7	15	13
Dryandra tridentata	15	0	15	13
Isopogon adenanthoides	15	4	0	26
Dryandra sclerophylla	14	3	22	35
Dryandra tortifolia	14	14	14	7
Lasiopetalum drummondii	14	0	38	21
Lasiopetalum lineare	14	0	42	7
Alexgeorgea subterranea	13	0	13	15
Allocasuarina ramosissima	12	6	0	17
Conostylis aculeata ssp. *breviflora*	12	3	15	33
Banksia grossa	11	5	11	57
Banksia elegans	10	0	10	10
Conostylis angustifolia	10	0	0	20
Dryandra aff. *patens* (E.A.Griffin 1507)	9	9	18	22
Conostylis crassinervia ssp. *absens*	8	2	18	48
Cryptandra humilis	8	0	38	13
Eriostemon pinoides	8	0	15	13
Haemodorum venosum	8	0	8	13
Hybanthus aff. *floribundus* (E.A. Griffin s.n.)	8	0	10	12

cont'd ...

Taxon	A	B	C	D
Isopogon tridens	8	0	33	12
Phlebocarya pilosissima ssp. *pilosissima*	8	0	15	13
Beaufortia aff. *bracteosa* (E.A. Griffin 1176)	7	3	29	27
Beaufortia bicolor	7	7	28	14
Stylidium aff. *repens* (A.S. George 2341)	7	0	9	30
Stylidium maitlandianum	7	7	20	15
Banksia chamaephyton	6	6	19	31
Caladenia crebra	6	0	56	16
Conostylis canteriata	5	0	5	42
Conostylis crassinerva ssp. *crassinerva*	5	0	23	22
Conostylis neocymosa	5	0	5	20
Grevillea rudis	5	0	26	19
Dryandra nana	4	0	7	28
Darwinia speciosa	3	0	23	30
Dryandra aff. falcata (sp 9) (E.A. Griffin 3489)	2	2	20	50
Dryandra shuttleworthiana	2	1	8	118
Dryandra carlinoides	1	1	10	89
Verticordia grandis	*	*	*	*

current conservation resrves. These taxa, their total number of known mappable populations (at 1:1 000 000 scale) and the percentage of these populations on current conservation reserves are:

Species	Total number mappable pop.	% on cons. res.
Acacia retrorsa	8	12
Banksia tricuspis	12	0
Darwinia helichrysoides	9	0
Daviesia sp. (M.D. Crisp 6213)	5	20
Daviesia epiphyllum	4	0
Daviesia sp. * (M.D. Crisp 5429)	8	0
Dryandra sclerophylla	35	22
Eucalyptus aff. *haematoxylon*	7	0
Eucalyptus lateritica	13	7
Eucalyptus suberea	11	0
Genus nova aff. *Ecdeiocolea* E.A. Griffin 2157	7	28
Gompholobium aff. *polymorphum* (E.A. Griffin 2304)	3	0
Grevillea acrobotrya ssp. *uniforma*	6	0
Grevillea thelemanniana ssp. *delta*	2	0
Hakea erinacea var. *longiflora*	8	12
Hakea neurophylla	10	0
Hypocalymma aff. *ericifolium*	2	0
Leucopogon plumuliflorus	6	0
Patersonia argyrea	3	0
Persoonia rudis	3	0
Phlebocarys pilosissima ssp. *teretifolia*	5	0
Stylidium aeonioides	6	16
Tetratheca remota	2	0
Thysanotus aff. *sparteus*	3	0
Thysanotus vernalis	4	0
Xanthosia tomentosa	15	0

Eight taxa have been found only in the eastern upland area. These taxa, their total number of known populations and the per cent on existing conservation reserves are:

Banksia chamaephyton - 31, 19%
Beaufortia bicolor - 14, 28%
Dryandra aff. *falcata* (E.A. Griffin 3459) - 50, 20%
Dryandra aff. *patens* (E.A. Griffin 1507)- 22, 18%
Dryandra carlinoides - 89, 10%
Dryandra tortifolia - 7, 14%
Phlebocarya pilosissima ssp. *pilosissima* - 13, 15%
Stylidium maitlandianum - 15, 20%

All are represented elsewhere on conservation reserves, although *Dryandra* aff. *patens* (E.A. Griffin 1507) only sparingly.

From mainly Herbarium information an attempt was made to identify in which of three broad physiographic units within Lesueur the regional endemics occurred (i.e coastal (Quindalup, Spearwood and Bassendean landforms), western uplands (Peron Slopes, Lesueur Dissected Uplands and Gairdner Dissected Uplands) and eastern uplands (Banovich Uplands and Bitter Pool Rises). Very few (4) of the species occurred in the coastal areas (Appendix 2). Most (65) occurred in both the western and the eastern uplands. A significant number (42) occurred in only one or other of the uplands (34 in the western uplands, 8 in the eastern uplands).

5.8 DECLARED RARE FLORA

There are 32 taxa of Declared Rare Flora (DRF) in the northern kwongan, seven (22%) of which are known to occur in the Lesueur Area (Figure 5.8; Table 5.7). The Lesueur - Eneabba area contains the greatest concentration of declared taxa in the region (Figure 5.4).

The number of known DRF in the Lesueur Area is likely to rise given that 54 additional taxa in the area are on CALM's Reserve List for urgent further survey to assess their need for declaration.

The seven Lesueur species of DRF vary from large conspicuous shrubs (*Banksia tricuspis, Eucalyptus lateritica, E. suberea*) through small shrubs (*Hakea megalosperma, Acacia forrestiana*) to a shrublet (*Asterolasia drummondii*) and a sun orchid (*Thelymitra stellata*). The latter two are only conspicuous during their brief flowering seasons.

The Lesueur Area contains 97% of the known individuals of *Banksia tricuspis*, 90% of *Hakea megalosperma*, 89% of *Acacia forrestiana*, 68% of *Eucalyptus suberea*, 62% of *Eucalyptus lateritica*, 53% of *Asterolasia drummondii* and 22% of *Thelymitra stellata* (Table 5.7). On average 43% of the total number of known individuals, and 67% of the individuals within the Lesueur Area occur in the eastern uplands (i.e. in the Gairdner Dissected Uplands, Banovich Uplands and the Bitter Pool Rises).

No populations of *Banksia tricuspis*, *Acacia forrestiana, Eucalyptus suberea, E. lateritica* and *Thelymitra stellata* are known on secure conservation reserves at present, and only small populations of *Asterolasia drummondii* and *Hakea megalosperma* occur on nature reserves elsewhere. The declaration of the Lesueur Area as a conservation reserve is therefore essential to afford protection to these species of DRF.

A study of isozyme variation in *Eucalyptus lateritica* and *E. suberea* (Moran and Hopper 1987) showed that both had an unusually high proportion of localised alleles for eucalypts. Also, *E. lateritica* had greater average variation within populations than *E. suberea*, and both rare species showed relatively little divergence between populations (i.e. 13% of the total genetic variation sampled for both species). Further study of these taxa is needed, as only two populations of *E. lateritica* and three of *E. suberea* were investigated. Indeed, with the exception of *Banksia tricuspis* (see Chapter 7), the genetics, population biology and recruitment of all of Lesueur's DRF have yet to be investigated in detail. This will be essential for future management of these threatened taxa.

5.9 POORLY KNOWN TAXA AND OTHER PLANTS ON CALM'S RESERVE LIST

There are 155 northern kwongan taxa currently on CALM's Reserve List, and 58 (37%) have been recorded in the Lesueur Area (Table 5.8). Of the 58, 20 are Priority 1 species in urgent need of further survey, and 16 of these are very geographically restricted with a known range of less than 50 km.

Sixteen of the 58 in the Lesueur Area are Priority 2, while 18 are Priority 3. One (*Platysace dissecta*) is presumed extinct, and six have been adequately surveyed and appear secure but require monitoring to ensure that they do not become threatened (i.e. *Eucalyptus exilis, Grevillea olivacea, Hakea neurophylla, Macropidia fuliginosa, Stylidium inversiflorum* and *Thelymitra variegata* var. *apiculata*).

On the basis of the narrowness of their geographic range, the number of known populations and reservation status, a priority order for urgent further survey has been developed for 48 of the 58 taxa on the reserve list that occur in the Lesueur Area (Table 5.9). Mapping of these plants is considered the top priority for future work aimed at documenting the flora conservation values of the Lesueur Area.

5.10 SPECIES AT THEIR NORTHERN OR SOUTHERN LIMIT

Populations at the limits of a species' range are often subjected to unusual selective pressures in marginal habitats. They may, as a consequence, diverge genetically from mainstream populations. For example, Moran and Hopper (1987, unpublished) found that the isolated populations of jarrah in the Lesueur Area were distinct in their isozyme frequencies from a northern forest stand. Brooker and Hopper (unpublished) found that seedlings from Lesueur were slower growing than forest seedlings. It is well known that jarrah at Lesueur is a stunted mallee unlike the forest tree from further south. Thus, jarrah populations at Lesueur are

Table 5.7

Number of Declared Rare Flora populations and individuals in the Lesueur Area.

	Total		In Lesueur Area	
	No. Pop	No. Plants	No. Pop	No. Plants
Acacia forrestiana				
number	5	920	4	820
% total populations	-	-	80.0	89.1
Asterolasia drummondii				
number	11	3213	9	1713
% total populations	-	-	81.5	53.3
Banksia tricuspis				
number	72	19031	65	18940
% total populations	-	-	90.3	97.2
Eucalyptus lateritica				
number	13	260	8	160
% total populations	-	-	61.5	61.5
Eucalyptus suberea				
number	11	220	8	150
% total populations	-	-	72.7	68.2
Hakea megalosperma				
number	11	1274	6	1150
% total populations	-	-	54.5	90.3
Thelymitra stellata				
number	11	51	4	11
% total populations	-	-	36.4	21.5
MEAN				
% TOTAL POPULATIONS	-	-	68.1	68.7
(±SE)			17.1	24.5

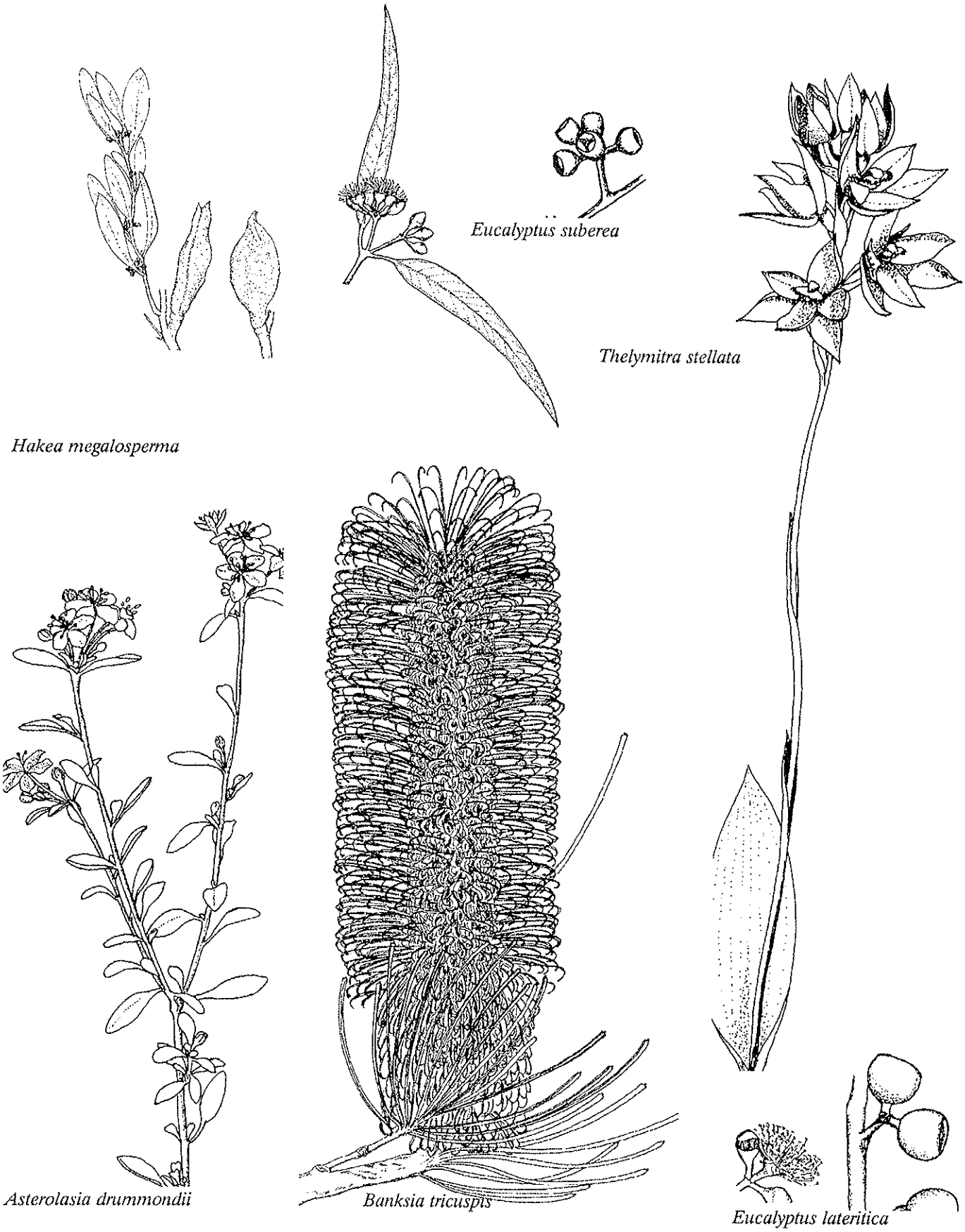


Figure 5.8.
Six of the seven species of Declared Rare Flora found in the Lesueur Area. *Acacia forrestiana* is not illustrated.
(Drawn by Susan Patrick)

Table 5.8
Regional endemic taxa in the proposed Lesueur National Park and the northern kwongan as a whole giving total numbers within different geographical range classes for taxa of Declared Rare Flora, taxa listed on CALM's Reserve Flora List (priorities 1-5) or for taxa not so listed.

Taxon Code	In Proposed National Park maximum geographical range			Total*	
	<50km	50-160km	>160km	LNP	IDB
Declared Rare Flora	3	3	1	7	32
CALM reserve list priorities					
1	16	2	2	20	63
2	7	9	0	16	50
3	3	11	4	18	32
4	0	0	0	0	1
5	4	1	1	6	9
Not on DRF or Reserve Lists	2	35	7	44	72

*LNP - proposed Lesueur National Park

- IBD Irwin Botanical District

genetically differentiated from forest stands in a number of attributes, and may be important in the future if breeding of this major timber tree is required to enhance disease resistance or other qualities.

In this context, Lesueur is of special conservation significance as an exceptionally high number of plants reach their northern or southern limit in the area. Griffin and Hopkins (1985a) reported 25 species at the northern limit of their distribution at Mt Lesueur. It is now known that the area contains a much larger number of these species (81, Appendix 1). This represents about 10% of the total known flora of the Lesueur Area.

Species at the northern limit of a continuous distribution are from a wide range of families: *Actinostrobus pyramidalis* (Cupressaceae), *Thysanotus glaucus* (Liliaceae *sens. lat.*), *Banksia grandis* (Proteaceae) and *Daviesia longifolia* (Papilionaceae), to mention a few. There are many species which have disjunct distributions with the nearest populations outside the Lesueur Area 50 km or more away (Table 5.10). Disjunct species also are from a wide range of families and genera and include *Thysanotus anceps, Isopogon asper, Acacia obovata, Chorizema ilicifolium, Boronia crassifolium, Eucalyptus marginata, E. exilis, Polypompholyx multifida, Goodenia fasciculata, Stylidium pycnostachyum*, and *Trichocline spathulata*.

Only two of the species at their northern limit are confined to the coastal plain (*Logania vaginalis* and *Leucopogon australis*). Most occur in the Arrowsmith Region of the Lesueur Area in both the western uplands (Peron Slopes, Lesueur Dissected Uplands and Gairdner Dissected Uplands) and eastern uplands (Banovich Uplands and Bitter Pool Rises). Slightly more of these species were found in the western than in the eastern uplands. Both had significant numbers of species present in only one or the other (28 only in the western and 10 only in the eastern uplands).

Although it was not possible to compile a breakdown of their distribution by vegetation types, species at their northern and southern limit clearly are represented in a variety of types including lateritic uplands (*Boronia crassifolia* and *Acacia drummondii*), sandy soils (*Dasypogon obliquifolius* and *Olearia*

Table 5.9

Priorities for urgent further survey of poorly known plants recorded within the Lesueur Area.

Taxon	No. of known populations	CALM Reserve list code
VERY GEOGRAPHICALLY RESTRICTED (<50 km)		
Restio sp. (Briggs 7473 & Johnson)	1	1
Andersonia longifolia	2	1
Goodenia xanthotricha	2	1
Grevillea thelemanniana ssp. *delta*	2	1
Hypocalymma aff. *ericifolium* (E.A. Griffin 1972)	2	1
Gompholobium aff. *polymorphum* (E.A. Griffin 2306)	3	1
Patersonia argyrea	3	1
Persoonia rudis	3	1
Tetratheca remota	3	1
Phlebocarya pilosissima ssp. *teretifolia*	5	1
Leucopogon plumuliflorus	6	1
Eucalyptus aff. *haematoxylon* (E.A. Griffin 2481)	7	1
Daviesia sp. (M.D. Crisp 5429)	8	1
Hakea erinacea var. *longiflora*	8	1
Darwinia helichrysoides	9	1
Xanthosia tomentosa	15	1
Hypocalymma xanthopetalum var. nov. (C.A. Gardner 9096)	3	2
Thysanotus sp. (E.A. Griffin 2511)	3	2
Thysanotus vernalis	4	2
Daviesia sp. (M.D. Crisp 6213)	5	2
Grevillea acrobotrya ssp. *uniforma*	6	2
Stylidium aeonioides	6	2
Acacia retrorsa	8	2
Daviesia epiphyllum	4	3
Walteranthus erectus	5	3
Restionaceae Genus aff. *Ecdeiocolea* (E.A. Griffin 2157)	7	3
GEOGRAPHICALLY RESTRICTED (50-160 km)		
Hakea auriculata var. *spathulata*	3	1
Hemigenia curvifolia	8	1
Tricoryne sp. (J.S. Beard 1901)	3	2
Loxocarya sp. (B. Briggs 7481)	4	2
Acacia aff. *myrtifolia* (R.J. Cranfield 33)	6	2
Astroloma sp. (N. Marchant s.n.)	6	2
Guichenotia sp. (E.A. Griffin 858)	6	2
Hensmannia stoniella	6	2
Oxylobium reticulatum var. *gracile*	6	2
Acacia plicata	7	2
Astroloma sp. (E.A. Griffin 1022)	7	2

cont'd ...

Taxon	No. of known populations	CALM reserve list code
Dryandra tortifolia	7	3
Lasiopetalum lineare	7	3
Comesperma acerosum	8	3
Acacia volubilis	11	3
Lepidobolus sp. (E.A. Griffin 2093)	11	3
Isopogon tridens	12	3
Allocasuarina grevilleoides	13	3
Phlebocarya filifolia	13	3
Phlebocarya pilosissima ssp. *pilosissima*	13	3
Beaufortia bicolor	14	3
Stylidium maitlandianum	15	3

paucidentata), wandoo woodlands (*Trymalium floribundum* and *Chorizema ilicifolium*), clayey soils (*Drosera microphylla* and *Utricularia menziesii*), and drainage lines (*Banksia littoralis* and *Hakea varia*). An interesting feature is that they represent a range of lifeforms from annuals, geophytes, shrubs and trees.

Only five species are at their southern limit and none of these is considered to be disjunct. Most of these occur in the coastal units.

Because of the presence at Lesueur of many species at their northern limit, especially disjunct species such as jarrah, Hopkins *et al.* (1983) highlighted the value of the Lesueur Area as a refugium. Jarrah, for example, occurs in relatively favourable sites (south facing slopes) and does not survive in more exposed areas. Churchill (1968) proposed that jarrah had a much wider distribution in the past when the climate was wetter. For such species the Lesueur Area has important evolutionary significance. An understanding of the habitat requirements of such species will better equip managers to plan for, and perhaps even counter, any adverse impacts on the conservation of plant species in southwestern Australia that might result from climatic changes associated with predicted global warming.

5.11 RELICTUAL SPECIES

Griffin and Hopkins (1985) noted a number of species at Mt Lesueur which appear to have no close relatives and may be relicts from past periods when the Lesueur Area had a more mesic climate. These included local endemics (*Darwinia sanguinea, Hakea megalosperma, Hakea neurophylla*), species with disjunct distributions (*Hakea marginata, Isopogon sphaerocephalus*) and others (*Isopogon linearis*). Very little of this type of assessment has been done and undoubtedly many more species could be similarly classified.

As a carefully studied example, Brooker and Hopper (1986) recently described Cork Mallee (*Eucalyptus suberea*) and noted it had no close relatives. Subsequently, Ladiges *et al.* (1987) established that in a cladistic analysis, *E. suberea* was indeed an isolated taxon that presumably arose early in the evolution of the Western Australian monocalypt eucalypts (well before jarrah and its allies and before common distinctive mallees such as *E. preissiana, E. sepulcralis, E. pendens, E. johnsoniana, E. todtiana, E. lateritica, E. buprestium* and *E. insularis*). The taxonomic distinctiveness of *E. suberea* was formally recognized when Chippendale (1988) named the new monotypic series *Eucalyptus* ser. *Subereae*.

Ladiges *et al.* (1987) argued for a Tertiary origin for species such as *E. suberea*. If correct, the species may well have been around when much of south-western Australia was covered by subtropical rainforest (Hopper 1979). It has persisted at Lesueur presumably because a somewhat mesic refugium was provided in the breakaway upland systems as the region became progressively drier during the late Tertiary and Quaternary. During this long persistence, populations of *E. suberea* appear to have declined in genetic variation relative to that seen in much younger species such as *E. lateritica* (Moran and Hopper 1987).

Studies of this kind will no doubt reveal many more aspects to the evolutionary history of the flora of the Lesueur Area, and reinforce its value as a future refugium for species from more mesic climates and times.

5.12 CHROMOSOME STUDIES

The Lesueur Area features prominently in the most comprehensive survey of chromosome variation completed on a northern kwongan plant, that of Coates and James (1979) and Coates (1980) on *Stylidium crossocephalum*. Cockleshell Gully constituted a barrier to different localised chromosome races (D and E) to the north and south along the Peron Slopes and Coastal Plain (Figure 5.9). The dissected uplands of Lesueur constituted another barrier, isolating race C to the east from Cockleshell races D and E. Moreover, the distribution of micro B chromosomes also responded to these barriers (Coates 1980).

A complex evolution of chromosome races is thus evident within the confines of the Lesueur Area in this species. This striking example highlights another aspect of the richness of the flora, at the genetic level within morphologically defined species. Clearly, it would be unwise to assume that different populations of the same morpho-species in the Lesueur Area have the same genetic, evolutionary and ecological attributes. Careful studies like that on *Stylidium crossocephalum* are needed to resolve genetic variation within species. This is an essential prerequisite in certain groups if genetic management, relocation, and revegetation are required for endangered populations (Hopper and Coates 1989).

Table 5.10
Statistics on the distribution within the Lesueur Area of taxa at their Northern and Southern Limits.

Distribution	Northern Limit		Southern Limit	Total
Code	Continuous	Disjunct	Continuous	
1	2	0	4	6
2	14	13	1	28
3	6	4	0	10
2 and 3	21	16	0	35
Total	43	33	5	81

Distribution codes:

1 Coastal

2 Central Uplands Peron Slopes
Lesueur Dissected Uplands
Gairdner Dissected Uplands

3 Eastern Uplands Banovich Uplands
Bitter Pool Rises

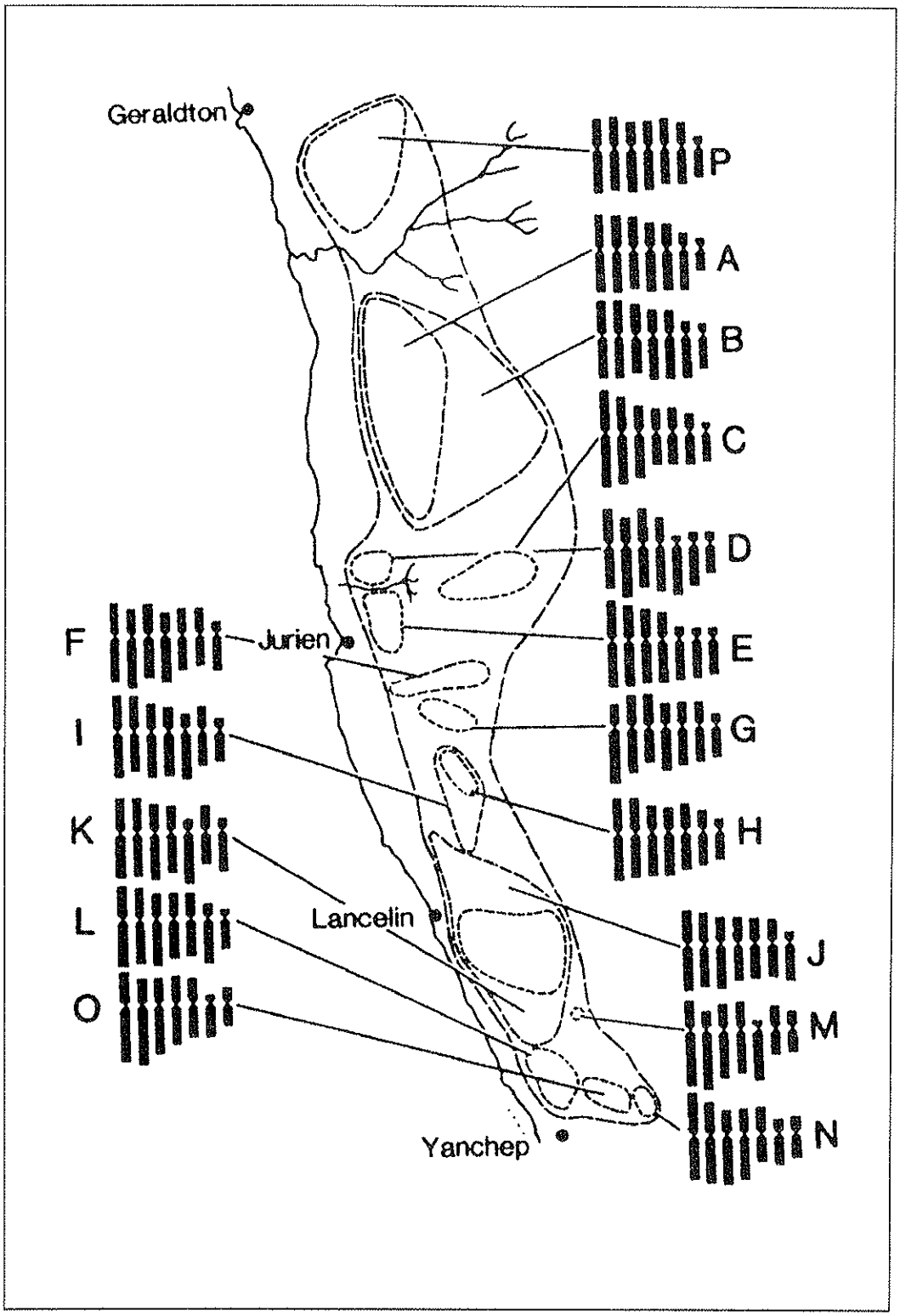


Figure 5.9
Chromosome races in *Stylidium crossocephalum* (from Coates and James 1979).

15.1 APPENDIX 1

List of the vascular flora of the Lesueur Area.

Column A: Plant family code as given in Green (1985).

Column B: Conservation coding, (1 to 5) CALM's reserve list priorities as outlined in text, (6) Declared Rare Flora.

Column C: Geographic limits of taxa for which the Lesueur Area represents, (1) the northern limit of their geographic range; (2) the northern limit and disjunct populations; (3) the southern limit of their geographic ranges.

Column D: Taxa which are regarded with confidence as being new and as yet undescribed.

Taxa: Taxon name and authority, introduced species indicated by (*).

A	B	C	D	TAXA
163	.	.	.	*Acacia alata* R.Br. var. *alata*
163	.	.	.	*Acacia auronitens* Lindley
163	.	.	.	*Acacia blakelyi* Maiden
163	.	.	.	*Acacia dilatata* Benth.
163	.	1	.	*Acacia drummondii* Lindley
163	.	.	.	*Acacia epacantha* (Maslin)Maslin
163	.	.	.	*Acacia ericifolia* Benth.
163	6	.	.	*Acacia forrestiana* E.Pritzel
163	.	.	.	*Acacia idiomorpha* Cunn. ex Benth.
163	.	.	.	*Acacia incrassata* Hook.
163	.	.	.	*Acacia lasiocarpa* Benth. var. *lasiocarpa*
163	.	.	.	*Acacia latipes* Benth.
163	.	1	.	*Acacia moirii* E.Pritzel ssp. *recurvistipula* Maslin
163	.	.	.	*Acacia multispicata* Benth.
163	2	.	1	*Acacia* aff. *myrtifolia* Benth. (R.J. Cranfield 33)
163	.	2	.	*Acacia obovata* Benth.
163	2	.	.	*Acacia plicata* Maslin
163	.	.	.	*Acacia pulchella* R.Br. var. *glaberrima* Meissner
163	.	.	.	*Acacia pulchella* R.Br. var. *pulchella*
163	.	.	.	*Acacia quadrisulcata* F.Muell.
163	2	.	.	*Acacia retrorsa* Meissner
163	.	.	.	*Acacia rostellifera* Benth.
163	.	.	.	*Acacia saligna* (Labill.)H.L.Wendl.
163	.	.	.	*Acacia sessilis* Benth.
163	.	.	.	*Acacia signata* F.Muell.
163	.	.	.	*Acacia spathulifolia* Maslin
163	.	.	.	*Acacia sphacelata* Benth.
163	.	1	.	*Acacia squamata* Lindley
163	.	.	.	*Acacia stenoptera* Benth.
163	.	2	.	*Acacia teretifolia* Benth.
163	.	.	.	*Acacia truncata* (Burm.f.)Hort.ex.Hoffsgg.
163	3	1	.	*Acacia volubilis* F.Muell.
163	.	.	.	*Acacia xanthina* Benth.

cont'd ...

A	B	C	D	TAXA
54C	.	.	.	*Acanthocarpus canaliculatus* George
54C	.	.	.	*Acanthocarpus preissii* Lehm.
18	.	.	.	*Actinostrobus acuminatus* Parl.
18	.	1	.	*Actinostrobus pyramidalis* Miq.
281	.	.	.	*Actinotus leucocephalus* Benth.
90	.	.	.	*Adenanthos cygnorum* Diels
31	.	.	.	**Aira cupaniana* Guss.
39	.	.	.	*Alexgeorgea nitens* (Nees)L.Johnson & B.Briggs
39	.	.	.	*Alexgeorgea subterranea* Carlq.
70	.	.	.	*Allocasuarina campestris* (Diels)L.Johnson
70	3	.	.	*Allocasuarina grevilleoides* (Diels)L.Johnson
70	.	.	.	*Allocasuarina humilis* (Otto & Dietr.)L.Johnson
70	.	.	.	*Allocasuarina microstachya* (Miq.)L.Johnson
70	.	.	.	*Allocasuarina ramosissima* (C.Gardner)L.Johnson
70	.	.	.	*Allocasuarina thuyoides* (Miq.)L.Johnson
221	.	.	.	*Alyogyne hakeifolia* (Giord.)Alef.
221	.	.	.	*Alyogyne huegelii* (Endl.)Fryx. var. *wrayae* A.S.Mitchell
31	.	.	.	*Amphipogon debilis* R.Br.
31	.	.	.	*Amphipogon turbinatus* R.Br.
97	.	.	.	*Amyema miquelii* (Lehm.ex Miq.)Tieghem
293	.	.	.	**Anagallis arvensis* L. var. *caerulea* Gouan
39	.	1	.	*Anarthria gracilis* R.Br.
288	.	.	.	*Andersonia heterophylla* Sonder
288	.	.	.	*Andersonia lehmanniana* Sonder
288	1	.	.	*Andersonia longifolia* (Benth.) L.Watson
55	.	.	.	*Anigozanthos humilis* Lindley ssp. *humilis*
55	.	.	.	*Anigozanthos manglesii* D.Don ssp. *quadrans* Hopper
55	.	.	.	*Anigozanthos pulcherrimus* Hook.
315	.	.	.	*Anthocercis littorea* Labill.
155	.	.	.	*Aphanopetalum clematideum* (J.Drumm.& Harvey)Domin
40	.	.	.	*Aphelia brizula* F.Muell.
40	.	.	.	*Aphelia cyperoides* R.Br.
345	.	.	.	**Arctotheca calendula* (L.)Levyns
54F	.	1	.	*Arnocrinum preissii* Lehm.ex Endl.
345	.	.	.	*Asteridea pulverulenta* Lindley
175	6	.	.	*Asterolasia drummondii* Paul G.Wilson
288	.	2	.	*Astroloma ciliatum* (Lindley)Druce
288	.	.	.	*Astroloma glaucescens* Sonder
288	3	.	.	*Astroloma microdonta* F.Muell. ex Benth.
288	.	.	.	*Astroloma pallidum* R.Br.
288	2	.	1	*Astroloma* aff. *pallidum* R. Br. (E.A.Griffin 1022)
288	.	.	.	*Astroloma serratifolium* (DC.)Druce var. *horridulum* (Pritzel)Druce
288	2	.	.	*Astroloma* aff. *serratifolium* (DC.) Druce (N.G. Marchants s.n.)
288	.	.	.	*Astroloma stomarrhena* Sonder
288	.	.	.	*Astroloma xerophyllum* (DC.)Sonder
273	.	.	.	*Baeckea camphorosmae* Endl.
273	.	.	.	*Baeckea crispiflora* F.Muell.
273	.	.	.	*Baeckea grandiflora* Benth.
90	.	.	.	*Banksia attenuata* R.Br.
90	.	.	.	*Banksia candolleana* Meissner
90	.	.	.	*Banksia chamaephyton* George
90	.	.	.	*Banksia elegans* Meissner
90	.	1	.	*Banksia grandis* Willd.

cont'd ...

A	B	C	D	TAXA
90	.	.	.	*Banksia grossa* George
90	.	1	.	*Banksia ilicifolia* R.Br.
90	.	.	.	*Banksia leptophylla* George
90	.	1	.	*Banksia littoralis* R.Br.
90	.	.	.	*Banksia menziesii* R.Br.
90	.	.	.	*Banksia micrantha* George
90	.	.	.	*Banksia prionotes* Lindley
90	6	.	.	*Banksia tricuspis* Meissner
32	.	.	.	*Baumea juncea* (R.Br.)Palla
32	.	1	.	*Baumea preissii* Nees
273	3	.	.	*Beaufortia bicolor* Strid
273	.	.	1	*Beaufortia* aff. *bracteosa* Diels (E.A.Griffin 1176)
273	.	.	.	*Beaufortia elegans* Schauer
316	.	.	.	**Bellardia trixago* (L.)All.
185	.	.	.	*Beyeria similis* (Muell.arg.)Benth.
152	.	.	.	*Billardiera bicolor* (Putterl.)E.M.Bennett
152	.	2	.	*Billardiera coeruleo-punctata* (Klotzsch)E.M.Bennett
55	.	.	.	*Blancoa canescens* Lindley
175	.	.	.	*Boronia coerulescens* F.Muell.
175	.	2	.	*Boronia crassifolia* Bartling
175	.	.	.	*Boronia cymosa* Endl.
175	.	.	.	*Boronia ramosa* (Lindley)Benth. ssp. *anaethifolia* (Bartling)Paul G.Wilson
175	.	.	.	*Boronia scabra* Lindley
54F	.	.	.	*Borya sphaerocephala* R.Br.
165	.	.	.	*Bossiaea eriocarpa* Benth.
165	.	2	.	*Bossiaea peduncularis* Turcz.
31	.	.	.	**Briza maxima* L.
31	.	.	.	**Briza minor* L.
54J	.	1	.	*Burchardia bairdiae* Keighery
54J	.	.	.	*Burchardia umbellata* R.Br.
165	.	.	.	*Burtonia conferta* DC.
54F	.	.	.	*Caesia micrantha* Lindley
66	.	.	.	*Caladenia bicalliata* Rogers
66	.	.	.	*Caladenia crebra* George
66	.	.	1	*Caladenia deformis* (R.Br.)
66	.	.	.	*Caladenia denticulata* Lindley ssp. *denticulata*
66	.	.	.	*Caladenia discoidea* Lindley
66	.	.	.	*Caladenia flava* R.Br. ssp. *flava*
66	.	.	1	*Caladenia gemmata* (Lindley)
66	.	1	.	*Caladenia hirta* Lindley ssp. *hirta*
66	.	.	.	*Caladenia latifolia* R.Br.
66	.	.	.	*Caladenia longicauda* Lindley ssp. *calcigena* Hopper ined.
66	.	.	.	*Caladenia longicauda* Lindley ssp. *elassa* Hopper ined.
66	.	.	.	*Caladenia longicauda* x aff. *huegelii*
66	.	1	.	*Caladenia marginata* Lindley
66	.	.	.	*Caladenia reptans* Lindley
66	.	.	1	*Caladenia* sp. (A.P. Brown 198 & S. van Leeuwen)
66	.	1	1	*Caladenia* sp. (S. van Leeuwen 99)
66	.	.	1	*Caladenia* sp. (A.P. Brown 197 & S. van Leeuwen)
111	.	.	.	*Calandrinia calyptrata* J.D.Hook.
54C	.	.	.	*Calectasia cyanea* R.Br.
273	.	3	.	*Calothamnus blepharospermus* F.Muell.

cont'd ...

A	B	C	D	TAXA
273	.	.	.	*Calothamnus hirsutus* T.J.Hawkeswood
273	.	.	.	*Calothamnus quadrifidus* R.Br.
273	.	.	.	*Calothamnus sanguineus* Labill.
273	.	.	.	*Calothamnus torulosus* Schauer
345	.	.	.	*Calotis erinacea* Steetz
273	.	.	.	*Calythropsis* sp. indet. (E.A.Griffin 2224)
273	.	.	.	*Calytrix* aff. *tenuifolia* (Meissner)Benth (E.A.Griffin s.n.)
273	.	.	.	*Calytrix aurea* Lindley
273	.	.	.	*Calytrix flavescens* Cunn.
273	.	.	.	*Calytrix fraseri* Cunn.
273	.	.	.	*Calytrix leschenaultii* (Schauer)Benth.
273	.	.	.	*Calytrix oldfieldii* Benth.
273	.	.	.	*Calytrix sapphirina* Lindley
131	.	.	.	*Cassytha flava* Nees
131	.	.	.	*Cassytha glabella* R.Br.
131	.	.	.	*Cassytha pomiformis* Nees
131	.	.	.	*Cassytha racemosa* Nees
70	.	.	.	*Casuarina obesa* Miq.
32	.	.	.	*Caustis dioica* R.Br.
32	.	.	1	*Caustis* sp. (A.S.George 9318)
345	.	.	.	**Centaurea melitensis* L.
303	.	.	.	**Centaurium erythraea* Rafn.
40	.	.	.	*Centrolepis aristata* (R.Br.)Roemer & Schultes
40	.	.	.	*Centrolepis drummondiana* (Nees)Walp.
40	.	.	.	*Centrolepis inconspicua* W.Fitzg.
54F	.	.	.	*Chamaescilla corymbosa* (R.Br.)F.Muell.ex Benth.
273	.	.	.	*Chamelaucium uncinatum* Schauer
7	.	.	.	*Cheilanthes austrotenuifolia* H.Quirk & T.C.Chambers
165	.	2	.	*Chorizema ilicifolium* Labill.
345	.	.	.	*Chrysocoryne pusilla* (Benth.)Endl.
119	.	.	.	*Clematis pubescens* Huegel ex Endl.
183	3	.	.	*Comesperma acerosum* Steetz
183	.	.	.	*Comesperma calymega* Labill.
183	.	1	.	*Comesperma ciliatum* Steetz
183	.	.	.	*Comesperma drummondii* Steetz
183	.	.	.	*Comesperma scoparium* Steetz
223	.	.	.	*Commersonia pulchella* Turcz.
90	.	.	.	*Conospermum crassinervium* Meissner
90	.	.	.	*Conospermum glumaceum* Lindley
90	.	.	.	*Conospermum nervosum* Meissner
90	.	.	.	*Conospermum stoechadis* Endl.
90	.	.	1	*Conospermum* aff. *triplinervium* R.Br. (E.A.Griffin 5262)
288	.	.	.	*Conostephium pendulum* Benth.
288	.	.	.	*Conostephium preissii* Sonder
55	.	.	.	*Conostylis aculeata* R.Br. ssp. *breviflora* Hopper
55	.	.	.	*Conostylis androstemma* F.Muell.
55	.	.	.	*Conostylis angustifolia* Hopper
55	.	.	.	*Conostylis aurea* Lindley
55	.	.	.	*Conostylis candicans* Endl. ssp. *candicans*
55	.	.	.	*Conostylis canteriata* Hopper
55	.	.	.	*Conostylis crassinerva* J.W.Green ssp. *absens* Hopper
55	.	.	.	*Conostylis crassinerva* J.W.Green ssp. *crassinerva*
55	.	.	.	*Conostylis latens* Hopper

cont'd ...

A	B	C	D	TAXA
55	.	.	.	*Conostylis neocymosa* Hopper
55	.	.	.	*Conostylis teretifolia* J.W.Green ssp. *teretifolia*
55	.	.	.	*Conostylis teretiuscula* F.Muell.
273	.	.	.	*Conothamnus trinervis* Lindley
54F	.	.	.	*Corynotheca micrantha* (Lindley)J.F.Macbr.
345	.	.	.	*Cotula coronopifolia* L.
345	.	.	.	*Craspedia glauca* (Labill.)Spreng.
149	.	.	.	*Crassula colorata* (Nees)Ostenf.
149	.	.	.	*Crassula peduncularis* (Smith)Meigen
215	.	.	.	*Cryptandra arbutiflora* Fenzl
215	.	.	.	*Cryptandra glabriflora* Benth.
215	.	.	.	*Cryptandra humilis* (Benth.)F.Muell.
215	.	.	.	*Cryptandra leucophracta* Schldl.
215	.	.	.	*Cryptandra pungens* Steudel
307A	.	.	.	*Cuscuta australis* R.Br.
32	.	.	.	*Cyathochaeta avenacea* Benth.
66	.	.	.	*Cyrtostylis huegelii* Endl.
341	.	.	.	*Dampiera alata* Lindley
341	.	.	.	*Dampiera carinata* Benth.
341	.	.	.	*Dampiera cuneata* R.Br.
341	.	.	.	*Dampiera lavandulacea* Lindley
341	.	.	.	*Dampiera lindleyi* Vreise
341	.	.	.	*Dampiera oligophylla* Benth. var. *juncea* (Benth.) Rajput & Carolin
341	.	.	.	*Dampiera spicigera* Benth.
341	.	.	.	*Dampiera teres* Lindley
31	.	.	.	*Danthonia caespitosa* Gaudich.
273	1	.	.	*Darwinia helichrysoides* (Meissner)Benth.
273	1	.	.	*Darwinia helichrysoides* x *neildiana*
273	1	.	.	*Darwinia helichrysoides* x *sanguinea*
273	.	.	.	*Darwinia neildiana* F.Muell.
273	1	.	.	*Darwinia neildiana* x *sanguinea*
273	.	.	.	*Darwinia pauciflora* Benth.
273	5	.	.	*Darwinia sanguinea* (Meissner)Benth.
273	.	.	.	*Darwinia speciosa* (Meissner)Benth.
54C	.	1	.	*Dasypogon obliquifolius* Lehm.ex Nees
281	.	.	.	*Daucus glochidiatus* (Labill.)Fischer *et al.*
165	.	.	.	*Daviesia benthamii* Meissner
165	.	.	.	*Daviesia daphnoides* Meissner
165	.	.	.	*Daviesia decurrens* Meissner
165	.	.	.	*Daviesia divaricata* Benth.
165	3	.	.	*Daviesia epiphyllum* Meissner
165	.	.	.	*Daviesia incrassata* Smith
165	.	1	.	*Daviesia longifolia* Benth.
165	.	.	.	*Daviesia nudiflora* Meissner
165	.	.	.	*Daviesia pedunculata* Benth.
165	.	.	.	*Daviesia preissii* Meissner
165	.	.	.	*Daviesia quadrilatera* Benth.
165	2	.	1	*Daviesia* aff *striata* (M.D.Crisp 6213)
165	.	.	.	*Daviesia triflora* M.D.Crisp
165	1	.	1	*Daviesia* sp. (M.D.Crisp 5429)
54E	.	.	.	*Dianella revoluta* R.Br.
31	.	.	.	*Dichelachne crinata* (L.f.)J.D.Hook.
54F	.	.	.	*Dichopogon capillipes* (Endl.)Brittan

cont'd ...

A	B	C	D	TAXA
54F	.	.	.	*Dichopogon preissii* (Endl.)Brittan
54F	.	.	.	*Dichopogon* sp. (E.A.Griffin s.n.)
59	.	.	.	*Dioscorea hastifolia* Endl.
175	.	.	.	*Diplolaena angustifolia* Hook.
175	3	.	.	*Diplolaena ferruginea* Paul G.Wilson
175	.	.	.	*Diplolaena microcephala* Bartling var. *microcephala*
207	.	.	.	*Diplopeltis huegelii* Endl.
345	.	.	.	**Dittrichia graveolens* (L.)Greuter
66	.	.	.	*Diuris laxiflora* Lindley
66	.	.	.	*Diuris longifolia* R.Br.
66	.	.	.	*Diuris setacea* R.Br.
207	.	.	.	*Dodonaea ericoides* Miq.
143	.	.	.	*Drosera barbigera* Planchon
143	.	.	.	*Drosera erythrorrhiza* Lindley
143	.	.	.	*Drosera gigantea* Lindley
143	.	.	.	*Drosera glanduligera* Lehm.
143	.	.	.	*Drosera heterophylla* Lindley
143	.	.	.	*Drosera leucoblasta* Benth.
143	.	.	.	*Drosera macrantha* Endl.
143	.	.	.	*Drosera menziesii* R.Br. ssp. *menziesii*
143	.	.	.	*Drosera menziesii* R.Br. ssp. *thysanosepala* (Diels)N.Marchant
143	.	2	.	*Drosera microphylla* Endl.
143	.	.	.	*Drosera pallida* Lindley
143	.	.	.	*Drosera stolonifera* Endl. ssp. *humilis* (Planch.)N.Marchant
90	.	.	.	*Dryandra armata* R.Br.
90	.	.	.	*Dryandra bipinnatifida* R.Br.
90	.	.	.	*Dryandra carlinoides* Meissner
90	.	.	1	*Dryandra* aff. *falcata* R.Br. (E.A.Griffin 3489)
90	.	.	.	*Dryandra fraseri* R.Br.
90	.	.	.	*Dryandra nana* Meissner
90	.	.	.	*Dryandra nivea* (Labill.)R.Br.
90	.	.	1	*Dryandra* aff. *patens* Benth. (E.A.Griffin 1507)
90	.	.	.	*Dryandra sclerophylla* Meissner
90	.	.	.	*Dryandra sessilis* (Knight)Domin
90	.	.	.	*Dryandra shuttleworthiana* Meissner
90	3	.	.	*Dryandra tortifolia* Kipp.ex Meissner
90	.	.	.	*Dryandra tridentata* Meissner
39	.	.	.	*Ecdeiocolea monostachya* F.Muell.
31	.	.	.	**Ehrharta longiflora* Smith
32	.	.	.	*Eleocharis acuta* R.Br.
66	.	.	.	*Elythranthera brunonis* (Endl.)George
66	.	.	.	*Elythranthera emarginata* (Lindley)George
137B	.	.	.	*Emblingia calceoliflora* F.Muell.
105	.	.	.	*Enchylaena tomentosa* R.Br.
273	.	.	.	*Eremaea acutifolia* F.Muell.
273	.	.	.	*Eremaea beaufortioides* Benth.
273	.	1	1	*Eremaea* aff. *brevifolia* (Benth.) Domin (D.Coates M1 175.5)
273	.	.	1	*Eremaea* aff. *brevifolia* (Benth.) Domin (D.Coates 818 E4/2)
273	.	.	1	*Eremaea pauciflora* (Endl.)Druce ssp. (D.Coates E8)
273	.	.	.	*Eremaea violacea* F.Muell.
66	.	.	.	*Eriochilus dilatatus* Lindley ssp. *dilatatus*
66	.	.	.	*Eriochilus scaber* Lindley
175	.	.	.	*Eriostemon pinoides* Paul G.Wilson

cont'd ...

A	B	C	D	TAXA
175	.	.	.	*Eriostemon spicatus* A.Rich.
167	.	.	.	**Erodium aureum* Carolin
281	.	.	.	*Eryngium rostratum* Cav.
273	.	.	.	*Eucalyptus accedens* W.Fitzg.
273	.	1	.	*Eucalyptus calophylla* Lindley
273	.	.	.	*Eucalyptus* aff. *decipiens* Endl. (E.A.Griffin s.n.)
273	.	.	.	*Eucalyptus drummondii* Benth.
273	.	3	.	*Eucalyptus erythrocorys* F.Muell.
273	.	2	.	*Eucalyptus exilis* Brooker
273	.	.	.	*Eucalyptus pluricaulis* Brooker & Hopper ined.
273	.	.	.	*Eucalyptus gittinsii* Brooker & Blaxell
273	1	.	1	*Eucalyptus* aff. *haematoxylon* Maiden (E.A.Griffin 2481)
273	6	.	.	*Eucalyptus lateritica* Brooker & Hopper
273	.	2	.	*Eucalyptus marginata* Donn ex Smith
273	.	3	.	*Eucalyptus obtusifolia* DC.
273	.	.	.	*Eucalyptus rudis* Endl.
273	6	.	.	*Eucalyptus suberea* Brooker & Hopper
273	.	.	.	*Eucalyptus todtiana* F.Muell.
273	.	.	1	*Eucalyptus wandoo* Blakely ssp. (M.I.H. Brooker 9885 & C. Souness)
273	.	.	.	*Eucalyptus* sp. (C.A. Gardner 9088)
92	.	.	.	*Exocarpos sparteus* R.Br.
32	.	.	.	*Gahnia* sp. indet. (E.A.Griffin s.n.)
331	.	.	.	**Galium murale* (L.)All.
165	.	.	.	*Gastrolobium bidens* Meissner
165	.	.	.	*Gastrolobium callistachys* Meissner
165	.	2	.	*Gastrolobium ilicifolium* Meissner
165	.	.	.	*Gastrolobium oxylobioides* Benth.
165	.	.	.	*Gastrolobium pauciflorum* C.Gardner
165	.	2	.	*Gastrolobium plicatum* Turcz.
165	.	.	.	*Gastrolobium spinosum* Benth.
276	.	.	.	*Glischrocaryon aureum* (Lindley)Orch.
345	.	.	.	*Gnaphalium sphaericum* Willd.
165	.	.	.	*Gompholobium aristatum* Benth.
165	.	.	.	*Gompholobium knightianum* Lindley
165	.	.	.	*Gompholobium marginatum* R.Br.
165	1	.	1	*Gompholobium* aff. *polymorphum* R.Br.(E.A.Griffin 2306)
165	.	.	.	*Gompholobium preissii* Meissner
165	.	.	.	*Gompholobium tomentosum* Labill.
276	.	.	.	*Gonocarpus nodulosus* Nees
276	.	.	.	*Gonocarpus pithyoides* Nees
341	.	.	.	*Goodenia caerulea* R.Br.
341	.	2	.	*Goodenia fasciculata* Benth.
341	.	.	.	*Goodenia filiformis* R.Br. var. *filiformis*
341	.	.	.	*Goodenia filiformis* R.Br. var. *minutiflora* F.Muell.
341	.	.	.	*Goodenia hassallii* F.Muell.
341	1	.	.	*Goodenia xanthotricha* Vriese
90	.	.	.	*Grevillea acerosa* F.Muell.
90	2	.	.	*Grevillea acrobotrya* Meissner ssp. *uniforma* McGillvray
90	.	.	.	*Grevillea argyrophylla* Meissner
90	.	.	.	*Grevillea eriostachya* Lindley
90	.	.	.	*Grevillea integrifolia* (Endl.)Meissner ssp.
90	5	.	.	*Grevillea olivacea* George
90	.	.	.	*Grevillea pilulifera* (Lindley)Druce

cont'd ...

A	B	C	D	TAXA
90	.	.	.	*Grevillea pinifolia* Meissner
90	.	.	.	*Grevillea rudis* Meissner
9	.	.	.	*Grevillea synapheae* R.Br.
90	1	.	.	*Grevillea thelemanniana* Huegel ex Endl. ssp. *delta* McGillvray
90	.	.	.	*Grevillea thelemanniana* Huegel ex Endl. ssp. *thelemanniana*
223	2	.	1	*Guichenotia* sp. (E.A. Griffin 858)
223	.	.	.	*Guichenotia sarotes* Benth.
108	.	.	.	*Gyrostemon ramulosus* Desf.
55	.	1	.	*Haemodorum laxum* R.Br.
55	.	.	.	*Haemodorum loratum* T.D.Macfarlane
55	.	1	.	*Haemodorum paniculatum* Lindley
55	.	.	.	*Haemodorum simplex* Lindley
55	.	.	.	*Haemodorum simulans* F.Muell.
55	.	.	.	*Haemodorum spicatum* R.Br.
55	.	.	.	*Haemodorum venosum* T.D.Macfarlane
90	.	.	.	*Hakea auriculata* Meissner var. *auriculata*
90	1	.	.	*Hakea auriculata* Meissner var. *spathulata* Benth.
90	.	.	.	*Hakea conchifolia* Hook.
90	.	.	.	*Hakea corymbosa* R.Br.
90	.	.	.	*Hakea costata* Meissner
90	.	1	.	*Hakea erinacea* Meissner var. *erinacea*
90	1	.	.	*Hakea erinacea* Meissner var. *longiflora* Benth.
90	.	.	.	*Hakea flabellifolia* Meissner
90	.	.	.	*Hakea gilbertii* Kipp.ex Meissner
90	.	.	.	*Hakea incrassata* R.Br.
90	.	.	.	*Hakea lissocarp*ha R.Br.
90	.	2	.	*Hakea marginata* R.Br.
90	6	.	.	*Hakea megalosperma* Meissner
90	5	.	.	*Hakea neurophylla* Meissner
90	.	.	.	*Hakea obliqua* R.Br.
90	.	.	.	*Hakea prostrata* R.Br.
90	.	.	.	*Hakea ruscifolia* Labill.
90	.	.	.	*Hakea stenocarpa* R.Br.
90	.	.	.	*Hakea trifurcata* (Smith)R.Br.
90	.	1	.	*Hakea undulata* R.Br.
90	.	1	.	*Hakea varia* R.Br.
165	.	.	.	*Hardenbergia comptoniana* (Andrews)Benth.
345	.	.	.	*Helichrysum apiculatum* (Labill.)D.Don
345	.	.	.	*Helichrysum bracteatum* (Vent.)Andrews
345	.	.	.	*Helichrysum macranthum* Benth.
345	.	.	.	*Helipterum corymbosum* (A.Gray)Benth.
345	.	.	.	*Helipterum cotula* (Benth.)DC.
345	.	.	.	*Helipterum gracile* (A.Gray)Benth.
345	.	.	.	*Helipterum manglesii* (Lindley)F.Muell.ex Benth.
345	.	2	.	*Helipterum oppositifolium* S.Moore
313	.	.	.	*Hemiandra linearis* Benth.
313	.	.	.	*Hemiandra pungens* R.Br.
313	2	.	.	*Hemiandra rubriflora* O.Sarg.
313	.	1	.	*Hemigenia barbata* Bartling
313	1	.	.	*Hemigenia curvifolia* F.Muell.
313	2	3	.	*Hemigenia diplanthera* F.Muell.
313	.	3	.	*Hemigenia saligna* Diels
54F	2	.	.	*Hensmania stoniella* Keighery

cont'd ...

A	B	C	D	TAXA
226	.	.	.	*Hibbertia acerosa* (R.Br.ex DC.)Benth.
226	.	.	.	*Hibbertia aurea* Steudel
226	.	.	.	*Hibbertia crassifolia* (Turcz.)Benth.
226	.	.	.	*Hibbertia desmophylla* (Benth.)F.Muell.
226	.	.	.	*Hibbertia huegelii* (Endl.)F.Muell.
226	.	.	.	*Hibbertia hypericoides* (DC.)Benth.
226	.	.	.	*Hibbertia* aff. *hypericoides*(DC.)Benth. (E.A.Griffin 2227)
226	.	2	.	*Hibbertia montana* Steudel
226	.	.	.	*Hibbertia* aff. *montana* Stuedel (E.A.Griffin 1831)
226	.	.	.	*Hibbertia racemosa* (Endl.)Gilg
226	.	.	.	*Hibbertia rupicola* (S.Moore)C.Gardner
226	.	.	.	*Hibbertia spicata* F.Muell.
226	.	.	.	*Hibbertia subvaginata* (Steudel)F.Muell.
226	.	.	.	*Hibbertia* sp. (E.A.Griffin 2253)
226	.	.	.	*Hibbertia* sp. (E.A.Griffin 2480)
281	.	.	.	*Homalosciadium homalocarpum* (F.Muell.)H.Eichler
165	.	.	.	*Hovea pungens* Benth.
165	.	.	.	*Hovea stricta* Meissner
165	.	.	.	*Hovea trisperma* Benth.
243	.	.	.	*Hybanthus calycinus* (DC.ex Ging.)F.Muell.
243	.	.	.	*Hybanthus* aff. *floribundus* (Lindley)F.Muell. (E.A. Griffin s.n.)
281	.	.	.	*Hydrocotyle diantha* DC.
281	.	.	.	*Hydrocotyle* sp. (E.A.Griffin s.n.)
273	1	.	1	*Hypocalymma* aff. *ericifolium* Benth. (E.A.Griffin 1972)
273	.	.	.	*Hypocalymma angustifolium* Endl.
273	.	.	.	*Hypocalymma xanthopetalum* F.Muell.
273	2	.	1	*Hypocalymma xanthopetalum* F.Muell. var. (C.Gardner 9096)
345	.	.	.	**Hypochoeris glabra* L.
56A	.	.	.	*Hypoxis occidentalis* Benth. var. *occidentalis*
32	.	.	.	*Isolepis marginata* (Thunb.)A.Dietr.
32	.	.	.	*Isolepis nodosa* (Rottb.)R.Br.
90	3	.	.	*Isopogon adenanthoides* Meissner
90	.	2	.	*Isopogon asper* R.Br.
90	.	.	.	*Isopogon divergens* R.Br.
90	.	2	.	*Isopogon drummondii* Benth.
90	.	2	.	*Isopogon dubius* (R.Br.)Druce
90	.	.	.	*Isopogon linearis* Meissner
90	.	2	.	*Isopogon sphaerocephalus* Lindley
90	.	.	.	*Isopogon teretifolius* R.Br.
90	3	.	.	*Isopogon tridens* F. Muell.
340	.	.	.	*Isotoma hypocrateriformis* (R.Br.)Druce
165	.	.	.	*Isotropis cuneifolia* (Smith)Benth. ex B.D.Jackson
165	.	.	.	*Jacksonia angulata* Benth.
165	.	.	.	*Jacksonia capitata* Benth.
165	.	.	.	*Jacksonia floribunda* Endl.
165	.	.	.	*Jacksonia furcellata* (Bonpl.)DC.
165	.	.	.	*Jacksonia lehmannii* Meissner
165	.	.	.	*Jacksonia restioides* Meissner
165	.	.	.	*Jacksonia spinosa* (Labill.)R.Br.
165	.	.	.	*Jacksonia sternbergiana* Huegel
165	.	.	.	*Jacksonia ulicina* Meissner
54F	.	.	.	*Johnsonia pubescens* Lindley
52	.	.	.	*Juncus* sp. indet. (E.A.Griffin s.n.)

cont'd ...

A	B	C	D	TAXA
165	.	.	.	*Kennedia prostrata* R.Br.
54C	.	.	.	*Kingia australis* R.Br.
164	.	.	.	*Labichea cassioides* Gaudich.
164	.	.	.	*Labichea punctata* Benth.
345	.	.	.	*Lagenifera huegelii* Benth.
31	.	.	.	**Lagurus ovatus* L.
90	.	.	.	*Lambertia multiflora* Lindley
223	.	.	.	*Lasiopetalum drummondii* Benth.
223	.	2	.	*Lasiopetalum floribundum* Benth.
223	3	.	.	*Lasiopetalum lineare* S.Paust
221	.	.	.	*Lawrencia glomerata* Hook.
221	.	.	.	*Lawrencia squamata* Nees ex Miq.
54F	.	.	.	*Laxmannia omnifertilis* Keighery
54F	.	.	.	*Laxmannia sessiliflora* Decne. ssp. *drummondii* Keighery
54F	.	.	.	*Laxmannia squarrosa* Lindley
341	.	.	.	*Lechenaultia biloba* Lindley
341	.	.	.	*Lechenaultia floribunda* Benth.
341	.	.	.	*Lechenaultia hirsuta* F.Muell.
341	.	.	.	*Lechenaultia linarioides* DC.
341	.	.	.	*Lechenaultia stenosepala* E.Pritzel
39	.	.	.	*Lepidobolus chaetocephalus* F.Muell.
39	.	.	.	*Lepidobolus preissianus* Nees
39	3	.	1	*Lepidobolus* sp. (E.A. Griffin 2093)
39	.	.	.	*Lepidibolus* sp. (E.A.Griffin s.n.)
32	.	.	.	*Lepidosperma angustatum* R.Br.
32	.	.	.	*Lepidosperma carphoides* F.Muell.ex Benth.
32	.	.	.	*Lepidosperma resinosum* (Nees)Benth.
32	.	.	.	*Lepidosperma tenue* Benth.
32	.	.	.	*Lepidosperma tuberculatum* Nees
32	.	2	.	*Lepidosperma viscidum* R.Br.
66	.	.	.	*Leporella fimbriata* (Lindley)George
39	.	.	.	*Leptocarpus aristatus* R.Br.
66	.	.	.	*Leptoceras menziesii* (R.Br.)Lindley
92	.	.	.	*Leptomeria empetriformis* Miq.
273	.	.	.	*Leptospermum oligandrum* Turcz.
273	.	.	.	*Leptospermum spinescens* Endl.
39	.	.	.	*Lepyrodia macra* Nees
39	.	.	.	*Lepyrodia* sp. indet. (E.A.Griffin 2535)
288	.	1	.	*Leucopogon australis* R.Br.
288	.	.	.	*Leucopogon conostephioides* DC.
288	.	.	.	*Leucopogon gracillimus* DC.
288	.	.	.	*Leucopogon* aff. *planifolius* Sonder (E.A.Griffin 2512)
288	1	.	.	*Leucopogon plumuliflorus* F.Muell.
288	.	.	.	*Leucopogon propinquus* R.Br.
288	2	.	1	*Leucopogon* aff. *rubicundus* F.Muell. ex Benth. (E.A.Griffin 2206)
288	.	.	.	*Leucopogon striatus* R.Br.
288	.	.	1	*Leucopogon* sp. (E.A.Griffin 1031)
288	.	.	.	*Leucopogon* sp. (E.A.Griffin 2153)
288	2	.	1	*Leucopogon* sp. (E.A.Griffin 2641)
343	.	.	.	*Levenhookia dubia* Sonder
343	.	.	.	*Levenhookia octomaculata* R.Erickson & J.H.Willis
343	.	.	.	*Levenhookia pusilla* R.Br.
340	.	.	.	*Lobelia heterophylla* Labill.

cont'd ...

A	B	C	D	TAXA
340	.	.	.	*Lobelia winfridae* Diels
302	.	.	.	*Logania campanulata* R.Br.
302	.	.	.	*Logania spermacocea* F.Muell.
302	.	1	.	*Logania vaginalis* (Labill.)F.Muell.
54C	.	1	.	*Lomandra brittanii* T.S.Choo
54C	.	.	.	*Lomandra caespitosa* (Benth.)Ewart
54C	.	.	.	*Lomandra hastilis* (R.Br.)Ewart
54C	.	.	.	*Lomandra micrantha* (Endl.)Ewart
54C	.	.	.	*Lomandra preissii* (Endl.)Ewart
54C	.	.	.	*Lomandra sericea* (Endl.)Ewart
54C	.	1	.	*Lomandra suaveolens* (Endl.)Ewart
54C	.	.	.	*Lomandra* sp. (E.A.Griffin s.n.)
39	.	.	1	*Loxocarya* aff. *cinerea* R.Br. (E.A.Griffin 1986)
39	.	.	.	*Loxocarya fasciculata* (R.Br.)Benth.
39	.	.	.	*Loxocarya flexuosa* (R.Br.)Benth.
39	2	.	1	*Loxocarya* sp. (B. Briggs 7481)
39	.	.	.	*Lyginea barbata* R.Br.
66	.	.	.	*Lyperanthus nigricans* R.Br.
288	.	.	.	*Lysinema ciliatum* R.Br.
110A	.	.	.	*Macarthuria australis* Huegel ex Endl.
55	5	.	.	*Macropidia fuliginosa* (Hook.)Druce
16A	.	.	.	*Macrozamia riedlei* (Fisch.ex Gaudich.) C.Gardner
273	.	.	.	*Melaleuca acerosa* Schauer
273	.	.	1	*Melaleuca* aff. *acerosa Schauer* (E.A.Griffin 2436)
273	.	.	.	*Melaleuca bracteosa* Turcz.
273	.	.	.	*Melaleuca cardiophylla* F.Muell.
273	.	.	.	*Melaleuca ciliosa* Turcz.
273	.	.	.	*Melaleuca huegelii* Endl.
273	.	.	.	*Melaleuca lateritia* A.Dietr.
273	.	.	1	*Melaleuca* aff. *megacephala* F.Muell. (E.A.Griffin 2359)
273	.	.	.	*Melaleuca platycalyx* Diels
273	.	.	.	*Melaleuca preissiana* Schauer
273	.	.	.	*Melaleuca radula* Lindley
273	.	.	.	*Melaleuca rhaphiophylla* Schauer
273	.	.	.	*Melaleuca scabra* R.Br.
273	.	.	1	*Melaleuca* aff. *sclerophylla* Diels (E.A.Griffin 1590)
273	.	.	.	*Melaleuca scabra* x aff. *megacephala* (E.A. Griffin s.n.)
273	.	.	.	*Melaleuca seriata* Lindley
273	.	.	.	*Melaleuca trichophylla* Lindley
273	.	.	.	*Melaleuca* aff. *trichophylla* Lindley (E.A.Griffin s.n.)
273	.	.	.	*Melaleuca uncinata* R.Br.
273	.	.	.	*Melaleuca undulata* Benth.
273	.	.	.	*Melaleuca viminea* Lindley
32	.	.	.	*Mesomelaena graciliceps* (C.B.Clarke)K.L.Wilson
32	.	.	.	*Mesomelaena stygia* (R.Br.)Nees
32	.	.	.	*Mesomelaena tetragona* (R.Br.)Benth.
313	.	.	1	*Microcorys* sp. (R.J.Hnatuik 771501)
66	.	1	.	*Microtis alba* R.Br.
66	.	1	1	*Microtis* aff. *alba* R.Br. (E.A.Griffin s.n.)
66	.	.	.	*Microtis unifolia* (G.Forster)H.G.Reichb.
345	.	.	.	*Millotia myosotidifolia* (Benth.)Steetz
345	.	.	.	*Millotia tenuifolia* Cass.
165	.	.	.	*Mirbelia floribunda* Benth.

cont'd ...

A	B	C	D	TAXA
165	.	.	.	*Mirbelia spinosa* Benth.
302	.	.	.	*Mitrasacme paradoxa* R.Br.
185	.	.	.	*Monotaxis grandiflora* Endl.
103	.	.	.	*Muehlenbeckia adpressa* (Labill.)Meissner
326	.	.	.	*Myoporum caprarioides* Benth.
345	.	.	.	*Myriocephalus rhizocephalus* (DC.)Benth.
31	.	.	.	*Neurachne alopecuroides* R.Br.
97	.	.	.	*Nuytsia floribunda* (Labill.)R.Br.ex Fenzl
95	.	.	.	*Olax benthamiana* Miq.
95	1	.	.	*Olax scalariformis* Miq.
345	.	.	.	*Olearia axillaris* (DC.)F.Muell.ex Benth.
345	.	2	.	*Olearia ciliata* (Benth.)F.Muell.ex Benth.
345	.	.	.	*Olearia elaeophila* (D.C.)F.Muell.ex Benth.
345	.	2	.	*Olearia paucidentata* (Steetz)F.Muell.ex Benth.
345	.	.	.	*Olearia rudis* (Benth.)F.Muell.ex Benth.
331	.	.	.	*Opercularia vaginata* Labill.
60	.	.	.	*Orthrosanthus* laxus (Endl.)Benth. var. *laxus*
168	.	.	.	**Oxalis* sp. indet. (E.A.Griffin s.n.)
165	.	.	.	*Oxylobium capitatum* Benth.
165	2	.	.	*Oxylobium reticulatum* Meissner var. *gracile* Benth.
66	.	.	.	*Paracaleana nigrita* (Lindley)Blaxell
316	.	.	.	**Parentucellia latifolia* (L.)Caruel
88	.	.	.	*Parietaria debilis* G.Forster
60	1	.	.	*Patersonia argyrea* D.A.Cooke
60	.	.	.	*Patersonia drummondii* (F.Muell.)Benth.
60	.	.	.	*Patersonia occidentalis* R.Br.
90	.	.	.	*Persoonia acicularis* F.Muell.
90	.	1	.	*Persoonia comata* Meissner
90	1	.	.	*Persoonia rudis* Meissner
90	.	.	.	*Persoonia rufiflora* Meissner
90	.	.	1	*Persoonia* aff. *sulcata* Meissner (E.A.Griffin 795)
90	.	.	.	*Petrophile brevifolia* Lindley
90	2	.	1	*Petrophile* aff. *brevifolia* Lindley (E.A.Griffin 2203)
90	.	.	.	*Petrophile chrysantha* Meissner
90	2	.	1	*Petrophile* aff. *divaricata* R.Br. (E.A.Griffin 2547)
90	.	.	.	*Petrophile ericifolia* R.Br.
90	.	.	.	*Petrophile inconspicua* Meissner
90	.	.	.	*Petrophile linearis* R.Br.
90	.	.	.	*Petrophile macrostachya* R.Br.
90	.	.	.	*Petrophile megalostegia* F.Muell.
90	.	.	.	*Petrophile seminuda* Lindley
90	.	.	.	*Petrophile serruriae* R.Br.
90	.	.	.	*Petrophile shuttleworthiana* Meissner
90	.	.	.	*Petrophile striata* R.Br.
50	.	.	.	*Philydrella pygmaea* (R.Br.)Caruel ssp. *pygmaea*
55	.	1	.	*Phlebocarya ciliata* R.Br.
55	3	.	.	*Phlebocarya filifolia* (F.Muell.)Benth.
55	3	.	.	*Phlebocarya pilosissima* (F.Muell.)Benth ssp. *pilosissima*
55	1	.	.	*Phlebocarya pilosissima* (F.Muell.)Benth.ssp. *teretifolia* T.MacFarlane
185	.	.	.	*Phyllanthus calycinus* Labill.
273	.	.	.	*Pileanthus filifolius* Meissner
263	.	.	.	*Pimelea angustifolia* R.Br.
263	.	.	.	*Pimelea argentea* R.Br.

cont'd ...

A	B	C	D	TAXA
263	.	.	.	*Pimelea floribunda* Meissner
263	.	.	.	*Pimelea imbricata* R.Br. var. *piligera* (Benth.)Diels & E.Pritzel
263	.	.	.	*Pimelea suaveolens* Meissner
263	.	.	.	*Pimelea sulphurea* Meissner
263	.	.	.	*Pimelea sylvestris* R.Br.
345	.	.	.	*Pithocarpa pulchella* Lindley
152	.	.	.	*Pittosporum phylliraeoides* DC.
311A	.	.	.	*Pityrodia bartlingii* (Lehm.)Benth.
311A	.	.	.	*Pityrodia verbascina* (F.Muell.)Benth.
281	.	.	.	*Platysace juncea* (Bunge)Norman
281	.	.	.	*Platysace teres* (Bunge)Norman
281	.	.	.	*Platysace xerophila* (E.Pritzel)L.Johnson
182	.	1	.	*Platytheca galioides* Steetz
31	.	.	.	*Poa drummondiana* Nees
345	.	.	.	*Podolepis gracilis* (Lehm.)R.A.Graham
345	.	.	.	*Podolepis lessonii* (Cass.)Benth.
345	.	.	.	*Podotheca angustifolia* (Labill.)Less.
345	.	.	.	*Podotheca chrysantha* (Steetz)Benth.
345	.	.	.	*Podotheca gnaphalioides* R.A.Graham
323	.	2	.	*Polypompholyx multifida* (R.Br.)F.Muell.
185	.	.	.	*Poranthera microphylla* Brongn.
66	.	.	.	*Prasophyllum cyphochilum* Benth.
66	.	.	.	*Prasophyllum elatum* R.Br.
66	.	.	.	*Prasophyllum fimbria* H.G.Reichb.
66	.	.	.	*Prasophyllum giganteum* Lindley
66	.	.	.	*Prasophyllum macrostachyum* R.Br.
66	.	.	.	*Prasophyllum ringens* (H.G.Reichb.)Bates
66	.	.	.	*Prasophyllum ovale* Lindley var. *triglochin* H.G.Reichb.
66	.	1	.	*Prasophyllum parvifolium* Lindley
66	.	.	.	*Prasophyllum sargentii* (Nicholls)George
66	.	.	.	*Pterostylis dilatata* George
66	.	.	.	*Pterostylis nana* R.Br.
66	.	.	.	*Pterostylis scabra* Lindley var *scabra*
66	.	.	.	*Pterostylis scabra* Lindley var. *robusta* (R.Rogers) George
66	.	.	.	*Pterostylis vittata* Lindley var. *vittata*
106	.	.	.	*Ptilotus esquamatus* (Benth.)F.Muell.
106	.	.	.	*Ptilotus gaudichaudii* (Steudel)J.Black
106	.	.	.	*Ptilotus manglesii* (Lindley)F.Muell.
106	.	.	.	*Ptilotus stirlingii* (Lindley)F.Muell. var. *stirlingii*
165	.	2	.	*Pultenaea ericifolia* Benth.
345	.	.	.	*Quinetia urvillei* Cass.
39	3	.	1	*Restio* aff. *sphacelatus* R.Br. (B. Briggs 6293)
39	1	.	1	*Restio* sp. (Briggs 7473 & Johnson)
39	3	.	1	Restionaceae Genus aff. *Ecdeiocolea* (E.A.Griffin 2157)
185	.	.	.	*Ricinocarpus glaucus* Endl.
60	.	.	.	**Romulea rosea* (L.)Ecklon
223	.	.	.	*Rulingia corylifolia* R.A.Graham
223	.	.	.	*Rulingia* sp. indet. (E.A.Griffin s.n.)
345	.	.	.	*Rutidosis multiflora* (Nees)Robinson
293	.	.	.	*Samolus junceus* R.Br.
293	.	.	.	*Samolus repens* (Forster & G.Forster)Pers.
92	.	.	.	*Santalum spicatum* (R.Br.)A.DC.
341	.	.	.	*Scaevola canescens* Benth.

cont'd ...

A	B	C	D	TAXA
341	.	.	.	*Scaevola crassifolia* Labill.
341	.	.	.	*Scaevola glandulifera* DC.
341	.	.	.	*Scaevola lanceolata* Benth.
341	.	.	.	*Scaevola longifolia* Vreise
341	.	.	.	*Scaevola paludosa* R.Br.
341	.	.	.	*Scaevola phlebopetala* F.Muell.
341	.	.	.	*Scaevola pilosa* Benth.
341	.	.	.	*Scaevola thesioides* Benth.
32	.	.	.	*Schoenoplectus pungens* (M.Vahl)Palla
32	.	.	.	*Schoenus asperocarpus* F.Muell.
32	.	.	.	*Schoenus brevisetis* (R.Br.)Benth.
32	.	.	.	*Schoenus curvifolius* (R.Br.)Benth.
32	.	.	.	*Schoenus globifer* Nees
32	.	.	.	*Schoenus grandiflorus* (Nees)F.Muell.
32	.	.	.	*Schoenus nanus* (Nees)Benth.
32	.	.	.	*Schoenus obtusifolius* (Nees)Boeckler
32	.	.	.	*Schoenus pedicellatus* (R.Br.)Benth.
32	.	.	.	*Schoenus pleiostemoneus* F.Muell.
32	.	.	.	*Schoenus* aff. *pleiostemoneus* F.Muell. (E.A.Griffin s.n.)
32	.	.	.	*Schoenus subflavus* Kuck.
32	.	.	.	*Schoenus unispiculatus* F.Muell.ex Benth.
32	.	.	.	*Schoenus* sp. (E.A.Griffin 2541)
32	.	.	.	*Schoenus* sp. (E.A.Griffin 4236)
273	.	.	.	*Scholtzia capitata* F.Muell.ex Benth.
273	.	.	.	*Scholtzia involucrata* (Endl.)Druce
3	.	.	.	*Selaginella gracillima* (Kunze)Alston
345	.	2	.	*Senecio glomeratus* Desf.ex Poiret
345	.	.	.	*Senecio glossanthus* (Sonder)Belcher
345	.	.	.	*Senecio hispidulus* A.Rich.
345	.	.	.	*Senecio minimus* Poiret
221	.	.	.	*Sida hookeriana* Miq.
113	.	.	.	**Silene gallica* L.
345	.	.	.	*Siloxeros humifusus* Labill.
345	.	.	.	**Sonchus oleraceus* L.
54F	.	.	.	*Sowerbaea laxiflora* Lindley
165	.	.	.	*Sphaerolobium linophyllum* (Huegel)Benth.
165	.	.	.	*Sphaerolobium macranthum* Meissner
215	.	.	.	*Spyridium tridentatum* (Steudel)Benth.
185	.	.	.	*Stachystemon axillaris* George
202	.	.	.	*Stackhousia monogyna* Labill.
31	.	.	.	*Stipa compressa* R.Br.
31	.	.	.	*Stipa elegantissima* Labill.
31	.	1	.	*Stipa flavescens* Labill.
31	.	.	.	*Stipa macalpinei* Reader
31	.	.	.	*Stipa* sp. (E.A.Griffin 4279)
31	.	.	.	*Stipa* sp. (E.A.Griffin s.n.)
90	.	.	.	*Stirlingia latifolia* (R.Br.)Steudel
90	.	.	.	*Stirlingia simplex* Lindley
90	.	.	.	*Strangea cynanchocarpa* (Meissner)F.Muell.
343	.	.	.	*Stylidium adpressum* Benth.
343	2	.	.	*Stylidium aeonioides* Carlq.
343	.	2	.	*Stylidium breviscapum* R.Br.
343	.	.	.	*Stylidium brunonianum* Benth. ssp. *brunonianum*

cont'd ...

A	B	C	D	TAXA
343	.	.	.	*Stylidium calcaratum* R.Br.
343	.	2	.	*Stylidium carnosum* Benth.
343	.	.	.	*Stylidium crossocephalum* F.Muell.
343	.	.	.	*Stylidium dichotomum* DC.
343	.	.	.	*Stylidium diuroides* Lindley
343	.	.	.	*Stylidium elongatum* Benth.
343	.	.	.	*Stylidium inundatum* R.Br.
343	5	.	.	*Stylidium inversiflorum* Carlq.
343	.	.	.	*Stylidium junceum* R.Br.
343	.	.	.	*Stylidium leptocalyx* Sonder
343	.	.	.	*Stylidium leptophyllum* DC.
343	3	.	.	*Stylidium maitlandianum* E.Pritzel
343	.	.	.	*Stylidium piliferum* R.Br.
343	.	.	.	*Stylidium pubigerum* Sonder
343	.	2	.	*Stylidium pycnostachyum* Lindley
343	.	.	.	*Stylidium repens* R.Br.
343	.	.	1	*Stylidium* aff. *repens* R.Br.(A.S.George 2341)
343	.	.	.	*Stylidium schoenoides* DC.
90	.	.	.	*Synaphea petiolaris* R.Br.
90	.	.	.	*Synaphea spinulosa* (Burm.f.)Merr.
165	.	.	.	*Templetonia biloba* (Benth.)Polh.
165	.	.	.	*Templetonia retusa* (Vent.)R.Br.
108	.	.	.	*Tersonia cyathiflora* (Fenzl)George
32	.	.	.	*Tetraria octandra* (Nees)Kuek.
182	.	.	.	*Tetratheca confertifolia* Steetz
182	.	.	.	*Tetratheca paucifolia* J.Thompson
182	1	.	.	*Tetratheca remota* J.Thompson
66	.	.	.	*Thelymitra antennifera* (Lindley)J.D.Hook.
66	.	.	.	*Thelymitra campanulata* Lindley
66	.	1	.	*Thelymitra crinita* Lindley
66	.	.	.	*Thelymitra fuscolutea* R.Br. ssp. *fuscolutea*
66	.	.	.	*Thelymitra nuda* R.Br.
66	.	.	.	*Thelymitra pauciflora* R.Br.
66	6	.	.	*Thelymitra stellata* Lindley
66	5	.	.	*Thelymitra variegata* (Lindley)F.Muell. var.*apiculata* George
66	.	.	.	*Thelymitra variegata* (Lindley)F.Muell. var. *variegata*
66	.	.	.	*Thelymitra villosa* Lindley
223	.	.	.	*Thomasia foliosa* Gay
223	.	.	.	*Thomasia grandiflora* Lindley
223	.	1	.	*Thomasia pauciflora* Lindley
273	.	.	.	*Thryptomene baeckeacea* F.Muell.
54F	1	2	.	*Thysanotus anceps* Lindley
54F	.	1	.	*Thysanotus arbuscula* Baker
54F	.	.	.	*Thysanotus arenarius* Brittan
54F	.	.	.	*Thysanotus asper* Lindley
54F	.	.	.	*Thysanotus dichotomus* (Labill.)R.Br.
54F	.	1	.	*Thysanotus glaucus* Endl.
54F	.	.	.	*Thysanotus manglesianus* Kunth
54F	.	.	.	*Thysanotus patersonii* R.Br.
54F	.	.	.	*Thysanotus sparteus* R.Br.
54F	2	.	1	*Thysanotus* aff. *sparteus* R.Br. (E.A. Griffin 2511)
54F	.	.	.	*Thysanotus thyrsoideus* Baker
54F	.	.	.	*Thysanotus triandrus* (Labill.)R.Br.

cont'd ...

A	B	C	D	TAXA
54F	2	.	.	*Thysanotus vernalis* Brittan
281	.	.	.	*Trachymene coerulea* R.A.Graham
281	.	.	.	*Trachymene cyanopetala* (F.Muell.)Benth.
281	.	.	.	*Trachymene pilosa* Smith
55	.	.	.	*Tribonanthes australis* Endl.
345	.	2	.	*Trichocline spathulata* (Cunn.ex DC.)J.H.Willis
54F	.	.	.	*Tricoryne elatior* R.Br.
54F	2	.	1	*Tricoryne* aff. *humilis* Endl. (E.A.Griffin 1451)
165	.	.	.	**Trifolium campestre* Schreber
26	.	.	.	*Triglochin centrocarpa* Hook.
26	.	.	.	*Triglochin mucro nata* R.Br.
202	.	.	.	*Tripterococcus brunonis* Endl.
31	.	.	.	**Trisetaria cristata* (L.)Kerguelen
215	.	1	.	*Trymalium floribundum* Steudel
215	.	.	.	*Trymalium ledifolium* Fenzl
215	.	.	.	*Trymalium wichurae* Nees ex Reissek
215	.	.	1	*Trymalium* aff. *wichurae* Nees ex Reisse (E.A.Griffin 2234)
345	.	.	.	**Ursinia anthemoides* (L.)Poiret
323	.	2	.	*Utricularia menziesii* R.Br.
341	.	.	.	*Velleia trinervis* Labill.
341	.	.	.	*Verreauxia reinwardtii* (Vreise)Benth.
273	.	.	.	*Verticordia chrysantha* Endl.
273	.	.	1	*Verticordia* aff. *brownii* (Desf.) DC. (A.S. George 16562 & E.A. George).
273	.	.	.	*Verticordia densiflora* Lindley
273	.	.	.	*Verticordia grandis* J.Drumm.ex Meissner
273	.	.	.	*Verticordia huegelii* Endl.
273	.	.	.	*Verticordia insignis* Endl. ssp. (A..S. George 16871 & E.A. George)
273	.	.	.	*Verticordia nobilis* Meissner
273	.	.	.	*Verticordia ovalifolia* Meissner
273	.	.	.	*Verticordia pennigera* Endl.
273	.	.	.	*Verticordia picta* Endl.
273	.	.	.	*Verticordia* sp. indet.(E.A.Griffin s.n.)
165	.	.	.	*Viminaria juncea* (Schrader & Wendl.)Hoffsgg.
31	.	.	.	**Vulpia myuros* (L.) C.Gmelin var. *hirsuta* Hack.
339	.	.	.	**Wahlenbergia capensis* (L.)A.DC.
339	.	.	.	*Wahlenbergia preissii* Vreise
345	.	.	.	*Waitzia aurea* (Benth.)Steetz
345	.	.	.	*Waitzia paniculata* (Steetz)F.Muell.ex Benth.
345	.	.	.	*Waitzia suaveolens* (Benth.)Druce
108	3	.	.	*Walteranthus erectus* Keighery
313	.	.	.	*Westringia dampieri* R.Br.
54J	.	.	.	*Wurmbea dioica* (R.Br.)F.Muell. ssp. *alba* T.Macfarlane
54D	.	.	.	*Xanthorrhoea drummondii* Harvey
281	.	.	.	*Xanthosia fruticulosa* Benth.
281	.	.	.	*Xanthosia huegelii* (Benth.)Steudel
281	1	.	.	*Xanthosia tomentosa* George
90	.	.	.	*Xylomelum angustifolium* Kipp. & Meissner

15.2 APPENDIX 2

Distributional, information, reserve status and conservation coding for regional endemics and Declared Rare Flora of the Northern Sandplain between the Moore and Irwin Rivers.

Column A: Geographic range of the taxa, (1) less than 50 km, (2) 50 to 160 km, (3) greater than 160 km.

Column B: Location within Lesueur Area, (0) not present, (1) coastal, (2) western uplands, (3) eastern uplands.

Column C: Conservation coding, (1 to 5) CALM's reserve list priorities as outlined in text, (6) Declared Rare Flora, (7) other taxa (unallocated and non-priority species).

Column D: Undescribed taxa (1).

Column E: Geomorphology on which the taxa have been recorded, (1) Arrowsmith, (2) Bassendean Dunes, (3) Coastal Belt, (4) Dandaragan Plateau, (5) Eneabba Plain, (6) Yandanooka Uplands, (7) Yarra Yarra Region.

Herbarium Location Data

Column F: Number of records.

Column G: Per centage in conservation reserve.

Column H: Per centage in Lesueur Area.

Column I: Per centage in eastern uplands of Lesueur Area.

TAXA	A	B	C	D	E	F	G	H	I
Acacia aff. *bidentata* (B.R. Maslin 6122)	1	0	2	1	7	4	25	0	0
Acacia cliftoniana ssp. *cliftoniana*	1	0	1	0	17	5	0	0	0
Acacia epacantha	2	23	7	0	14	12	0	33	8
Acacia fagonioides	2	0	7	0	1357	14	0	0	0
Acacia flabellifolia	2	0	1	0	7	6	0	0	0
Acacia forrestiana	2	23	6	0	14	5	0	80	40
Acacia aff. *microbotrya* (S. van Leeuwen 269)	1	0	6	1	1	1	0	0	0
Acacia aff. *myrtifolia* (R.J. Cranfield 33)	2	23	2	1	14	6	0	50	17
Acacia nodiflora	1	0	1	0	7	3	0	0	0
Acacia plicata	2	23	2	0	1	7	0	43	29
Acacia retrorsa	1	23	2	0	18	12	6	3	13
Acacia volubilis	2	23	3	0	147	11	0	36	9
Acacia aff. *xanthina* (A.R. Chapman 564)	2	0	2	1	135	6	0	0	0
Adenanthos stictus	2	0	3	0	7	11	18	0	0
Alexgeorgea subterranea	3	2	7	0	1237	15	13	13	0
Allocasuarina grevilleoides	2	23	3	0	14	13	15	15	7
Allocasuarina ramosissima	2	23	7	0	14	17	0	12	6
Andersonia longifolia	1	2	1	0	1	2	0	100	0
Anigozanthos humilis ssp. *chrysanthus*	1	0	6	0	4	2	0	0	0
Anigozanthos humilis ssp. (S.D. Hopper 6730)	2	0	1	1	12	3	0	0	0
Anigozanthos viridis ssp. terraspectans	1	0	6	0	2	3	0	0	0
Arnocrinum drummondii	3	0	2	0	7	2	0	0	0
Arnocrinum gracillimum	1	0	1	0	1	1	0	0	0
Asterolasia drummondii	2	23	6	0	1	11	0	82	36
Astroloma microdonta	3	2	3	0	145	20	20	20	0

cont'd ...

TAXA	A	B	C	D	E	F	G	H	I
Astroloma aff. pallidum (E.A. Griffin 1022)	2	23	2	1	145	7	14	28	14
Astroloma aff. *serratifolium* (N. Marchant s.n.)	2	2	2	1	15	6	0	17	0
Banksia burdettii	3	0	7	0	147	60	17	0	0
Banksia chamaephyton	2	3	7	0	147	31	19	6	6
Banksia elegans	2	1	7	0	35	10	10	10	0
Banksia grossa	2	23	7	0	147	57	11	11	5
Banksia hookeriana	2	0	7	0	135	30	10	0	0
Banksia lanata	2	0	7	0	145	23	17	0	0
Banksia micrantha	2	23	7	0	15	33	18	33	6
Banksia tricuspis	1	23	6	0	1	72	0	90	64
Beaufortia bicolor	2	3	3	0	1	14	28	7	7
Beaufortia aff. *bracteosa* (E.A. Griffin 1176)	2	23	7	1	1457	27	29	7	3
Beaufortia eriocephala	2	0	1	0	4	5	0	0	0
Beyeria cygnorum	3	0	3	0	0	3	0	0	0
Caladenia crebra	2	1	7	0	3	16	56	6	0
Caladenia denticulata ssp. (S.D. Hopper 6589)	1	0	1	1	5	1	0	0	0
Calothamnus longissimus	3	0	7	0	145	20	5	0	0
Calothamnus pachystachyus	2	0	2	0	47	5	0	0	0
Calytrix chrysantha	1	0	2	0	15	4	50	0	0
Calytrix drummondii	2	0	2	0	4	3	66	0	0
Calytrix eneabbensis	1	0	2	0	15	8	40	0	0
Calytrix platycheiridia	1	0	2	0	4	1	0	0	0
Calytrix superba	1	0	2	0	15	12	50	0	0
Caustis sp. (A.S. George 9318)	1	0	2	1	14	2	100	0	0
Chamelaucium sp. (G.J. Keighery 11009)	1	0	6	1	1	1	0	0	0
Comesperma acerosum	2	23	3	0	15	8	12	38	13
Comesperma rhadinocarpum	3	0	1	0	12	3	0	0	0
Conospermum crassinervium	2	2	7	0	15	19	16	32	0
Conospermum nervosum	2	23	7	0	1345	32	22	16	3
Conostylis aculeata ssp. *breviflora*	2	23	7	0	123457	33	15	12	3
Conostylis aculeata ssp. *spinuligera*	2	0	2	0	2	5	0	0	0
Conostylis angustifolia	2	2	7	0	124	20	0	10	0
Conostylis canteriata	2	2	7	0	134567	42	5	5	0
Conostylis crassinerva ssp. *absens*	3	23	7	0	125	48	18	8	2
Conostylis crassinerva	2	2	7	0	145	22	23	5	0
Conostylis dielsii ssp. *dielsii*	2	0	7	0	16	13	0	0	0
Conostylis festucacea ssp. *filifolia*	1	0	7	0	47	6	17	0	0
Conostylis hiemalis	3	0	7	0	13457	39	13	0	0
Conostylis neocymosa	2	2	7	0	1357	20	5	5	0
Conostylis seminuda	1	0	3	0	14	13	38	0	0
Conostylis tomentosa	1	0	7	0	15	10	10	0	0
Corynanthera flava	2	0	7	0	147	18	27	0	0
Cryptandra humilis	2	2	7	0	147	13	38	8	0
Dampiera tephrea	1	0	1	0	3	1	0	0	0
Darwinia acerosa	1	0	6	0	4	7	0	0	0
Darwinia helichrysoides	1	23	1	0	13	9	0	78	11
Darwinia neildiana	3	23	7	0	1245	39	15	21	3
Darwinia pinifolia	1	0	3	0	124	7	14	0	0
Darwinia sanguinea	2	23	5	0	1235	22	18	36	5
Darwinia speciosa	2	2	7	0	145	30	23	3	0
Dasypogon obliquifolius	2	23	7	0	15	8	25	25	12
Daviesia epiphylla	1	23	3	0	1	4	0	50	25
Daviesia aff. striata (M.D. Crisp 6213)	1	23	2	1	15	5	20	40	20

cont'd ...

TAXA	A	B	C	D	E	F	G	H	I
Daviesia sp. (M.D. Crisp 6480)	1	0	6	1	7	5	0	0	0
Daviesia sp. (M.D. Crisp 5429)	1	2	1	1	1	8	0	50	0
Daviesia sp. (S.D. Hopper 4829)	1	0	6	1	4	2	100	0	0
Diplolaena ferruginea	3	23	3	0	15	16	6	31	6
Dryandra aff. *armata* (A.S. George 16787)	1	0	1	1	7	2	0	0	0
Dryandra carlinoides	3	3	7	0	1245	89	10	1	1
Dryandra aff. *conferta* (E.A. Griffin s.n.)	2	0	7	0	14	30	20	0	0
Dryandra aff. *falcata* (E.A. Griffin 3489)	2	3	7	1	14	50	20	2	2
Dryandra aff. *frazeri* (J.S. Beard 7275)	2	0	1	1	17	8	0	0	0
Dryandra aff. *hewardiana* (A.S. George 16789)	1	0	1	1	7	11	0	0	0
Dryandra kippistiana	3	0	7	0	1457	51	18	0	0
Dryandra nana	2	2	7	0	1	28	7	4	0
Dryandra aff. *patens* (E.A. Griffin 1507)	2	3	7	1	1457	22	18	9	9
Dryandra aff. *polycephala* (E.A. Griffin 4945)	2	0	1	0	47	16	6	0	0
Dryandra aff. *pteridifolia* (E.A. Griffin 3475)	2	0	7	0	14	5	40	0	0
Dryandra sclerophylla	1	23	7	0	14	35	22	14	3
Dryandra aff. *sclerophylla* (A.S. George 16866)	1	0	1	1	4	1	0	0	0
Dryandra serratuloides	2	0	6	0	17	6	0	0	0
Dryandra shuttleworthiana	3	23	7	0	1245	18	8	2	1
Dryandra subulata	2	0	3	0	14	13	30	0	0
Dryandra tortifolia	2	3	3	0	15	7	14	14	14
Dryandra tridentata	2	2	7	0	12345	13	15	15	0
Dryandra sp. (E.A. Griffin 3453)	1	0	1	1	14	2	0	0	0
Dryandra sp. (R.D. Royce 9625)	1	0	1	1	14	2	100	0	0
Eremaea beaufortioides	2	0	1	0	15	5	0	0	0
Eremaea aff. *brevifolia* (D. Coates 818 E4/2)	1	0	2	1	145	5	40	0	0
Eremaea aff. *brevifolia* (D. Coates MI 175.5)	2	0	2	1	15	4	25	0	0
Eremaea aff. *paucifolia* (D. Coates 687)	1	0	1	1	7	1	0	0	0
Eremaea aff. *paucifolia* (D. Coates WAT2)	1	0	2	1	7	1	100	0	0
Eremaea aff. *violacea* (D. Coates WI 3/4/88)	1	0	1	1	47	2	0	0	0
Eremaea aff. violacea (E.A. Griffin 1557)	2	0	3	1	14	8	25	0	0
Eremophila microtheca ssp. (S.D. Hopper 2478)	1	0	6	1	3	1	100	0	0
Eriostemon pinoides	2	2	7	0	145	13	15	8	0
Eucalyptus aff. *accedens* (M.I.H. Brooker 8823)	1	0	6	1	1	1	0	0	0
Eucalyptus carnabyi	2	0	5	0	14	4	0	0	0
Eucalyptus foecunda ssp. (M.I.H. Brooker 9556)	1	0	2	1	3	2	100	0	0
Eucalyptus aff. *haematoxylon* (E.A. Griffin 2481)	1	23	1	1	1	7	0	100	43
Eucalyptus johnsoniana	1	0	6	0	15	12	58	0	0
Eucalyptus lateritica	1	23	6	0	1	13	0	62	23
Eucalyptus macrocarpa ssp. (S.D. Hopper 3121)	2	0	5	1	1245	37	3	0	0
Eucalyptus pendens	2	0	5	0	1	22	13	0	0
Eucalyptus suberea	1	23	6	0	1	11	0	73	27
Eucalyptus sp. (M.I.H. Brooker 9740)	2	0	2	1	147	2	0	0	0
Eucalyptus sp. (M.I.H. Brooker 9026)	1	0	6	1	1	2	0	0	0
Eucalyptus sp. (M.I.H. Brooker s.n.)	1	0	1	1	4	1	0	0	0
Eucalyptus sp. (M.I.H. Brooker 9025)	1	0	6	1	1	1	100	0	0
Eucalyptus sp. (S.D. Hopper 2764)	3	0	1	1	1	4	0	0	0
Eucalyptus sp. (M.I.H. Brooker 9744)	1	0	6	1	1	1	0	0	0
Eucalyptus sp. (M.I.H. Brooker 9736)	1	0	6	1	1	2	0	0	0
Eucalyptus sp. (M.I.H. Brooker 8734)	2	0	6	1	7	2	50	0	0
Eucalyptus sp. (M.I.H. Brooker 8634)	1	0	3	1	3	8	63	0	0
Eucalyptus wandoo ssp. (M.I.H., Brooker 9885 and C. Souness)	2	23	7	1	1247	11	0	27	9

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TAXA	A	B	C	D	E	F	G	H	I
Eucalyptus aff. *wandoo* (M.I.H. Brooker 9205)	2	0	6	1	1	3	30	0	0
Gastrolobium appressum	1	0	6	0	7	11	0	0	0
Gastrolobium bidens	2	23	7	0	124	30	0	27	7
Gompholobium aff. *aristatum* (B.R. Maslin 1427)	1	0	1	1	7	3	0	0	0
Gompholobium eatoniae	1	0	2	0	47	3	33	0	0
Gompholobium aff. *polymorphum* (E.A. Griffin 2306)	1	23	1	1	1	3	0	100	33
Goodenia xanthotricha	1	2	1	0	13	2	0	50	0
Grevillea acrobotrya ssp. *uniforma*	1	23	2	0	1	6	0	50	17
Grevillea aff. *bipinnatifida* (S.D. Hopper 6333)	1	0	2	1	1	1	0	0	0
Grevillea aff. *hookeriana* (S.D. Hopper 6350)	1	0	6	1	1	3	0	0	0
Grevillea leptopoda	1	0	1	0	7	1	0	0	0
Grevillea makinsonii	1	0	1	0	1	2	0	0	0
Grevillea murex	1	0	1	0	7	1	0	0	0
Grevillea olivacea	1	1	5	0	35	9	44	44	0
Grevillea rudis	2	2	7	0	145	19	26	5	0
Grevillea saccata	2	0	6	0	14	13	0	0	0
Grevillea thelemanniana ssp. *delta*	1	23	1	0	1	2	0	100	0
Grevillea thrysoides	2	0	1	0	1247	6	0	0	0
Guichenotia sp. (E.A. Griffin 858)	2	2	2	1	1235	6	16	33	0
Haemodorum loratum	2	23	7	0	15	5	0	40	20
Haemodorum venosum	2	2	7	0	145	13	8	8	0
Hakea auriculata var. *spathulata*	2	23	1	0	14	3	0	66	33
Hakea conchifolia	2	23	7	0	14	5	20	40	20
Hakea erinacea var. *longiflora*	1	23	1	0	1	8	12	63	13
Hakea flabellifolia	2	23	7	0	14	11	27	27	9
Hakea megalosperma	2	23	6	0	14	11	10	54	36
Hakea neurophylla	1	23	5	0	1	10	0	80	20
Haloragis foliosa	1	0	1	0	7	3	66	0	0
Hemiandra gardneri	1	0	6	0	7	6	0	0	0
Hemiandra rutilans	2	0	6	0	147	11	27	0	0
Hemigenia curvifolia	2	23	1	0	147	8	0	38	13
Hensmania stoniella	2	2	2	0	1257	6	0	17	0
Hybanthus aff. *floribundus* (E.A. Griffin s.n.)	2	2	7	1	1357	12	10	8	0
Hypocalymma aff. *angustifolium* (G.J. Keighery 4595)	1	0	2	1	1	1	100	0	0
Hypocalymma aff. *ericifolium* (E.A. Griffin 1972)	1	23	1	1	1	2	0	100	50
Hypocalymma tetrapterum	2	0	2	0	124	5	0	0	0
Hypocalymma aff. tetrapterum (G.J. Keighery 5151)	1	0	2	1	12	2	0	0	0
Hypocalymma aff. tetrapterum (C.A. Gardner 9014)	1	0	2	0	14	2	0	0	0
Hypocalymma xanthopetalum ssp.(C.A. Gardner 9096)	1	2	2	1	13	3	0	67	0
Hypocalymma aff. *xanthopetalum* (E.A. Griffin 1524)	1	0	2	1	14	5	20	0	0
Isopogon adenanthoides	3	23	3	0	125	26	0	15	4
Isopogon tridens	2	2	3	0	145	12	33	8	0
Jacksonia carduacea	2	0	3	0	147	7	42	0	0
Jacksonia eremodendron	2	0	2	0	7	8	0	0	0
Kunzea sp. (D.J.E. Whibley 4887)	1	0	1	0	7	2	0	0	0
Lasiopetalum drummondii	2	2	7	0	1357	21	38	14	0
Lasiopetalum lineare	2	2	3	0	1245	7	42	14	0
Lasiopetalum aff. *membranaceum* (Stoate s.n.)	1	0	1	1	1	2	0	0	0
Lasiopetalum aff. *oldfieldii* (Reid 101)	1	0	1	1	7	1	0	0	0
Lechenaultia juncea	2	0	1	0	7	3	0	0	0
Lepidobolus sp. (B. Briggs 7770)	1	0	1	1	7	2	0	0	0
Lepidobolus (sp. E.A. Griffin 2093)	2	23	3	1	145	11	0	27	9
Leucopogon obtectus	1	0	6	0	5	11	27	0	0

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TAXA	A	B	C	D	E	F	G	H	I
Leucopogon oliganthus	2	0	3	0	124	4	50	0	0
Leucopogon phyllostachys	2	0	3	0	147	6	83	0	0
Leucopogon plumuliflorus	1	23	1	0	1	6	0	100	16
Loxocarya sp. (B. Briggs 7498 & L. Johnson)	2	0	1	1	15	4	0	0	0
Loxocarya aff. *jasiculata* (B. Briggs 6319)	3	0	1	1	1	2	50	0	0
Loxocarya ssp. (B. Briggs 7481)	2	2	2	1	15	4	0	25	0
Macarthuria aff. *georgeana* (B. J. Banyard 517)	1	0	1	1	1	2	0	0	0
Macropidia fuliginosa	3	23	5	0	14	16	6	31	6
Menkea draboides	3	0	1	0	1	1	100	0	0
Mesomelaena stygia ssp. *deflexa*	2	0	1	0	15	2	50	0	0
Myriocephalus suffruticosus	1	0	1	0	14	2	0	0	0
Olax scalariformis	3	2	1	0	125	6	17	17	0
Oxylobium reticulatum var. *gracile*	2	23	2	0	1	6	16	32	16
Paracaleana sp. (E.A. Griffin 2625)	1	0	2	1	15	2	50	0	0
Patersonia argyrea	1	23	1	0	1	3	0	66	33
Patersonia spiralifolia	1	0	2	0	1	3	33	0	0
Persoonia rudis	1	23	1	0	1	3	0	100	33
Petrophile biternata	2	0	2	0	1	3	0	0	0
Petrophile chrysantha	2	23	7	0	1457	24	17	21	4
Petrophile inconspicua	2	23	7	0	145	23	17	30	4
Petrophile sp. (E.A. Griffin 5464)	1	0	2	1	4	1	100	0	0
Phlebocarya filifolia	2	23	3	0	13	13	23	23	8
Phlebocarya pilosissima ssp. *pilosissima*	2	3	3	0	1	13	15	8	0
Phlebocarya pilosissima ssp. *teretifolia*	1	2	1	0	13	5	0	100	100
Physopsis spicata	2	0	2	0	14	13	8	0	0
Pityrodia viscida	1	0	1	0	167	3	0	0	0
Platysace dissecta	3	0	4	0	0	0	0	0	0
Regelia megacephala	1	0	1	0	7	5	0	0	0
Restio sp. (B. Briggs 7738)	1	0	2	1	14	5	20	0	0
Restio sp. (B. Briggs 850)	2	0	3	1	14	1	0	0	0
Restio sp. (B. Briggs 6308)	3	23	3	1	123	5	20	40	20
Restio sp. (B. Briggs 7473 & L. Johnson)	1	2	1	1	1	1	0	100	0
Restionaceae Genus aff. *Ecdeiocolea* (E.A. Griffin 2157)	1	23	3	1	1	7	28	43	14
Scaevola sp. (H. Demarz 985)	1	0	1	1	5	1	0	0	0
Schoenus aff. *indutus* (E.A. Griffin 3842)	1	0	2	1	15	4	25	0	0
Schoenus aff. *obtusifolius* (E.A. Griffin 3841)	3	0	2	1	5	2	50	0	0
Scholtzia teretifolia	2	0	3	0	14	8	37	0	0
Sphaerolobium macranthum var. *pulchellum*	2	0	3	0	145	11	18	0	0
Spirogardnera rubescens	2	0	6	0	1	4	25	0	0
Stawellia dimorphantha	1	0	6	0	5	2	0	0	0
Strangea cynanchocarpa	2	23	7	0	15	23	9	39	13
Stylidium aeonioides	1	23	2	0	1	6	16	83	17
Stylidium aff. *bulbiferum* (A.H. Burbidge 2100)	2	0	3	1	14	9	0	0	0
Stylidium inversiflorum	1	2	5	0	12	10	20	20	0
Stylidium maitlandianum	2	3	3	0	1245	15	20	7	7
Stylidium nonscandens	1	0	2	0	14	5	40	0	0
Stylidium pseudocaespitosum	1	0	1	0	3	1	0	0	0
Stylidium aff. *repens* (A.S. George 2341)	3	2	7	1	125	30	9	7	0
Tetratheca remota	1	23	1	0	1	2	0	50	0

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TAXA	A	B	C	D	E	F	G	H	I
Thelymitra stellata	3	23	6	0	1	11	0	36	36
Thelymitra variegata var. *apiculata*	2	23	5	0	1	8	0	38	25
Thomasia formosa	1	0	1	0	7	2	0	0	0
Thysanotus aff. *sparteus* (E.A. Griffin 2511)	1	23	2	1	1	3	0	66	33
Thysanotus anceps	3	2	1	0	1	3	0	67	0
Thelymitra variegata var. *apiculata*	2	23	5	0	1	8	0	38	25
Thomasia formosa	1	0	1	0	7	2	0	0	0
Thysanotus spinigera	2	0	2	0	145	10	30	0	0
Thysanotus vernalis	1	23	2	0	12	4	0	75	25
Tricoryne aff. *humilis* (E.A. Griffin 1451)	2	2	2	1	123	3	0	33	0
Trymalium aff. *wichurae* (E.A. Griffin 2234)	1	23	7	1	12	4	0	50	25
Verticordia aff. *acerosa* (A.S. George 16351 & E.A. Berndt)	2	0	7	1	0	0	0	0	0
Verticordia aff. *chrysostachys* (F. Lullfitz 1934)	1	0	7	1	0	0	0	0	0
Verticordia aff. *chrysantha* (A.S. George 16318 & E.A. Berndt)	1	0	7	1	0	0	0	0	0
Verticordia aff. *chrysantha* (A.S. George 7856)	3	0	7	1	0	0	0	0	0
Verticordia aff. *grandiflora* (A.S. George 16315 & E.A. Berndt)	2	0	7	1	0	0	0	0	0
Verticordia grandis	3	23	7	0	14567	0	0	0	0
Verticordia insignus ssp.(A.S. George 16871 & E.A. George)	2	0	7	0	0	0	0	0	0
Verticordia aff. *muelleriana* (B. Barnsley 892)	1	0	7	1	0	0	0	0	0
Verticordia muelleriana ssp. *muelleriana*	2	0	7	0	0	0	0	0	0
Verticordia aff. *nitens* (A.S. George 12932)	1	0	7	1	0	0	0	0	0
Verticordia patens	2	0	7	0	147	0	0	0	0
Verticordia aff. *pennigera* (M. Morgan 15A)	2	0	7	1	0	0	0	0	0
Verticordia aff. *pennicillaris* (C. Chapman 52C)	1	0	7	1	0	0	0	0	0
Verticordia spicata ssp. (C. Chapman 42)	1	0	7	1	0	0	0	0	0
Verticordia sp. (A.S. George 16361 & E.A. Berndt)	1	0	7	1	0	0	0	0	0
Verticordia sp. (A.S. George 3219)	1	0	7	1	0	0	0	0	0
Walteranthus erectus	1	1	3	0	3	5	40	20	0
Xanthosia tomentosa	1	23	1	0	12	15	0	67	13