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STUDIES IN THE GENUS *DRYANDRA* R. BR. (PROTEACEAE) 1. SPECIES DISTRIBUTION, ECOLOGY AND CONSERVATION STATUS.

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ABSTRACT

Distribution maps for each of the 66 known species of Dryandra, *including 10 that are undescribed, are presented, together with brief notes on their morphology, habitat, flowering period and conservation status.*

All of the species are restricted to south-western Australia, and isoflor diagrams show two nodes of high species richness, near Eneabba and around the Stirling Range, with a narrow band of moderate species richness between the two. The species rich areas fall within the 400 to 600 mm annual rainfall zone, where they seem to be closely correlated with extensive areas of kwongan or sclerophyllous shrublands. Several apparently undercollected areas were highlighted in the course of the study.

Dryandra polycephala, D. serratuloides, D. squarrosa *and* D. *sp. A are considered to be endangered of being depleted in the wild state, while an additional 17 species have a vulnerable status.* D. formosa *and* D. polycephala *are the most heavily commercially exploited species with a further four species exploited to a lesser degree. Thirteen species are either not represented in conservation areas at all, or are in conservation reserves for only a part of their distribution ranges.*

INTRODUCTION

There are currently 56 recognised named species in the genus *Dryandra*, (Green 1981), and a further 10 recognisable unnamed species referred to as *D.* sp. A to J in this paper. The genus is endemic in south-western Australia. The plants are mostly low sclerophyllous perennial shrubs, although at least three species, viz. *D. arborea, D. praemorsa* and *D. sessilis*, attain the stature of small trees. Diels (1906) recognised the frequent occurrence of *Dryandra* in his "sklerophyll gëbusche", and more recent studies have shown them to be important components of some kwongan, or sclerophyllous shrubland communities, in terms of physiognomy (e.g. Beard 1976, 1979) and floristics (e.g. Griffin et al. 1983, Brown and Hopkins 1983).

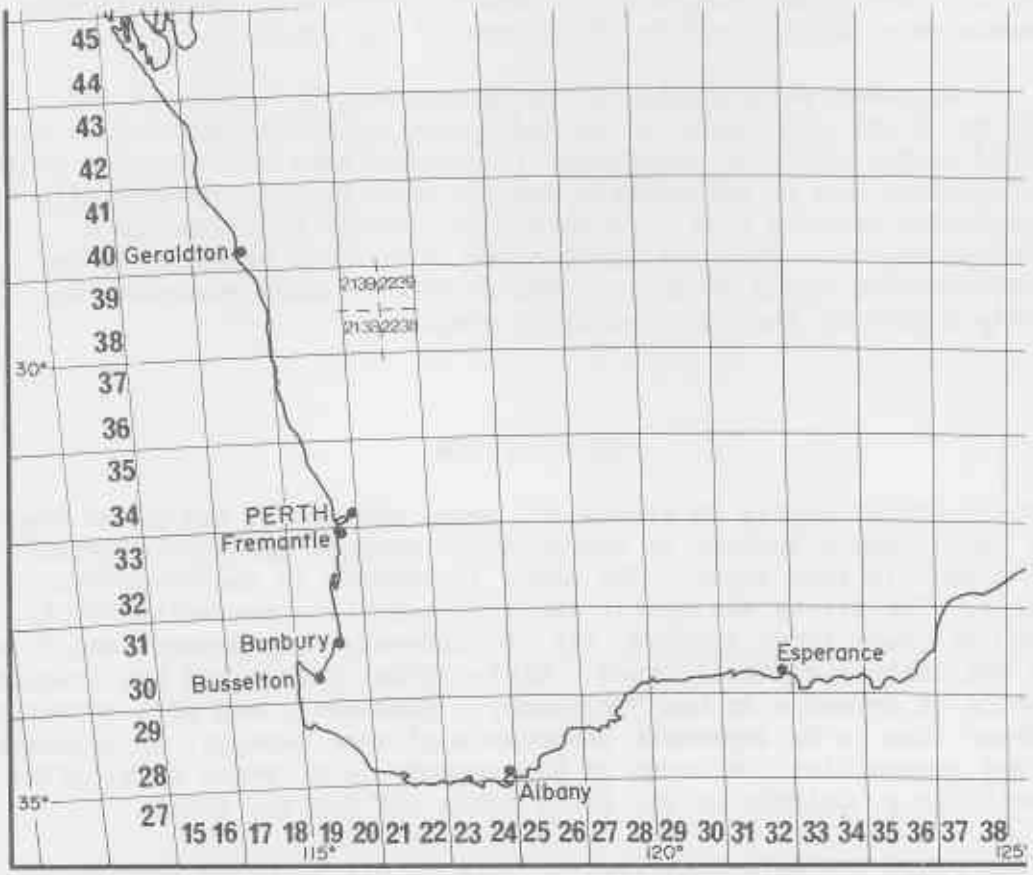
This paper presents distribution data on all 66 known species of *Dryandra*, together with brief notes on their morphology, ecology and conservation status. The distribution of *Dryandra* in relation to climate, soils and phytogeography will be presented in a separate paper elsewhere.

METHODS

The data presented were obtained principally from plant material, and from information on herbarium sheets, of specimens housed in the Western Australian Herbarium (PERTH), although specimens at the herbaria of the Botany Department, University of Western Australia and of King's Park and Botanic Garden were also examined. Species were identified by matching them with type specimens held in PERTH, and with designated specimens which had been matched by A.S. George with type specimens in other herbaria. Recognisable, but undescribed, species were included in the study.

All published *Dryandra* names were investigated, using literature available in PERTH, although synonyms are not listed here. Names given by Green (1981) as *D. sessilis* and *D. ferruginea* were referred to as *D. floribunda* and *D. runcinata* respectively by Blackall and Grieve (1954): *D. drummondii* Meissner, considered by Bentham (1870) to be a synonym of *D. calophylla* R.Br. but now considered to be a distinct species, and *D. arborea*, *D. cyanaroides*, *D. foliosissima*, *D. subpinnatifida* and *D. subulata*, which were described by C.A. Gardner in 1964.

The distribution ranges of all species were mapped using point records of collecting locations. These were plotted in grids of 0.5° latitude by 0.5° longitude dimensions, each grid being numbered as shown in Map 1. The grid cells of approximately 55 x 45 km size compares favourably with the 'optimal' size of 96 x 96 km suggested by Phipps and Cullen (1976) for biogeographical studies.



Map 1. Numbered cells for 1/2° x 1/2° grids (from Division of National Mapping 1:100,000 topographic map series).

RESULTS AND DISCUSSION

Two isoflor diagrams to show distribution patterns of the genus were generated from two data sets. Map 2 was based on herbarium data only while Map 3 incorporated additional observations made in the field by the author and K.R. Newbey, and also included conservatively inferred presences when there appeared to be unrealistic gaps in distribution patterns. Thus the isoflor diagram in Map 3 was an attempt by the author to depict the distribution pattern of the genus as it might have been with more intensive collecting.

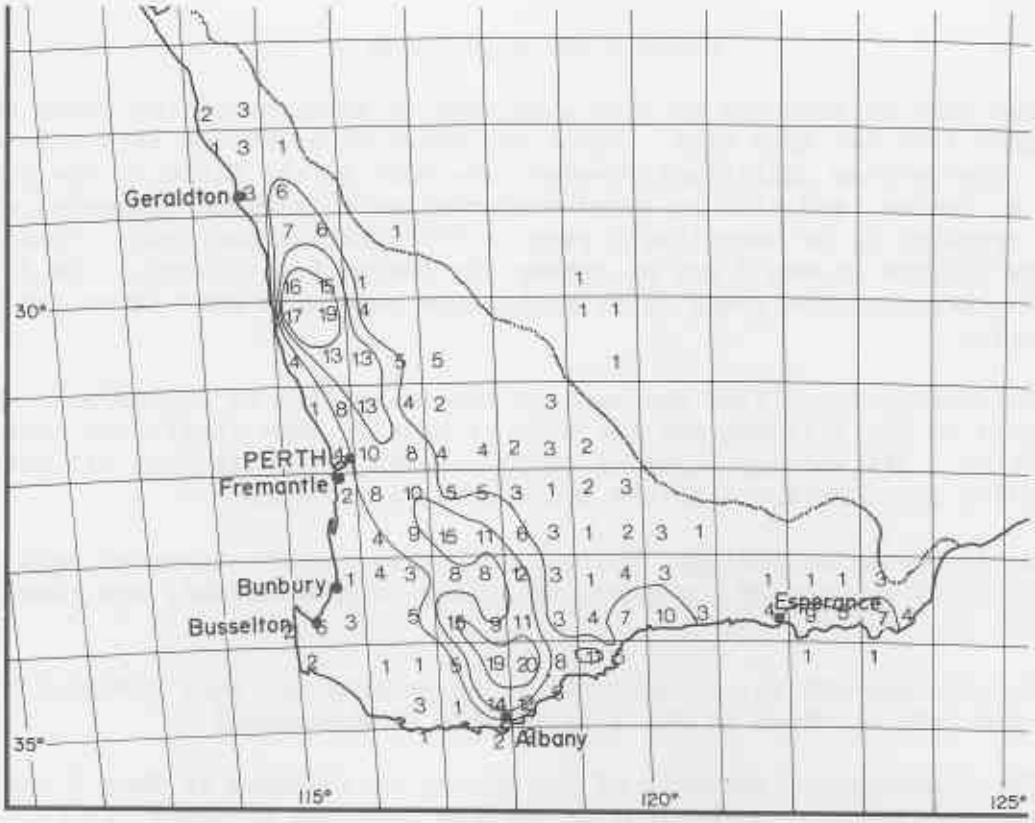
Collecting localities for each of the 66 species of *Dryandra* are shown in Maps 4 to 27, although for the sake of clarity some localities have had to be omitted. All species occur in south-western Australia, and all but *D. arborea* are restricted to the South-western province.

Notes on the morphology, ecology and conservation status of each of the 66 recognised species of *Dryandra*, including 10 undescribed, are given in Appendix 1.

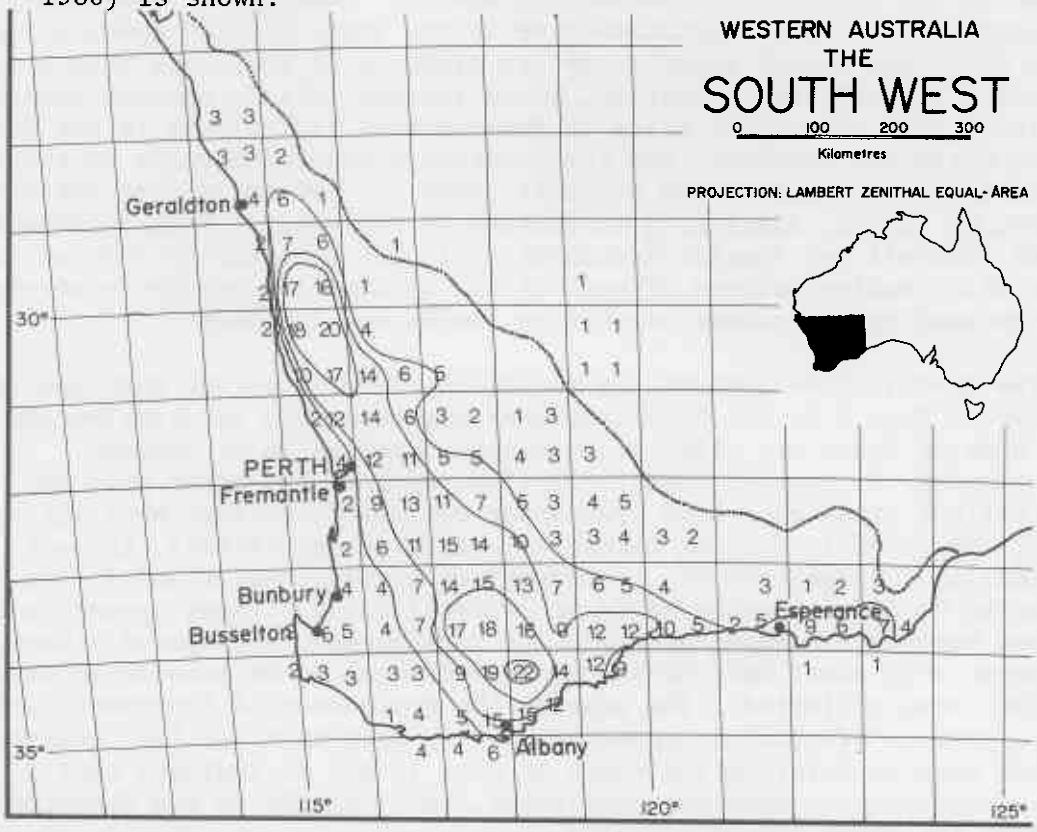
Species present in, or inferred to be present in, each numbered 0.5^{o} x 0.5^{o} grid cell as shown in Map 1 are listed in Appendix 2.

The distribution patterns of the genus, as depicted in Maps 2 and 3, appear to be similar to the isoflor diagram provided by Speck (1958), although detailed comparisons between the sets were not made. There are two nodes of high species richness, where the number of species per grid cell exceeds 20; one near Eneabba and the other around the Stirling Range. Between these nodes is a zone of moderate species richness, where the number of species per grid cell is between 10 and 20. Kwongan, or sclerophyllous shrubland, is the main vegetation type in the areas of high species richness. In the Karri and Jarrah forests species richness is low, less than 5 species per grid. In woodland vegetation, found further inland, species richness is also low. Thus the genus, which is found almost exclusively in the South-western botanical province, has the greatest number of species in the region bounded by the 400 and 600 mm isohyets, with the 300 mm isohyet defining the eastern, or inland, limit of distribution of the genus. This relationship between rainfall and species distribution is not necessarily a direct one, as the distribution pattern of each of the species of *Dryandra* also appears to be related to associated vegetation, soils and landforms.

The distribution patterns of collecting localities for each species, as shown in Maps 4 to 27, highlight many apparent gaps in distribution. While some of these are clear disjunctions, such as in *D. cuneata*, *D. drummondii*, *D. speciosa* and *D. vestita*, many of the other gaps may, in fact, reflect areas that have been under-collected, or that have suffered destruction in early days of naturally occurring populations, through landclearing for agriculture. A comparison between Maps 2 and 3 gives an indication of areas considered to be undercollected. These appear to be greatest between the towns of Wagin and Jerramungup, and around Albany. In both areas only about half of the species thought to be present in each grid cell have been collected. The area to the north-west of Esperance, which shows a paucity of species, could also be an area that has been undercollected. Apparent gaps in distribution shown in Maps 15 and 21 indicate that *D. nivea* and *D. sessilis* have been undercollected, particularly in the forested areas and along the south and west coasts.



Map 2. Isoflor diagram of *Dryandra* based on number of species, from Herbarium collections, in 1/2° x 1/2° grid cells. Contour interval was 5 species. Boundary of South-western botanical province (Beard 1980) is shown.



Map 3. Isoflor diagram as per Map 2 but with additional information from inferred presences in gaps and from reliable field observations.

Most species of *Dryandra*, apart from *D. polycephala*, *D. praemorsa* and *D. squarrosa* which are restricted to woodland or forest, occur in shrubland, particularly kwongan. Of the 62 species that are found in shrubland, 44 species or 71% of the number are restricted to that vegetation type. In woodland or forest associations, in which species of *Dryandra* are present, the shrub stratum is usually closed, or nearly so. *Dryandra* species generally prefer well drained sandy or lateritic gravelly soils, and only rarely occur in poorly drained clayey or calcareous soils.

The main flowering period, for the genus as a whole, is in spring, from August to October, as shown in Figure 1, although some species, such as *D. horrida* and *D. vestita*, have a summer to autumn flowering period.

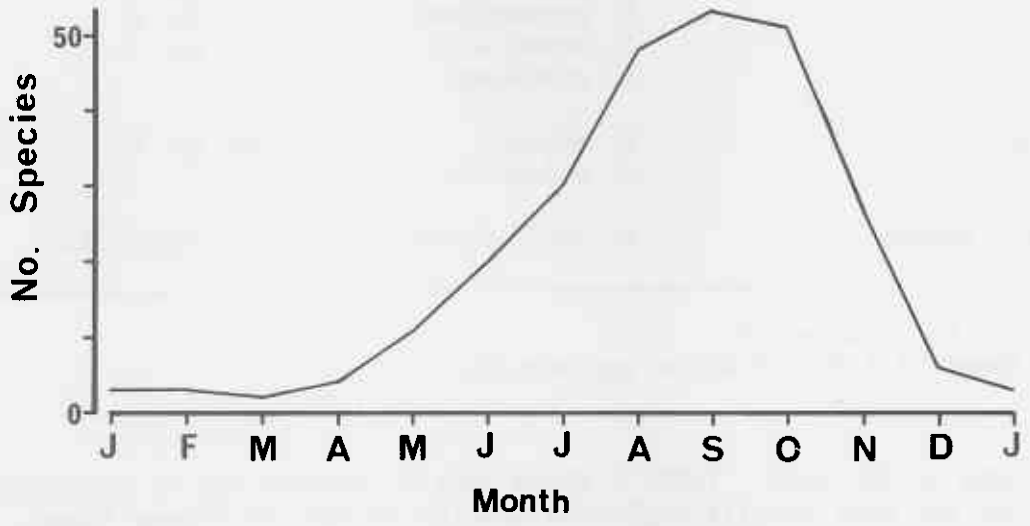


Fig. 1. Apparent number of species flowering per month. Data from Appendix 1.

The assessment of the conservation status of each *Dryandra* species, as shown in Appendix 1, was based upon information obtained from herbarium records, supplemented by additional observations. Table 1 lists species at greatest risk of being depleted in the wild state. They include *D. polycephala*, *D. serratuloides*, *D. squarrosa* and *D.* sp. A, although 26 species, or 39% of the total number, are considered to be under threat, with 17 of these vulnerable. About half of the species under threat are thought to be not represented in conservation reserves, while many others are probably found in conservation reserves for a limited part of their distribution ranges only.

The findings of Rye et al. (1980), together with those of Burgman and Hopper (1982), show that 32 species of *Dryandra*, or 48% of the total number, are being commercially exploited by the wildflower industry, mostly from

Table 1. Summary of species most under threat in the wild. Data from Appendix 1.

Categories of Leigh et al. (1981)*	Species	
X (Extinct)	-	
E (Endangered)	*D. polycephala* +	*D. squarrosa*
	D. serratuloides +	*D.* sp. A +
V (Vulnerable)	*D. arborea* +	*D. stuposa*
	D. cynaroides	*D. subpinnatifida*
	D. horrida +	*D. tridentata*
	D. patens +	*D. vestita*
	D. praemorsa +	*D.* sp. B +
	D. preissii +	*D.* sp. D +
	D. proteoides	*D.* sp. G +
	D. serra +	*D.* sp. J +
	D. speciosa	
R (Rare)	*D. comosa*	*D.* sp. F
	D. pulchella	
K (Poorly known)	*D. foliosissima*	*D. tortifolia*

\+ Species not 'conserved'
* See Appendix 1 for detailed explanation

populations in the wild. Table 2 shows that *D. formosa* and *D. polycephala* are by far the most heavily exploited species in the cut flower trade, followed by *D. quercifolia*, *D. drummondii*, *D. carduacea* and *D. pteridifolia*.

Commercially exploited species, such as *D. arborea*, *D. patens*, *D. polycephala*, *D. praemorsa*, *D. proteoides* and *D. tridentata* are under threat of being depleted in the wild.

Table 2. Commercially exploited species of *Dryandra*. C = Cut flower. N = Nursery stock. S = Seed.

Species	Exploitation			Quantity harvested bunches or stems 1980/81
D. arborea			S	
D. armata			S	
D. ashbyi			S	
D. bipinnatifida			S	
D. calophylla	C		S	
D. carduacea	C		S	>1,000
D. carlinoides			S	
D. cirsioides	C		S	
D. drummondii	C			>10,000
D. falcata	C			
D. formosa	C	N	S	>30,000
D. fraseri			S	
D. hewardiana	C			
D. kippistiana			S	
D. mucronulata			S	
D. nana			S	
D. nivea	C		S	
D. nobilis	C	N	S	
D. obtusa	C			
D. patens			S	
D. plumosa	C			
D. polycephala	C	N	S	>30,000
D. praemorsa		N	S	
D. preissii			S	
D. proteoides			S	
D. pteridifolia	C	N	S	>1,000
D. quercifolia	C	N	S	>12,500
D. sessilis	C	N	S	
D. speciosa		N	S	
D. stuposa	C			
D. tenuifolia	C		S	
D. tridentata			S	

ACKNOWLEDGEMENTS

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REFERENCES

Beard, J.S. (1976). Vegetation Survey of Western Australia. The Vegetation of the Newdegate and Bremer Bay Areas, Western Australia. *Map and Explanatory Memoir, 1:250,000 Series*. Vegmap Publications. Perth.

Beard, J.S. (1979). Vegetation Survey of Western Australia. The Vegetation of the Moora and Hill River Areas, Western Australia. *Map and Explanatory Memoir, 1:250,000 Series*. Vegmap Publications. Perth.

Beard, J.S. (1980). A new phytogeographic map of Western Australia. *W. Austral. Herb. Res. Notes* 3: 37058.

Bentham, G. (1870). *Flora Australiensis* Vol. 5. Reeve. London.

Blackall, W.E. and Grieve, B.J. (1954). *How to Know Western Australian Wildflowers* Part 1. University of Western Australia Press, Perth.

Brown, J.M. and Hopkins, A.J.M. (1983). The kwongan (Sclerophyllous Shrublands) of Tutanning Nature Reserve, Western Australia. *Austral. J. Bot.* 8: 63-73.

Burgman, M.A. and Hopper, S.D. (1982). *The Western Australian Wildflower Industry, 1980-81.* Dept. Fish. Wildl. W. Austral. Report No. 53. Dept. Fish. Wildl., Perth.

Burtt, B.L. (1939). *Notes in Bulletin of Miscellaneous Information.* pp. 183-184. Royal Botanical Gardens, Kew.

Diels, L. (1906). *Die Pflanzenwelt von West-Australien Sudlich des Wendekreises.* Die Vegetation der Erde. Vol. VII. Ed. A. Engler and O. Drude. W. Englemann, Leipzig.

Green, J.W. (1981). *Census of the vascular plants of Western Australia.* Western Australian Herbarium, Department of Agriculture, Perth.

Griffin, E.A., Hopkins, A.J.M. and Hnatiuk, R.J. (1983). Regional Variation in Mediterranean-Type Shrublands near Eneabba, South Western Australia. *Vegetatio* 52: 103-127.

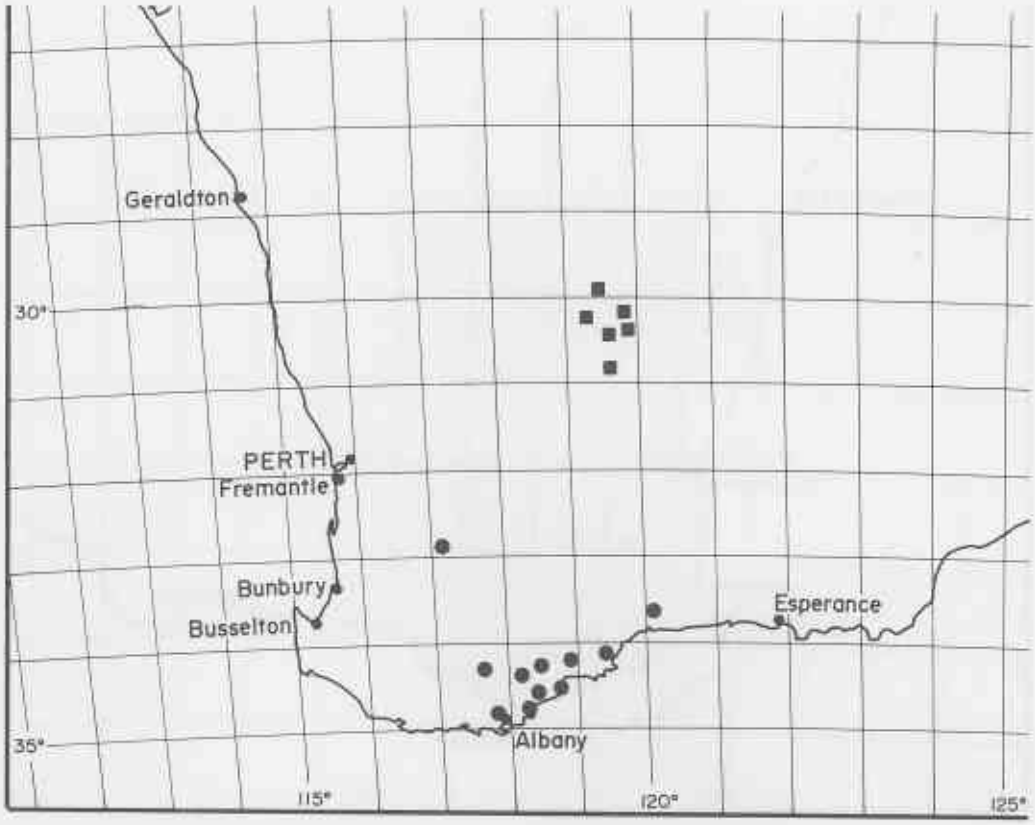
Leigh, J., Briggs, J. and Hartley, W. (1981). *Rare or threatened Australian plants.* Austral. Nat. Parks Wildl. Serv. Special Publication No. 7. 178 pp. Austral. Nat. Parks Wildl. Serv., Canberra.

Marchant, N.G. and Keighery, G.J. (1979). *Poorly Collected and Presumably Rare Vascular Plants of Western Australia.* Kings Park Res. Notes No. 5. 103 pp. Kings Park Board. Perth.

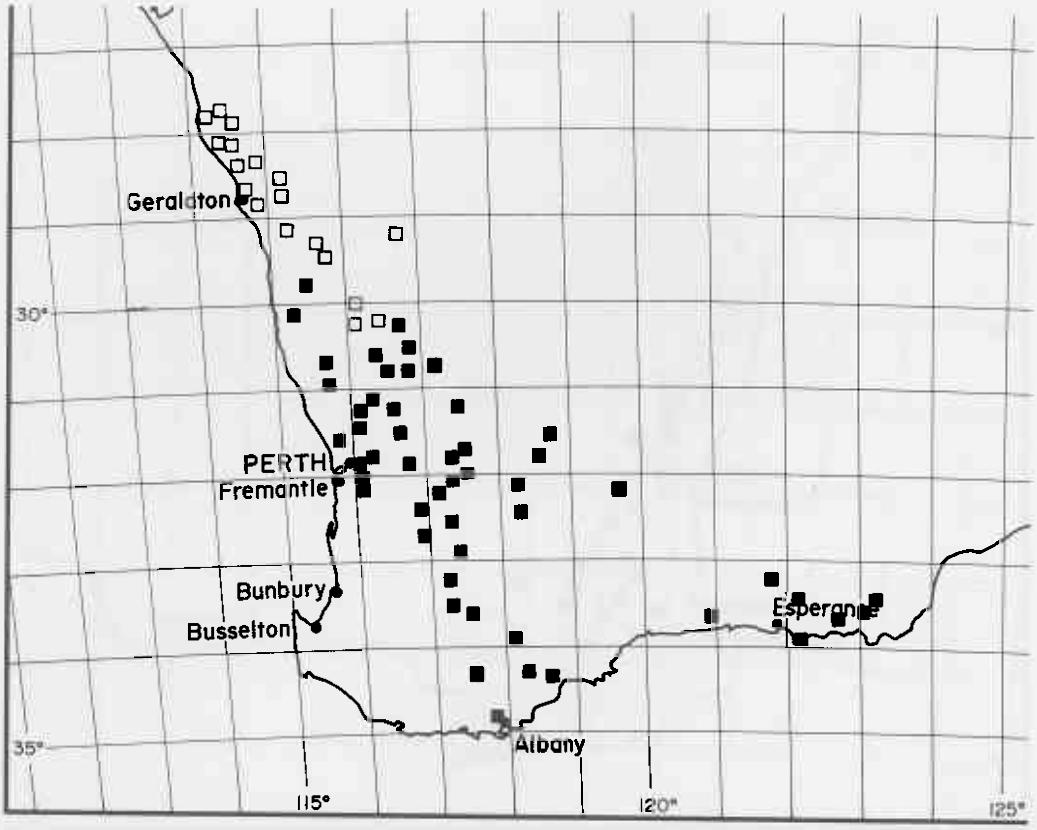
Phipps, J.B. and Cullen, J. (1976). Centres of Diversity Quantified - A maximum variance approach to a biogeographic problem. *Vegetatio* 31: 147-159.

Rye, B.L., Hopper, S.D. and Watson, L.E. (1980). *Commercially exploited vascular plants native in Western Australia: census, atlas and preliminary assessment of conservation status.* Dept. Fish. Wildl., W. Austral. Report No. 40. Dept. Fish. Wildl., Perth.

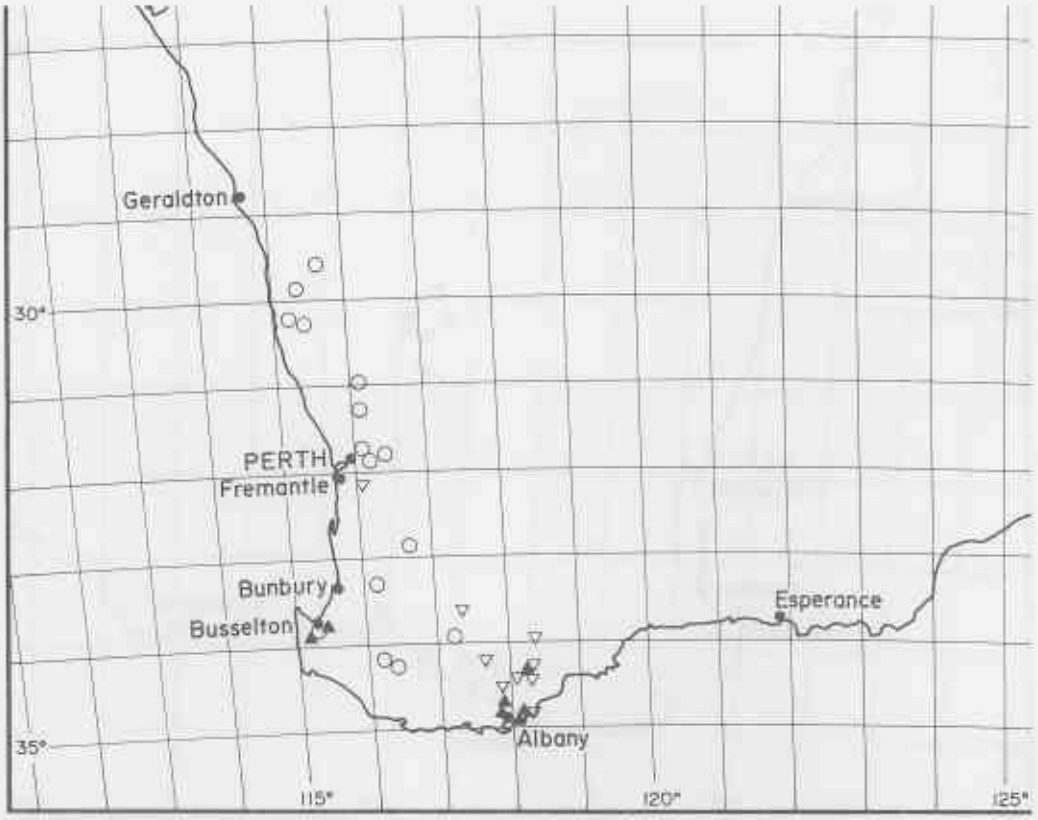
Speck, N.H. (1958). *The Vegetation of the Darling-Irwin Botanical Districts and an Investigation of the Family Proteaceae in South-Western Australia.* Ph.D. Thesis (Botany), University of Western Australia, Perth (unpublished).



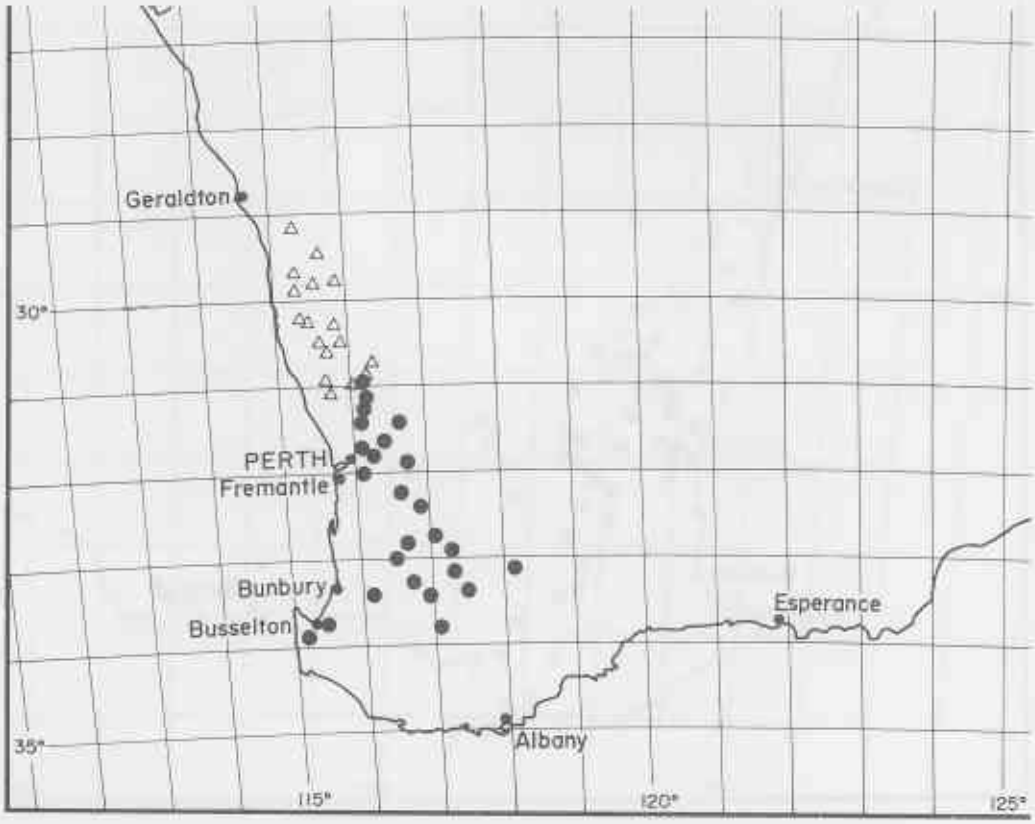
Map 4. *D. arborea* (■), *D. arctotidis* (●).



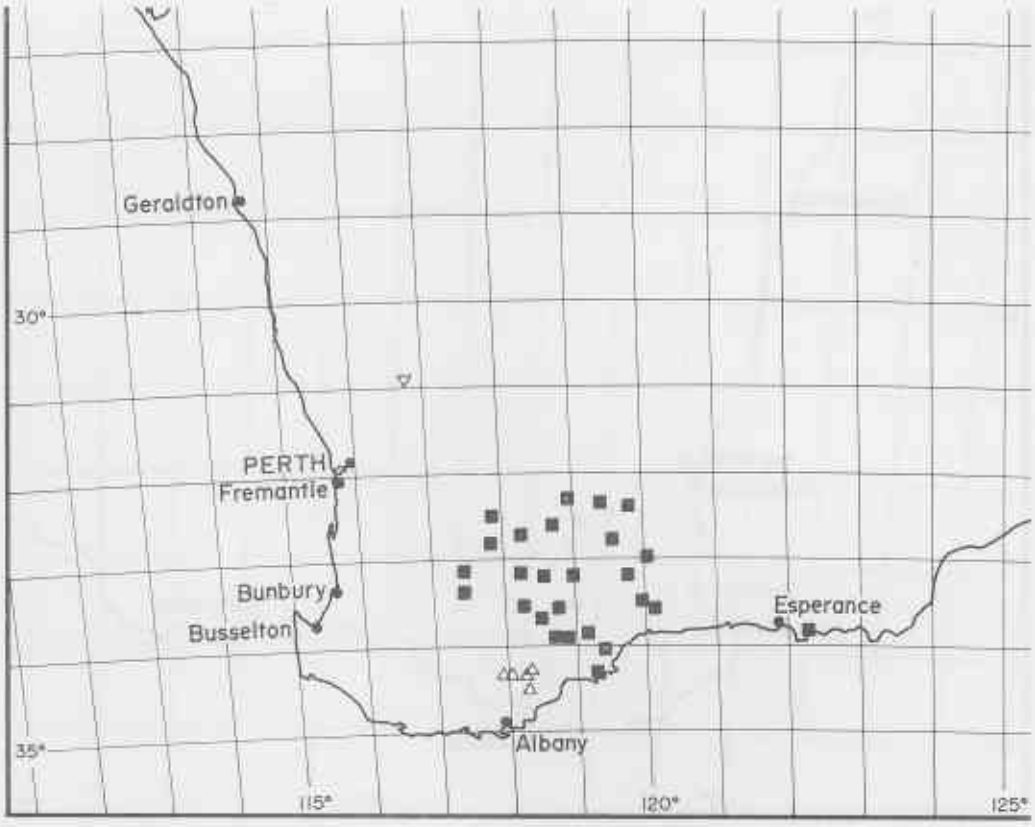
Map 5. *D. armata* (■), *D. ashbyi* (□).



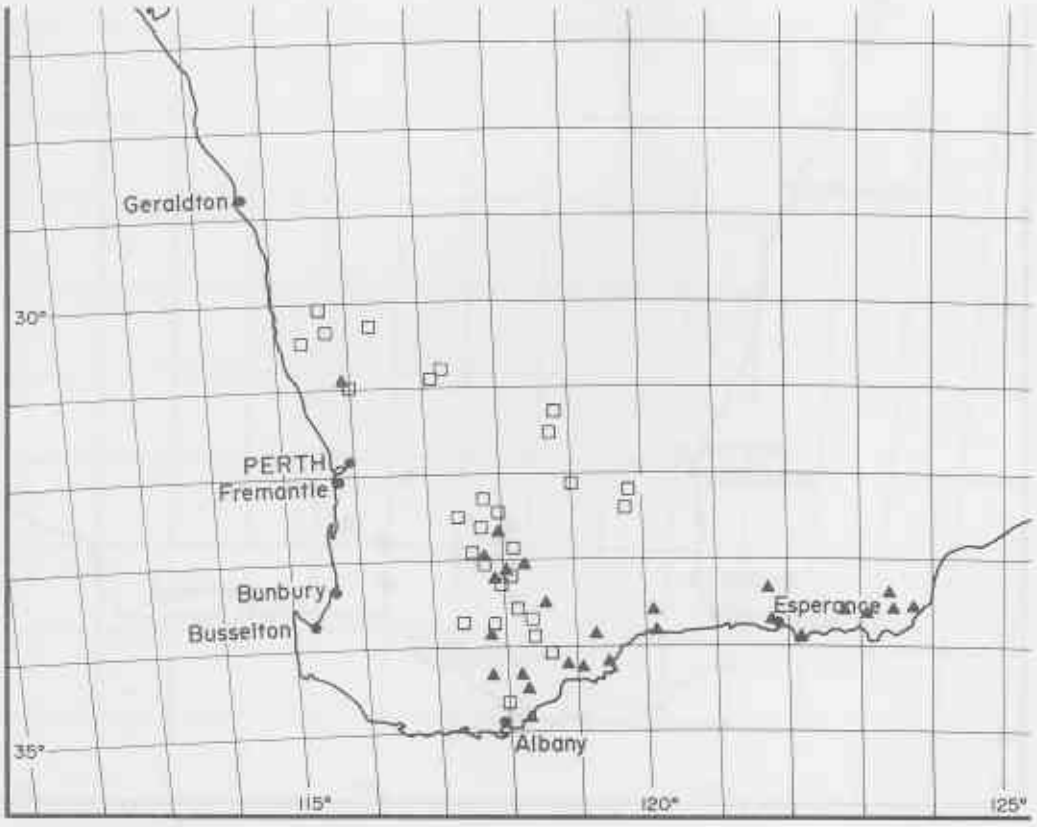
Map 6. *D. baxteri* (▲), *D. bipinnatifida* (○), *D. calophylla* (▽).



Map 7. *D. carduacea* (●), *D. carlinoides* (△).



Map 8. *D. cirsioides* (■), *D. comosa* (▽), *D. concinna* (△).



Map 9. *D. conferta* (□), *D. cuneata* (▲).

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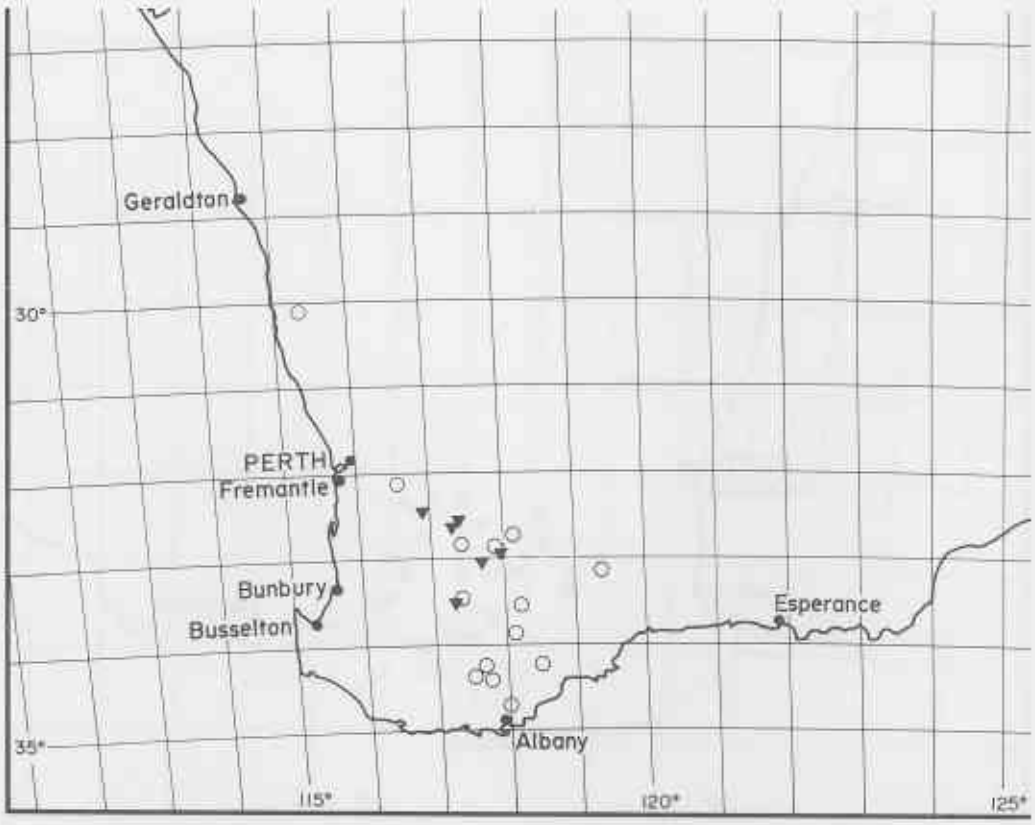
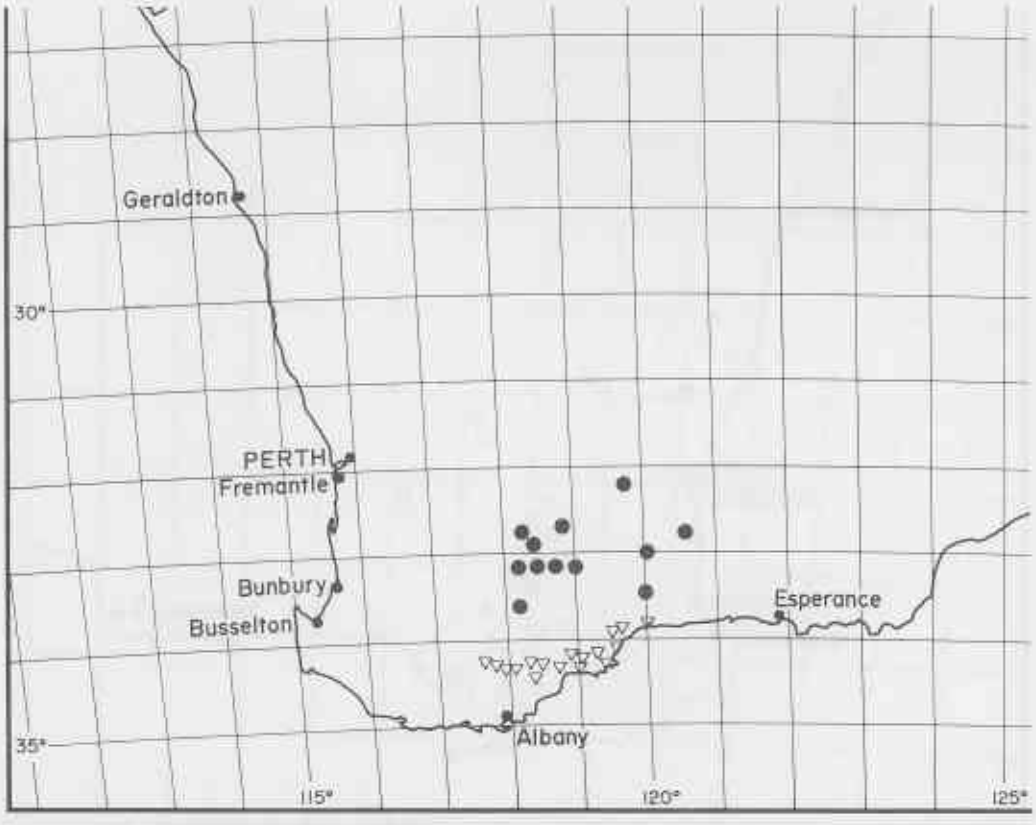
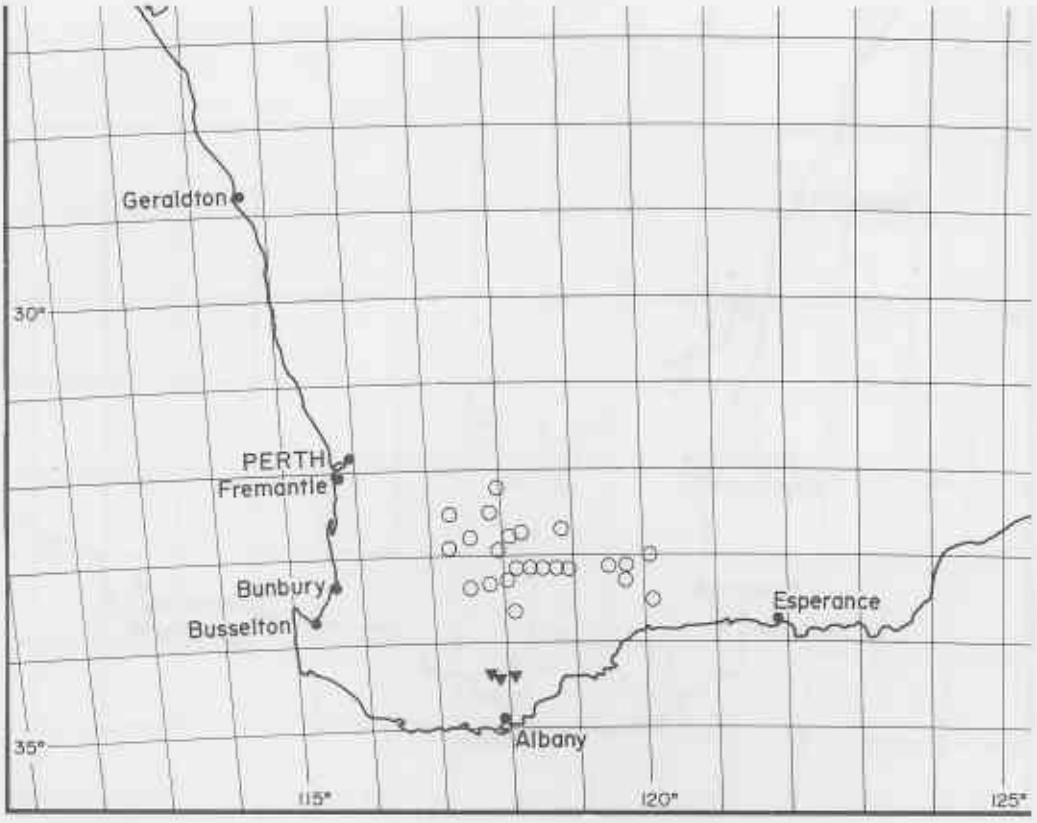


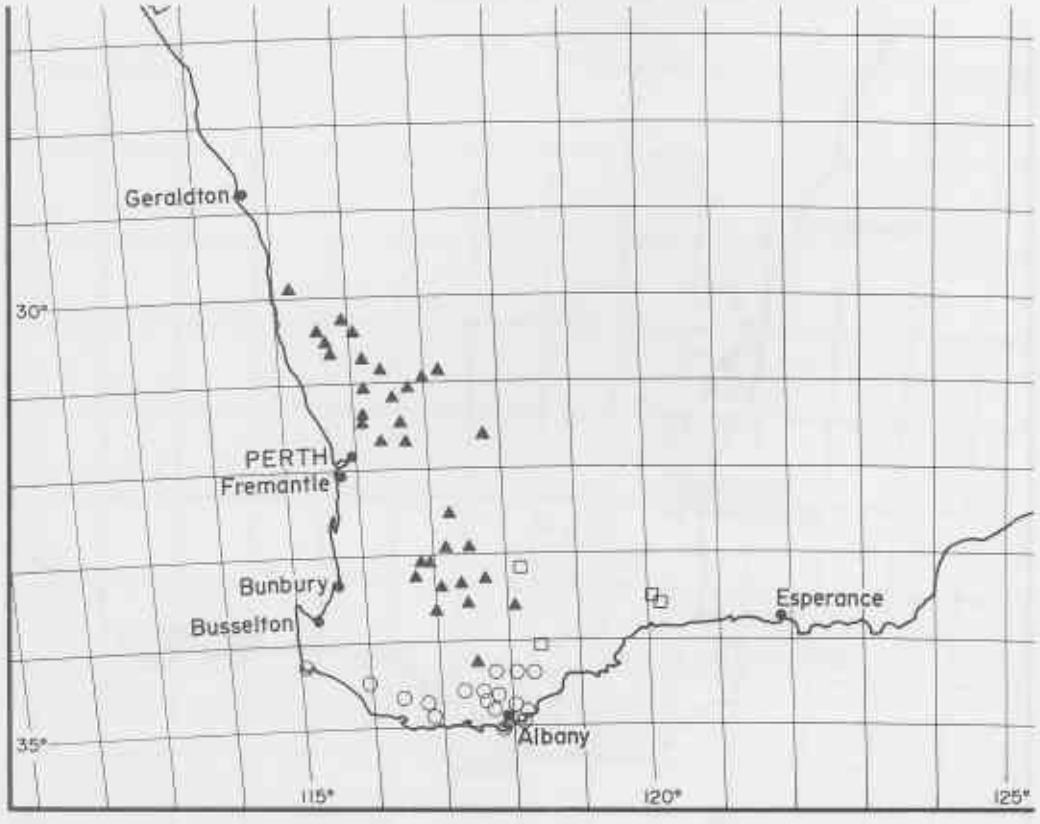
Map 10. *D. cynaroides* (▼), *D. drummondii* (○).



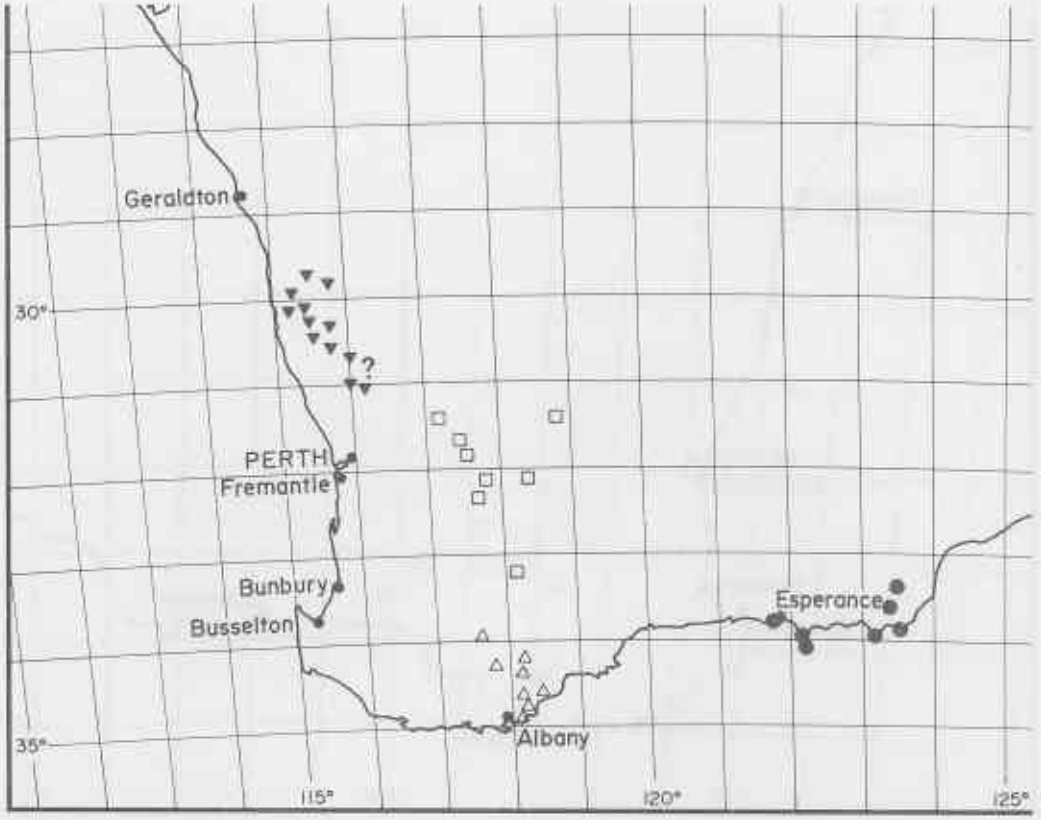
Map 11. *D. erythrocephala* (●), *D. falcata* (▽).



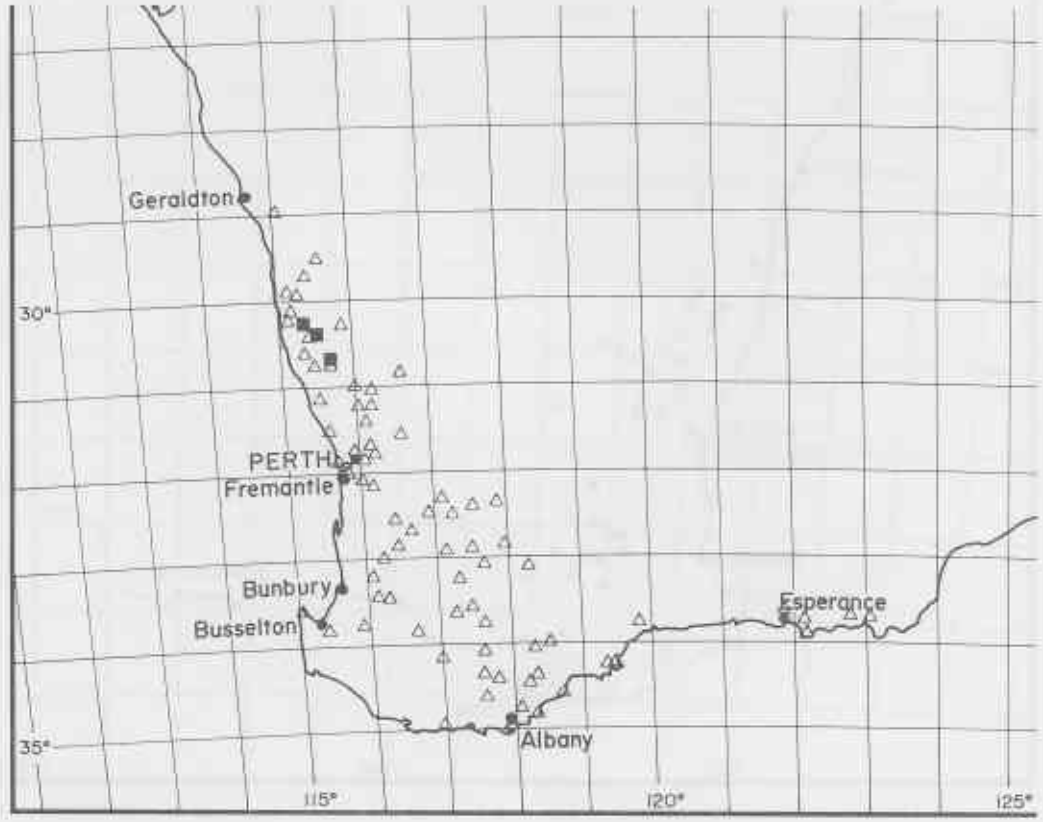
Map 12. *D. ferruginea* (○), *D. foliolata* (▼).



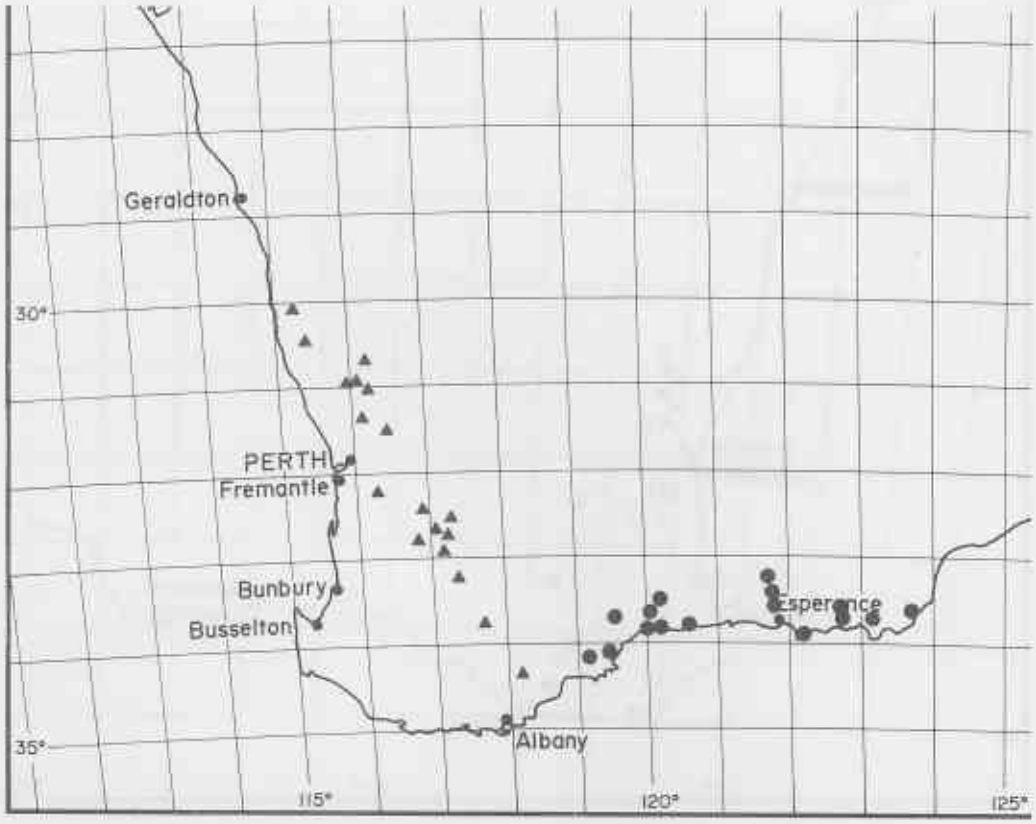
Map 13. *D. foliosissima* (□), *D. formosa* (○), *D. fraseri* (▲).



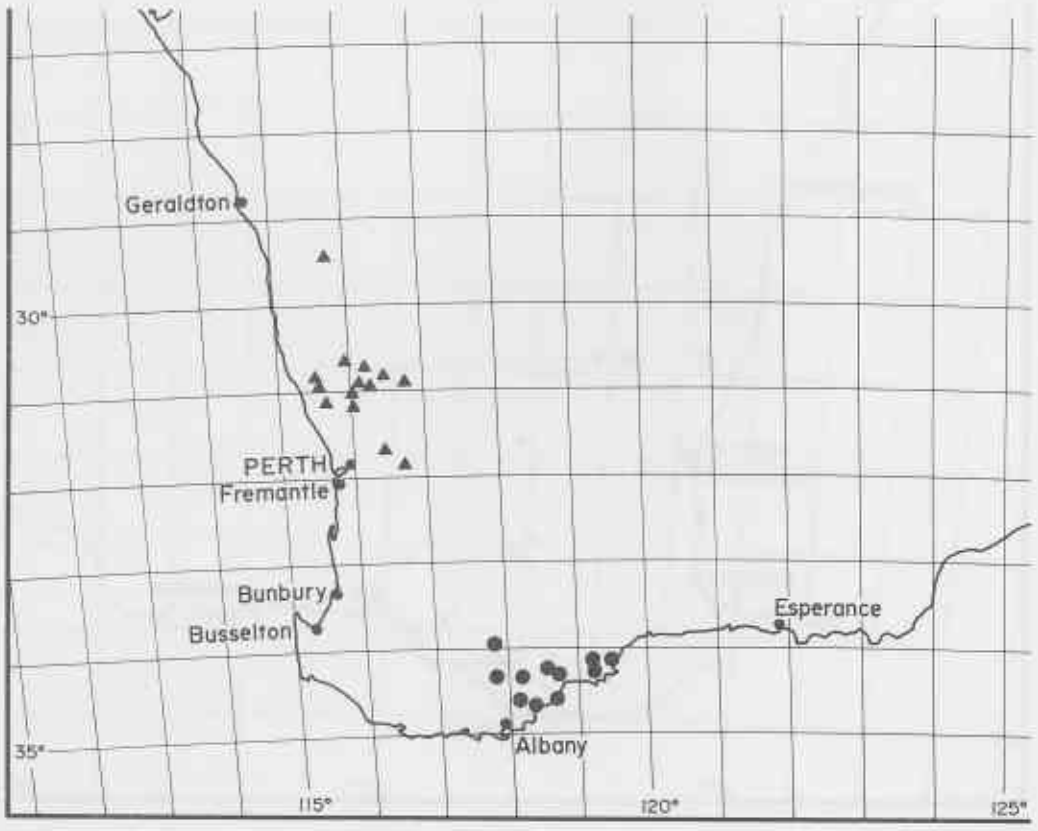
Map 14. *D. hewardiana* (?), *D. horrida* (□), *D. kippistiana* (▼), *D. longifolia* (●), *D. mucronulata* (△).



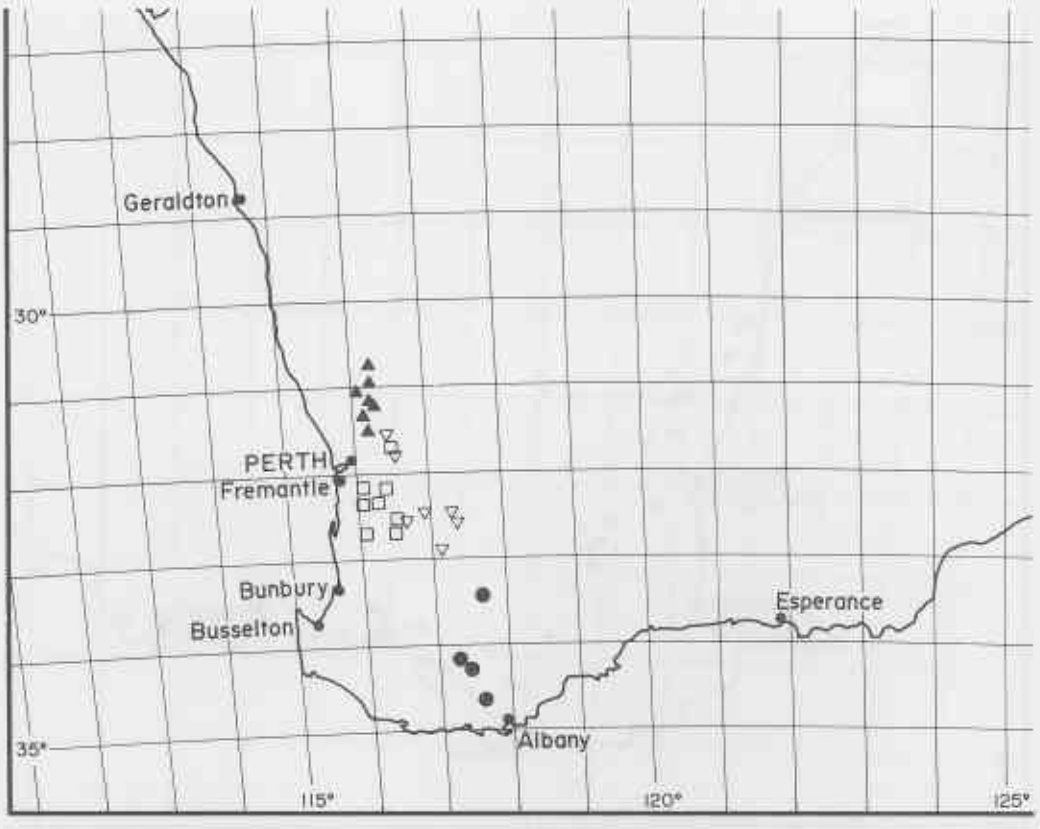
Map 15. *D. nana* (■), *D. nivea* (△).



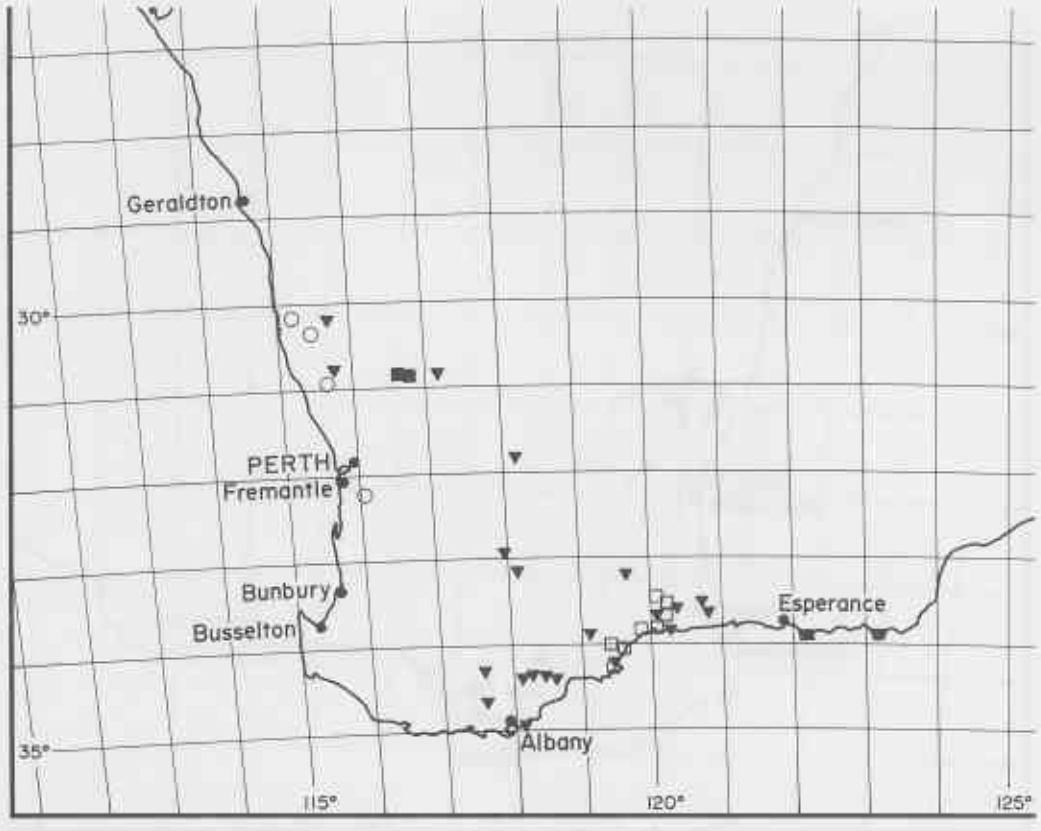
Map 16. *D. nobilis* (▲), *D. obtusa* (●).



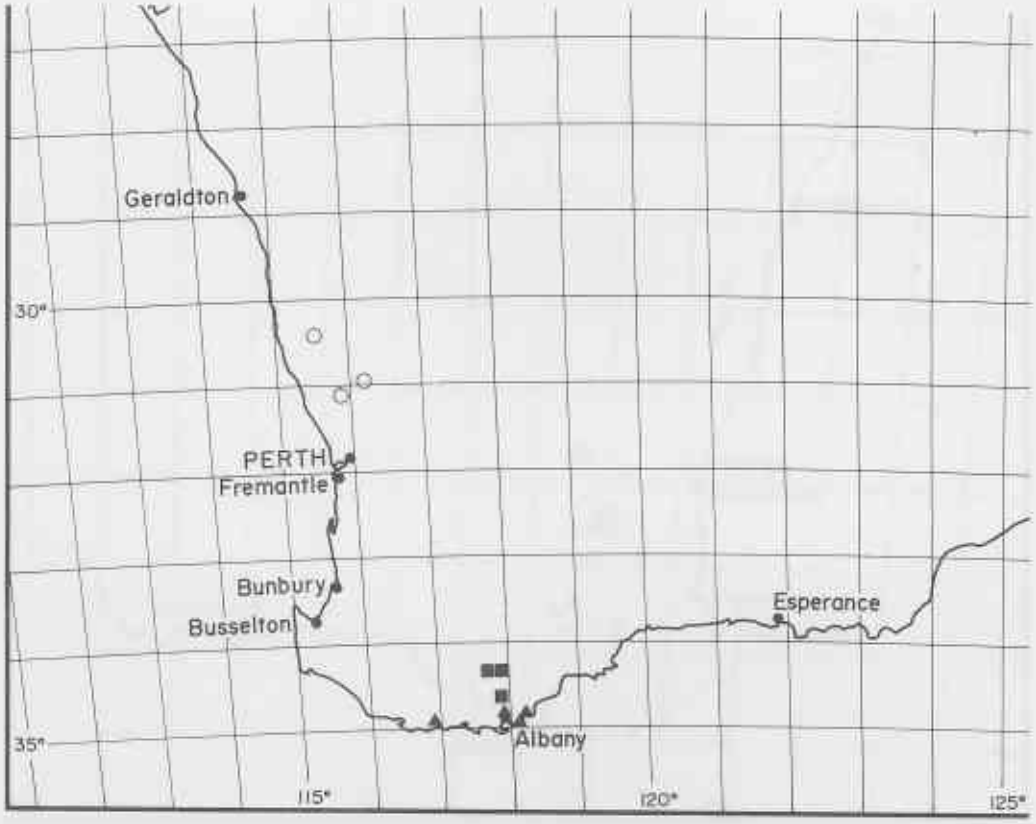
Map 17. *D. patens* (▲), *D. plumosa* (●).



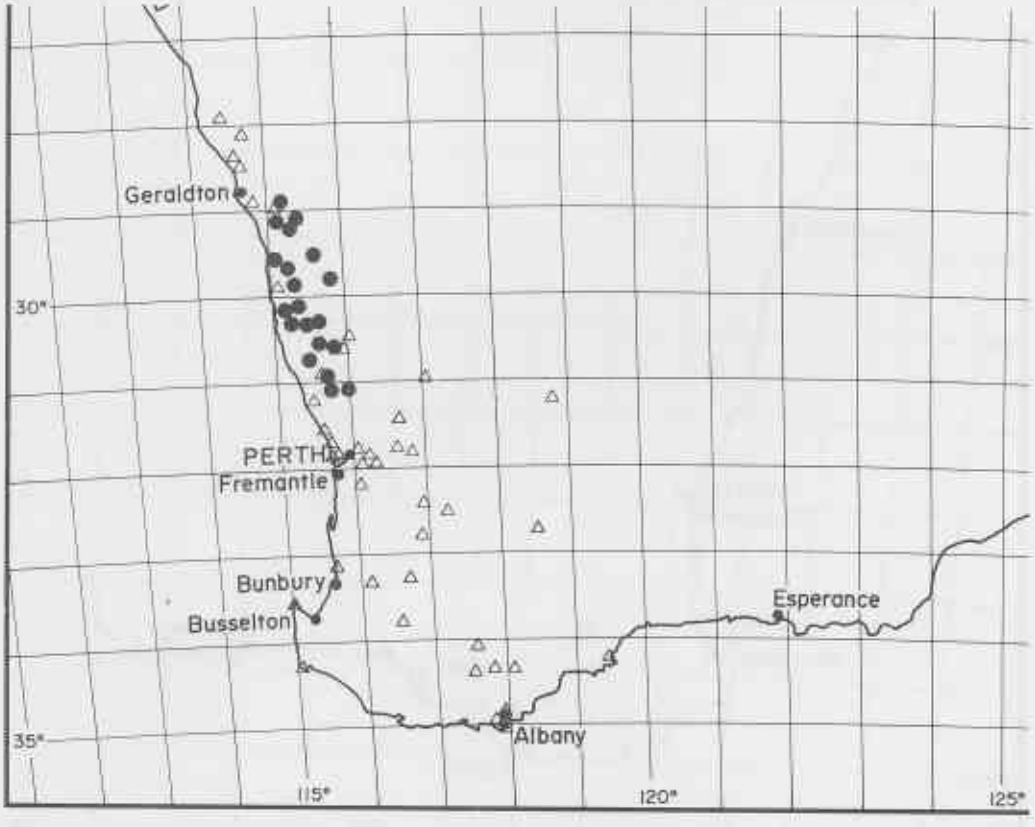
Map 18. *D. polycephala* (▲), *D. praemorsa* (□), *D. preissii* (●), *D. proteoides* (▽).



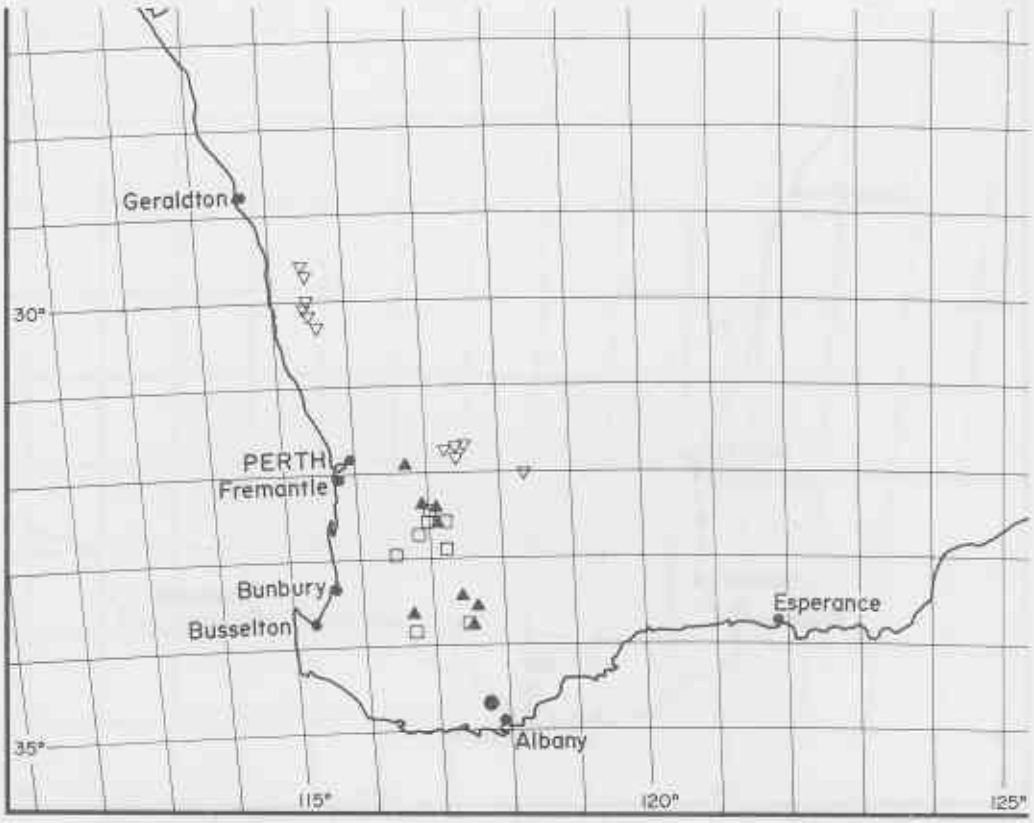
Map 19. *D. pteridifolia* (▼), *D. pulchella* (■), *D. quercifolia* (□), *D. sclerophylla* (○).



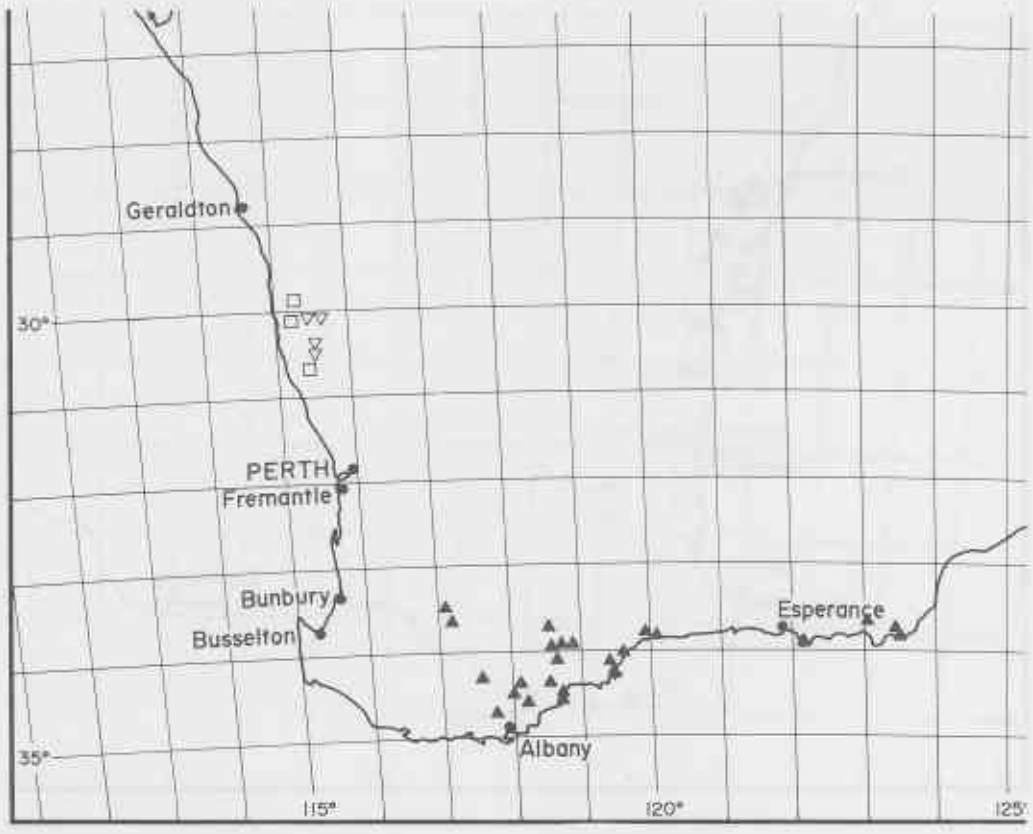
Map 20. *D. seneciifolia* (■), *D. serra* (▲), *D. serratuloides* (○).



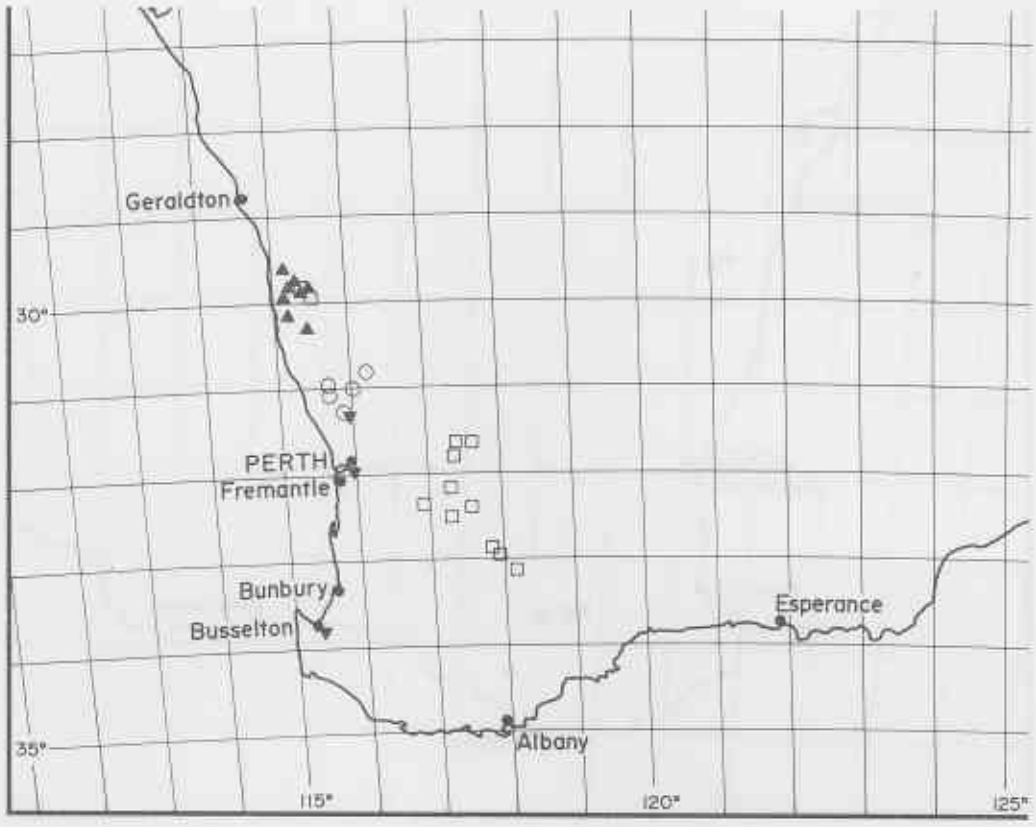
Map 21. *D. sessilis* (△), *D. shuttleworthiana* (●).



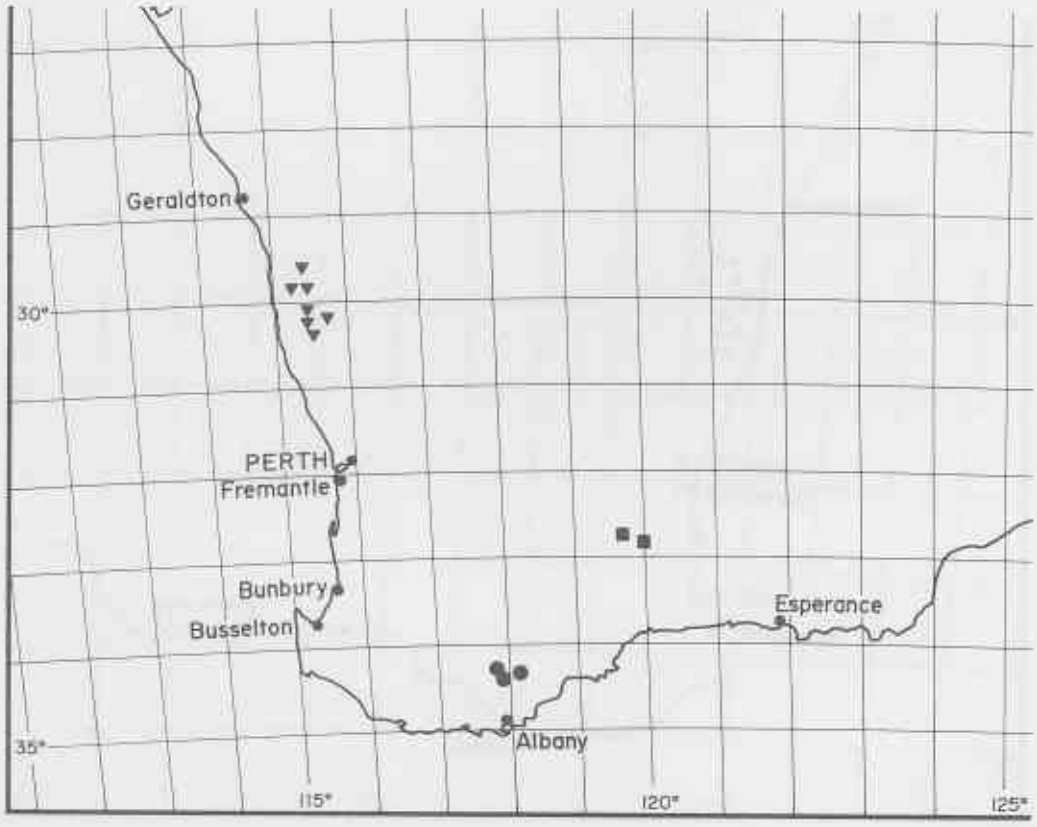
Map 22. *D. speciosa* (▽), *D. squarrosa* (●), *D. stuposa* (▲), *D. subpinnatifida* (□).



Map 23. *D. subulata* (▽), *D. tenuifolia* (▲), *D. tortifolia* (□).



Map 24. *D. tridentata* (▲), *D. vestita* (□), *D.* sp. A (▼), *D.* sp. B (○).



Map 25. *D.* sp. C (▼), *D.* sp. D (■), *D.* sp. E (●).

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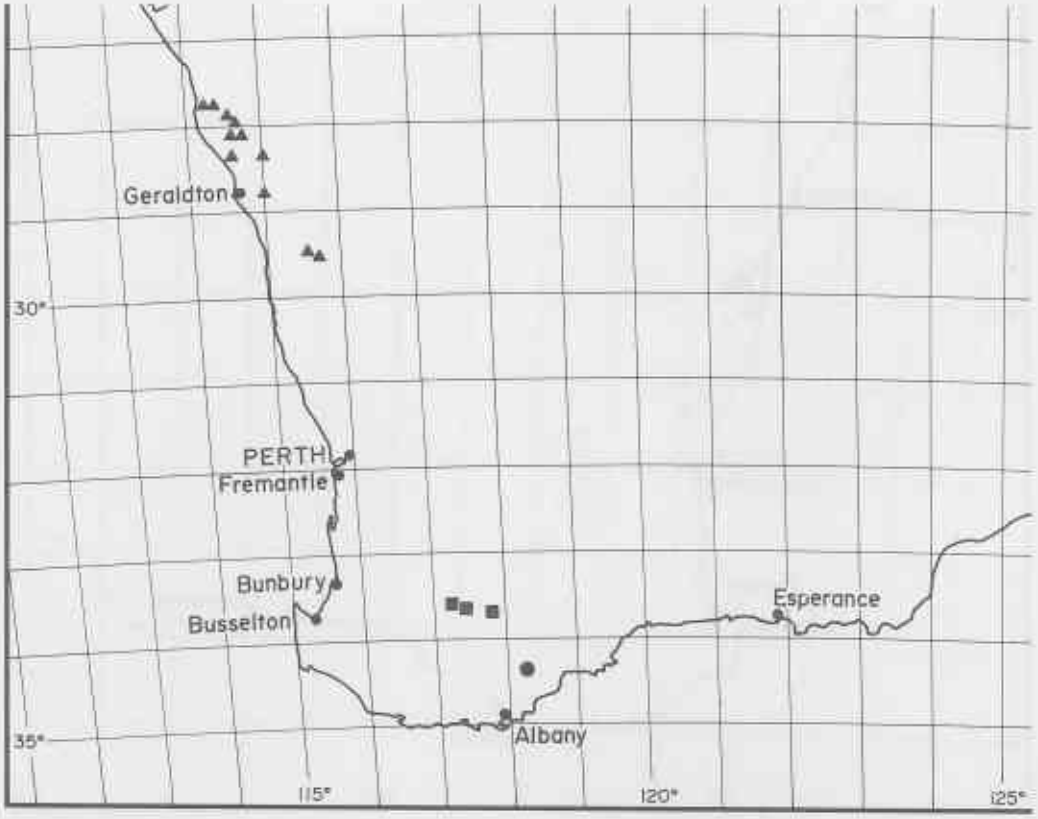
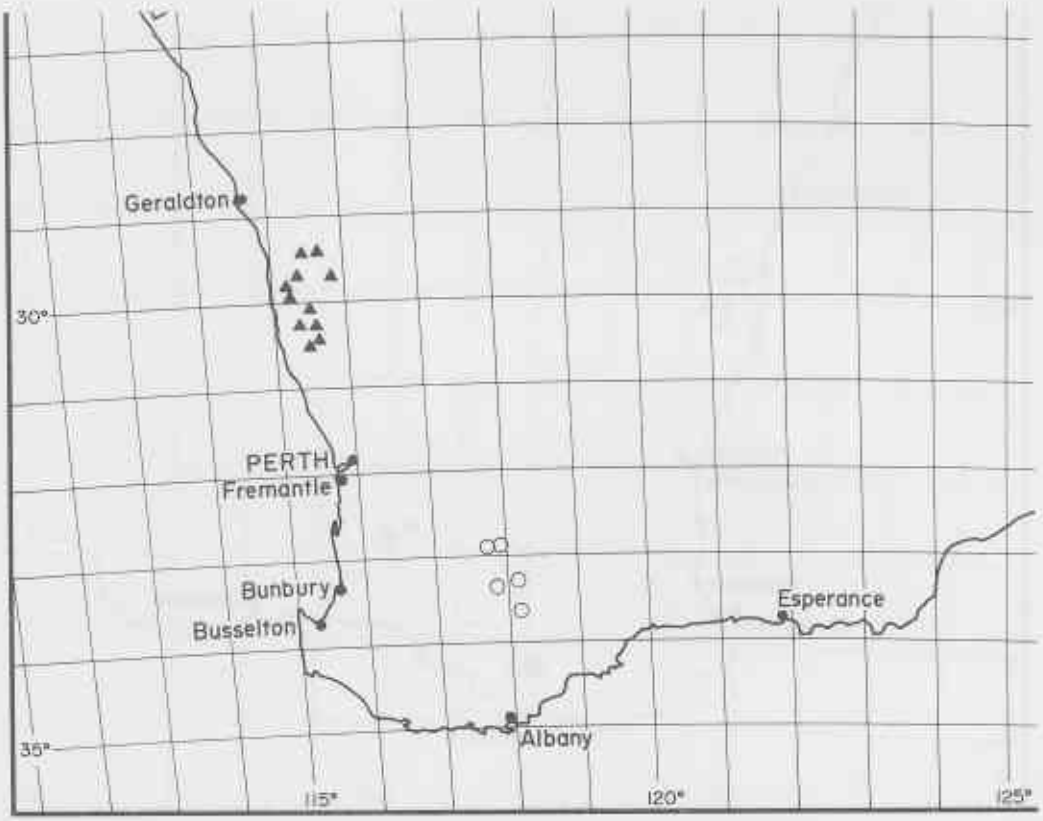


Map 26. *D.* sp. F (●), *D.* sp. G (■), *D.* sp. H (▲).



Map 27. *D.* sp. I (▲), *D.* sp. J (o).

APPENDIX 1

Notes on the morphology, ecology and conservation status of *Dryandra* species

Where all specimens of the one species examined appeared to conform reasonably well morphologically with the type specimen, no special notes are provided. Where the variation observed suggested heterogeneity, notes are provided.

Ecological notes provided include:-

S Soil types (from specimen labels)
V Vegetation types (from specimen labels)
F Flowering months (from specimen labels)
C Conservation status (inferred from herbarium data and observations).

Conservation status was expressed using the two schemes shown below. The assessment of status for each species was based upon current studies, and may differ from those given elsewhere.

First mention - Marchant and Keighery (1979)

Number = number of specimens in the Western Australian Herbarium (PERTH)
B = rare
C = represented in PERTH only by the type
D = poorly collected, less than 5 collections in PERTH
E = restricted to localities less than 100 km apart
F = restricted to localities less than 160 km apart
G = none of above

Second mentioned - Leigh et al. (1981)

1 = species known only from type collection
2 = species with very restricted distribution in Australia and with a maximum geographic range of less than 100 km
3 = species with a range over 100 km in Australia but occurring only in small populations which are mainly restricted to highly specific habitats
0 = non of above
X = species presumed extinct
E = endangered species in serious risk of disappearing from the wild state within one or two decades if present land use or other casual factors continue to operate
V = vulnerable species not presently endanged but at risk over a longer period through continued depletion, or which largely occur on sites likely to experience changes in land use which would threaten the survival of the species in the wild
R = species which are rare in Australia but which are not currently considered endangered or vulnerable
K = poorly known species that are suspected, but not definitely known to belong to any of the above categories
C = species known to be represented within a national park or other proclaimed reserves

D. arborea C.A.Gardner
S ironstone and jasperlite ridges
V scrub
F August-October
C 16F, 3V

D. arctotidis R.Br.
Bentham (1870) considered *A. arctotidis* to include *D. tortifolia* as a variety. There were a few differences in leaf and flower indumentum between these taxa. They were geographically separated and although considered as separate species here, *D. tortifolia* may be a subspecies of *D. arctotidis*.
S sand, gravel
V Wandoo woodland, mallee heath, heath
F August-October
C 17G, OC

D. armata R.Br.
There was considerable morphological variation in this species, particularly in the leaves and in the floral bracts. Many specimens included under *D. armata* here have previously been considered to be *D. cirsioides*, an apparently closely related species. Two distinct, undescribed species, *D.* sp. E and *D.* sp H, have been recognised from the confusion betwen *D. armata* and *D. cirsioides*. Separate recognition of *D. favosa* Lindl., *D. gilbertii* S.Moore or *D. purdieana* Diels was not possible at this stage of study. However these or other taxa could probably be recognised when a thorough revision of the genus is made.
S gravel, sand, clay-loam
V heath, shrubland, mallee heath, Wandoo woodland
F June-November
C > 20G, OC

D. ashbyi B.L.Burtt
D. ashbyi was closely related to *D. fraseri*. However, as noted by Burtt (1939), there appeared to be specimens with leaf shape and bract indumentum intermediate between these species. For this study, such intermediates, which came from the Dandaragan to Greenough River area, were included under *D. fraseri*. *D. ashbyi* may prove to be a subspecific taxon.
S lateritic gravel, sandy clay-loam, yellow sand
V heath, shrubland
F June-September
C > 20G, OC

D. baxteri R.Br.
Two geographically well separated populations of *D. baxteri* occur in the Busselton and Albany areas. No consistent differences in morphology between these populations were observed.
S gravel, sand, sometimes moist
V *Banksia-Eucalyptus* heath, Jarrah forest
F July-October
C 14G, OC

D. bipinnatifida
The northern populations of *D. bipinnatifida* have consistently narrower leaf segments than the southern populations.
S sandy lateritic gravels
V heath, Jarrah forest
F October-November
C 18G, OC

D. calophylla R.Br.
S sand, clay over laterite
V scrub
F October-November
C 10G, 3C

D. carduacea Lindl.
There were wide variations in the leaf size, although the relative size of the lobes seemed constant. See also *D. squarrosa* and *D.* sp. G.
S sandy lateritic gravels, sand over gravel
V heath
F July-November
C > 20G, OC

D. carlinoides Meisn.
S sandy lateritic gravels, sand over gravel
V heath
F September-October
C > 20-, C

D. cirsioides Meisn.
There were wide variations, particularly in leaf and lobe dimensions. See notes on *D. armata*. Several taxa may be recognisable here, although easy separation was not possible at this stage. Specimens closest to the type occur between Lake Grace and Fitzgerald River; a broadleaved form with short lobes between Lake Grace and Ravensthorpe; and another form between Kulin and Lake King.
S sand, gravel, clay-loam
V heath, scrub, mallee heath
F April-October
C > 20G, OC

D. comosa Meisn.
S lateritic hills and slopes
V shrubland
F July-August
C 6E, 2RC

D. concinna R.Br.
S shale, gravel
V scrub heath, mallee heath
F August-October
C 10E, 2C

D. conferta Benth.
There was a variation in form. Two geographically restricted forms (one in the Northern Sandplains and another near Pingelly) could be distinct subspecific taxa.
S sand, sandy gravel
V heath, shrubland, mallee heath, Wandoo woodland
F May-October
C > 20G, OC

D. cuneata R.Br.
S sand, sandy gravel, shale
V heath, mallee heath
F May-October
C > 20G, OC

D. cynaroides C.A.Gardner
S sand, sandy gravel
V heath, shrubland
F October-November
C 9F, 3VC

D. drummondii Meisn.
Distinctly outlying populations of *D. drummondii* occurred in the Badgingarra area.
S lateritic gravel, sandy loam
V heath, woodland
F August-October
C 19G, OC

D. erythrocephala C.A.Gardner
S sand, lateritic gravel
V heath, scrub, mallee
F September-November
C 20G, OC

D. falcata R.Br.
D. falcata was reasonably uniform in morphology over its range. A closely related taxon *D.* sp. C occurred in the Eneabba area.
S sand, clay, shale, gravel
V heath, scrub, mallee
F September-November
C 20G, OC

D. ferruginea Kipp. ex Meisn.
S lateritic gravel, sandy loam
V heath, shrubland, thicket
F June-December
C > 20G, OC

D. foliolata R.Br.
S sandy, peaty sand
V *Banksia* heath
F October-December
C 6E, 2C

D. foliosissima C.A.Gardner
S gravelly sand, granite
V scrub
F May-October
C 8G, 3KC

D. formosa R.Br.
A distinctly outlying population of *D. formosa* occurred in the Augusta area.
S sandy, peaty sand, granite, laterite
V shrubland, mallee heath
F May-December
C > 20G, 3C

D. fraseri R.Br.
(See notes under *D. ashbyi*)
S sandy lateritic gravel, sandy loam
V heath, scrub, Wandoo woodland, Jarrah forest
F June-October
C > 20G, OC

D. hewardiana Meisn.
The identity of *D. hewardiana* was not well known. No specimens in PERTH agreed exactly with the type. One specimen annotated by A.S. George as being similar to the type appeared more closely related to *D. patens* in the indumentum on the involucral bracts. These species were very closely related and may prove synonymous, in which case *D. hewardiana* would have priority. *D. patens* was preferred here as the specimens were closer to its type. No ecological information was known for *D. hewardiana*.

D. horrida Meisn.
S gravelly sand, yellow sand
V heath, *Allocasuarina* scrub
F February-June
C 11G, 3V

D. longifolia R.Br.
S sand over granite or limestone
V heath, shrubland
F May-November
C 19F, 3C

D. mucronulata R.Br.
S gravel, clay
V heath, scrub
F May-October
C 19F, 3C

D. nana Meisn.
S lateritic gravel
V heath, scrub
F August-November
C 9E, 2C

D. nivea (Labill.) R.Br.
Considerable variation in morphology was noted under *D. nivea*, although separation of these into distinct taxa proved too difficult for this study. Leaf and lobe size appeared to be the most variable characters, but variations in habit and inflorescences also occurred. In some areas of its range it was possible to recognise distinct geographically confined forms.
S sandy clay, sand, lateritic gravel, granite soils, limestone, swampy
V heath, shrubland, woodland, forest
F August-October
C > 20G, OC

D. nobilis Lindl.
Distinctly outlying populations of *D. nobilis* occurred in the Badgingarra area and these had smaller leaf lobes than the type.
S lateritic gravel, sandplain
V heath, shrubland, Wandoo woodland
F June-October
C > 20G, OC

D. obtusa R.Br.
S sand, gravel
V heath, scrub, mallee heath
F August-October
C > 20G, OC

D. patens Benth.
See notes on *D. hewardiana*. An undescribed species, *D.* sp. I, closely related to *D. patens* occurred in the Eneabba area.
S lateritic gravel
V heath, thicket, open woodland
F August-November
C > 20G, 3V

D. plumosa R.Br.
S gravel loam, sand over laterite
V heath, mallee, scrub
F August-November
C 15F, OC

D. polycephala Benth.
S sandy gravel, gravel loam
V woodland, forest
F July-November
C 18E, 2E

D. praemorsa Meisn.
S lateritic gravel, granite
V Jarrah forest
F July-October
C 12F, 3V

D. preissii Meisn.
S gravel loam
V Wandoo woodland, mallee heath
F September-October
C 7B, 2V

D. proteoides Lindl.
S lateritic gravel
V Powderbark wandoo woodland, scrub
F July-September
C 7G, 3CV

D. pteridifolia R.Br.
Outlying populations of *D. pteridifolia* occurred at the northern limit of its range.
S gravel, sandy clay, loam
V heath, shrubland, mallee heath, Wandoo woodland
F September-November
C > 20G, OC

D. pulchella Meisn.
S gravel loam, red clay
V mallee shrubland, woodland
F October-? November
C 7E, 2RC

D. quercifolia Meisn.
S lateritic gravel, quartzite, sandplain
V Scrub, thicket, mallee heath
F April-December
C > 20G, OC

D. sclerophylla Meisn.
A specimen with a collecting locality of 'Wongong' (near Perth) seemed to be an error as *D. sclerophylla* appeared to be restricted to the Eneabba-Moore River area.
S shallow grey sand over laterite
V heath
F September-October
C 10F, 3C

D. seneciifolia R.Br.
S gravelly sands, shale
V shrubland
F July-October
C 4E, 2C

D. serra R.Br.
S sandy gravel
V shrubland
F August-November
C 9F, 3V

D. serratuloides Meisn.
D. sp. J, an undescribed species closely related to *D. serratuloides*, occurred in the Dumbleyung area.
S sandy gravel
V mallee heath
F July-October
C 4B, 2E

D. sessilis (Knight) Domin
D. sessilis was a widespread species and appeared to have a variety of geographically related leaf size forms.
S lateritic gravel, sand, granite, limestone
V heath, shrubland, woodland
F April-November
C > 20G, OC

D. shuttleworthiana Meisn.
S sand, lateritic gravel
V heath
F June-September
C > 20G, OC

D. speciosa Meisn.
Distinctly disjunct populations of *D. speciosa* occurred in the Badgingarra and Tammin areas, though only the flower colour appeared to differ.
S sandy, gravel, laterite
V heath, shrubland, mallee heath
F June-September
C > 20G, 3VC (Badg. pop. 7E, 2VC; Tamm. pop. > 20F, 3EC)

D. squarrosa R.Br.
D. squarrosa appeared to be closely related to *D. carduacea* and *D.* sp. G. Only one specimen at PERTH was considered to conform reasonably with the type description.
S ? gravel
V woodland
F ? - August - ?
C 1B, 2EC

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D. stuposa Lindl.
S sandy lateritic gravel
V scrub, powderbark wandoo woodland
F July-November
C 9G, 3VC

D. subpinnatifida C.A.Gardner
S gravel loam
V scrub
F September-November
C 10F, 3VC

D. subulata C.A.Gardner
S sand, sandy lateritic gravel
V heath, scrub, mallee heath
F August-October
C 10E, 2C

D. tenuifolia R.Br.
D. tenuifolia varied in leaf shape and habit across its range. Coastal specimens had lobes along almost the complete length of the leaf, and were clumped shrubs with ascending branches. Specimens from around Ongerup and Jerramungup had few lobes along the leaf which had a very long petiole and were generally prostrate shrubs or with subterranean stems. These differences may lead to subspecific segregation.
S sandy loam, lateritic clay, sandstone, granite
V heath, mallee scrub
F May-November
C > 20G, OC

D. tortifolia Kipp. ex Meisn.
See notes on *D. arctotidis*.
S sand over lateritic gravel 'at depth'
V heath, shrubland
F October-November
C 5E, 2KC

D. tridentata Meisn.
S sand, sandy gravel
V heath
F August-October
C 20E, 2VC

D. vestita Kipp. ex Meisn.
The main populations of *D. vestita* were in the central wheatbelt, but distinctly outlying populations occurred in the Eneabba-Coorow area.
S lateritic gravel, sandy clay
V heath, mallee heath, 'Tamma scrub'
F December-May
C 18G, 3V (Eneabba pop. 3E, 2C; Wheatbelt pop. 15-, 3VC)

D. sp. A (Voucher A.S. George 14165)
This species had a habit similar to some *D. nivea* forms, but with different shaped leaves and flowers. The leaves were dentate rather than lobed or pinnate as in *D. nivea*. The flowers are more similar to *D. preissii* than they are to *D. nivea*. This species has, since the submission of the manuscript, been described as *D. mimica* by A.S. George (Nuytsia 5: 49-51, 1984).

S sand, sandy loam
V low open woodland, open heath
F December
C 3B, 3E

D. sp. B (Voucher A.S. George 15324)
This species appeared to be intermediate between *D. patens* and *D. polycephala.*
S sandy laterite
V heath, woodland
F July-November
C 11E, 2V

D. sp. C (Voucher E.A. Griffin 971)
This species was closely related to *D. falcata* but geographically separate.
S laterite
V heath, scrub
F August-September
C 13F, 3C

D. sp. D (Voucher A.S. George 9446)
The habit and leaves of this species were similar to but the inflorescence was quite different.
S sandy gravel
V heath, scrub
F July-September
C 3B, 2V

D. sp. E (Voucher G.J. Keighery 4848)
This species was related to *D. armata* but had larger leaves and inflorescences.
S sandy clay over sandstone
V mallee heath
F March-September
C 5E, 2C

D. sp. F (Voucher F. Lullfitz 3379)
This species was known from only one locality in the Stirling Range.
S rocky
V ? mallee heath
F October
C 3B, 2RC

D. sp. G (Voucher K. Newbey 2839)
This species was closely related to *D. carduacea* and *D. squarrosa*, but has longer and narrower leaves and lobes than *D. carduacea*, and has the recurved subulate outer involucral bracts of *D. squarrosa.*
S gravel ridge
V heath
F August-December
C 4E, 2V

D. sp. H (Voucher A.S. George)
This species was closely related to *D. armata* but had different flowers and involucral bracts.
S yellow sand, sand over laterite, lateritic gravel
V heath, scrub, mallee heath
F June-September
C 18G, OC (Southern populations not conserved)

D. sp. I (Voucher E.A. Griffin 2404)
This species was closely related to *D. armata* but had tomentose, not glabrous, limbs and much shorter lobes with distinct sinuses.
S lateritic gravel
V heath, thicket
F August-October
C 14F, 3C

D. sp. J (Voucher J.S. Beard 2121)
This species was closely related to *D. serratuloides* but differed mainly in its leaves.
S sandy gravel
V heath
F September-October
C 7G, 3V

APPENDIX 2

Lists of *Dryandra* species known (or considered likely) to occur in ½° lat. x ½° long. grid cells of south-western Australia. Occurrences not represented by a specimen are indicated by an asterisk. Cells in which no species were considered to occur have not been shown. The key to the cell code numbering is provided in Map 1. Each number consists of a longitudinal component (shown along bottom of map), and a latidudinal component shown along left hand side of map).

GRID CELL 1742 GANTHEAUME		3 species recorded
D. ashbyi	*D. sessilis*	*D.* sp. H
GRID CELL 1842 AJANA		3 species recorded
D. ashbyi	*D. sessilis*	*D.* sp. H
GRID CELL 1741 HUTT		3 species recorded
D. ashbyi	*D. sessilis**	*D.* sp. H*
GRID CELL 1841 NORTHAMPTON		3 species recorded
D. ashybi	*D. sessilis*	*D.* sp. H
GRID CELL 1941 MUNGO		2 species recorded
D. ashbyi	*D.* sp. H*	
GRID CELL 1840 GERALDTON		4 species recorded
D. ashbyi	*D. shuttleworthiana*	*D.* sp. H*
D. sessilis		
GRID CELL 1940 INDARRA		6 species recorded
D. ashbyi	*D. nivea*	*D. shuttleworthiana*
D. carlinoides	*D. sessilis*	*D.* sp. H
GRID CELL 2040 MULLEWA		1 species recorded
*D. ashbyi**		
GRID CELL 1839 DONGARA		2 species recorded
*D. nivea**	*D. sessilis**	

GRID CELL 1939 MINGENEW — 7 species recorded
D. ashbyi, *D. bipinnatifida*, *D. carlinoides*, *D. fraseri*, *D. nivea*, *D. sessilis*, *D. shuttleworthiana*

GRID CELL 2039 YANDANOOKA — 6 species recorded
D. ashbyi, *D. carlinoides*, *D. fraseri*, *D. nivea*, *D. shuttleworthiana*, D. sp. H

GRID CELL 2239 ROTHSAY — 1 species recorded
D. ashbyi

GRID CELL 1838 BEAGLE ISLANDS — 2 species recorded
*D. nivea**, *D. sessilis**

GRID CELL 1938 ARROWSMITH — 17 species recorded
*D. armata**, *D. bipinnatifida*, *D. carlinoides*, *D. conferta*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. sclerophylla*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. tortifolia*, *D. tridentata*, *D. vestita*, D. sp. C, D. sp. I

GRID CELL 2038 CARNAMAH — 16 species recorded
D. armata, *D. ashbyi*, *D. bipinnatifida*, *D. carlinoides*, *D. conferta**, *D. fraseri*, *D. kippistiana*, *D. nivea*, *D. patens*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa**, *D. subulata*, D. sp. C, D. sp. H, D. sp. I

GRID CELL 2138 CARON — 1 species recorded
D. ashbyi

GRID CELL 2738 JOHNSTON RANGE — 1 species recorded
D. arborea

GRID CELL 1837 JURIEN — 2 species recorded
*D. nivea**, *D. sessilis**

GRID CELL 1937 HILL RIVER — 18 species recorded
D. armata, *D. bipinnatifida*, *D. carlinoides*, *D. conferta**, *D. drummondii*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. nobilis*, *D. sclerophylla*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. tortifolia*, *D. tridentata*, D. sp. C, D. sp. I

GRID CELL 2037 BADGINGARRA — 20 species recorded
D. armata, *D. bipinnatifida*, *D. carlinoides*, *D. conferta*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. patens**, *D. pteridifolia*, *D. sclerophylla*, *D. serratuloides*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. subulata*, *D. tridentata*, *D. vestita*, D. sp. C, D. sp. I

GRID CELL 2137 WATHEROO — 4 species recorded
D. armata, *D. ashbyi*, *D. conferta*, *D. fraseri*

GRID CELL 2737 JACKSON — 1 species recorded
D. arborea

GRID CELL 2837 BUNGALBIN — 1 species recorded
D. arborea

GRID CELL 1936 WEDGE ISLAND — 10 species recorded
*D. bipinnatifida**, *D. carlinoides**, *D. conferta*, *D. nana**, *D. nivea*, *D. sclerophylla**, *D. sessilis**, *D. shuttleworthiana*, *D. tortifolia*, *D.* sp. C*

GRID CELL 2036 DANDARAGAN — 17 species recorded
D. armata, *D. bipinnatifida**, *D. carlinoides*, *D. conferta**, *D. cuneata*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. patens*, *D. pteridifolia*, *D. sclerophylla*, *D. serratuloides**, *D. sessilis*, *D. shuttleworthiana*, *D.* sp. B, *D.* sp. C*

GRID CELL 2136 MOORA — 14 species recorded
D. armata, *D. bipinnatifida*, *D. carduacea*, *D. carlinoides*, *D. conferta**, *D. fraseri*, *D. kippistiana*, *D. nivea*, *D. nobilis*, *D. patens*, *D. polycephala*, *D. serratuloides*, *D. sessilis*, *D.* sp. B

GRID CELL 2236 WONGAN — 6 species recorded
D. armata, *D. comosa*, *D. fraseri*, *D. nivea**, *D. patens*, *D. pulchella*

GRID CELL 2336 KOORDA — 5 species recorded
D. armata, *D. conferta*, *D. fraseri*, *D. pteridifolia*, *D. sessilis*

GRID CELL 2736 BULLFINCH — 1 species recorded
*D. arborea**

GRID CELL 2836 — 1 species recorded
D. arborea

GRID CELL 1935 LEDGE POINT — 2 species recorded
*D. nivea**, *D. sessilis*

GRID CELL 2035 GINGIN — 14 species recorded
*D. armata**, *D. bipinnatifida*, *D. carduacea*, *D. carlinoides**, *D. fraseri*, *D. kippistiana*, *D. nivea*, *D. nobilis*, *D. patens*, *D. polycephala*, *D. serratuloides*, *D. sessilis*, *D. shuttleworthiana*, *D.* sp. B

GRID CELL 2235 GOOMALLING — 6 species recorded
D. armata, *D. carduacea*, *D. fraseri*, *D. nivea*, *D. patens**, *D. sessilis**

GRID CELL 2335 DOWERIN — 3 species recorded
D. armata — *D. fraseri** — *D. horrida*

GRID CELL 2435 TRAYNING — 2 species recorded
*D. armata** — *D. horrida**

GRID CELL 2535 MERREDIN — 1 species recorded
*D. horrida**

GRID CELL 2635 WESTONIA — 3 species recorded
D. conferta — *D. horrida* — *D. sessilis*

GRID CELL 2034 PERTH — 4 species recorded
A. armata — *D. sessilis* — *D.* sp. A
D. nivea

GRID CELL 2134 WOOROLOO — 12 species recorded
D. armata — *D. fraseri* — *D. polycephala*
D. bipinnatifida — *D. nivea* — *D. praemorsa**
D. carduacea — *D. nobilis* — *D. proteoides*
D. drummondii — *D. patens** — *D. sessilis*

GRID CELL 2234 NORTHAM — 11 species recorded
D. armata — *D. nivea* — *D. proteoides*
*D. carduacea** — *D. nobilis** — *D. sessilis*
*D. drummondii** — *D. patens* — *D. stuposa*
D. fraseri — *D. praemorsa*

GRID CELL 2334 CUNDERDIN — 5 species recorded
D. armata — *D. horrida* — *D. vestita*
*D. fraseri** — *D. speciosa*

GRID CELL 2434 KELLERBERRIN — 5 species recorded
D. armata — *D. horrida* — *D. vestita*
D. fraseri — *D. speciosa**

GRID CELL 2534 BRUCE ROCK — 4 species recorded
D. armata — *D. pteridifolia* — *D. speciosa**
*D. horrida**

GRID CELL 2634 MUNTAGIN — 3 species recorded
D. armata — *D. conferta* — *D. horrida*

GRID CELL 2734 HOLLETON — 3 species recorded
D. armata — *D. conferta** — *D. pteridifolia*

GRID CELL 2033 FREMANTLE — 2 species recorded
D. nivea — *D. sessilis*

GRID CELL 2133 JARRAHDALE — 9 species recorded
D. armata — *D. carduacea* — *D. praemorsa*
*D. bipinnatifida** — *D. nivea* — *D. sclerophylla*
D. calophylla — *D. nobilis* — *D. sessilis*

GRID CELL 2233 BEVERLEY — 13 species recorded

D. armata	*D. fraseri**	*D. proteoides**
D. carduacea	*D. nivea*	*D. sessilis*
D. conferta	*D. nobilis*	*D. stuposa*
D. cynaroides	*D. praemorsa**	*D. vestita*
D. drummondii		

GRID CELL 2333 BROOKTON — 11 species recorded

D. armata	*D. fraseri**	*D. proteoides**
*D. carduacea**	*D. nivea*	*D. sessilis*
*D. conferta**	*D. nobilis**	*D. vestita*
*D. ferruginea**		

GRID CELL 2433 CORRIGIN — 7 species recorded

*D. armata**	*D. ferruginea*	*D. nivea*
*D. cirsioides**	*D. horrida*	*D. vestita*
D. conferta		

GRID CELL 2533 NAREMBEEN — 5 species recorded

D. armata	*D. ferruginea**	*D. speciosa*
*D. cirsioides**	*D. horrida*	

GRID CELL 2633 HYDEN — 3 species recorded

*D. armata**	*D. cirsioides*	*D. conferta**

GRID CELL 2733 O'CONNOR — 4 species recorded

*D. armata**	*D. conferta*	*D. erythrocephala**
D. cirsioides		

GRID CELL 2833 HOLLAND — 5 species recorded

D. armata	*D. conferta*	*D.* sp. D*
*D. cirsioides**	*D. erythrocephala**	

GRID CELL 2032 PINJARRA — 2 species recorded

*D. nivea**	*D. sessilis**

GRID CELL 2132 DWELLINGUP — 6 species recorded

*D. bipinnatifida**	*D. nivea*	*D. sessilis**
D. carduacea	*D. praemorsa*	*D. subpinnatifida*

GRID CELL 2232 CROSSMAN — 11 species recorded

D. armata	*D. nivea*	*D. sessilis*
D. bipinnatifida	*D. nobilis*	*D. stuposa**
D. carduacea	*D. praemorsa*	*D. subpinnatifida*
*D. fraseri**	*D. proteoides*	

GRID CELL 2332 NARROGIN — 15 species recorded

D. arctotidis	*D. drummondii*	*D. proteoides*
D. armata	*D. ferruginea*	*D. sessilis*
D. carduacea	*D. fraseri*	*D. stuposa*
D. conferta	*D. nivea*	*D. subpinnatifida*
D. cynaroides	*D. nobilis*	*D. vestita*

GRID CELL 2432 YEALERING — 14 species recorded

*D. armata**	*D. cynaroides*	*D. nivea*
*D. carduacea**	*D. drummondii*	*D. pteridifolia*
D. cirsioides	*D. ferruginea*	*D. vestita*
D. conferta	*D. fraseri*	*D.* sp. J
D. cuneata	*D. horrida**	

GRID CELL 2532 KULIN — 10 species recorded

D. cirsioides
D. conferta
*D. cuneata**
D. drummondii
D. erythrocephala
D. ferruginea
D. horrida
*D. nivea**
D. sessilis
*D. vestita**

GRID CELL 2632 PEDERAH — 3 species recorded

D. cirsioides
D. erythrocephala
D. ferruginea

GRID CELL 2732 HURLESTONE — 3 species recorded

D. cirsioides
*D. erythrocephala**
*D. ferruginea**

GRID CELL 2832 IRONCAP — 4 species recorded

D. cirsioides
*D. erythrocephala**
*D. ferruginea**
D. sp. D

GRID CELL 2932 HOPE — 3 species recorded

D. cirsioides
D. erythrocephala
D. ferruginea

GRID CELL 3032 TAY — 2 species recorded

*D. cirsioides**
D. erythrocephala

GRID CELL 2031 BUNBURY — 4 species recorded

*D. bipinnatifida**
*D. carduacea**
*D. nivea**
D. sessilis

GRID CELL 2131 COLLIE — 4 species recorded

D. bipinnatifida
D. carduacea
*D. nivea**
D. sessilis

GRID CELL 2231 DARKAN — 7 species recorded

*D. bipinnatifida**
D. carduacea
D. fraseri
*D. nivea**
D. sessilis
*D. stuposa**
*D. subpinnatifida**

GRID CELL 2331 WAGIN — 14 species recorded

D. armata
D. calophylla
D. carduacea
D. cirsioides
*D. cynaroides**
D. drummondii
D. ferruginea
D. fraseri
D. nivea
D. nobilis
*D. sessilis**
*D. stuposa**
*D. subpinnatifida**
D. tenuifolia

GRID CELL 2431 DUMBLEYUNG — 15 species recorded

*D. armata**
D. carduacea
*D. cirsioides**
*D. conferta**
D. cuneata
D. cynaroides
*D. drummondii**
*D. erythrocephala**
D. ferruginea
D. fraseri
D. nivea
*D. nobilis**
D. preissii
*D. pteridifolia**
D. sp. J

GRID CELL 2531 KUKERIN — 13 species recorded

D. carduacea
D. cirsioides
D. conferta
D. cuneata
D. drummondii
D. erythrocephala
D. ferruginea
D. foliosissima
D. horrida
D. nivea
D. pteridifolia
D. vestita
D. sp. J

GRID CELL 2631 BURNGUP — 7 species recorded
D. cirsioides — *D. erythrocephala* — *D. foliosissima**
*D. cuneata** — *D. ferruginea* — *D. pteridofolia*
*D. drummondii**

GRID CELL 2731 NEWDEGATE — 6 species recorded
*D. cirsioides** — *D. erythrocephala** — *D. foliosissima**
D. drummondii — *D. ferruginea** — *D. pteridifolia**

GRID CELL 2831 KING — 5 species recorded
D. cirsioides — *D. ferruginea* — *D. pteridifolia*
D. erythrocephala — *D. foliosissima**

GRID CELL 2931 MOOLYALL — 4 species recorded
D. cirsioides — *D. ferruginea* — *D. foliosissima**
D. erythrocephala

GRID CELL 3231 SCADDAN — 3 species recorded
*D. armata** — *D. cuneata* — *D. obtusa*

GRID CELL 3331 BURDETT — 1 species recorded
D. armata

GRID CELL 3431 BEAUMONT — 2 species recorded
*D. armata** — *D. cuneata*

GRID CELL 3531 BURAMINYA — 3 species recorded
D. armata — *D. cuneata* — *D. longifolia*

GRID CELL 1830 CLAIRAULT — 2 species recorded
D. nivea — *D. sessilis*

GRID CELL 1930 BUSSELTON — 6 species recorded
D. baxteri — *D. carduacea* — *D. sessilis*
D. bipinnatifida — *D. nivea* — *D.* sp. A

GRID CELL 2030 DONNYBROOK — 5 species recorded
D. baxteri — *D. carduacea* — *D. sessilis**
*D. bipinnatifida** — *D. nivea*

GRID CELL 2230 DINNINUP — 7 species recorded
*D. bipinnatifida** — *D. nivea* — *D. stuposa*
*D. carduacea** — *D. sessilis* — *D. subpinnatifida*
D. fraseri

GRID CELL 2330 KOJONUP — 17 species recorded
D. armata — *D. cynaroides* — *D. sessilis**
D. bipinnatifida — *D. drummondii* — *D. stuposa*
D. calophylla — *D. fraseri* — *D. subpinnatifida*
D. carduacea — *D. nivea* — *D. tenuifolia*
D. conferta — *D. nobilis** — *D.* sp. G
D. cuneata — *D. pteridifolia*

GRID CELL 2430 KATANNING — 18 species recorded

D. armata
*D. calophylla**
*D. carduacea**
D. conferta
D. cuneata
*D. drummondii**
*D. fraseri**
D. mucronulata
D. nivea
D. nobilis
D. plumosa
*D. preissii**
*D. pteridifolia**
*D. sessilis**
D. stuposa
*D. subpinnatifida**
*D. tenuifolia**
D. sp. G

GRID CELL 2530 NYABING — 16 species recorded

*D. arctotidis**
D. armata
D. calophylla
D. cirsioides
D. conferta
*D. cuneata**
D. drummondii
D. erythrocephala
D. ferruginea
D. foliosissima
D. fraseri
D. nivea
*D. pteridifolia**
*D. sessilis**
D. tenuifolia
D. sp. J

GRID CELL 2630 JERRAMUNGUP — 9 species recorded

*D. arctotidis**
D. cirsioides
*D. conferta**
D. cuneata
*D. ferruginea**
*D. foliosissima**
*D. nivea**
*D. pteridifolia**
D. tenuifolia

GRID CELL 2730 JACUP — 12 species recorded

*D. arctotidis**
D. cirsioides
D. cuneata
*D. falcata**
*D. ferruginea**
*D. foliosissima**
*D. nivea**
*D. obtusa**
D. pteridifolia
D. quercifolia
*D. sessilis**
*D. tenuifolia**

GRID CELL 2830 COCANARUP — 12 species recorded

*D. arctotidis**
*D. cirsioides**
D. cuneata
D. erythrocephala
D. falcata
*D. foliosissima**
D. nivea
D. obtusa
*D. pteridifolia**
D. quercifolia
D. tenuifolia
D. sp. J

GRID CELL 2930 RAVENSTHORPE — 10 species recorded

D. arctotidis
D. cirsioides
D. cuneata
D. falcata
D. ferruginea
D. foliosissima
D. obtusa
D. pteridifolia
D. quercifolia
D. tenuifolia

GRID CELL 3030 OLDFIELD — 5 species recorded

D. armata
*D. cirsioides**
*D. cuneata**
D. obtusa
D. pteridifolia

GRID CELL 3130 STOKES INLET — 2 species recorded

*D. armata**
*D. obtusa**

GRID CELL 3230 ESPERANCE — 5 species recorded

*D. armata**
D. cuneata
D. longifolia
D. nivea
D. obtusa

GRID CELL 3330 MERIVALE — 9 species recorded

D. armata
D. cirsioides
D. cuneata
D. falcata
D. longifolia
D. nivea
D. obtusa
D. pteridifolia
D. tenuifolia

GRID CELL 3430 HOWICK — 6 species recorded

D. armata
D. cuneata
*D. longifolia**
D. nivea
D. obtusa
D. tenuifolia

GRID CELL 3530 SANDY BIGHT — 7 species recorded

D. armata	*D. nivea*	*D. pteridifolia*
D. cuneata	*D. obtusa*	*D. tenuifolia*
D. longifolia		

GRID CELL 3630 MALCOLM — 4 species recorded

D. cuneata	*D. obtusa*	*D. tenuifolia*
D. longifolia		

GRID CELL 1829 TOOKER — 2 species recorded

*D. nivea**	*D. sessilis**

GRID CELL 1929 LEEUWIN — 3 species recorded

D. formosa	*D. nivea**	*D. sessilis*

GRID CELL 2029 DONNELLY — 3 species recorded

D. bipinnatifida	*D. nivea*	*D. sessilis**

GRID CELL 2129 MANJIMUP — 3 species recorded

D. bipinnatifida	*D. nivea**	*D. sessilis**

GRID CELL 2229 TONEBRIDGE — 3 species recorded

*D. bipinnatifida**	*D. nivea**	*D. sessilis**

GRID CELL 2329 FRANKLAND — 9 species recorded

D. armata	*D. fraseri**	*D. pteridifolia*
*D. calophylla**	*D. nivea*	*D. sessilis*
*D. drummondii**	*D. preissii*	*D. tenuifolia**

GRID CELL 2429 TAMBELLUP — 19 species recorded

D. arctotidis	*D. foliolata*	*D. preissii*
D. armata	*D. formosa*	*D. pteridifolia*
D. calophylla	*D. fraseri*	*D. seneciifolia*
D. concinna	*D. mucronulata*	*D. sessilis*
D. cuneata	*D. nivea*	*D. tenuifolia*
D. drummondii	*D. plumosa*	*D.* sp. E
D. falcata		

GRID CELL 2529 BORDEN — 22 species recorded

D. arctotidis	*D. drummondii*	*D. nobilis*
D. armata	*D. falcata*	*D. plumosa*
D. baxteri	*D. foliolata*	*D. pteridifolia*
D. calophylla	*D. foliosissima*	*D. sessilis*
*D. cirsioides**	*D. formosa*	*D. tenuifolia*
D. concinna	*D. mucronulata*	*D.* sp. E
*D. conferta**	*D. nivea*	*D.* sp. F
D. cuneata		

GRID CELL 2629 PALLINUP — 14 species recorded

D. arctotidis	*D. cuneata*	*D. plumosa*
D. armata	*D. drummondii**	*D. pteridifolia*
D. calophylla	*D. falcata*	*D. sessilis**
*D. cirsioides**	*D. nivea**	*D. tenuifolia*
D. conferta	*D. obtusa**	

GRID CELL 2729 BREMER — 12 species recorded

D. arctotidis
*D. armata**
D. cirsioides
D. cuneata
D. falcata
D. nivea
D. obtusa
D. plumosa
D. pteridifolia
D. quercifolia
D. sessilis
D. tenuifolia

GRID CELL 2829 HOOD POINT — 9 species recorded

*D. arctotidis**
D. cirsioides
*D. cuneata**
D. falcata
*D. nivea**
D. obtusa
*D. pteridifolia**
D. quercifolia
D. tenuifolia

GRID CELL 3329 MONDRAIN — 1 species recorded

D. longifolia

GRID CELL 3529 CAPE ARID — 1 species recorded

D. longifolia

GRID CELL 2128 NORTHCLIFFE — 1 species recorded

*D. formosa**

GRID CELL 2228 DEEP RIVER — 4 species recorded

D. formosa
D. nivea
D. serra
*D. tenuifolia**

GRID CELL 2328 DENMARK — 5 species recorded

D. formosa
*D. nivea**
*D. serra**
*D. sessilis**
5 species recorded
*D. tenuifolia**

GRID CELL 2428 MOUNT BARKER — 15 species recorded

D. arctotidis
D. armata
D. baxteri
D. calophylla
D. conferta
*D. drummondii**
D. formosa
D. tenuifolia
D. nivea
D. preissii
D. pteridifolia
D. seneciifolia
D. serra
D. sessilis
D. squarrosa

GRID CELL 2528 MANYPEAKS — 13 species recorded

D. arctotidis
D. armata
*D. baxteri**
D. calophylla
*D. conferta**
D. drummondii
D. formosa
D. mucronulata
D. nivea
D. pteridifolia
D. serra
D. sessilis
D. tenuifolia

GRID CELL 2628 CHEYNE — 12 species recorded

D. arctotidis
*D. armata**
*D. baxteri**
*D. calophylla**
*D. cuneata**
*D. falcata**
D. mucronulata
D. nivea
D. plumosa
D. pteridifolia
*D. sessilis**
D. tenuifolia

GRID CELL 2227 NORNALUP — 4 species recorded

D. formosa
D. nivea
D. serra
D. tenuifolia

GRID CELL 2327 PARRY INLET — 4 species recorded

*D. formosa**
*D. nivea**
*D. serra**
*D. tenuifolia**

GRID CELL 2427 ALBANY — 6 species recorded

D. baxteri	*D. nivea**	*D. sessilis*
D. formosa	*D. serra*	*D. tenuifolia*

GRID CELL 2527 BREAKSEA — 2 species recorded

D. baxteri	*D. formosa*