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A STUDY OF THE HARVESTING METHODS AND THE REGENERATION CAPACITY OF HEAVILY EXPLOITED AND/OR GEOGRAPHICALLY RESTRICTED SPECIES IN WESTERN AUSTRALIA

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ABSTRACT

The report on the Western Australian Wildflower Industry by Burgman and Hopper (1982) included a recommendation to examine harvesting methods of geographically restricted species. An expanded list of 124 species which warranted study was compiled. Plants included on the list had been harvested in some form and were either geographically restricted, on the CITES (Convention on Trade and Endangered Species) Appendix II list or were the 55 most heavily exploited.

Contact with pickers revealed details about harvesting methods, species availability and potential regeneration of plants after picking. On the whole plants which are harvested heavily regenerate well and there was little observed death caused by picking. Fire or other disturbance is an essential part of the growth cycle as far as saleable stems on many species are concerned. Many plants are only available for good cut stems when they are young and older plants of the species are untouched. Additionally, wholesaler requirements for picked stems significantly limit the percentage of each plant available for harvest in many species.

Only Banksia coccinea, Verticordia brownii and V. grandis appeared to be possibly limited supplies of cut flowers with B. coccinea being badly affected by Phytophthera cinnamomi (die-back) in some areas. Anigozanthos pulcherrimus and Macropidia fuliginosa require further management as natural populations but cultivation of the species is alleviating supply shortages.

There is a significant trend among suppliers of cut flowers to cultivate or bush-farm species which should help lessen the pressure on some heavily exploited species, especially of Banksia and Anigozanthos.

I INTRODUCTION

The report on the Western Australian Wildflower Industry 1980-81 by Burgman and Hopper (1982) included a number of recommendations on the administration of and future research into the industry. One recommendation concerned research into the effect of harvesting on the few geographically restricted species which are utilised in large quantities by wildflower merchants. Funds recently made available by the Australian National Parks and Wildlife Service to the Western Australian Department of Fisheries and Wildlife have enabled a start to be made on research in this area.

The aims of this report are to -

1. Gain information on harvesting methods for particular species;

2. Assess any damage or potential damage being done to particular species as a result of harvesting methods; and

3. Make recommendations for further study if necessary on species at risk and suggestions for possible management of pickers or picking areas.

The particular species studied include the 55 most heavily exploited species, those plants on the CITES (Convention on Trade in Endangered Species) Appendix II list which are used in the wildflower industry as well as geographically restricted species. Appendix I shows the plants included on the list and their status in terms of exploitation, restriction or CITES listing.

As the three months of this study began in May, many plants could not be studied in depth or at first hand. May and June are the two 'quietest' months for the taking of cut flowers, as shown by Burgman and Hopper (1982). This is especially the case in the northern sandplain picking area which has its main season in the spring and summer. However, the Mt. Barker/Albany area produces a number of the important backing or foliage species for dried arrangements and Agonis parviceps, Podocarpus drouyniana, Adenanthos obovata and Beaufortia decussata are all picked over the winter months.

Additionally, plants of Banksia baxteri, Beaufortia sparsa and Verticordia brownii could be examined for previously cut stems.

Information gained from picker questionnaires and interviews gave some idea of the availability and regeneration capabilities of some of the species not being picked during the study months.

Seed collecting was not included in the study although two seed wholesalers were contacted and gave information on species availability.

Overall Methods

Work in the study was divided into three areas -

1. Questionnaires mailed to selected pickers on picking methods and availability of species.

2. Follow-up contact with some pickers to examine picking areas.

3. Interviews with wholesalers on availability of species, changes in species popularity and specifications for picked stems.

II QUESTIONNAIRES SENT TO PICKERS

Method

A preliminary questionnaire on harvesting methods and with related questions on species regeneration was used with three pickers in person and from that amendments were made to ensure that the final questionnaire was as un-ambiguous and as applicable as possible.

Approximately 50 sets, including 2 questionnaires and a covering letter were mailed to selected pickers. The first questionnaire was designed to acquire general information on species availability, harvesting areas and their regeneration and the problems in obtaining the species required. A copy of this is seen in Fig 1. The second questionnaire aimed at gaining specific information on the actual method of harvesting and the requirements for a saleable cut stem. (See Fig. 2.)

Selection of pickers was from harvesting returns for the months of May, June and July in 1983 and included only those pickers who took species of interest. About 50% of pickers contacted responded. It was subsequently found that at least four of the pickers on the mailing list had moved.

Questionnaires returned were examined for species details and harvesting information of value and also for comments on availability. Unsolicited comments on the wildflower industry, cultivation of species and the effects of fire on harvestable species were also noted.

Results and Conclusions

50% (25) of questionnaires sent out were returned. As expected some were more useful than others in terms of specific harvesting methods data.
The results of some of the questions are as follows -

Q1. NAME, LICENCE NUMBER.

Q2. HOW LONG HAVE YOU HELD A LICENCE?

Mean time	32.1 months
Median time	27 months
Shortest time	7 months
Longest time	6 years

TABLE 1 - LIST OF SPECIES STUDIED AND THEIR STATUS

Species	CITES flowers	CITES seed	Top 55	Geog. Restricted	NB. ++ = top 21 + = top 55
Acacia leioderma				+	
Adenanthos barbigerus			+		
A. meisneri			+	+	
A. obovatus			++		
A. teges				+	
Agonis juniperina			+		
A. parviceps			++		
Andersonia aristata				+	
A. simplex			+	+	
Anigozanthos bicolor		+			
A. flavidus	+	+	+		
A. humilis		+			
A. manglesii	+	+	++		
A. pulcherrimus	+	+	++	+	
A. rufus	+		++		
A. viridis		+			
Baeckea astarteoides			+		
Banksia attenuata			+		
B. baxteri	+	+	++		
B. burdetti	+	+	+	+	
B. candolleana				+	
B. coccinea	+	+	++	+	
B. gardneri				+	
B. grandis	+				
B. hookeriana	+		++	+	
B. laricina				+	
B. media		+			
B. menziesii	+		+		
B. occidentalis		+			
B. petiolaris				+	
B. pilostylis		+			
B. prionotes	+	+	+		
B. sceptrum	+				
B. speciosa	+	+	+		
B. victoriae	+			+	
Beaufortia decussata			++	+	
B. sparsa			++		
Boronia heterophylla			+		
B. megastigma			++	+	
B. ternata			+		
Bossiaea laidlawiana				+	
B. webbii				+	
Callistemon speciosus			+		
Calothamnus pinifolius				+	
C. rupestris				+	
Cephalotus follicularis				+	
Chamelaucium uncinatum			++		
Chorizema dicksonii				+	

Species	CITES flowers	CITES seed	Top 55	Geog. restricted
Conospermum amoenum	+			
C. brachyphyllum	+			
C. crassinervium	+		+	
C. densiflorum				+
C. glumaceum	+			
C. incurvum	+			
C. stoechadis	+		+	
C. triplinervium	+		+	
Crowea angustifolia	+	+	+	+
Cycas armstrongii		+		
Dasypogon hookeri				+
Daviesia juncea				+
Dryandra drummondii			+	
D. formosa	+	+	++	
D. mucronulata				+
D. patens				+
D. plumosa				+
D. polycephala	+		++	+
D. praemorsa				+
D. quercifolia			+	+
D. stuposa				+
Eucalyptus caesia				+
E. crucis				+
E. forrestiana				+
E. macranda				+
E. supulchralis				+
Geleznowia verrucosa			+	
Hakea cucullata				+
H. loranthifolia				+
H. neurophylla				+
H. orthorrhyncha				+
Helichrysum bracteatum			+	
H. cordatum			++	
Helipterum humboldtianum			+	
H. manglesii			+	
H. roseum			+	
Hybanthus floribundus			+	
Isopogon baxteri				+
I. cuneatus				+
I. tripartitus				+
Kennedia macrophylla				+
K. stirlingii				+
Lachnostachys eriobotrya			+	
Lambertia uniflora				+
Leptocarpus scariosus			+	
Leptospermum firmum			+	
Leucopogon verticillatus			+	
Livistcna alfredii				+
Lysinema ciliatum			+	
Macropidia fuliginosa	+			+
Macrozamia reidlei	+	+		

Species	CITES flowers	CITES seed	Top 55	Geog. restricted
Melaleuca diosmifolia				+
M. nesophila				+
Orthrosanthus polystachyus				+
Pandorea pandorana				+
Pimelea physodes				+
Podocarpus drouyniana			++	
Stirlingia latifolia			++	
Strangea cyanchocarpa				+
Stylidium plantagineum				+
Tetragonia decumbens				+
Thryptomene australis			+	
Thysanotus glaucus				+
Verticordia brownii			++	
V. chrysantha			+	
V. densiflora			+	
V. drummondii			++	
V. grandiflora			+	
V. grandis				+
V. lehmanii				+
V. lindleyi				+
V. nitens			++	
Xanthosia rotundifolia				+
Xylomelum angustifolium		+		
Xylomelum occidentale	+			

1. NAME : ..... LICENCE NO.: .....

2. HOW LONG HAVE YOU HAD A LICENCE? (Years/months) .....

3. WHAT SPECIES DO YOU PICK? .....
.....
.....

4. DO YOU PICK AMOUNTS a) to fill a contract? .....
b) as supply allows? .....

5. PICKING LOCATIONS. DO YOU USE a) the same 'patch' each year?
b) the same general area but a different 'patch'
c) a different area?

(Put a, b or c for each species picked) .....
.....
.....
.....

6. DO YOU HAVE TROUBLE REACHING FLOWERING STEMS IN SOME SPECIES? (State which species) .....

HOW DO YOU OVERCOME IT? (e.g. use ladders, long secateurs, not bother, break branch) .....
.....

7. ARE 'OLD' PICKING SITES BECOMING LESS AVAILABLE (e.g. being cleared, burnt etc.) OR HAVING LESS MATERIAL TO PICK? STATE SPECIES WHERE TROUBLE EXISTS IF YOU CAN.
.....
.....

DO PICKING AREAS OF PARTICULAR SPECIES RECOVER FROM BEING USED FROM ONE SEASON TO THE NEXT? i.e. DO YOU NOTICE BREAKS/GAPS IN FOLIAGE OR LESS FLOWERS FROM THE PREVIOUS PICKING? .....
.....

DO SOME SPECIES HAVE MORE FLOWERING HEADS IF PICKED REGULARLY? .....
.....

ARE SOME AREAS OR SPECIES AFFECTED BY THE SEASON? (e.g. less flowers after drought or frost.) STATE SPECIES AND HOW THEY ARE AFFECTED. .....
.....
.....

8. DO YOU TAKE WHOLE PLANTS OR PULL SPECIES WHICH CANNOT BE CUT EASILY? WHICH SPECIES? .....

9. ARE THERE ANY SPECIES WHICH YOU ARE HAVING TROUBLE FINDING STANDS OF? .....
.....

ARE THERE ANY SPECIES WHICH ARE BECOMING MORE RESTRICTED TO CERTAIN AREAS?
.....

FIGURE 1

SPECIES QUESTIONNAIRE

SPECIES PICKED	PART OF PLANT TAKEN	STAGE OF FLOWERING/ FRUITING REQUIRED	METHOD OF PICKING	LENGTH/SIZE REQUIRED

FIGURE 2

NOTE: Please use botanical name if possible, otherwise common name.
Plant part - flowering stem, non-flowering stem, fruit/nut, seeds, whole plant.
Stage - bud, ½ open, old fruit (e.g. with eyes 'open' as in banksias) etc.
Method - e.g. cut with secateurs, sawn, snapped etc.
Length/size/shape - Any specifications from the wholesaler, e.g. 20 cm, unbranched stem, certain fruit/head size.

Q3. WHAT SPECIES DO YOU PICK?

This information was listed more fully in the species methods questionnaire.

Q4. ARE AMOUNTS PICKED A) TO FILL A CONTRACT?
B) AS SUPPLY ALLOWS?

8 pickers (33%) picked species to fill a contract.
13 pickers (54.1%) picked species as supply allowed.

Of the remaining 3 who answered 2 operated on both modes with one of these storing excess flowers dried. One picker who only took Banksia hookeriana and B. coccinea, stated that supply never allowed him to fill a contract.

From these results it may be deduced that the majority of pickers pick all that is available of a particular species at a particular time in their area. This may or may not be sufficient to fill a specific contract from a wholesaler or it may be that they are asked to supply all that they can. This latter case is probably most likely with less available and/or highly popular species such Banksia hookeriana and B. coccinea, Anigozanthos pulcherrimus, some Verticordia species and the very popular Agonis species and Stirlingia latifolia.

When pickers take stems to fill a contract they are possibly being more selective and leaving larger numbers of flowering stems behind provided they have an adequate supply.

Q5. PICKING LOCATIONS.
ARE STEMS PICKED IN - A) THE SAME 'PATCH' EACH YEAR
B) THE SAME GENERAL AREA BUT A DIFFERENT 'PATCH'
C) A DIFFERENT AREA?

All species which received predominantly 'a' scores are those which have restricted picking or distribution areas and which are generally tree or large bush species. They include Dryandra formosa, D. quercifolia, Banksia hookeriana, B. coccinea, B. baxteri and Hybanthus. Species which received 'b' and 'c' ratings were mostly those which are widespread and freely available and which are found as low, multi-stemmed plants. They included Lysinema ciliatum, Stirlingia latifolia, Adenanthos obovatus and Podocarpus drouyniana. Because of the small number of scores received for each species the results cannot be very conclusive but a pattern does occur. See Appendix VI for a complete table of scores.

Q6. DO YOU HAVE TROUBLE REACHING FLOWERING STEMS IN ANY SPECIES?

- 15 of 24 pickers (62.5%) had trouble reaching stems. Species concerned were mostly Banksia coccinea, B. baxteri and Banksias in general. One had trouble with 'tea-tree'.

- Of those 15 who had difficulty, 8 (53.3%) did not bother to overcome it.

- Of the 7 who tried to reach stems, 6 used long secateurs if possible and one backed a vehicle up if the area was clear but usually did not bother.

In general, except where stems are at a premium (e.g. B. coccinea) pickers find the effort involved in obtaining out-of-reach stems more than it is worth. One picker contacted had tried long secateurs and found them too difficult.

Q7. ARE 'OLD' PICKING SITES BECOMING LESS AVAILBLE OR HAVING LESS MATERIAL TO PICK?

Little useful information was gained from this question. A few pickers mentioned land clearing as being a problem.

DO PICKING AREAS OF PARTICULAR SPECIES RECOVER FROM BEING USED FROM ONE SEASON TO THE NEXT?

Most pickers gave a positive answer to this question.

DO SOME SPECIES HAVE MORE FLOWERING HEADS IF PICKED REGULARLY?

Of 17 useable questionnaires, 17 species of interest were mentioned as being improved for future harvesting by regular picking or pruning. These were mainly members of the Proteaceae especially the banksias and dryandras. Table 2 shows the species mentioned and the number of times they were mentioned.

Two pickers answered 'yes' to the question but did not elaborate. One stated that species were 'definitely better for being picked and burnt in the right manner'.

TABLE 2 - SPECIES REPORTED AS PRODUCING BETTER FLOWERS IF PICKED REGULARLY

Species	No. times mentioned
Banksia baxteri	2
B. coccinea	3
B. hookeriana	2
B. menziesii	1
B. occidentalis	2
B. speciosa	2
Beaufortia sparsa	2
Boronia inornata	1
B. megastigma	1
Conospermum spp.	1
Dryandra formosa	5

D. quercifolia	2
Hybanthus floribundus	2
Lysinema ciliatum	1
Podocarpus drouyniana	1
Verticordia nitens	1

ARE SOME AREAS OR SPECIES AFFECTED BY THE SEASON?

Eight pickers reported drought as adversely affecting flowers. Effects such as later flowering, smaller flowers and buds not developing were noted. 'Tea-tree', Dryandra quercifolia, Banksias and Hybanthus seemed to be most affected.

Agonis parviceps was affected by heavy summer rain or unseasonal heavy rain which produced non-flowering growing tips. Unseasonal rain was also reported to affect Banksia coccinea and B. hookeriana, the latter being affected by mildew according to one picker.

Agonis juniperina and Beaufortia sparsa were reported to be adversely affected by warm winters in that they produced less flowers.

Q8. DO YOU TAKE WHOLE PLANTS OF PULL SPECIES WHICH CANNOT BE CUT EASILY?

All except 2 pickers answered 'no' to this question. One picker reported pulling stems of the species Leptocarpus scariosus but this probably has little effect on the plant overall. A Perth-based picker reported taking whole plants of Anigozanthos humilis from around the metropolitan area.

Q8/9 ARE THERE ANY SPECIES WHICH YOU ARE HAVING TROUBLE FINDING STANDS OF/WHICH ARE BECOMING MORE RESTRICTED TO CERTAIN AREAS?

Twelve species were mentioned by pickers in this context. (See Table 3). Except for Boronia megastigma each species was only reported to be in shortage by one picker. However, many of the spring and summer flowering species were not well represented by pickers.

Banksia coccinea and B. baxteri were reported to be more restricted due to land clearing. B. occidentalis, Dryandra quercifolia and Hybanthus were also supposedly difficult to find due to the extension of farms in the Ravensthorpe-Hopetoun area. This latter group was reported by both major pickers at Ravensthorpe.

One picker from the Denmark area stated that all the species he picked were becoming hard to find due mostly to the increase in the number of pickers.

TABLE 3 - SPECIES OF WHICH PICKERS HAD TROUBLE FINDING PICKABLE STANDS

Species	Comment
Agonis parviceps	
Anigzanthos pulcherrimus	
Banksia baxteri	becoming more restricted
B. coccinea	becoming more restricted
B. occidentalis	due to land clearing
Boronia megastigma	
B. purdiana	
Chamaleucium uncinatum	
Dryandra quercifolia	due to land clearing
Hybanthus floribundus ssp adpressus	due to land clearing
Macropidia fuliginosa	
Pithocarpa corymbulosa	becoming more restricted
Verticordia grandiflora	
V. nitens	

There are a number of species which pickers mentioned as being taken which were not listed in Burgman and Hopper (1982). These and other species known as being harvested are listed in Appendix II.

III EXAMINATION OF PICKING AREAS

Most pickers contacted were helpful in discussing picking methods and general areas but not all were prepared to actually show their picking areas. Problems with 'poaching' on good public-access areas is probably one reason why some pickers are reticent about revealing exact locations. Many pickers interviewed picked at least some of their requirements on privately owned land but this is not always indicated on picker returns unless the plant is picked by the property owner who is then shown as having a Commercial Producers Licence.

In the Mt. Barker/Denmark area there appears to be a 'gentlemens's agreement' whereby pickers who have traditionally used certain areas of vacant crown land (VCL) or Forests Department land retain their 'right'. Some dissatisfaction was aired on changes in regulations where previously allotted Forests Department areas have been thrown open to all pickers. (See Fig. 3a.)

Competition for picking areas seems to be a problem only with geographically restricted species such as Banksia hookeriana, B. coccinea and B. baxteri. Other spring and summer picked species may also possibly be included here. Banksia hookeriana is one species for which there is very little pickable Crown land available and which is very popular at a time of the year when there is little else available in the northern region. Up to six pickers have been reported to be using the area off BeeKeeper Road north of Eneabba (See Map 4 in Appendix V for location and Fig. 3b). However, as with many species, a reasonable percentage of B. hookeriana is taken from private property.

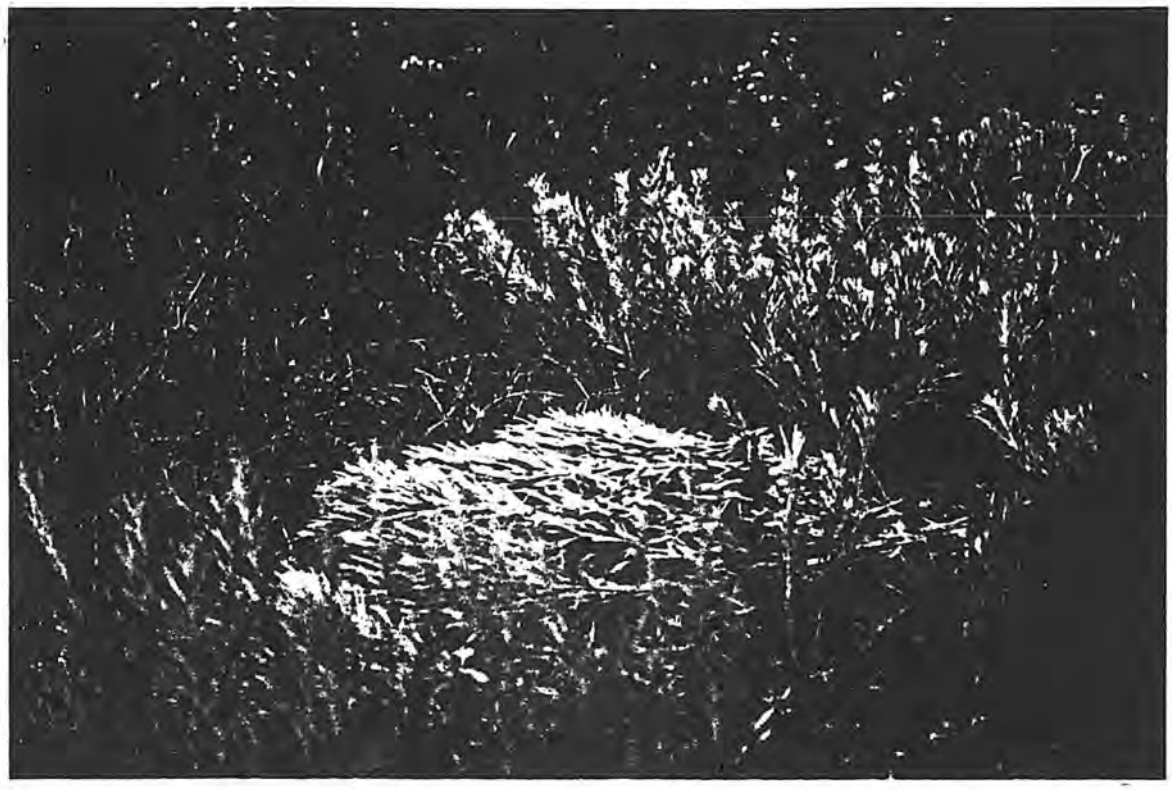


Fig. III 3a - Bunches of Podocarpus drouyniana in a stand of the species in the Denbarker Forests Department picking area.

Fig. III 3b - Heavily harvested stand of Banksia hookeriana off Beekeeper Road north of Eneabba. (See Map 4.)

Quadrat Harvesting Counts

Introduction and Methods

As is shown in the Species List in Appendix I, some picking areas were examined in detail and counts made of the stems picked, flowering heads/cones remaining and/or possible pickable stems per plant. Information varied for each of the species examined due to the type of flower collected and the time of harvest.

Quantitative data was obtained relatively easily for Banksia and Dryandra species due to the size of cut stems and the persistence of the old cones. Information was also gathered on Verticordia brownii, Beaufortia sparsa and Hybanthus floribundus which are generally heavily picked over a small area. Many of the south west forest species do not grow in dense stands and therefore harvesting counts are very difficult to obtain.

Where possible for each species counted the percentage of flowering stems taken was calculated. The following formula was used for Banksias, Dryandra quercifolia and Beaufortia sparsa.

$$\% \text{ taken} = \frac{\text{No. of cuts}}{\text{No. of cuts + total no. of flowering heads + no. of old cones}}$$

The maximum percentage of possibly pickable flowering heads was also calculated for the Banksia species using the formula -

$$\frac{\text{No. of cuts + no. of possibly pickable stems}}{\text{No. of cuts + no. old cones + total flowering heads}}$$

This formula assumes that pickers are constantly checking stands for ripe heads and that a standard of stem length and straightness is adhered to.

For V. brownii the number of cut stems from the previous season and the number of remaining pickable stems were counted. These figures gave the total percentage of pickable flowering stems taken in the 1983 season.

For Hybanthus floribundus previously cut stems and stems pickable in the current season were counted. The percentage increase in pickable stems was calculated.

Table 4 summarizes the results of quadrat data obtained over the 3 month study period.

Discussion

Because of the varying stages of flowering of the species examined it was difficult to gain direct comparisons of harvesting percentages. Of the Banksia species examined the highest total percentage of stems cut to date (both B. coccinea and B. hookeriana were seen part-way through the harvesting period) was 36.4% and the lowest 0%. The overall average was 10.95% of stems taken. The young stand of B. coccinea was the most heavily picked on average due to the fact that young plants have a single straight, reachable stem and therefore 100% of the flowering stems of the plant can be taken. In the case of B. baxteri an average of 2.06 stems per plant was taken in the 1983 and 1984 seasons which represented 14.3% of the available flowering heads.

Harvesting rates of B. hookeriana were found to vary considerably (av. 7.42%). Because the picking area was examined in the early stages of the harvesting period many possibly pickable stems were unripe. Maximum possible picking percentages of up to 52.9% were recorded and the area was seen to be regularly harvested by a number of pickers. However, the most heavily picked plants were near roads and tracks and plants further into the stand were generally very lightly cut.

Similarly quadrats of Beaufortia sparsa were found to be subject to very variable picking percentages with the average over five quadrats being 9.42%. Results represent a whole season's harvest and it is seen that the overall percentage harvest is relatively small.

The figure of 40.6% for Dryandra quercifolia indicates the flowering stems picked on easily accessible, gravel-pit edge plants and is, on investigation of plants further into the stand, considerably higher than the overall average. The plants examined were more mature and bushier than those in the main stand which many have resulted from harvesting/pruning, lack of competition and /or increased weter run-off.

The number of pickable stems in Hybanthus floribundus appeared to increase as a result of heavy cutting. Plants which were picked one or two seasons previously produced more flowering stems than had been havvested before.

In Verticordia brownii the percentage of pickable flowering stems taken per quadrat was generally high. Population 1 which had only been picked for one season was heavily harvested with a subsequent loss of some plants in the dense stand. Population 2 which was included in a large area on private property which had been picked for 10 years was less heavily cut but still gave an overall of 47% of stems taken. The plants in Population 2 had mostly remained healthy but 3-5 years growth is required before stems can be re-picked.

From the species examined it can be seen that picking percentages can be as high as 74.8% for saleable stems in V. brownii. However, the figure is generally considerably lower and exceptions are only found in easily accessible, fringe plants. Plants or stands which are regularly picked over a long period may come under strain as a result of seed stock diminution but most stands examined were not harmed directly from stem cutting.

Illegal Harvesting

Some evidence and heresay of roadside picking was noted. Picked roadside plants of Banksia prionotes and Verticordia nitens were seen. It is possible that the latter was picked by travellers but B. prionotes was secateur picked. Roadside populations of B. hookeriana appeared to be largely unpicked.

IV INTERVIEWS WITH WHOLESALERS

Seven major wholesalers in Perth and country areas (including one at Mt. Barker, one at Cervantes and one at Coomberdale) were interviewed over the 3 month period of the study. Perth wholesalers were asked about specific plants and

TABLE 4 - QUADRAT DATA FOR COUNTS CARRIED OUT ON SELECTED SPECIES

Species		No. plants sampled	% of flowering stems taken to date	Max. % of poss. pickable stems.
Banksia baxteri		45	14.3	-
Banksia coccinea	Q1	53	25.6	69.5
	Q2	42	21.2	72.0
B. hookeriana	Q1	4	36.4	52.9
	Q2	9	0	10.8
	Q3	8	7.4	41.5
	Q4	21	1.2	33.7
	T1	23	4.5	17.9
	T2	19	2.3	28.5
	T3	41	4.5	17.8
	T4	16	3.1	24.5
Beaufortia sparsa				
	Q1	25	21.5	-
	Q2	18	3.3	-
	Q3	18	0	-
	Q4	16	14.3	-
	Q5	12	8.0	-
Dryandra quercifolia		10	40.6	-
Hybanthus floribundus		20	-	% increase in pickable stems 150.0
Verticordia brownii				% pickable flowering stems taken
Pop.1	Q1	53	-	74.8
	Q2	51	-	67.4
Pop.2	Q1	86	-	55.0
	Q2	142	-	39.0

(Q = quadrat, T = transect)

their availability, the changing emphasis of plant popularity in overseas and interstate markets and their specifications for picked stems. Wholesalers did not necessarily use all the plants on the list and therefore some species are not well documented.

Although species availability and popularity is not directly related to harvesting methods it gives some indication of the stress on particular species due to clearing, burning and/or picking and the possible changes in requirements and therefore future stress.

Individual species comments by wholesalers are recorded in Appendix I along with other species details.

Results and Discussion

Q1. ARE THERE ANY SPECIES FOR WHICH YOU CAN'T FILL ORDERS OR OF WHICH YOU COULD SELL MORE STEMS IF THEY WERE AVAILABLE?

Seventeen species were mentioned by the wholesalers questioned. Two of them, Hakea platysperma and Verticordia monadelpha are not on the main species list examined but have been included in Table 5 below. The number of times the species has been mentioned by wholesalers is also recorded.

TABLE 5 - SPECIES FOR WHICH INSUFFICIENT SUPPLY IS AVAILABLE

Species	No. wholesalers	
Banksia ashbyi	1	
B. baxteri	1	
B. coccinea	1	
B. hookeriana	1	
B. victoriae	2	
Dryandra formosa	1	hard to get from the bush
D. polycephala	2	Could use more/disappearing
Hakea cucullata	1	fungal problems
H. platysperma	(1 wholesaler said others had problems)	
Hybanthus floribundus	1	(others didn't use it)
Lachnostachys verbascifolia	1	
Leptocarpus scariosus	1	short at Albany this year
Macropidia fuliginosa	1	
Stirlingia latifolia	2	could sell more/seasonal variations

Verticordia brownii	1	some years harder to get
V. grandis	4	dying species, could be picked out
V. monadelpha	1	

Q2 HAVE YOU NOTICED ANY CHANGES IN POPULARITY OF PARTICULAR SPECIES TRADED?

Table 6 below gives a barometer of popularity of species and the number of wholesalers who mentioned particlar species.

TABLE 6 - CHANGE IN SPECIES POPULARITY

Species	up/down	No. wholesalers
Agonis parviceps	up	2
Banksia baxteri	down	1
B. candolleana	down	1
B. laricina	down	3 (too expensive)
B. menziesii	down	2
B. speciosa	down	1
Beaufortia sparsa	up	2
Boronia ternata	down	1
Daviesia cordata	down	1
Dryandra polycephala	down	1
Hakea cucullata	down	2
H. platysperma	down	1
Helichrysum cordatum	down	1 (a little)
Leucopogon verticillatus	down	1
Stirlingia latifolia	up	1
Verticordia drummondii	up	1

Two wholesalers stated that the popularity of banksias had dropped slightly on the overseas market. One of these wholesalers however, said that the increase in the Eastern States market had made up for it. It was also reported that kangaroo paws had dropped in popularity because of the price, espcially Anigozanthos pulcherrimus and Macropidia fuliginosa.

Q3. DO YOU RECEIVE MUCH EVIDENCE OF BAD PICKING, DAMAGE OR WASTEAGE?

Some mention was made of pickers taking kangaroo paws with the roots on but wholesalers say such pickers are discouraged strongly. New pickers may pick stems which are not saleable but soon learn to distinguish poor stems from those for which they receive payment. Wholesalers stated that they generally only use known pickers and those who supply good stems reliably.

V DAMAGE DUE TO HARVESTING

Very few comments were received by pickers or wholesalers on damage observed or heard of in harvested species.

Three reports of past damage to Anigozanthos species were heard. Plants were apparently pulled out whole and the flowering stem then cut off. In this way the whole plant is destroyed. This practice is blamed on 'fly by night' spring and summer pickers and wholesalers claim they never accept stems with roots attached.

Species of the 'Everlasting' group have also been reported to be pulled out whole. Two pickers stated that they pulled up Waitzia, Helipterum and Pithocarpa species because it is quicker. As these plants are annual species the practice is probably not particularly damaging.

One report of tree damage by seed pickers cutting down whole small trees or branches was received. Similarly a rival picker from the southern area reported branch destruction and vehicle damage on some Hakea and Dryandra species.

The number and severity of damage reports is low. One the one hand pickers and wholesalers are probably reluctant to paint a black picture of the industry but on the other pickers (especially long term ones) are unlikely to damage areas on which they pick regularly or seasonally. They state that it is in their own interests to preserve harvestable populations and that potential damage is only from '1 time' pickers or new pickers who do not know how to best pick plants for continued flower availability.

Field observations showed remarkably little damage even to heavily picked stands. It is possible that areas which had been badly looked after were not shown but in areas which were examined the major damage seen was some trampling between Banksia baxteri and a small amount of vehicle damage in some areas. (See Fig.4a.) Some stems of Banksia coccinea were seen cut off but not collected thereby wasting potential seed source but numbers were relatively very small. Cut heads of B. hookeriana were also observed among the leaves stripped from the stems (Fig.4b).

Some important damage which has probably been incurred or at least been accelerated by pickers in the spreading of Phytophthera cinnamomi among Banksia coccinea on the south coast. Local wildlife officers state that the disease has spread rapidly throughout B. coccinea stands and is threatening the survival of the species in some aras. Extensive plant death was observed, especially in the Cheyne's Beach area and also beginning on the Ledge Beach National Park where picking occurs. No obvious die-back induced plant death was noted in other species of Banksia examined.

Fig. V 4a
Vehicle damage to part of a stand of Banksia hookeriana off Beekeeper Road.

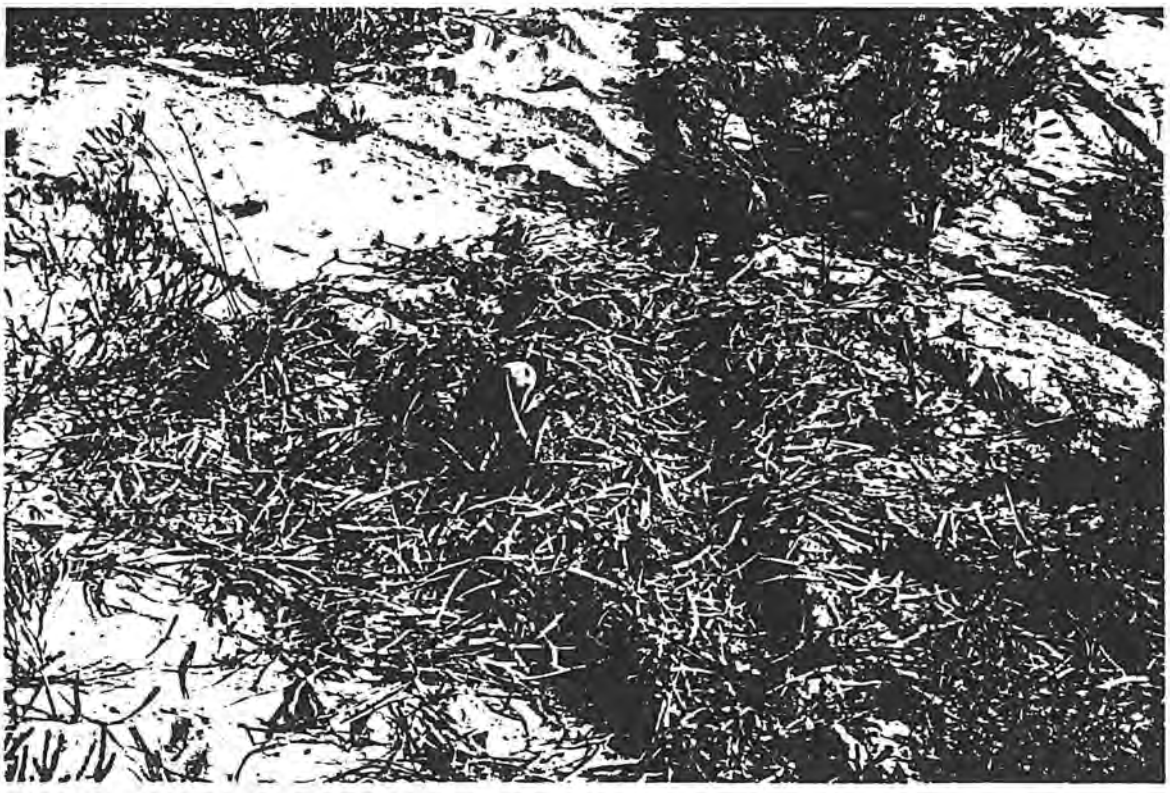


Fig. V 4b - Vehicle tracks and wasted cut heads observed in a stand of Banksia hookeriana off Beekeeper road.

VI EFFECTS OF FIRE ON THE HARVESTABILITY OF SPECIES.

Sixteen out of twenty-five pickers contacted by questionnaire regarded burning as essential for continued availability of harvestable stems.

In both southern and northern picking areas it is widely claimed that periodic fires are essential. The low shrub species seem to be particularly responsive to fire and regenerate from the base producing many fresh, straight stems.

Table 7 lists the species specifically mentioned as being improved for picking after a fire with the time scales applicable.

Pickers on the whole have 'tunnel vision' with regard to the need to burn bush areas and generally feel that fires every 5-6 years would not be too frequent. They take no account of the requirements of un-picked plant species, insects or animals. However, possible future management of bush areas for wildflower harvesting may depend on periodic burning.

TABLE 7 - REPORTED FIRE REQUIREMENTS FOR HARVESTED SPECIES

Species	No. years after fire that stems are available	No. years good stems are available
Adenanthos obovatus	0.5	3-4
A. cuneatus	-	3-4
Agonis parviceps	2-3	4(if not previously picked)
Anigozanthos humilis	<1	2-3
A. pulcherrimus	<1	3-4
Banksia coccinea	3-4	-
B. occidentalis	2	-
Beaufortia decussata	2	2
B. sparsa	2-3	2-3
Conospermum crassinervium	improved	-
Dryandra quercifolia	7-8	-
Helichrysum bracteatum	1-2	-
H. cordatum	improved	-
Lachnostachys verbascifolia	improved	-
Macropidia fuliginosa	improved	-
Podocarpus drouyniana	1.5	3-4
Stirlingia latifolia	1	-
Thryptomene sp.	2-3	-
Verticordis grandis	at its best	-
V. nitens	4	indef.
Xanthosia angustifolia	improved	-

VII SUMMARY AND CONCLUSIONS

It was difficult to make any substantial assessment of harvesting methods and their resulting effect on picked plant species in the three months of the study. However, of the species which could be examined closely in some areas a reasonable understanding of the potential problems, if any, was attained.

Information was gained in the following ways -

- 52 pickers were contacted in person and/or through questionnaires
- 6 picking areas were examined covering 11 species and populations of a number of other species were observed.
- 7 wholesalers were interviewed.

A. Survey Problems and Limitations

Problems involved in the study included -

i) the time of the year as well as the length of time available,
ii) a probable bias in pickers contacted in that those available were mostly longer term and did not include 'one-off' pickers.

B. Effects of Harvesting

From observations very few species appeared to be adversely affected by harvesting. Of those examined the species most at-risk is probably Banksia coccinea but the main reason for its state is the problem of Phytophthera cinnamomi infection (dieback). Banksia hookeriana is heavily picked over a restricted area but damage would only occur if seed stocks were depleted to a great degree. This is a long term effect.

Only one other species examined possibly gives grounds for concern. Verticordia brownii is heavily picked in the Moora to Badgingarra area, is very slow to regenerate and can be killed if not picked correctly. The latter aspect also applies to some other Verticordia species and Hybanthus floribundus ssp. adpressus.
Of the remaining species on the list only Verticordia grandis stands out as being endangered although mainly in terms of availability of pickable stems.

Anigozanthos pulcherrimus and Macropidia fuliginosa are also at a premium in their wild state but cultivation of these species should and will continue to alleviate the problem. Wholesalers prefer cultivated stems because of their superior quality.

On the whole, harvested species are either growing in sufficient quantities or are able to regenerate and produce prolifically so as not to be adversely affected overall by the wildflower industry. In addition, and as stated by Burgman and Hopper (1982) land clearing and development is a far greater threat to the survival of some restricted species.

Four extra species were mentioned a number of times with regard to apparent overpicking or extra usage. These were Adenanthos cuneata, Boronia purdieana, Daviesia cordata and Hakea platysperma. Further details of these species are recorded in Appendix VII.

The few at-risk species mentioned are generally well represented in Nature Reserves and National Parks.

The very heavily exploited foliage and flower species from the forests and heaths of the south west appear to be under no threat as long as Forests Department lands remain uncleared. Adenanthos obovatus, Agonis parviceps, Podocarpus drouyniana and Beaufortia sparsa are found abundantly and regenerate well after fire. A high percentage of stems are unharvested because of unsuitability.

No study was made of the differing effects of harvesting methods, i.e. cut versus snapped stems. Generally, stems were cut unless it was faster and more comfortable to do otherwise.

The Boronia species (heterophylla and megastigma) require further study to determine the distribution and safety of populations.

C. Industry Trends

The major trend noted among those involved in the industry who were contacted was the increasing amount of harvested material coming from 'bush farming' on private property and from cultivation.

An apparently high percentage of northern sandplain species especially is taken from private property and includes heavily exploited Banksia hookeriana and Verticordia brownii. One major Perth wholesaler at least leases bush blocks in Badgingarra and Moora which are kept specifically for the production of wildflowers. Additionally, some farmers are beginning to manage bush areas on their property by strip burning and slashing.

It was found from reports in picker questionnaires that 7 (27%) pickers were either farming bush on their own properties or were cultivating saleable species. Species being cultivated included Banksia baxteri, B. coccinea, B. ashbyi, Boronia megastigma, Anigozanthos rufus and Helipterum species.

D. Management Options

To try to ensure the continued availability of marketable stems and the health of populations the following management options are put forward -

- Heavy controls or total bans on bush picking of Macropidia fuliginosa and possibly Anigozanthos pulcherrimus.

- Heavy control of bush picking of Banksia coccinea.

- The introduction of a system of picking leases over 5-10 years with species harvest number restrictions and management supervision and requirements.

- The imposition of ceiling numbers of stems of some species allowed to be taken from vacant Crown land areas. This would involve clearer documentation on stem origins and include wholesaler checks.

Inevitably, such management requires increased inputs of manpower and funds as well as co-operation from wholesalers and pickers.

However, in the absence of further knowledge on species at risk and regeneration over the long term it is felt that some controls such as those outlined above should be implemented.

VIII ACKNOWLEDGEMENTS

This report has been completed with the administrative assistance of the Wildlife Research Centre at Wanneroo and with the guidance and comments of Dr. Stephen Hopper. Thanks go to Julie Mutter for the collation of the original species list and for help in the field. Bernie Haberley of the Moora office of the Department of Fisheries and Wildlife was helpful in the direction to and location of known picking areas.

The co-operation of the pickers and wholesalers contacted has been essential and much appreciated. Special thanks must go to Leslie Byass, Al Barrow, Bill and Barbara Wilson, Lorraine Jones, Clive Tonkin, Bob Blizzard, Heather James, Paul Hunt, Barry Vaughan, Brian Jack, Faye Deacon and Flower Exporters Australia Pty Ltd. Pickers who returned questionnaires are also thanked. They are listed in Appendix III along with other contacts.

Use of the Western Australian Herbarium and the Fisheries and Wildlife pickers licensing records is also acknowledged.

IX REFERENCES

Burgman M.A., Hopper S.D., (1982). The Western Australian Wildflower Industry 1980-81. Fisheries and Wildlife, Perth.

Holliday I., Watton G., (1975). A Field Guide to Banksias. Rigby, Adelaide.

APPENDIX I

SPECIES LIST - EXPLANATION

The information in this list was collected from a number of sources. The species list is designed to collate all the relevant information on individual species in the hope of attaining an overview of their immediate and potential damage due to harvesting where known.

The figure next to the species name is the number of stems reported as being taken in the 1980/81 survey by Burgman and Hopper (1982). A common name, if available is then given in brackets.

Distribution - Taken from lists and maps made of Western Australian Herbarium site records in all cases except for the Banksias where the information is from Holliday and Watton (1975) and the Anigozanthos species where the information was obtained from Gardner (1978).

Picking areas - Taken from picker return records in 1980/81 and as listed for each species in Burgman and Hopper. In some cases field examination has confirmed picking areas. Refer to Figures A and B for grid squares and to Appendix IV for percentages taken from each square and for the species distribution.

Picking times - As for 'Picking areas' and confirmed and adjusted by field observation when available.

Populations sighted - Plants observed in the field in natural situations and notes on their health and the effect of picking if seen. Location maps are found in Appendix V.

Picking restrictions - The requirements put forward by wholesalers for cut stems which may limit the number of stems taken due to length, flower age etc. Also reference to the accessibility of plants and other factors causing restrictions in their harvesting. These have been acquired from pickers questionnaires and observations.

Picking methods - Also obtained from pickers questionnaires and observations.

Regeneration/growth - Notes on species' reaction to harvesting taken from pickers and wholesalers questionnaires and interviews as well as field observations.

Counts - Statistical information acquired from examination of picked stands where available. Information and criteria is varied between species.

Wholesalers comments - Tabulated comments from interviews with wholesalers on species availability and popularity.

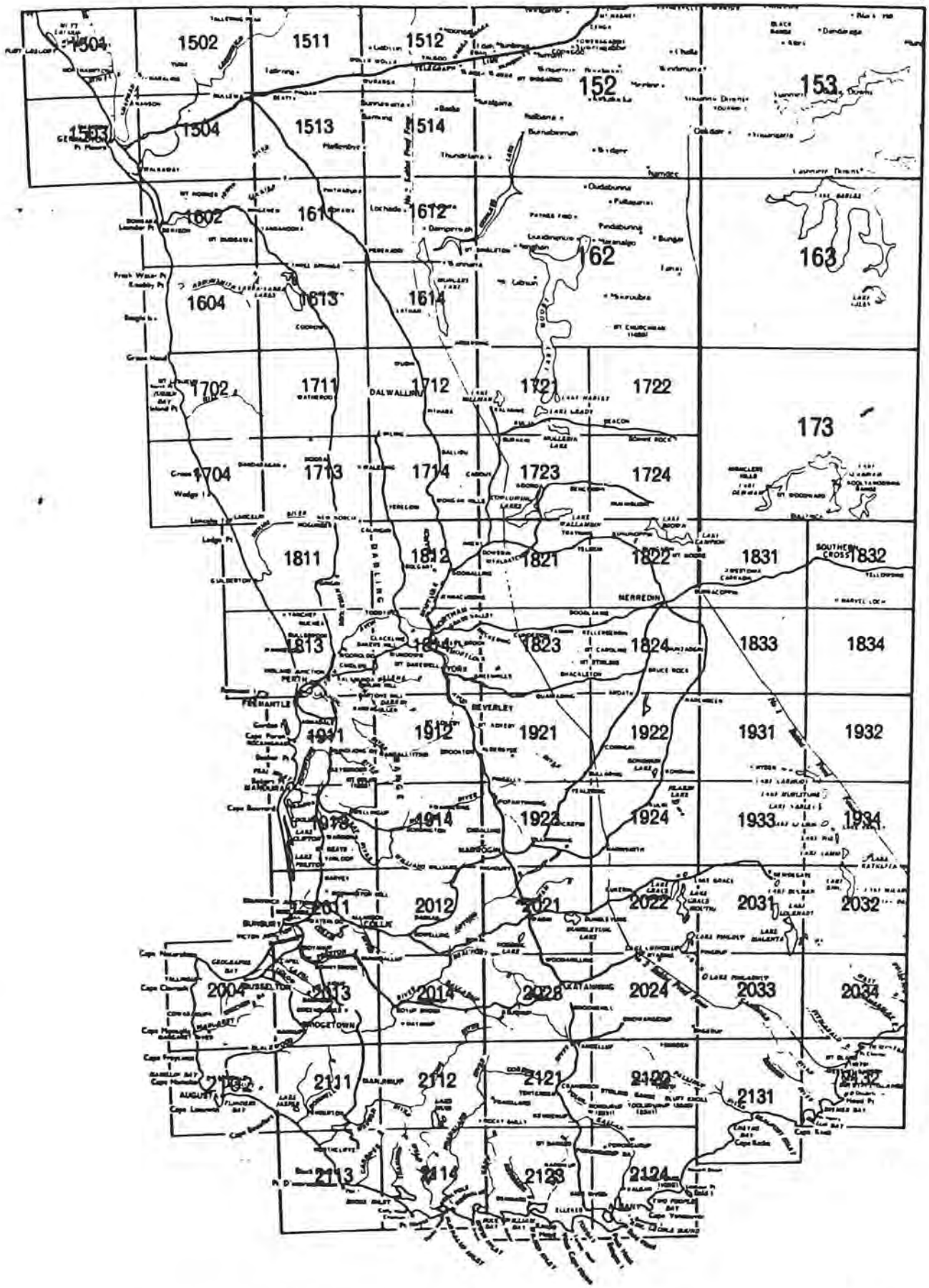


Fig. A Map of the South West of Western Australia issued to pickers showing 1/2 x 3/4° grids and their reference numbers

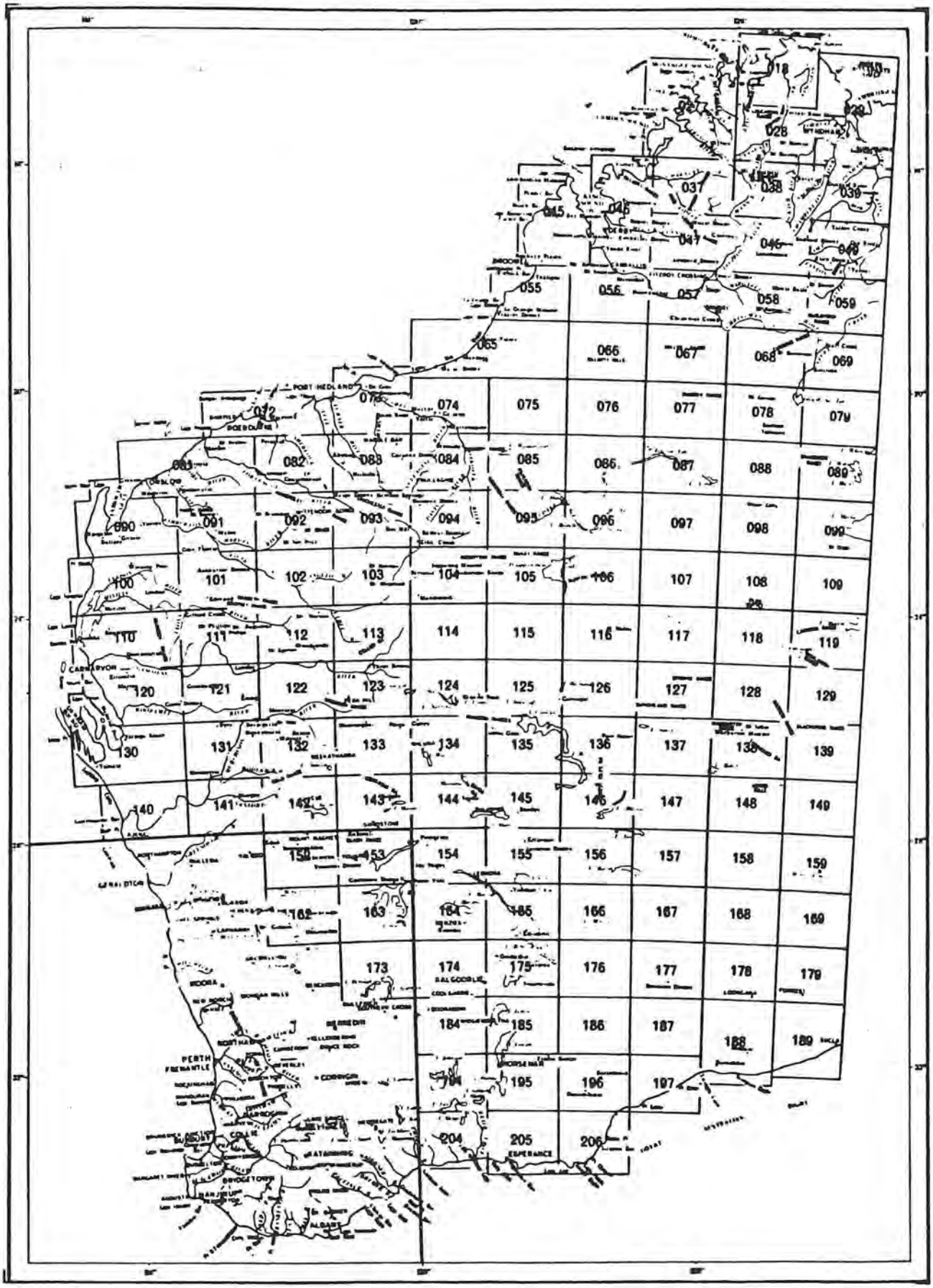


Fig. B Map of Western Australia issued to pickers showing $1^{o} \times 1\frac{1}{2}^{o}$ grids and their reference numbers.

SPECIES LISTING

ACACIA LEIODERMA GR

17.75kgs of seed taken from Mt. Barker 2124 in December 1980 and January 1981. No further information obtained.

ADENANTHOS BARBIGERUS 46,972 (Jug flower)

Distribution - Found in restricted coastal areas between Perth and Walpole.

Picking areas - According to the 1980/81 pickers returns this species was picked in the Mt. Barker 2123 and 2121 and the Perenjori 1613 areas. This does not fit with records of distribution as seen from herbarium collections.
No mention of the species or of another 'basket flower' was made by pickers interviewed in the Mt. Barker area or was seen in wholesaler sheds. It is possible that A. barbigerus has been confused with A. obovatus.

ADENANTHOS MEISNERI 40,375 GR

No mention of this species was made by pickers or wholesalers. Further investigation is required.

ADENANTHOS OBOVATUS 280,130 (Basket flower NOT Native Temp.)

Distribution - Found from Perth to Mt. Manypeaks in forest or sand heath. Occurs particularly in coastal and near coastal areas to 50 miles inland as far as Donnybrook and the Stirling Ranges.

Picking areas - See Fig. IV 1a. 65.7% taken from Mt. Barker 2123 and 25.4% from Bremer Bay 2131.

Picking times - Can be harvested all year as stems are picked for use as dried foliage.

Populations sighted - Extensive populations seen in the Denbarker area in Forests Department land (See Map 1). Also seen at Redmond, Narrikup and the Ledge Beach road area (See Map 3). Stands observed were variable in height up to 1 metre and with many stems. Many stems were not saleable according to pickers due to branching, stem diameter or coarseness. (See Fig. 1.)

Picking restrictions - Stems must be unbranched and fine with or without flowers. Length should be at least 60cm and up to 80cm. Fresh growth (second and third year) after a fire is the best age.

Picking methods - Of the 10 pickers contacted, 7 snapped stems and 2 used secateurs. All stems are accessible as the plants are low growing and scattered.

Fig. 1
Plant of Adenanthos obovatus in Denbarker Forests Department land. This plant is considered unpickable as it is 4+ years old and is therefore too coarse and branched.

Fig. 2a - Heavily picked population of Banksia baxteri off Cheyne's Beach road.

Regeneration/growth - A number of pickers mentioned that A. obovatus requires a burn every 4 to 5 years. Stems are available 6 months after a fire. Older plants become woody and branched and therefore unsaleable. No evidence of the effect of picking was noted.

Wholesalers comments -

1. Plenty available.
2. No shortage.

ADENANTHOS TEGES GR

Only 200 bunches were recorded as being picked in 1980/81. No mention made by pickers or wholesalers.

AGONIS JUNIPERINA 214,970 (Coarse tea-tree, Winter tea-tree)

Distribution - Widespread in low lying heaths and swamps along the south coast from Margaret River to Mt. Manypeaks.

Picking areas - All stems were picked in the Mt. Barker 2123 grid square area. (See Fig. IV 1b)

Picking times - March through to October according to pickers returns in 1980/81 but two pickers stated that it was finished by June. This discrepancy reflects the confusion with naming of the "tea-tree" species.

Populations sighted - Extensive areas of heath and swamp incorporating this species were seen in Forest Department land in the Denbarker area. (See Map 1) A. juniperina grows in thick stands in association with Agonis parviceps and Beaufortia sparsa. Picking areas are widespread and often on adjoining private property. Some tracks and flattened areas were seen in the thickets but damage was not great. Tracks were few due to the density of the stand.

Picking restrictions - Stems must be in full flower and well covered. Lengths required range from 50cm to 75 cm minimum and stems must be straight but branched.

Picking methods - Stems are either cut with secateurs or snapped off (50/50). Pickers work on foot within a thicket.

Regeneration/growth - No direct observations were made on regeneration. All pickers and wholesalers spoken to reported that regeneration was very good and that bushes were much improved (in terms of pickable stems) if kept well picked.

Stands were supposedly best 3 years after a fire and lasted well for 2-3 years from first picking age. If not picked the older plants became too woody.

Dry summers were reported to cause flowering to be about 6 weeks later than usual.

AGONIS PARVICEPS 1,172,976 (Fine, white or spring tea-tree)

Distribution - Widespread throughout the south west corner in sandy lowlands.

Picking areas - (See Fig. IV 2a). 74.7% taken from Mt. Barker 2123.

Picking times - Appears to be pickable all year although it is referred to as 'spring' tea-tree. The majority is picked between August and December.

Populations sighted - As with A. juniperina large thickets were seen in Forests Department land in the Denbarker region.(Map 1) The species was also seen in quantity at Narrikup and Oyster Harbour. No estimation of amount was made as stands were extensive and mixed.

Picking restrictions and methods - As for A. juniperina.

Regeneration/growth - as for A. juniperina. Two pickers (of the 13 who reported taking A. parviceps) reported that they had trouble finding good stands. A further 2 pickers took the species on their own land. One picker stated that land released for farming in the Denmark area had reduced ti-tree sites.

Wholesalers comments -

1. Comes back well from picking - not endangered (seed merchant).
2. Much of the supply comes from farms.

ANDERSONIA ARISTATA GR 1,250

No mention of this species was made by pickers or wholesalers.

ANDERSONIA SIMPLEX 121,082 (Purple Heath) GR

Distribution - Found mostly on and around the Stirling Ranges and south to Albany.

Picking areas - (See Fig. IV 2b) Mt. Barker 2123, 91%, Pemberton 2114, 9%. The latter picking area does not correspond with the recorded distribution of this species.

One picker of 'purple heath' was contacted from the Manjimup area. It seems likely that at least some of the stems picked as A. simplex are actually A. caerulea. A. caerulea was seen quite commonly in the Denbarker Forests Department lands and was also seen being marketed as fresh and dried flowers. No specimens of A. simplex were noted at wholesalers sheds and one wholesaler was considering taking 'Purple heath' out of his catalogue.
Further investigation to contact pickers and identify specimens harvested is required to verify the above.

One wholesaler/picker from the Denbarker area stated that he did not take or ask for 'purple heath' anymore because it was too scattered to pick and too low on the ground.

ANIGOZANTHOS BICOLOR

Not used as a cut flower except in very small amounts. One wholesaler stated that it was beginning to be cultivated and a picker reported that his supply was obtained from a paddock.

ANOGOZANTHOS FLAVIDUS 42,632 (Green kangaroo paw)

Distribution - Very widespread in the South West corner of the State from Busselton to Albany usually in swamps and low lying sandy areas.

No pickers were contacted. Populations of this species are usually dense and plants occur as large clumps with numerous flowering heads.

Wholesalers comments -

1. Not much used, doesn't travel well.
2. Not much called for.

ANIGOZANTHOS HUMILIS 15,155, 6kg seed (Catspaw)

Distribution - Very common on sands of the western coastal plain, inland as far as Kellerberrin and Kulin and southwards to Albany.

Because of its short stems is not used greatly for cut or dried flowers. It was reported to be plentiful after fire but not often picked. One picker contacted took whole plants around the metropolitan area.

Seed collecting probably has a much greater effect on plant numbers due to the number of heads required. Approximately 40 heads are needed to obtain 1 gram of seed as there are only 1 or 2 seeds per 'finger' of the paw. Extrapolation from 1980/81 seed returns indicates that about 240,000 heads would have been picked to supply the 6 kg of seed. However, a seed merchant contacted maintains that many seeds are left because they have dropped before the collectors arrive and that they never pick ever head.

ANIGOZANTHOS MANGLESII 231,520 (Red and green kangaroo paw)

Distribution - Can be found on the coastal sands from Shark Bay to Manjimup. Common in the Perth region.

Picking areas - See Fig. IV 2c.

No pickers were contacted or populations sighted.

Wholesalers comments -

1. Demand has dropped considerably in recent years because of competition from Israel.

2. The flower doesn't travel well because it bruises and wilts.
3. There are far more in the bush than are required.

ANIGOZANTHOS PULCHERRIMUS 266,543 (Yellow kangaroo paw)

Distribution - Found on deep sand between the Moore River and Eneabba especially in depressions.

Picking areas - 75.1% taken from the Hill River areas 1702 and 1704. 19.4% cultivated in the Perth region in 1980/81. (See Fig. IV 2d)

Picking times - October to January.

Picking restrictions - Stems must be at least 80cm (according to wholesalers, 30cm according to one picker) with 3 or more paws on each stem. At least one 'finger' of the paw must be open.

Picking methods - Stems are cut with secateurs although reports of plants being pulled up by the roots are not uncommon. One wholesaler stated that 80-90% of stems can be picked from a good stand.

Regeneration/growth - Plants respond to fire and germinate very thickly in the spring after the burn. Flowers can only be picked commercially for 3-4 years after a fire. The first year is the best and then flower numbers decline. Drought causes poorer heads with less flowers and shorter stems.

Pickers stated that there were very few areas of this species on vacant Crown land and that finds of pickable stands were 'pot luck'. One picker reported that a farmer near Cervantes who had a fire 4 years ago had taken 35,000 bunches from his property since then.

Wholesalers comments -

1. All or most of supply was obtained from cultivated plots. (2 reports)
2. One acre of cultivation was worth 100 acres of bush plants. Stems are better and more reliable.

ANIGOZANTHOS RUFUS 158,097 (Red kangaroo paw)

Distribution - Commonly occurs in deep sands between Esperance and Ravensthorpe and extends as far west as the Stirling Range.

Picking areas - Ravensthorpe 204, 52.8%, Mt. Barker 2122, 13.3%, Mt. Barker 2124, 12.6% and Bremer Bay 2132, 9.4%. 5.8% cultivated in Perth. See Fig. IV 3a and 3b.

Picking times - June to December (mainly October to December).

Picking restrictions and methods - (3 pickers) As for A. pulcherrimus although stem lengths of 60-65cm were taken by one picker.

Regeneration/growth - Plants germinate and flower prolifically after fire or

other disturbance such as chaining or ploughing. No observations made.

Wholesalers comments -

1. 25-40% of stems in a stand can be taken at one time.

ANIGOZANTHOS VIRIDIS 2,355 stems, 10.5kg seed

Distribution - Inhabits winter-damp clay depressions on the coastal plain between Moora and Busselton.

Little requirement for this species. No shortage. Seed collection is probably of far greater importance.

B AECKEA ASTARTEOIDES 41,012

Distribution - Misidentifications and species confusion makes definite distribution mapping very difficult.

Picking areas - Perth 1813 86%, Perth 1811 14%.

No pickers contacted or populations seen.

Wholesalers comments -

1. Approximately 1000 bunches per year used.
2. Prolific regeneration after fire. Found in the Gingin/Wanneroo area.

BANKSIA ATTENUATA 27,251

Distribution - Very common over a wide area from near Shark Bay to Bremer Bay and into the wheatbelt.

Picking areas - Perenjori 1613, 53.2%, Hill River 1704, 29.5%, Moora 1711, 7.9% and Perth 1813, 7.3%. Small amounts taken from as far south as Mt. Barker.

Picking times - October to March.

Populations sighted - No known harvested populations were examined but plants were sighted in quantity especially in the Hill River district in association with Banksia hookeriana. Plants were also seen in good numbers in the Forests Department reserves at Denbarker and on VCL on the south coast east of Albany. (Maps 1 and 3).

Picking restrictions - As with all Banksias stem length and straightness is a major restriction. Stems must be at least 30cm long and straight. Because trees may grow to 10 metres high many flowering stems are inaccessible.

Picking methods - Stems are cut with secateurs. One picker used long secatuers to reach flowers.

Wholesalers comments - All stated that B. attenuata was not very popular and that there was plenty available.

BANKSIA BAXTERI 212,133

Distribution - Found from King George Sound to the mouth of the Munglinup River and including the Stirling Range.

Picking areas - 91.6% of stems taken from Mt. Barker 2124 and Bremer Bay 2131. 7.9% from Ravensthorpe 204. 0.1% cultivated in Perth. See Fig. IV 3c.

Populations sighted - A heavily picked area along the Cheyne's Beach road and deep into adjoining UCL was examined. (See Map 2 and Fig. 2a.) B. Baxteri is the dominant species and stands are thick and extensive in bands or 'patches'. Plants seen were up to 2.5 metres high, heavy flowering with numerous remaining cones.

Paths have been beaten down through the stand examined and one or two vehicle tracks across the intervening heath were seen but damage appeared to be minimal with no broken down plants. It was noticed that all lower, older growth was brown and presumably dead - only 1 to 2 recent years growth was green.

Picking restrictions - (6 pickers) Stems must be relatively straight with a minumum length of 30cm. Stamens should not be fully opened, leaf collars should be neat and flowers must be free from grubs.

Picking methods - Stems are cut with secateurs and most are accessible height-wise although thick stands are difficult to penetrate. One picker used long secateurs to reach stems. Flowers are collected on foot and many heads are left. B. baxteri flowers over a fairly long period and as a consequence early and late flowers are often not taken. To obtain the required length a stem containing the previous season's cone may be taken and the old flower trimmed off.

Regeneration/growth - New growth is rusty red and is about 30-45cm on terminals. Growth is often topped by a flower and from the base of that the next years growth and flower comes. Usually only 1 flower grows from an old cone but 2 or 3 may appear (Fig. 2b). Cockatoo damage to fresh flowers is quite heavy. The birds chew off unfinished flowers thereby depleting seed set.

It was noted that if stems were cut back to old wood (i.e. not red wood) regneration did not occur.

Counts in picked areas - A heavily picked stand on the eastern side of the Cheyne's Beach road was examined.

Because of the difficulty of using quadrat or straight transect methods plants were counted which were on path edges. These probably indicate a maximum picking percentage for the area as they are the most accessible. Only cut stems were counted because of the possibility of confusion with cockatoo damage. Also only the last two years cuts and growth were counted because of the numbers involved. i.e. red-wood stems and cones.

Fig. 2b - Banksia baxteri plants at Cheyne's Beach road. Note the growth habit. Usually only 1 new stem is produced from an old flowering head.

Fig. 3 - Stand of Banksia candolleana near Eneabba. Plants are low and spreading with the flowers inside. Note Banksia hookeriana in background.

Results

Plants sampled	45
Number of cuts	93
Number of cones remaining	556
Overall percentage of stems taken	14.3%
Average number of stems taken per plant	2.06

N.B. Some slight underestimation may occur here because stems taken with an old cone on them (i.e. 2 years growth) are only counted as one cut. However, if the old cone has set seed and is trimmed off and dropped on the ground in the vicinity, the seed source is still available.

Wholesalers comments -

1. Last year B. baxteri was difficult to obtain.
2. Pickers are lucky to get 25% of flowers from a bush.
3. Could use more than was available.
4. There are more available than are required.
5. Popularity has dropped in the last 1-2 years.

BANKSIA BURDETTII 46,804

Distribution - Inland between the Moore and Hill rivers.

Picking areas - Perenjori 1613, 56%, Moora 1713, 22.8%, Perth 1811 15%, Moora 1711, 4.4%.

Picking times - December to February.

No populations were sighted or pickers contacted.

Wholesalers comments -

1. 3 said they didn't use much of this species - only used some because it flowered when other species weren't available.
2. Very non-saleable species because it crushes and dies quickly.
3. Species had been "hammered" and it was hard to obtain viable fruit (seed merchant).

BANKSIA CANDOLLEANA 2,600 leaf stems, 806 flowering stems GR

Distribution - Found from the Hill River district to the Murchison River.

This species is picked mainly for leaf stems with only 806 flowering stems being taken in 1980/81. No pickers were contacted.

Populations sighted - This species was well represented around Eneabba and Badgingarra and was seen in abundance on VCL, reserves and parks (see Fig. 3). Bushes are very spreading (<3metres across) and have numerous leafy stems and

flowers. No evidence of picking was seen.

Wholesalers comments -

1. Leaf species are not so popular now. Obtained from private property.
2. Not much of this species required.
3. Stem length should be at least 50cm.

BANKSIA COCCINEA 516,455 (Albany banksia, scarlet banksia)

Distribution - Can be found from King George Sound to the Young River and north into the Stirling Range.

Picking areas - See Fig. IV 3d. 92.4% of stems taken from Mt. Barker 2124 and Bremer Bay 2131.

Picking times - June to December.

Populations sighted - Significant stands were observed in the Gull Rock/Ledge Beach area (Fig. 4a) and also near Cheynes Beach (Fig. 4b). Populations are not contiguous but are dense and include many young plants. Large populations in the Ledge Beach area are found in the National Park and are picked (supposedly with appropriate authority) by two Albany pickers. These stands are beginning to get spot plant death - presumably from Phytophthera cinnamomi (dieback). Heavily harvested areas on the Cheynes Beach road are heavily infected with dieback (Fig. 4c). It was estimated that approximately 60% of plants in the older stands are dead or dying.

Rarer yellow flowering plants were observed (Fig. 4d). These are also picked.

Picking restrictions - Flowering stems must be 30 cm or more and straight. Flowers must have stamens largely unopened (or up to a third open) but be mature enough so that stamens are looped. The collar of leaves under the head cannot contain too many insect galls. Flowers must have developed evenly and not be one-sided. Insect galls did not appear to be a problem in the Cheynes Beach stands but were a significant factor in plants at Ledge Beach. Cockatoo damage can be quite high and result in losses for pickers as well as in viable seeded cones. Additionally many stems are out of arms reach.

Picking methods - All 6 pickers contacted used secateurs to cut stems. Two pickers use long secateurs to obtain high flowers. Pickers in the Ledge Beach area trek on foot carrying bags.

Regeneration/growth - Growth of flowering heads is about 30 - 45 cm per year. Where stems have been previously cut lateral regrowth appears adequate. No difference on average was seen between old cut stems and those which still carried a cone except that new growth from the base of an old cone would cause the plant to be taller. Roadside, unpicked plants don't appear significantly different. Branching of trees seems to be more a function of population density rather than picking history although the old picked stand at Cheynes Beach was well branched. One picker reported that stems should not be cut back to old wood or regeneration would not occur.

Fig. 4a
Young stand of Banksia coccinea off Ledge Beach road near Albany. Stand has been picked for one previous season.

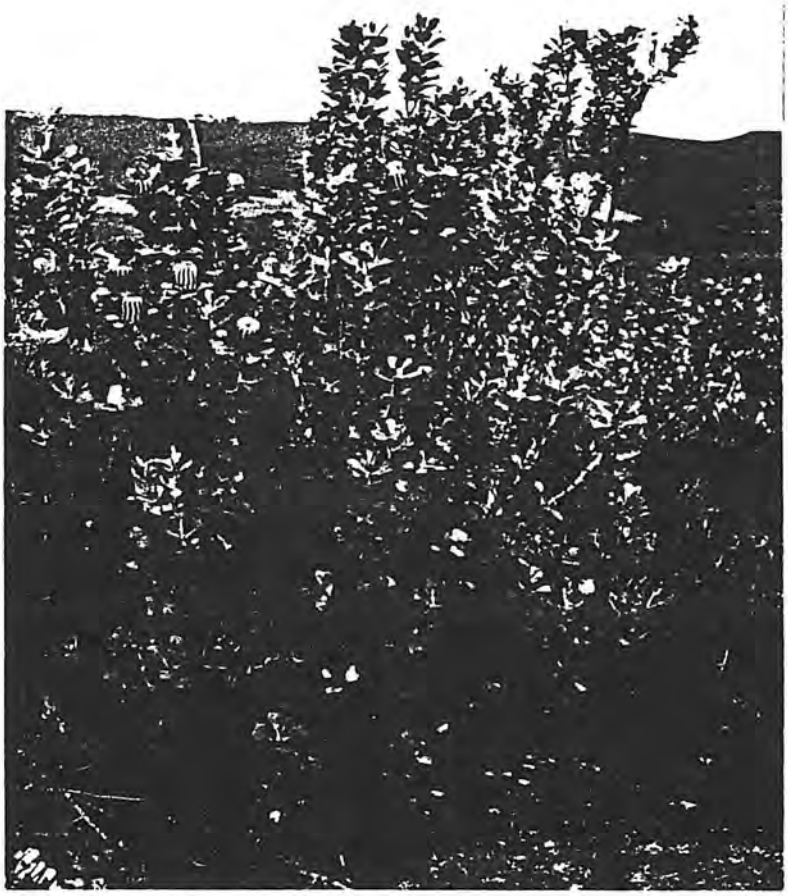


Fig. 4b - Die-back affected Banksia coccinea plant near Cheyne's Beach.

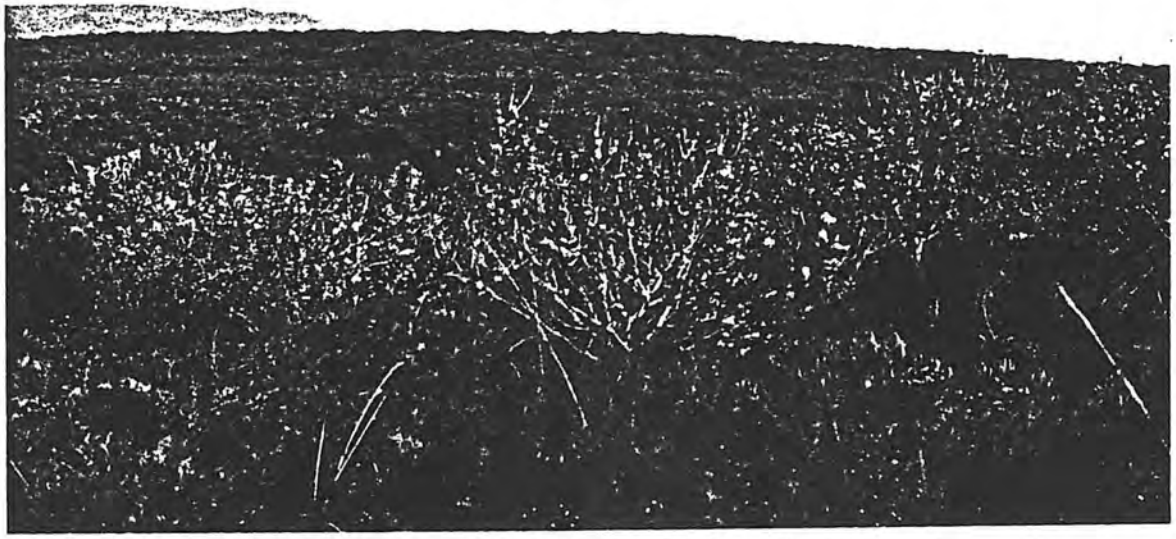


Fig. 4c - Heavily die-back affected stand of Banksia coccinea at Cheynès Beach. At least 60% of the plants have been killed.

Fig. 4d
Yellow-flowered form of Banksia coccinea seen in the Ledge Beach area. These flowers are also harvested.

Counts carried out

An examination was made of plants in the Ledge Beach road area which had supposedly had approximately 1,000 stems taken off in the last season. Plants were up to 2 m (mostly 1 to 1.5 m) high with some new seedlings observed. The picking site was aged 3-4 years and of an area of 25m x 30m.

Two 3 metre square sites were pegged. Cut stems were counted as well as the total number of flowering heads, the number of possibly pickable heads this season (taking into account the picking restrictions) and the number of old cones remaining on the bushes.

$$\% \text{ taken} = \frac{\text{No. of cuts}}{\text{No. of cuts + total no. of flowering heads + No. of old cones}}$$

$$\text{Max. possible \% pickable this season} = \frac{\text{No. possibly pickable stems}}{\text{Total no. of flowering heads}}$$

$$\% \text{ possible pickable overall} = \frac{\text{no. of cuts + no. possibly pickable stems}}{\text{No. of cuts + no. old cones + total flowering heads}}$$

Results

	Quadrat 1	Quadrat 2
Number of plants	53	42
% of flowering stems taken to date	25.6%	21.1%
Maximum possible % pickable this season	58.4%	55.7%
Possible % pickable overall	69.5%	72.0%

The plant numbers above include 3 dead plants in quadrat 1 and 13 dead plants in quadrat 2. The plants examined had probably only been picked for one season (1983) so this year the percentage of picked plants is likely to be higher.

It can be seen from the results that the possible percentage of stems taken over the picking life of the plants so far is around 70. This was the highest figure found for any of the species counted. It is possible that for older plants where stems are often out of reach or of unsaleable length that the numbers harvested would be less per plant.

Wholesalers comments -

1. Hardest species to obtain quantities of. It is very popular and not as prevalent as it was. Insects are a problem in leaves and head.
2. Could use more if it was available.
3. Obtained from cultivation and private property.

BANKSIA GARDNERI/PROSTRATA (Ground leaves)

Very little mention of this species by pickers or wholesalers. 'Ground leaves' can be leaves of either Banksia or Dryandra species and they are often confused.
Again one wholesaler stated that leaf lines were declining in popularity.

BANKSIA GRANDIS 8,124 (Bull banksia)

A very widespread species. Very few flowers are taken and trees are picked mostly for their leaves. No pickers were contacted but wholesalers reported that supplies were never short.

BANKSIA HOOKERIANA 192,569 GR

Distribution - Occurs in a restricted area of sandplain from approximately 20km north of, to 35km south of, Eneabba and only a short distance east of the Brand Highway.

Picking areas - See Fig. IV 4a. Dongara 1604, 41.3%, Dongara 1602, 38.7%, Moora 1711, 14.9%, Hill River 1702, 4.9%. 0.2% cultivated near Perth.

Picking times - May to October.

Populations sighted - Within the geographically restricted area of B. hookeriana the speices is very common. Populations were seen on roadsides, private property and reserves within a 20km radius of Eneabba. Roadside stands often consist of larger plants, presumably because of water runoff and perhaps extra space. Stands are usually dense and large with plants ranging in height up to 3m.

One heavily picked population on vacant crown land off BeeKeeper Road north of Eneabba (see Map 4) was examined in detail and counts carried out. Figure 3c in Section III shows part of the population. The area was approximately 800m x 700m with varying densities of B. hookeriana and also including B. menziesii, B. attenuata and B. candolleana. Six or seven pickers are reported to use the area and thousands of stems have been taken over the last 2-3 seaons. Roadside plants were extremely heavily picked and very few heads were missed at their picking stage. Plants produce many flowers when they are mature and there are many old cones on the older wood. (Fig. 5a).

Picking restrictions - (5 pickers) Stems should be at least 25cm long and as straight as possible. Collar height is important and should range from 1/4 to 1/2 of the length of the flowering head. Most stems are accessible, especially in young stands.

One picker stated that mildew was a problem if old cones were not removed from the bush. Cockatoo damage to flowers was also cited as restricting the number of heads available.

Picking methods - All pickers used secateurs. Vehicles are driven through the stand and then pickers work on foot near the vehicle.

Regeneration/growth - Pickers contacted stated that B. hookeriana produces more flowers after being picked. It was observed that heavy cutting of stems in previous years had not adversely affected flower production at all and plants produced just as many if not sometimes more heads. Figures 5b and 5c show flower production from cut and uncut heads. Flowering heads from around the cut

stem have already been removed. Up to 7 flowers can be produced from one stem of the previous season.

Picked roadside populations were visually compared with unpicked roadside populations and appeared to be unaffected. (See Fig. 5d and Fig. 3c in Section III.)

Counts - A number of plant counts were carried out in the heavily picked VCL area off Beekeeper road. These were made on two separate occasions nearly one month apart.

Firstly 4 quadrats were examined on and near the access road (see Diagram 1). All B. hookeriana plants within a 10m square area were counted.

Four separate counts were made on each plant.

a) Total flowering stems - buds were only counted when they had turned from brown to white. There were therefore possibly more heads to come.

b) Cut stems - included cuts from 1-3 seasons due to difficulty in telling the age of cuts.

c) Maximum pickable stems included all those heads which were 25 - 30cm long and reasonably straight with an unblown flower and no obvious defects.

d) Old cones - all old heads from previous years were counted.

Results

	Quadrat			
	1	2	3	4
Number of plants	4	9	8	21
Overall % taken to date	36.4	0	7.4	1.2
Max. possible % pickable	52.9	10.8	41.5	33.7

A second area of larger plants was examined on the west side of the access road. Plants observed were very heavily picked and counts were carried out on individual bushes to ascertain percentages. These plants would undoubtedly represent the most highly picked plants. Large plants averaged 2m high and 2-3m across and had probably been picked for at least 3 seasons.

Twenty plants were examined, 10 large and 10 smaller (1-1.5m tall and 1m across). All plants were within 20m of the road.

Results

	Large plants	Small plants
Average % taken per plant	41.3	12.6
Highest % taken	57.0	36.6
Lowest % taken	22.2	0
Average maximum % pickable	61.5	50.8

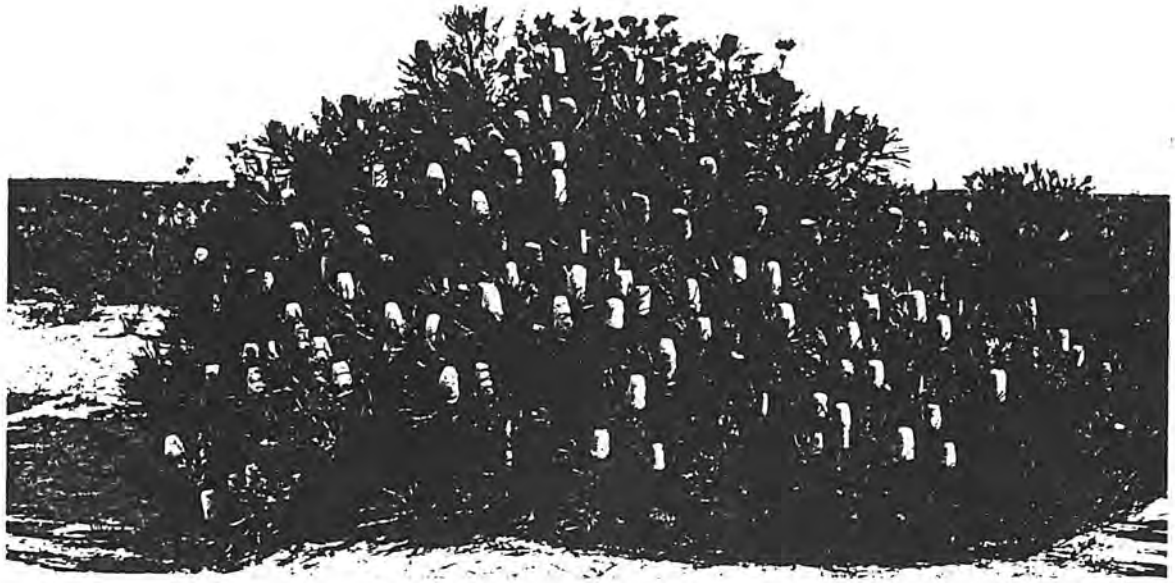


Fig. 5a - Unpicked Banksia hookeriana plant on private property near Eneabba.

Fig. 5b
Cut stems of Banksia hookeriana. The now-cut stems had grown out from a previously cut flowering head.

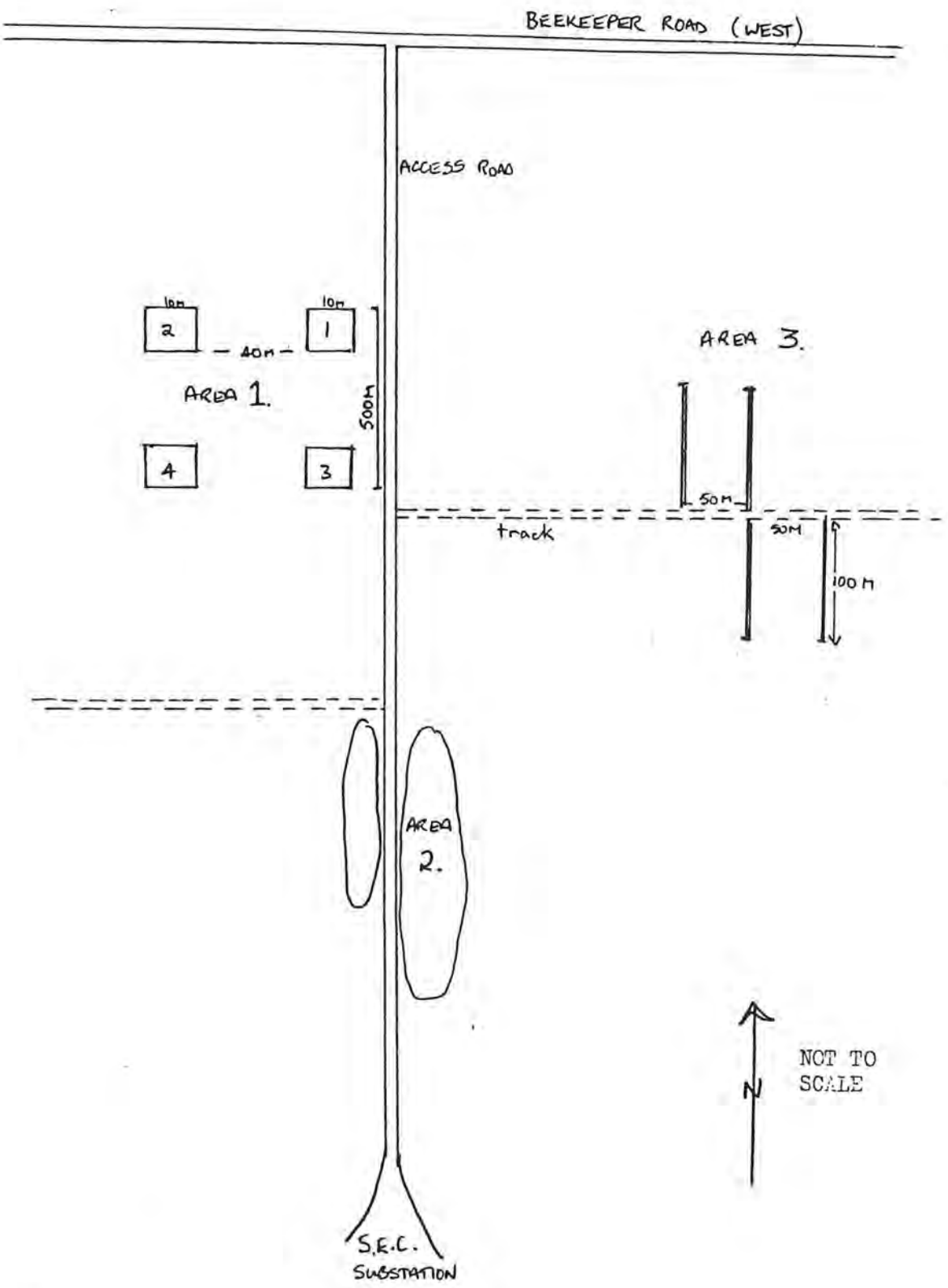


Diagram 1 - Map showing the layout of quadrat and transect counting areas for Banksia hookeriana off Beekeeper Road. (Map 4.)

Fig. 5c
Current season flowering stems of Banksia hookeriana produced from an uncut head.

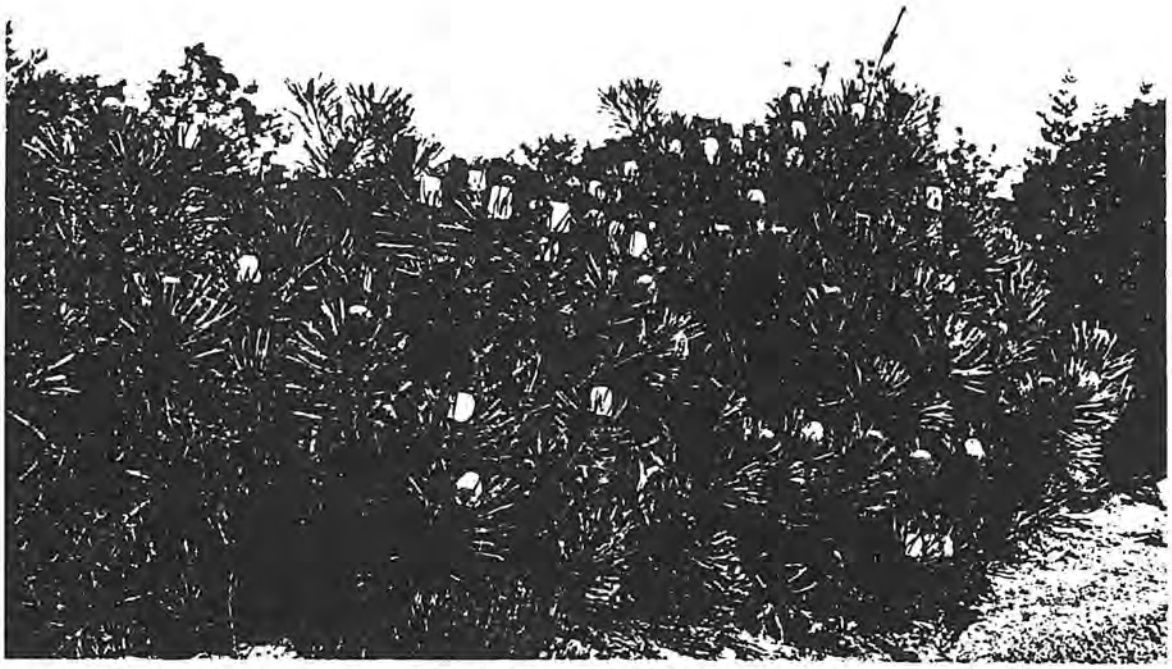


Fig. 5d - Very lightly picked Banksia hookeriana plants on Beekeeper Road. These plants can be compared with those heavily picked plants on the access road in the same area (Fig. III 3a).

On a subsequent visit 4 transects were made perpendicular to an access track and plants on the transects counted in the same way as described above.

Results

	Transect 1	2	3	4
Number of plants	23	19	41	16
Overall % of stems taken	4.5	2.3	4.5	3.1
Overall maximum % pickable	17.9	28.5	17.8	24.5

From the all the above results it can be seen that the maximum percentage picked was 57% and the overall average was considerably lower. Pickers tend to concentrate on more easily accessible plants near roads and tracks and plants further into the stand are often untouched. Additionally, older, larger plants appear to be more heavily picked. This is probably due to the efficiency of harvesting in one spot and the fact that older plants have a higher percentage of pickable stems.

Wholesalers comments -

1. Very prolific flowerers - up to 300 per tree.
2. A lot being cultivated. Could use more.
3. Supply is from cultivation and Beekeeper Road.
4. Supply mostly from private property. No problems. Stands need chaining, burning and raking to get better regrowth.

BANKSIA LARICINA 12,800 (Rose cones)

Distribution - Rare. Found on the coastal strip just north of Perth with a very restricted area.

Picking area - Perth 1811, 100%.

Picking times for cones - July to September.

No pickers were contacted.

Wholesalers comments -

1. Demand has dropped considerably.
2. The species is hard to get, except from where it was first found.
3. Not used in the last 12 months.
4. Not used at all.
5. No problems obtaining supplies. At least 50% of cones can be taken from a plant.

BANKSIA MEDIA 525g seed

Distribution - Common in coastal and inland areas from Ravensthorpe/Hopetoun to Jerramungup/Bremer Bay.

This species was not harvested by either picker in the Ravensthorpe area but was to a small extent by a Perth-based picker. It was seen to be prolific on roadsides in the southern distribution area and also in the Fitzgerald River National Park.

BANKSIA MENZIESII 35,280 nuts, 62,000 stems (Red and gold banksia)

Distribution - Can be found from just south of Perth to Shark Bay and well inland into the Avon district.

Picking areas - Geraldton 1501, 35.2%, Perth 1813, 32.7%, Pinjarra 1911, 15.0%, Hill River 1702 and 1704, 5.4%, Perth 1811 2.8%. See Fig. IV 4b.

Picking times - Main period is from April to July but stems were picked in all months except October, November, January and February.

Populations sighted - No known picked populations were seen but B. menziesii was observed extensively around Badjingarra and Eneabba in association with B. hookeriana and B. attenuata. Large populations were also seen on private property and nature reserves in the Gingin area.

Picking restrictions - Stems must be at least 30 cm long and straight. Flowers should be no more than half out (collar <5cm only) and must be free of insect or bird damage. Stem straightness is a major limiting factor in the harvesting of this species. One picker contacted from the Hill River area did not pick B. menziesii because of the difficulty in obtaining straight stems. Also the height of the trees, particularly in southern distribution areas, makes many stems inaccesible.
Cockatoo damage causes some flower loss and therefore seed losses. (See Fig. 6)

Picking methods - Only one picker contacted took this species. He took both nuts and flowers and used long secateurs to reach heads. In 1982 one private property supplier was asked for some thousands of fresh nuts still containing the seed.

Regeneration/growth - (See comment 4 below).

Wholesalers comments -

1. Demand has disappeared.
2. Not much is used, it doesn't sell easily.
3. No problems in obtaining supplies.
4. 20,000 will be obtained this year from the same trees picked last year in the bush because they are the best ones.

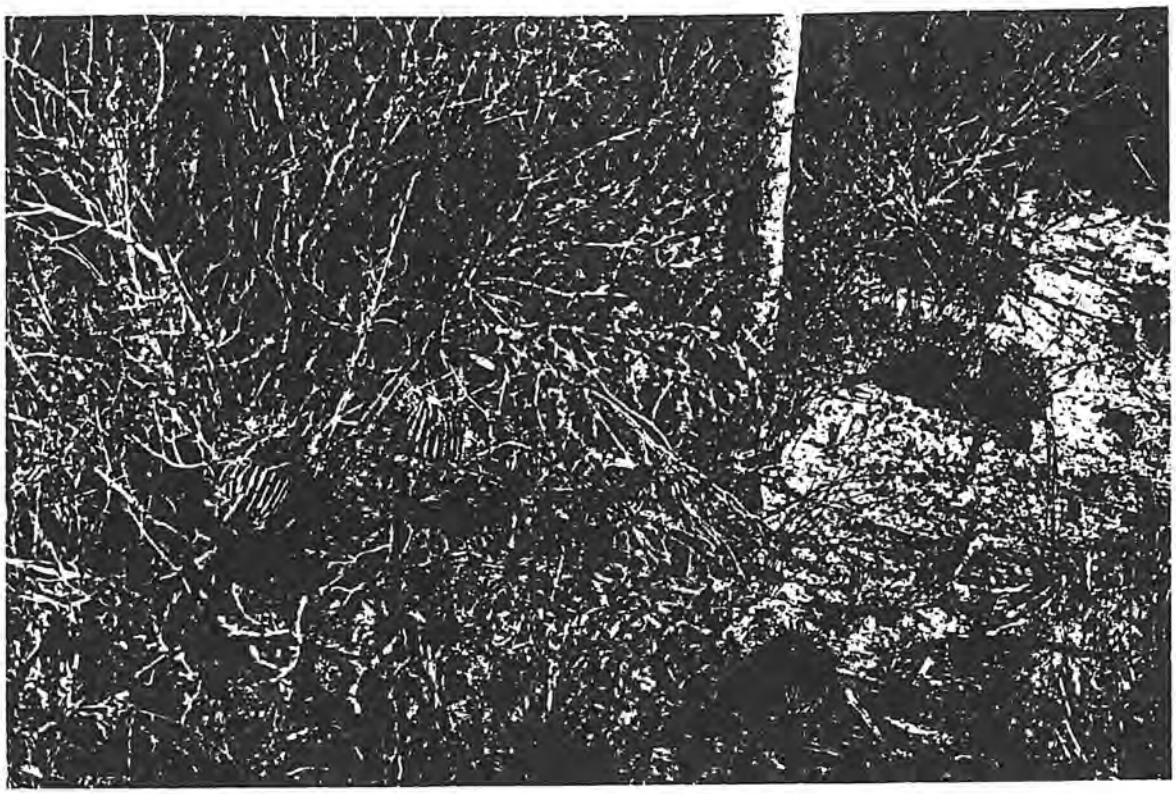


Fig. 6 - Cockatoo damage to flowering heads of Banksia menziesii.

Fig. 7a - Harvested stand of Banksia prionotes on railway reserve north of Coomberdale.

BANKSIA OCCIDENTALIS 344

Distribution - Found in swampy, peaty sands near the coast from Denmark to Esperance.

Picking areas - Very little was taken in 1980/81 but in 1983 at least 10,000 stems were harvested. 38.4% of stems taken in 1980/81 were cultivated in the Perth area and the remainder came from Ravensthorpe 204. In 1983 stems were harvested in Mt. Barker 2123 and 2124 and Esperance 205 produced 6,176 stems.

Picking times - February to June.

No populations were sighted.

Picking restrictions - flowering stems must be at least 25 cm long, preferably 30cm or longer. Flowers should be rose coloured and stamens must still be folded.

Picking methods - Stems are cut with secateurs. The wood is apparently soft.

Regeneration/growth - Pickers at Ravensthorpe stated that the species needs a fire to produce commercially viable stems. Pickable stems are available 2 years after a fire. One picker reported that plants were becoming hard to find due to land clearing.

Wholesalers comments -

1. Not used (3 wholesalers).
2. Supply is obtained from private property. Offers have to be knocked back.

BANKSIA PETIOLARIS

March 1981 - 5,029 stems picked. No further information.

BANKSIA PILOSTYLIS

October 1980 - 800g of seed taken. November to March 1981 - 24 stems cultivated in Perth. No further information.

BANKSIA PRIONOTES 115,400 (Acorn banksia)

Distribution - From King George Sound to the Murchison River and well inland, but excluding the extreme south west corner.

Picking areas - Perenjori 1613, 64.5%, Hill River 1702, 11.2%, Moora 1711, 11.07%, Mt. Barker 2123, 2.8%. (See Fig. IV 4c.)

Picking times - Mainly January to May.

Populations sighted - Extensive stands of mixed age trees were seen on the Moora road from Coomberdale north (Fig. 7a). These were on railway reserves, VCL,

Fig. 7b and 7c
Growth of new flowering heads from cut stems of Banksia prionotes.

It was noted that new growth occurred equally well from cut or uncut stems.

Flora and Fauna reserves and private property. Contiguous roadside and reserve populations were seen on the Brand Highway from Gingin to Eneabba and also on the Cervantes road.

A mixed age stand was examined on a railway reserve (within sight of the Moora - Coorow road) just north of Coomberdale. (See Map 5) The stand had been recently picked as well as at in at least one previous season.

Picking restrictions - Stems must be at least 30cm long and straight. B. prionotes has relatively straight stems, especially on young plants. Older, taller trees produce their lower flowers with curved stems. Becuase of this fact pickers prefer younger plants. Heads must have a quarter to a half collar (i.e. open stamens). Heads which are further out are unsaleable.

Picking methods - Only one picker who picked on VCL was spoken to. She used secateurs to cut stems and walked througout a stand, moving the vehicle very infrequently. She has picked the same trees each year for 5 years. 1,000 stems can be taken by one picker in a day.

Regeneration/growth - Pickers stated that picked plants grew back very well and where one head was taken 3 or 4 more flowering heads could develop (Fig. 7b and 7c). It was also reported that well picked bushes were better in following years.

Counts - A very brief count was made of 3 small plants examined on the railway reserve.

Cut stems 1983/84	Nuts remaining	Current flowering heads
9	1) 17 nuts on	14
5	2) ground	19
14	4	21

From this it appears that picking has not inhibited further flower growth at this stage.

However, it was also evident that stems branch whether the flowering head is picked or not. From examinations no significant difference was seen in regeneration from cut or uncut stems.

Wholesalers comments -

1. Absolutely no shortage even though it is heavily used.
2. Have knocked back offers of supply.
3. 50% come from the bush and 50% from private land. North of the Cataby road-house is about 5,000 ha of B. prionotes.
4. Picked plants remain bushy and produce better flowering heads.

BANKSIA SCEPTRUM 20,737

Distribution - Murchison River and Mullewa areas of the Irwin district.

Picking areas - All flowers are taken from Geraldton 1501.

Picking times - October to April.

No populations of this species were seen and none of the pickers contacted took it.

Wholesalers comments -

1. Supply is taken from the same trees year after year.
2. Supply is under a programme of semi-cultivation and burning.
3. A good number of stems are used. No shortage is apparent.

BANKSIA SPECIOSA 73,544

Distribution - Found on sandy heathlands from Hopetoun to Israelite Bay.

Picking areas - Taken entirely from two grid squares, these being Esperance 205 and Ravensthorpe 204. (See Fig. IV 4d.) Some cultivation has occurred near Perth and in Pemberton 2113.

Picking times - October to May mainly but some picking has been recorded in all months. Leaves were picked in November, February, March, May, June and August.

No populations were sighted.

Picking restrictions - (From 5 pickers). Stems must be at least 40cm long and straight. Collar height can range from 1/4 to 3/4 of the stamens out.

Picking methods - Stems are always cut with secateurs. One picker said that he cut leaving 3 new leaves on new wood. Only one of the pickers used long secateurs to acquire high stems.

Regeneration/growth - Three pickers stated that B. speciosa had more flowering heads if it was picked regularly. Three pickers took stems from the same 'patch' each year while two used the same general area.
It was mentioned that stems were shorter after a drought year and that they must not be cut back to old wood or new growth would not occur.

Wholesalers comments -

1. Three said that there was no shortage of stems.

BANKSIA VICTORIAE 9,520

A geographically restricted species found between Northampton and Ajana but not mentioned as being taken by pickers contacted.

Wholesalers comments -

1. Used leaves only. These come from the same trees each year on private property.
2. Not sufficient quantities available.
3. Very little offered. Not enough to satisfy the market.
4. Mostly easy to get hold of. (for seed trade)
5. Mostly found on road verges and private land.

BEAUFORTIA DECUSSATA 179,749 (Decassata)

Distribution - Restricted to south coastal areas from Augusta to Mt. Manypeaks. Found in jarrah woodlands and in some heath areas.

Picking areas - See Fig. IV 5a. Mt. Barker 2123, 98.4%. Pemberton 2114, 1.6%.

Picking times - All months except September and October.

Populations sighted - This species was seen in a number of woodland areas in the Denbarker area. Also observed at Redmond and in the Ledge Beach area. It does not appear to grow in dense or defined stands and is widely scattered in the jarrah forest. (See Map 1) No exact picking locations were seen.

Picking restrictions - (6 pickers) Stem lengths required ranged from 60 to 80cm with the majority at 60cm. Stems must be straight but with one or two branches and including an unopened flower head on the stem. Stems are unpickable for foliage if the bud begins to come out although a few stems are picked for their flowers.

Picking methods - Of the 6 pickers involved 4 used secateurs and 2 snapped stems off. One picker of 5 years stated that he picked the species in a different area each year.

Regeneration/growth - No comments were obtained from pickers on regrowth after picking. One source stated that plants were best for picking 2-4 years after a fire and another that only the new growth after a fire was pickable.

BEAUFORTIA SPARSA 566,611 (Bottlebrush)

Distribution - Found extensively in swampy, low lying sand heath from Augusta to Albany on the south coast reaching inland to the Porongorups and Pemberton.

Picking areas - (See Fig. IV 5b) Mt. Barker 2123, 75.8%, Bremer Bay 2131, 13.2%.

Picking times - Mainly February to May.

Populations sighted - Large areas of swamp flats in the Forests Department land at Denbarker (See Map 1) contained stands of B. sparsa. In some areas B. sparsa was the dominant species and in others was in association with Agonis species and Callistemon speciosus (see Fig. 8a). Plants were also seen in low lying

areas in the Ledge Beach road area. An extensive stand off Stans road from which 180,000 stems were taken this year was examined. This area had been burnt 3 years ago and plants were at their first good picking stage (Fig. 8b and 8c). Many flowering heads remained and the picking season was over.

Picking restrictions - (9 pickers) stems must be greater than 45cm long (4 reports were for lengths of 60cm minimum). Flowers must be full out but bright orange-red. If they have darkened they are not pickable. Most flowers are accessible.

Picking methods - Five pickers cut stems and three snapped them. One picker used both methods. Pickers traverse flats on foot. Most of the pickable bushes are 1 - 1.5m high.

Regeneration/growth - The stand examined had only been picked this season so regrowth observations could not be made. Plants were spreading and dense and retained a number of unpicked heads. Stems picked below the leaves appeared to die but the bush flourishes. Seventeen new plants (25cm high were noted in one quadrat examined. Pickers made varying comments -

1. Plants seem to bloom better if picked regularly (on a weekly basis when in bloom).
2. A third-year picking area is improving. More flowers are available.
3. One area had less flowers this year after last year's picking.
4. B. sparsa requires burning. Burnt bushes are pickable after 3 years and continue to be at their best for 2-3 years.

Counts of picked stems

Five quadrats along a vehicle track were marked out. Quadrats were 5m x 5m. The number of snapped stems per plant or clump and the number of unpicked flower heads per plant were counted.

Results

	Quadrat				
	1	2	3	4	5
No. of plants	25	18	18	16	12
No. picked stems	17	2	0	3	7
No. heads remaining	62	59	75	18	80
% harvested	21.5	3.3	0	14.3	8.0

As can be seen from the results for each quadrat the picking percentages are very variable. Of the 89 plants examined 68 (76.4%) were untouched and only 3 plants had more than 3 stems picked from them.

A further examination of a 100 metre square area revealed that very few bushes had been picked. From this it appears that the stand has been little affected by harvesting this season.

Fig. 8a
Beaufortia sparsa clumps seen in low lying sandy areas in the Denbarker Forests Department area. Note Callistemon speciosus plant behind.

Fig. 8b - Beaufortia sparsa flat in Forests Department land burnt 1-2 years ago. 180,000 stems were taken from this area in the last season.

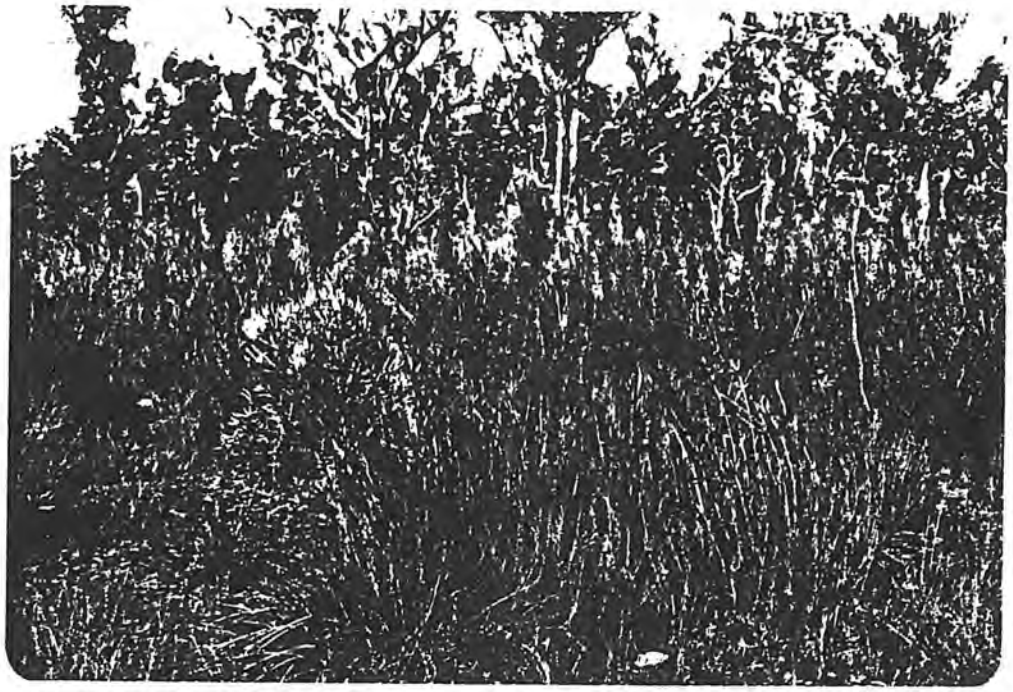


Fig. 8c - Unpicked Beaufortia sparsa clump. Later flowering plants are not harvested.

Fig. 9
Plants of Conospermum triplinervium on road verge near the Brand Highway.

Wholesalers comments -

1. Two said demand for the species had increased.
2. There is never any problem in obtaining large quantities.

BORONIA HETEROPHYLLA 68,837 (Pink boronia)

Distribution - Disjunct populations have been found near Busselton and from Denmark to Albany and the Porongorup Ranges.

Picking areas - Flowering stems - Mt. Barker 2123, 95%, Pinjarra 1913, 5%. Sprays - (Total 1809 kg) Mt. Barker 2123 50.3%, Pemberton 2114, 39.9%, Collie 2011, 9.8%. See Fig. IV 5c.

Picking times - August to November.

No populations were sighted. Only 2 pickers contacted took the species.

Picking restrictions - Stems must be at least 45cm long and branched. They must be in full late bud and well covered.

Picking methods - Both pickers used secateurs.

Regeneration/growth - No information was acquired on this. Both pickers involved picked on the same 'patch' year after year. (One has had a boronia licence for 14 years.)

BORONIA MEGASTIGMA 272,120 (Brown boronia)

Distribution - Occurring from Collie to Walpole and Albany in swamps and creeks.
Picking areas - See Fig. IV 5d. Mt. Barker 2123, 48.5%, Collie 2011, 24.1%, Pemberton 2114, 21.2%, Pemberton 2112 and 2113, 3% each.

Picking times - July to September.

Note: This species was not examined in any detail and pickers comments are from questionnaires only. There are many licenced boronia pickers and many of these pick only Boronia megastigma for blossom. A detailed study of availability of the species is probably required.

No picking areas or populations were sighted.

Picking restrictions (for cut flowers only) - Three pickers were contacted. Stem length required varied from 20-30cm for one picker to 45-60 cm for another. It may be that the shorter stems are for blossom rather than cut flowers. Flowers should be in the late bud stage or half open.

Picking methods - All pickers used secateurs.

Regeneration/growth - All three pickers took stems from the same 'patch' each year - one on private property. One picker has held a boronia licence for 14

years and stated that he was not having trouble finding stands of the species but that plants could be drought affected. Such plants had only 50% of their usual blossom and some did not recover. Another picker with 3 years experience stated that old sites of B. megastigma were being lost and that he was having trouble finding stands. He also stated that Boronia had more flowering heads if pruned 'correctly'.

One picker contcted had planted 200 plants on his property.

Wholesalers comments - Seed availability is apparently very restricted. One seed merchant said that he required 32 kg but could only obtain 4 kg.

BORONIA TERNATA 40,125

Distribution - Occurs in the central and southern wheatbelt and east to Southern Cross and Ravensthorpe.

Picking area - Perth 1813, 70%. Dongara 1604, 30%.

Picking times - June and July.

No populations of B. ternata were seen and no picker contacted took the species. One picker at Ravensthorpe however, claimed to be picking B. ternata var elongata in small quantities. A small, picked population of this was sighted near Ravensthorpe (See Map 6) on an old gravel pit. Some plants had been hard picked. The stems had been cut but no information is available on lengths or flowering stage required. Plants which had been heavily cut back in the previous year had recovered well and grown very bushy.

BOSSIAEA LAIDLAWNIANA GR

Only 160 g of seed taken in 1980/81 but it is possible that this species is also picked as 'miniature holly' (Bossiaea aquifolium), as wholesalers reported two types of 'miniature holly' being available. No further information is available.

BOSSIAEA WEBBII GR

1.6 kg of seed taken in 1980/81. Again it is possible that this species is used as 'miniature holly'.

CALLISTEMON SPECIOSUS 50,012 (Albany bottlebrush)

Distribution - Found in the south west corner in swampy areas between Albany and Collie.

Picking areas - All cut stems taken in the Mt. Barker 2123 area. Fig. IV 6a.

Picking times - July to November.

Populations sighted - Scattered populations were seen on road verges in the

Narrikup area and in association with Beaufortia sparsa in the Forests Department land at Denbarker. (See Map 1) These were not known to be picked.

Only one picker contacted took this species and another major picker/wholesaler stated that stems were no longer required. Stems are cut when in full flower and should be approximately 60cm long.

It appears from the lack of pickers and general comment that this species has declined in popularity.

CALOTHAMNUS PINIFOLIUS GR

Only 750 g of seed taken in 1980/81.

CALOTHAMNUS RUPESTRIS GR

Only 50 g of nuts and fruit and 520 kg seed taken in 1980/81.

CEPHALOTUS FOLLICULARIS GR

Distribution - Restricted to damp gullies on the south coast between Pemberton and Albany.

Picking areas - 1000 whole plants taken from Mt. Barker 2123 and 160 from Mt. Barker 2124.

No populations were sighted.

One major picker was contacted by questionnaire. He took plants from his own property but was not going to take any plants this year. He stated that the main market for the plant was in the eastern states but that the cost of airfreight plus barerooting and the low survival rate had made the operation uneconomical. No other comments were received.

CHAMELAUCIUM UNCINATUM 131,839 (Geraldton Wax)

Distribution - Reported from Kalbarri to Perth and inland to Moora.

Picking areas - According to wholesalers the majority of supplies of this species are obtained from cultivated plants in the Perth area. Fig. IV 6b shows the picking areas in 1980/81.

Only one picker was contacted. He claimed that stands of the species were difficult to find. It was also stated that the species was not threatened but that plants became unsightly when cut or knocked about.

CHORIZEMA DICKSONII GR

300g of seed and 1 bag of pods was taken in 1980/81.

CONOSPERMUM AMOENUM 6,620 (Blue smokebush)

Distribution - Found from Dongara to Albany and Newdegate but excluding the extreme south west corner.

Picking areas - Dongara 1604, 90.6%, Hill River 1704 6.3%, Mt. Barker 2124, 3%.

As it was not flowering no populations of this species were seen and none of the pickers contacted took stems.

Wholesalers comments -

1. None was obtained last season but it usually comes from private property.
2. Not used/very little used.

CONOSPERMUM CRASSINERVIUM 49,640 (Tassle smoke)

Distribution - Found in sandplain heath from Gingin to Eneabba and inland to Moora.

Picking areas - Hill River 1704 54%, Hill River 1702 36.4%, Perth 1813, 9.6%.

Picking times - October to February.

Populations sighted - Populations of this species were seen on road verges in the area from Regans Ford to Eneabba and also on National Parks and Flora and Fauna reserves in the Badgingarra to Eneabba region. No picking sites were examined.

Picking methods - Stems are snapped. They must be 30cm or longer and be in full flower and fluffy.

Regneration/growth - Only one picker was contacted. She maintained that the patches varied from year to year but were much better after being burning.

Wholesalers comments -

1. Not a big seller but plenty available (mostly on private property).
2. No problems obtaining supply.
3. Too much is offered - has to be turned down.
4. The plant has better flowers after picking. Obtained from VCL.

CONOSPERMUM DENSIFLORUM

Only 24g of seed was taken in 1980/81.

CONOSPERMUM INCURVUM 24,094 (Feather or plume smoke)

Distribution - Mainly seen between Regans Ford and Eneabba and east to Three Springs. Has been reported from Wanneroo and Pinjarra.

Picking area - Perth 1811, 36.2%, Perth 1813, 29%, Dongara 1604, 20.7%, Hill River 1704, 9.5%.

Picking times - September to December.

Populations sighted- Stands of this species were observed on the Lake Indoon reserve on the Coolimba road. No harvested populations were examined.

Picking methods - Only one picker was contacted. She hand picked stems of 30cm or longer and at a 'fluffy' stage.

It was reported by the picker that the species thrived on being picked and seemed unaffected by burning.

Wholesalers comments -

1. Not used by two wholesalers.
2. Plenty available.
3. The most popular smokebush with the biggest demand but not hard to find. Also the hardest to handle.
4. The same amount each year was obtained from the same area on Beekeeper road.

CONOSPERMUM STOECHADIS 121,680

No mention of this species was made by pickers or wholesalers contacted though in 1980/81 it was the most heavily picked Conospermum. It is possible that it was misnamed in the first instance or confused with C. incurvum which can look similar. One wholesaler mentioned 'elk' smokebush but did not supply a botanical name. Figure IV 6c shows distribution and 1980/81 picking areas.

CONOSPERMUM TRIPLINERVIUM 104,520 (Tree smoke)

Distribution - Found mainly from Perth to Ajana and east in the central wheatbelt. Some reports from Perth to Albany through the inland areas.

Picking areas - Hill River 1702, 56.6%, Moora 1713, 40.2%. (Fig. IV 6d.)

Picking times - October to December, March.

Populations sighted - This species was seen in quantity on west Beekeeper Road (See Map 4) in association with Banksia hookeriana. It was also noted on the Coolimba road on verges, in the Lake Indoon nature reserve and near the Brand Highway about half was between Eneabba and Badgingarra (Fig. 9). No harvested populations were examined.

Wholesalers comments -

1. Sold as fresh flowers only.
2. Mostly obtained from private property, some sold as fresh flowers, some dried.
3. Not used.

CONOSPERMUM SPP.

It was stated that the whole bush of shorted, narrower species could be taken at a picking. Also reported that new stems are available 1 year after a fire or chaining. They are taken just open or in bud.

CROWEA ANGUSTIFOLIA 42,462 cut stems, + 390kg

Distribution - There are two varieties of this species. Both var dentata and var angustifolia occur on the south coast from Pemberton to Two Peoples Bay and inland to the mouths of the Shannon and Gardner Rivers.

Picking areas - Pemberton 2114, 69.8%, Mt. Barker 2123 21.2%, Pemberton 2113, 8.9%.

Picking times - August, September, December.

No populations of this species were sighted.

Picking restrictions - (3 pickers) Stems must be at least 45cm (2 said 60cm minimum) and branched with the flowers fully open.

Picking methods - Stems are cut or snapped.

Wholesalers comments -

1. Not used. Price as a fresh flower for the eastern states market is a problem
2. Not popular last year.
3. Plenty available. Problems with rust spots.

CYCAS ARMSTRONGII

Palm-like plant found in the Kimberley region. 25 kg of seed taken in 1980/81.

DASYPOGON HOOKERI 3,000 GR

Distribution - Found in a restricted area of the south west corner of the state from Busselton to Augusta.

This species is very little used by cut flower merchants even though the seed head is decorative. One wholesaler mentioned using a small amount.

DAVIESIA JUNCEA GR

Only 150g of seed was taken from the Mt. Barker area in 1980/81. Not mentioned by either pickers or wholesalers although the stems were seen being marketed as a cut flower.

DRYANDRA DRUMMONDII 78,112

Distribution - Found from the Perth metropolitan areas through the central and lower wheatbelt to Albany and east to Bremer Bay. See Fig. IV 7a for distribution and 1980/81 picking areas.

Not mentioned by pickers or wholesalers.

DRYANDRA FORMOSA 438,119

Distribution - Mostly found in the Stirling Ranges, Mt. Barker and south to Two Peoples Bay. Also recorded just east of Katanning and 32km north of Walpole. Found on laterite outcrops.

Picking areas - Mt. Barker 2123, 84.2%, Mt Barker 2124, 3.9%, Pemberton 2114, 11.4%. (See Fig. IV 7b.)

Picking times - June to December.

Populations sighted - A small stand on a laterite outcrop 1km east of the Mt. Barker townsite on the Muir Highway was seen. The area was used regularly by at least one picker and picked plants were observed. No counts were carried out but a brief examination of regeneration and damage was made. Some stems were seen on the ground but damage/wastage was minimal. The area concerned was approximately 2 ha.

Picking restrictions - (6 pickers) Flowers must be out of tight bud stage but not blown. Stems may be branched and spread as long as the branch is 30cm minimum length. Stems may have more than one flower as long as they are at the right stage or in bud.

Picking methods - 6 out of 7 pickers cut stems with secateurs and one broke them. Few flowers, if any, would be unreachable. The stand examined was small enough to be foot traversed. Bunches may consist of 2 to 15 stems depending on the number of flowers per stem.

Regneration/growth - Good growth from around old cut stems was observed. Laterals or new shoots from around and below the cut grow out.

Pickers state that picked plants become bushier and have less woody stems. Five pickers reported that D. formosa has better/more flowers if it is regularly picked. Three picked the same bushes each year.

Wholesalers comments -

1. Attempts are being made to market D. formosa as a fresh flower. Supply is cultivated near Perth. The flower is hard to get from the bush.
2. Supply is obtained from cultivation and private property and some from bush sources. No problems.
3. Obtain all that is required.

DRYANDRA MUCRONULATA GR

Only 150g seed taken in 1980/81. No further mention made.

DRYANDRA PATENS GR

290g seed.

DRYANDRA PLUMOSA GR

200 whole plants taken from Mt. Barker 2122 in 1980/81.

DRYANDRA POLYCEPHALA 428,443 GR

Distribution - Restricted to between Perth and Moora on the western edge of the Darling scarp.

Picking areas - See Fig. IV 7c. 94.6% taken from Perth 1811.

Picking times - July to September.

No populations of this species have been sighted. Most picked stands are reported to be on private property or army land at Bindoon.

No pickers were contacted.

Wholesalers comments -

1. Supply comes from private property. Used to be top seller but not as must is sold now. One person has the market covered.
2. Supply from private property. Plants are better after picking.
3. Not unlimited available.
4. Species is disappearing. All on private property. Picking doesn't harm it.

DRYANDRA QUERCIFOLIA 24,812 GR (Oak leaved dryandra)

Distribution - Found within a small area around Ravensthorpe on laterite hills and south and west to East Mt. Barren. Good populations in the Fitzgerald River National Park.

Picking areas - Ravensthorpe 204, 88%, Pemberton 2114, 11.2%, Mt. Barker 2123,

0.7%. (The latter two records are probably cultivated or possibly misidentified.)

Picking times - March to August (at Ravensthorpe only).

Populations sighted - A large stand (approximately 40ha) 30kms east of Ravensthorpe and 50m from the Esperance-Ravensthorpe road was seen. Plants were on and around a gravel pit. A vehicle had been driven through parts of the stand but damage was not extensive. Plants were very numerous and ranged from 1 - 2.5 metres high. The stand is heavily picked at the edges. It was reported that 10- 20,000 stems had been taken in previous good years.

Banksia lehmaniana was also in large numbers within the stand.

Picking restrictions - Stems should be straight and at least 30cm long. Stems may contain more than one flower but flowers must be at a specific stage. The stamens should still be folded but the bud not too tight. Many flowers were left because they were 'blown' and many were unpickable because they were short or bent.

Picking methods - All three pickers contacted used secateurs. Extra, unusable flowers can be trimmed off stems . Most bushes and flowers are accessible on foot. It was stated that only about 10% of flowering stems were harvested due to restrictions.

Regeneration/growth - It was reported that bushes recovered well from picking and produced more flowers the following season. It was also stated that 2-3 new flowers usually resulted from one previously picked stem. Observation revealed that regrowth was often laterals from lower on the branch and not from the actual cut.

Plants are pickable 7-8 years after a fire and grow in a thick, almost monocultural stand.

Counts - An examination of heavily picked plants at the edge of the gravel pit was made. Because of their accessibility these plants would represent a maximum percentage taken. Additionally, the plants are older and more spreading than plants further into the stand and have a higher number of flowering heads. The number of cut stems and the number of remaining flowering heads were counted.

Results

Number of plants	10
Total number of cuts	87
Total number of remaining stems	127
Overall % of picked stems	40.6

One smaller plant which had 9 cut stems only retained 1 flower and therefore had a picking percentage of 90 but the remainder of plants examined had picking percentages of between 14.8 and 63.1%. The average was 43.5% of flowering stems picked per plant.

Plants checked further into the stand were very lightly picked. Even along

vehicle tracks it was difficult to find picked plants.

Wholesalers comments -

1. Don't use it.
2. Species is cultivated at Muchea. Some stems are obtained from the bush.
3. Plants are cultivated near Perth.

DRYANDRA PRAEMORSA GR

172g seed from the Perth 1813 area was taken in 1980/81.

DRYANDRA STUPOSA GR

Only 30 bunches of flowering stems and 2 bags of nuts and fruit taken in 1980/81. No further information was received.

EUCALYPTUS CAESIA GR

Only picked for seed. All seed now comes from cultivated plants.

EUCALYPTUS CRUCIS GR

500 g of seed only taken.

EUCALYPTUS FORRESTIANA GR (Fuschia)

2.5 kg seed, 2 bags of nuts and fruit and 10 bunches of flowering stems.

One picker reported picking stems of 40-50cm length with fresh red fruit.

EUCALYPTUS MACRANDA GR

200g seed taken. One seed merchant in Perth stated that supply was obtained from their cultivated tree and not from bush plants.

EUCALYPTUS SEPULCHRALIS GR

25 bags of nuts and fruit, 300g of seed. The species is well represented in the Fitzgerald River National Park.

GELEZNOWIA VERRUCOSA 40,200 (Yellow bells)

Distribution - Recorded from Dirk Hartog Island and south to Dandaragan. Common in the Northampton/Mullewa area and Coorow/Watheroo.

Picking areas - All stems taken from Geraldton 1501.

Picking times - July and August.

No populations of this species were seen nor pickers contacted. It was stated by wholesalers that 2 pickers in the Northampton area were the sole suppliers but no contact could be made. Stems are sold fresh.

Approximately 40% of pre-picked plants is supposedly available but on previously unpicked plants the figure is only 10%.

Wholesalers comments -

1. Picking improves bushes a lot. Patch is well looked after.
2. Not used.
3. All supplies from private property. A third of the plant is left after picking and it regenerates well.
4. Supplies are good and plants are bettter from being picked.

HAKEA CUCULLATA 6,861 (Cup leaf hakea) GR

Distribution - Found from near Hopetoun to Woodgenilup and Cheyne's beach and the Stirling Ranges.

Picking areas - Mt. Barker 2122, 56.3%, Bremer Bay 2131, 43.7%.

Picking times - June and July for flowering stems, all year for leaves.

Populations sighted - Large roadside populations of old and young plants were secen on the Woodgenilup and Chester Pass roads. (Fig. 10a). These were not noted as being picked. A large area of the species was also seen between Mt. Manypeaks townsite and Cheyne's Beach townsite. Thriving stands were found on the road verges and further in on UCL. (Fig. 10b.)
No signs of picking were seen in any areas. Young plants were well represented.

Picking restrictions - Leaves must be relatively free of insect damage and black spot fungus. The stems must be 45-60cm and straight or with one fork. Insect damage and fungal spot was seen on plants at Woodgenilup (Fig. 10c), but was not so evident at Cheyne's Beach. One picker stated that H. cucullata was easy to find east of Mt. Barker but was unpleasant to pick due to its prickliness and toughness.
Trees which reach maturity (i.e. 4m height are largely unpickable due to unreachable stems and stained leaves.

Picking methods - The one picker contacted cut stems with secateurs.

Regeneration/growth - One wholesaler stated that plants bush out after pruning.

Wholesalers comments -

1. Getting limited. Can't get enough. Needs to be slashed.
2. Don't use it much. Hope to get more.

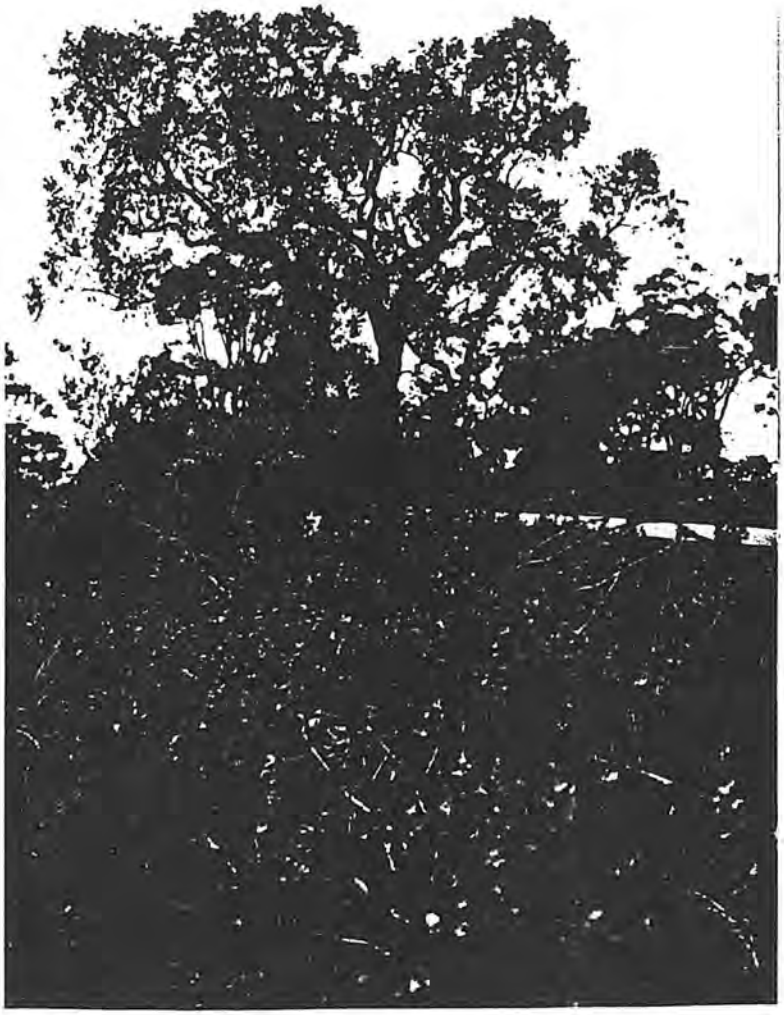


Fig. 10a
Mixed age stand of Hakea cucullata seen on road verge near Woodgenilup.

Fig. 10b - Mature plants of Hakea cucullata observed in vacant crown land off the Cheyne's Beach road.

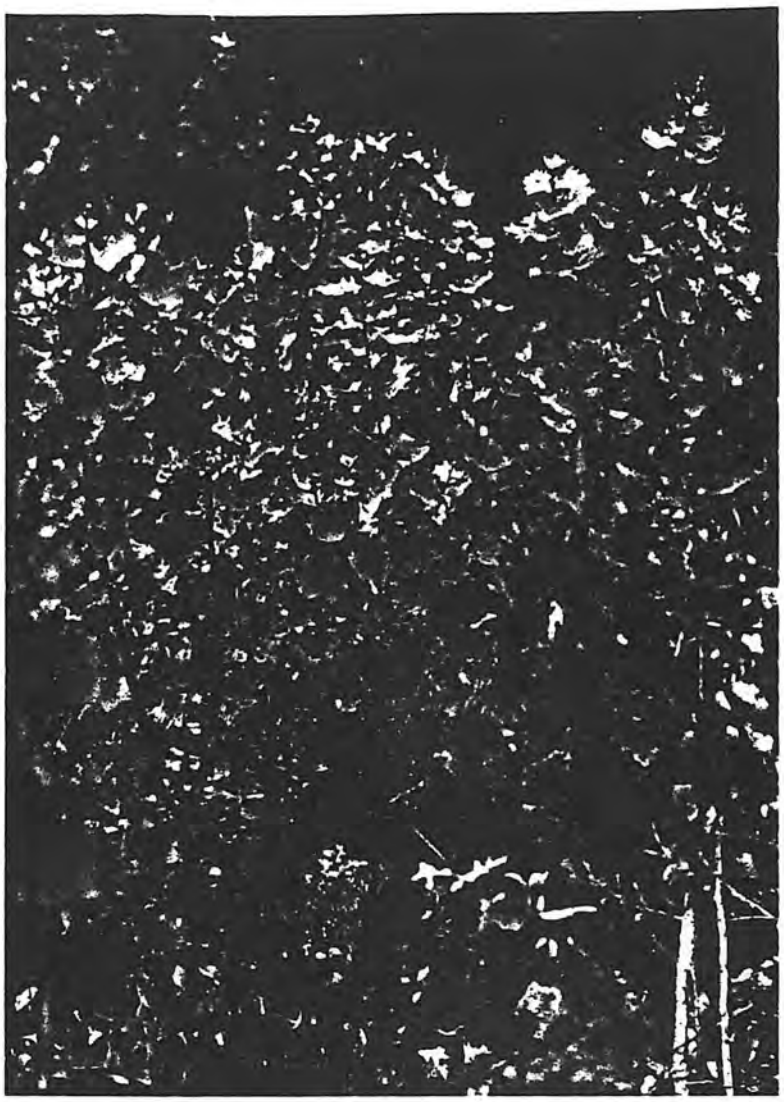


Fig. 10c
Insect damage and fungal spot on young plants of Hakea cucullata near Woodgenilup.

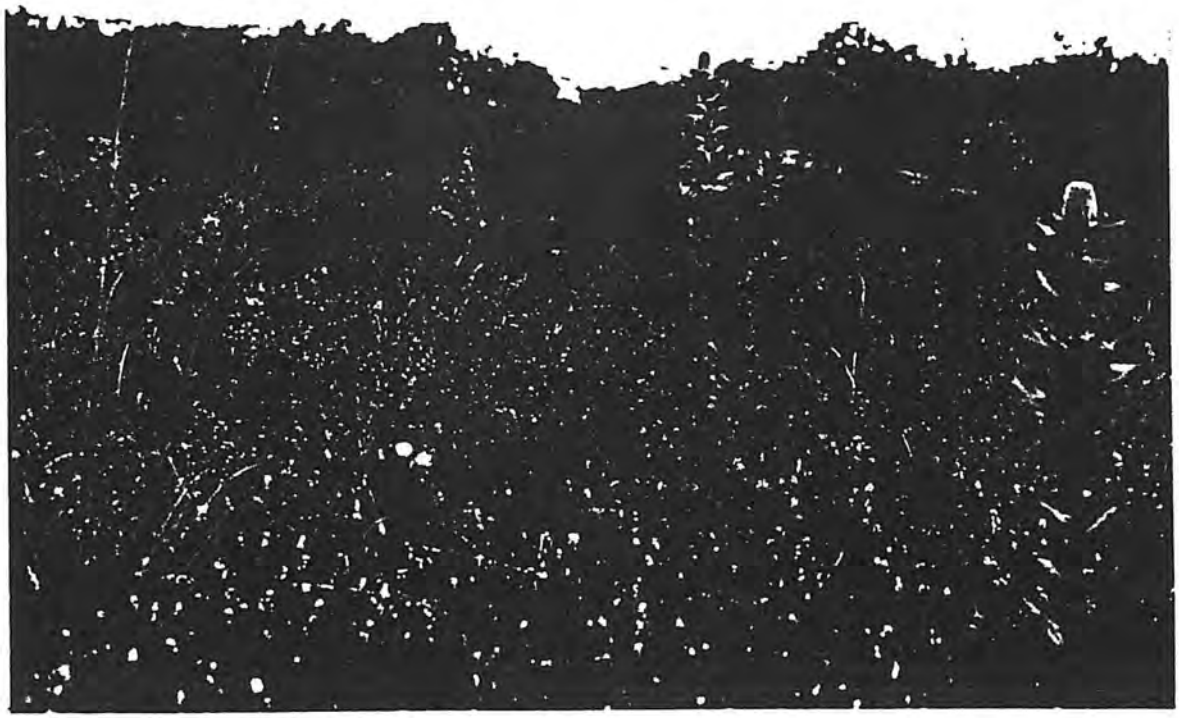


Fig. 11 - Stand of Lysinema ciliatum on National Park land at Oyster Harbour. This stand is unnickable due to its shortness.

3. Use about 5,000 stems a year. Black spot is a problem.
4. Plenty availble but grub infestation is a problem. Popularity has dropped.

HAKEA LORANTHIFOLIA 1,000 seed stems GR

Supposedly collected from the Hill River area but according to herbarium records is only found at Beverley and Pingelly.

HAKEA NEUROPHYLLA GR

Only 1 bag of nuts and fruit taken in 1980/81.

HAKEA ORTHORRYNCHA GR

Only 1 bag of nuts and fruit taken in 1980/81.

HELICHRYSUM BRACTEATUM 102,173 (Straw flower)

Distribution - Occurs from Geraldton to the Stirling Ranges but not in central wheatbelt areas. Also at Balladonia. (See Fig. IV 7d)

Picking areas - Geraldton 1501, 48.5%, Perth 1813, 25.5%, Perth 1814, 16.1%, Pinjarra 1913, 9.9%.

Picking times - Flowers can be picked in all months of the year according to the 1980/81 picking returns. However, some of these are probably under cultivation.
No populations were seen or pickers contacted.

Wholesalers comments - This species is a bi-ennial plant which produces leaves in the first season and flowers in the second. Sheep and rabbits eat it out. It regenerates well after fire.

HELICHRYSUM CORDATUM 208,200 (Seacrest)

Distribution - Found on coastal or near-coastal areas between Lancelin and Albany.

Picking areas - Pinjarra 1913, 40.3%, Perth 1813, 36.9%, Pinjarra 1911, 22.1%. (Fig. IV 8a.)

Picking times - November to February.

Populations sighted - Good stands were observed in Kings Park but none were seen in possible picking areas. Plants seen were dense and contain very many flowering stems.

Picking restrictions - Stems must be at least 50cm long and in late bud with good branching. Stands are apparently difficult to get to and in thick costal scrub. Picking at the height of summer is an added dis-incentive.

Picking methods - Both pickers contacted snapped stems. Pickers use the same stand each year but only annual flowering heads are taken and no leaves are included. There appears to be some secrecy surrounding the picking areas of this species.

Wholesalers comments -

1. Not popular with pickers. Supply is adequate.
2. Very popular species.
3. Not used.

HELIPTERUM HUMBOLDTIANUM 74,360

Distribution - Widespread in the interior as far north as Onslow and south and east to Norseman and Eucla. Also found in the Dongara and Pinjarra areas (Figs. IV 8b and 8c).

Picking areas - 99% of the stems taken in 1980/81 were from the Perth 1813 area and these were probably cultivated.

HELIPTERUM MANGLESII 48,240

Mostly cultivated in the Perth area. One picker at Wanneroo reported growing the species. See Figure IV 8d for distribution and 1980/81 picking areas.

HELIPTERUM ROSEUM 130,960

Distribution - Found from Shark Bay to Balladonia in inland areas and in central desert regions. Occurs in the Hill River and Kelleberrin districts.

Picking areas - (See Figs. IV 9a and 9b) Perth 1813, 43.7%, Ravensthorpe 204, 49%. The supply from the Perth area is probably cultivated.

HYBANTHUS FLORIBUNDUS 56,012

Distribution - The subspecies adpressus is the plant picked. It is found exclusively in a small area on and near the Ravensthorpe Ranges.

Picking areas - All stems taken from Ravensthorpe 204. (See Fig. IV 9c.)

Picking times - June to August.

Populations sighted - Two separate populations were seen in the Ravensthorpe area (see Map 6) as well as numerous plants on road verges in that area. Plants occurred in fairly dense stands near or on creek beds in sandy or gravelly soils. Bushes grow to 1.2m high and are well branched. Both stands seen were harvested and counts were carried out on one of them. Plants stems were cut or snapped to near the base of the plant and in some cases were picked very heavily.

Population 1 - On Masons Bay road. Many young seedling plants were observed near the creek bed. This was supposedly due to good early rains and then a dry period. This stand had been picked for 3 or 4 seasons and the many-branched bases of old plants were seen. Stems had been snapped and some counts were made.

Population 2 - In the Ravensthorpe Ranges on gravel. This stand was approximately over 2 ha and plants were 30-45cm high and exposed. The area had supposedly been well picked last season but it was not easy to find picked plants. Those that were seen were notable for their bright green regrowth. Stems were cut.

Picking restrictions - Stems should be at least 45cm long and heavily flowered. Flowers should be in late bud with some flowers open or fully out.

Picking methods - Of the two pickers contacted one cut stems and the other snapped them. No difference in regeneration of plants was noted. The picker who cut stems stated that snapped stems left sharp butts and these were a hazard when plants were repicked in later seasons.

Regeneration/growth - Regrowth in Population 2 was seen as thick and bushy from the plant stump. Pickers stated that plants became more branched after being picked but that it took 2 seasons for plants to be pickable again. Cut or snapped stems do not regrow but new foliage comes from laterals or base shoots. Some plants in Population 1 appeared to have been killed as a result of hard picking but percentages were very small. Observations showed that most plants recovered well.

Counts - Snapped stems on 20 plants in Population 1 were counted as were stems pickable this season.

Results

Number of plants counted	20
Total number of stems taken	81
Number of stems pickable this year	203
Total % increase in pickable stems	150%

From this result it is seen that plants produce more stems after having been picked. Stems are possibly smaller and finer but the plants is not disadvantaged.

Wholesalers comments -

1. Can't get enough but don't encourage 'fly-by-night' pickers.
2. Not used (2 reports).

ISOPOGON BAXTERI GR

Only 130g of seed and 100 whole plants taken from the Mt. Barker area in 1980/81. The plants is found only in the Stirling Ranges area.

ISOPOGON CUNEATUS GR

75 bunches of flowering stems and 200 whole plants taken from the Mt. Barker 2123 area. This species is restricted to the Mt. Barker/Albany region so flowering stems reportedly picked in Perth 1814 must have been cultivated.

No mention of the species was made by pickers or wholesalers.

ISOPOGON TRIPARTITUS GR

300 whole plants taken in 1980/81. Found in or near the Stirling Ranges with one record from the Cape Arid National Park.

Not mentioned by pickers or wholesalers.

KENNEDIA MACROPHYLLA GR

560g seed taken (from cultivated plants in Perth 1813.) This species is only found close to Augusta.

KENNEDIA STIRLINGII GR

Distribution - Found mainly in the Darling Scarp from Bakers Hill to east of Mundijong. Records from Waroona and Donnybrook.

Picking areas - Perth 1811 supplied all flowering stems. 7.04kg of seeds were taken from Perth 1814.

Picking times - From August to November.

No mention of this species or any creepers sold as fresh flowers made by pickers or wholesalers.

LACHNOSTACHYS ERIOBOTRYA 168,016 (Sago smoke)

Distribution - Grows extensively between Shark Bay and Perth, Also recorded from the Kalgoorlie, Leonora and Paynes Find areas.

Picking areas - (See Figs. IV 10a and 10b) Geraldton 1501, 90%, Perenjori 1613, 4.6%, Moora 1713, 1.8%.

Picking times - September to November.

No populations seen. One picker was contacted.

Picking restrictions and methods - Stems must be 20cm or longer with the flowers out on the 'wool'. Stems are picked by hand on private property and must be fresh new growth.

Wholesalers comments -

1. Plants are better to be cut back, prolongs fresh growth stage. Older growth is no good.
2. Plenty available. Some is cultivated. Comes back well after picking or slashing.
3. Obtained from Northampton, never short.
4. A lot used. No supply problems (2 reports).

LAMBERTIA UNIFLORA GR

Only 200 whole plants taken in 1980/81 in Mt. Barker 2124.
No populations seen or pickers contacted.

LEPTOCARPUS SCARIOSUS 41,200 stems (Velvet Rush)

Distribution - Occurs mostly around Pemberton to Denbarker and Bremer Bay. Reports also from Northam and near Busselton.

Picking areas - All stems taken from Mt. Barker 2123.

Picking times - February to August.

No populations were examined.

Picking restrictions - (6 pickers). Stems must be at least 50cm (4 said 60cm) and in full head.

Picking methods - All stems are cut with secateurs.

One picker reported the species as being difficult to find stands of. Only 1 picker of 4 reported using the same 'patch' each year.

Wholesalers comments -

1. Comes from paddocks on farms.
2. Take 15 - 20,000 bunches per year. (*This is significantly more than the total in the 1980/81 survey.)
3. Not much used.
4. Not popular with pickers. The Albany area short this year.

LEPTOSPERMUM FIRMUM 76,675 (Tea-tree)

There is undoubtedly confusion as to the identification of this species. No verifications were made and it may be that it is an Agonis species.

One picker reported taking L. firmum andL. ellipticum and another L. sericeum and L. ellipticum.

LEUCOPOGON VERTICILLATUS 97,517 (Tassel flower, Native Bamboo)

Distribution - Grows on hilly areas (especially laterite) from Perth to Mt. Manypeaks and as far west as Augusta.

Picking areas - Pemberton 2114, 15.9%, Mt. Barker 2123, 70.2%, Pemberton 2111, 11.5%. (See Fig. IV 10c.)

Picking times - All year.

Populations sighted - Scattered but widespread populations of this species were seen in the Denbarker area on Forests Department land (see Map 1) and in bush areas at Redmond (North of Albany) and the Ledge Beach Road area. No picked stands were examined.

Picking restrictions - (4 pickers) Stems must be at least 60cm long and branched. 'Tassels' may or may not be out. Stems must be young and fresh.

Picking methods - 3 pickers cut stems with secateurs and 1 snapped them.

Regeneration/growth - Pickers state that this species is best 2-3 years after a fire.

Wholesalers comments -

1. Can be cultivated.
2. Plenty available.
3. More stems are available than are required.
4. Hope to use more. No supply problems.

LYSINEMA CILIATUM 64,469 (Curry and Rice)

Distribution - Very widespread in the south west of the State from Ajana to Cape Arid and inland to Southern Cross.

Picking areas - Perth 1813, 96.3%, Ravensthorpe 204, 2.4%. Known now to be taken also from the Hill River area with very small amounts from Mt. Barker/Albany and Pinjarra. (See Fig. IV 10d.)

Picking times - June to September.

Populations sighted - Extensive and dense stands seen at Ledge Beach road near Albany (Fig. 11) and on road verges, reserves and National Parks in the Hill River district. Very common but of variable height. Stands seen at Ledge Beach were unpickable due to their lack of height. No picked stands were seen.

Picking restrictions - (5 pickers) Pickable length varied from 20cm to 60cm minimum. The smaller lengths are used is local dried flower arrangement production. Wholesalers required at least 35cm stems in full flower. Not so popular with pickers because it is smelly and sometimes scattered.

Picking methods - 3 pickers snapped stems and 1 cut them with secateurs. All of one clump can apparently be taken in one picking.

Regeneration/growth - Plants take one or two seasons to recover to picking height. Plants are pickable 3 years after a fire and produce better after fires or disturbance. Lysinema is found near swamps.

Wholesalers comments -

1. Comes back fresh each year. No trouble finding enough.
2. Plenty available.
3. There are a lot of unpickable plants.
4. Not much used but 3 pickers are using the same patch.
5. No problems obtaining supply.

MACROPIDIA FULIGINOSA 16,797 (Black Kangaroo paw)

Distribution - Found in now restricted sandplain areas from Perth to Dongara. Can be found also on ironstone gravel hills in the same area.

Picking areas - Hill River 1702, 23.5%, Hill River 1704, 18%, Perth 1813, 19.4% (cultivated), Dongara 1604, 7.4%, Dongara 1602, 13.4%, Moora 1711, 6.4%, Geraldton 1503, 6.5%, Perenjori 1611 and 1613, 2.7%, Moora 1713, 2.1%.

Picking times - September to November. Can be extended under cultivation and irrigation.

Populations sighted - Only one small roadside population was inspected. This consisted of approximately 25 plants/clumps and had been picked in the previous season. Only 2 flower stems were seen to remain.

Picking restrictions/methods - Stems should be 60cm or more long with at least one flower out. Because of the shortage of this species slightly bent or short stems are accepted.

Only 2 pickers who took the species were contacted. Both stated that it was difficult to find. One picker had picked 3310 stems from a patch on private property in 1982 but could not find enough to pick in 1983.

Wholesalers comments -

1. All supply is cultivated. Don't encourage bush pickers because poaching is a big problem.
2. Virtually non-existent in the bush. Can't get enough and demand is very high. Trying to cultivate it in Perth.
3. Price is very high so not much is traded. Comes from private property.
4. Species is dying out as it grows on better agricultural soil. Is found on the hills behind Allied Eneabba.

MACROZAMIA REIDLEI 9,425 (flowering stems?), 9,800 fronds (Zamia palm)

This is a widespread and common species found from just south of Dongara to Denmark and extending inland to Arthur River, Beverley and Frankland. Seeds are collected for cultivation and burnt fronds are used in dried arrangements. As

fronds are only taken after they have been burnt in bushfires pickers are not affecting plant growth. One picker was contacted. The species is collected over a wide area. (7 map grid squares.)

MELALEUCA DIOSMIFOLIA GR

640g of seed only collected in the Pemberton 2113 area.

MELALEUCA NESOPHILA GR 1,112, 4kg seed

This species is found mainly between Bremer Bay and Hopetoun. Two old records (80 years or more) from Perth and Koorda. Since the flowering stems were supposedly taken from Pemberton they must have either been cultivated or misidentified. All but 500g of the seed collected is also from cultivated plants.

ORTHROSANTHUS POLYSTACHYUS GR

400g seed collected from the Mt. Barker 2124 area in 1980/81.

PANDOREA PANDORANA GR 2,270

All flowering stems taken from the Pinjarra 1911 area in August 1981. No further information.

PIMELEA PHYSODES GR 8,620 (Qualup bell)

Distribution - Restricted to the area between the Gairdner and Phillips rivers in the south east. This species is well represented in the Fitzgerald River National Park (FRNP).

Picking areas - 97.9% from Newdegate 2034, 2.1% from Ravensthorpe 204.

Picking times - May and June.

Populations sighted - Numbers of this species were seen in the FRNP along roadsides. As such they are reasonably well protected from pickers although some stems are possibly taken from this park. No other populations were seen.

Only one picker was contacted. He stated that he could not now obtain P. physodes but that it came up after clearing and was pickable within 5 years.

Wholesalers comments -

1. Three wholesalers specifically questioned did not use the species.

PODOCARPUS DROUYNIANA 781,222 (Emu grass, emu bush)

Distribution - Found in karri and jarrah forest areas throughout the extreme south west corner from Busselton to Denmark. One record from Muchea.

Picking areas - See Fig. IV 11a. 83.4% from the Mt. Barker 2123 area.

Picking times - All year as it is the foliage only which is taken.

Populations sighted - Extensive stands of this species were seen in Forests Department land in the Denbarker region. (See Map 1 and Fig. 12). The plant was widespread and individual plants contained many stems. Stems grow from the ground. A 250m x 150m site from which approximately 22,500 stems had been taken in the previous 2 months was examined. 3000 stems were taken by two pickers in 2 hours and 45 minutes. Many plants seen were 'too old' and were classified as unpickable.

Picking restrictions - Stems must be at least 60cm long with no branching and without old woody stems. Many stems seen were not long enough or had small side branches. An average of 3-4 stems per clump was taken. Clumps contained at least 50-100 stems.

Picking methods - All 6 pickers use secateurs. Stems are cut near ground level by pickers traversing an area on foot. A small amount of trampling occurs but plants are far more damaged by kangaroos and emus which apparently rest on them. Seed pods are sometimes taken with the stems.

Regeneration/growth - Evidence of regeneration after picking was not seen. However, the percentage of stems taken from a clump is so small that plants are not affected. Plants are again pickable 18 months after a fire and then for 3-4 years before they become too coarse.

Because of the picking restrictions on this species and its range and density no problems with picker damage or depletion are envisaged.

STIRLINGIA LATIFOLIA 1,425,184

Distribution - Grows from Geraldton to Albany including the northern and southern wheatbelts. Widespread and common, especially in disturbed areas.

Picking areas - See Fig. IV 11b. 78.5% taken from Perth 1811 and 1813. 8.6% from Mt. Barker 2124.

Picking times - May to January. Early in the season stems are taken as fresh flowers.

Populations sighted - Stands were seen throughout the Perth metropolitan region and particularly around Wanneroo and Gingin, (Fig. 13). Populations were also sighted at Albany and from Badgingarra to Eneabba. Plants in older undisturbed areas were often not found to be flowering whereas those in recently burnt or disturbed areas were heavily in bud. No areas known to be picked were seen.

Picking restrictions - Flowering stems for dried arrangement use must be at the

Fig. 12 - Dense stand of Podocarpus drouyviana at Denbarker. This area had been burnt 3-4 years previously. Many stems in the clumps are unpickable.

Fig. 13 - Population of Stirlingia latifolia in bud. The stand is in a vacant block on Elliot Road in Wanneroo.

full 'ball' stage with heads fully open and fluffy. Stems should be at least 60cm long and well branched.

Picking methods - 3 of 4 pickers contacted snapped stems and 1 used secateurs. Pickable stands are usually dense and almost monocultural.

Regeneration/growth - Plants in long-undisturbed areas often cease to produce flowering stems although the plants remain healthy. Stands are thick and flower heavily in areas where fire, ploughing or roadwork has disturbed the soil.

It was reported that frost reduced flower set and the white flowers/seed heads did not appear, making the stems unpickable.

Wholesalers comments -

1. Not all plants are good for picking - very variable.
2. Needs to be picked at just the right stage with a full ball.
3. Frost affected supply in 1983. We can sell as much as we can get and more.
4. Picked from cleared paddocks. Not eaten by sheep much because it is bitter.

STRANGEA CYNANCHOCARPA GR

458 bunches taken in September 1980.

No mention of this species was made by either wholesalers or pickers. No populations were sighted. Found around the Hill River district, Mt. Lesueur.

STYLIDIUM PLANTAGINEUM GR

130g of seed taken in December 1980 at Mt. Barker 2124.

TETRAGONA DECUMBENS GR

20kg of seed taken from Perth 1813. No further information obtained.

THRYPTOMENE AUSTRALIS 62,275

Distribution - Found in the eastern wheatbelt from Newdegate to Wubin.

Picking areas - Hill River 1704, 60%, Perth 1813, 40%. These areas do not correspond to recorded distribution. See Fig. IV 11c for 1980/81 picking areas.

It is possible that either the species was misidentified or that is was cultivated in the Perth area at least.

Wholesalers stated that a number of species were traded as 'Thryptomene' and could include Baeckea or Scholtzia species. No picked flowering stems were seen to make more definite identifications.

THYSANOTUS GLAUCUS GR

5 bags of whole plants were taken in August 1980 but no further information was obtained.

VERTICORDIA BROWNII 291,228 (Cauliflower verticordia)

Distribution - Found extensively throughout the wheatbelt from Perenjori, Eneabba and Perth through Newdegate and Dumbleyung and east to Israelite Bay.

Picking areas - See Fig. IV 11d. Moora 1713, 22.3%, Perenjori 1613, 16.2%, Moora 1711, 10%. The remainder did not have an area recorded. A large number of stems was seen as having been cut in the Hill River 1702 area in 1983.

Picking times - November and December.

Populations sighted - Two large populations were observed and examined. The first was on an old Government battery reserve between Eneabba and Badgingarra (see Map 8) and the second on private property west of Coomberdale. Both stands had been picked in the previous season. The stand on private property had been picked for nearly 10 seasons and apparently produces more each year. Up to 25,000 bunches has been taken from the 12.5ha area each year.

Population 1 - The stand on Government land was approximately 70m x 50m in area but was very dense. Plants were up to 1.5m tall and had been first harvested in 1983 (Fig. 14a). A track/firebreak was observed on three sides of the stand but trampling damage within the stand was minimal.

Population 2 - This stand was noticeably shorter than Population 1. Plants were less than a metre high and were evenly grown (Fig.14b). The area had apparently been chained 5-6 years ago by the farmer and hence an even stand resulted. Few young plants or seedlings were seen.

Picking restrictions - Stems should be at least 30cm long with a good head size. Flowers should be fully out.

Picking methods - (3 pickers). Stems are either cut (2) or snapped (1). On older plants the whole top of the plant can be removed leaving a leafless stump. Pickers on Population 2 took stems to about 15cm from the ground. Bunches can consist of 5-10 stems but the top of the bunch should be 'dinner-plate' size.

Regeneration/growth - New plants were to be found only on the disturbed edges of stands and were not seen at Population 2.

It is apparent from reports by pickers and from a small trial carried out on Population 2 that picked stems take 3 to 5 years to regrow to picking height. New growth from picked stems is from laterals or lower stems and cut stems do not regenerate (Fig. 14c). Additionally, if stems are cut to below the last green side stem death occurs. This was seen in a number of older cut plants in Population 1.
Unpicked stems grow only approximately 3-5 cm per season and new growth comes from the top of the previous years flowering head (Fig. 14d).

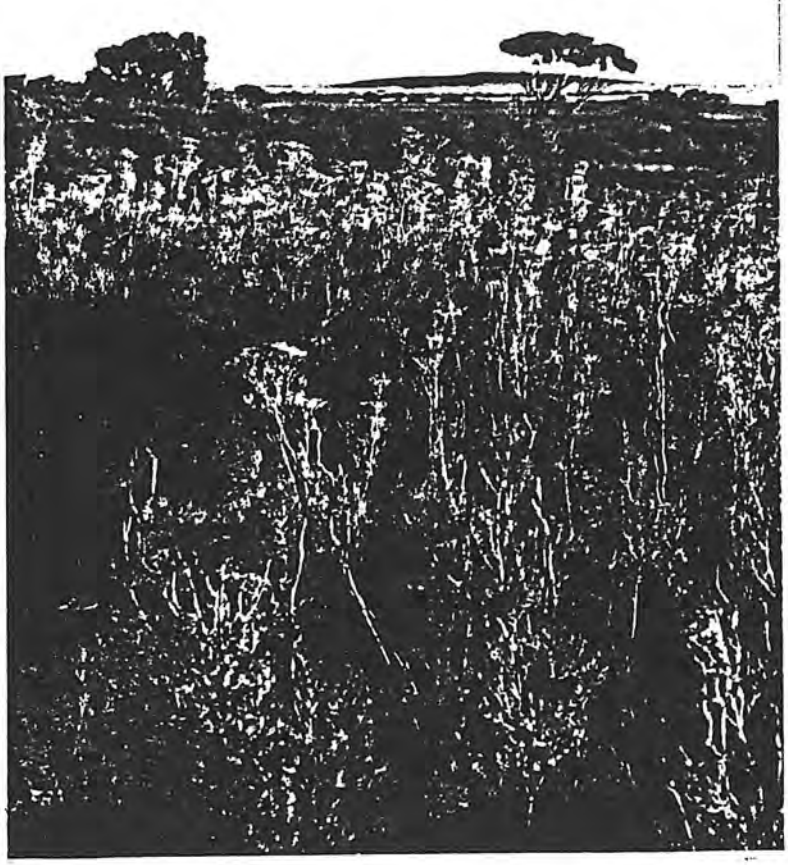


Fig. 14a
Old stand of Verticordia brownii on government land between Eneabba and Badgingarra. These plants are at least 8 years old and were picked for the first time in 1983.

Fig. 14b - Five-six year old population of Verticordia brownii on private property near Coomberdale. Over 25,000 bunches are taken from a 12.5ha area each year.

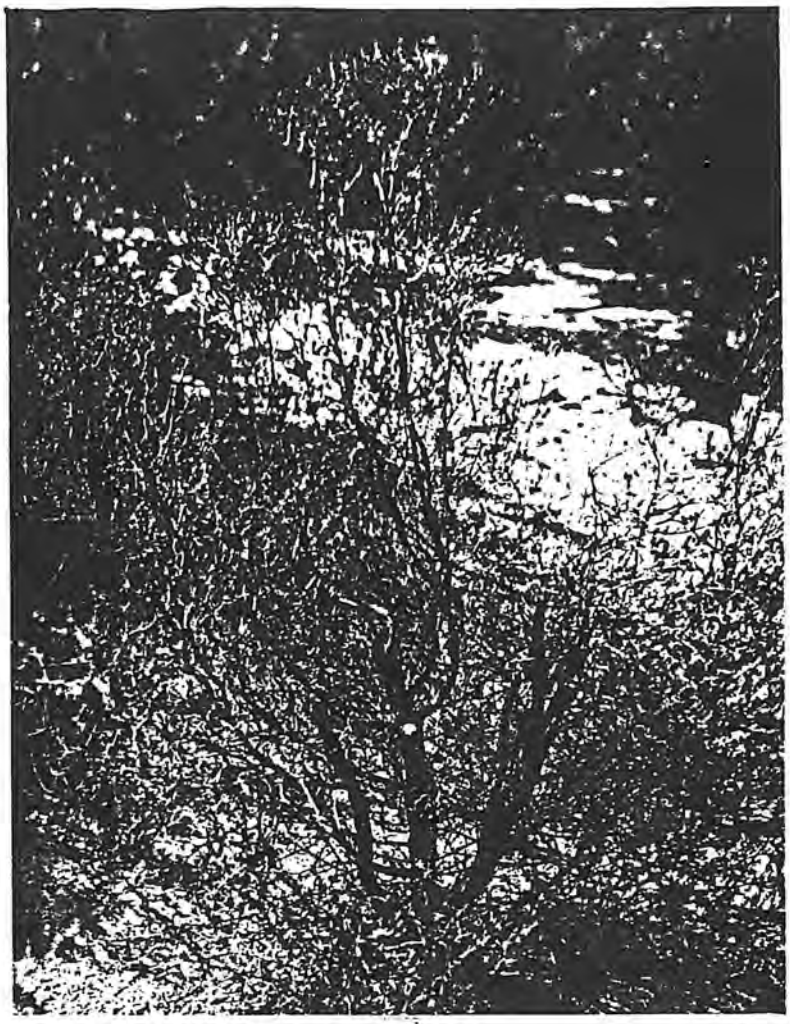


Fig. 14c
Heavily cut plant of Verticordia brownii. New growth comes from lateral stems - cut stems do not regenerate.

Fig. 14d
Mature plant of Verticordia brownii on government reserve. Yearly growth is produced from the previous seasons flowering head.

Counts -

Randomly selected plants within a 5m square quadrat were examined at Population 1. The number of cut stems and the number of pickable stems remaining were counted. At a later examination all plants in one 2m square quadrat were counted.

In Population 2, two plots of 5m x 2m were marked out and counted as above.

Results

	Pop. 1 Quadrat No. 1	Pop. 1 Quadrat No. 2	Pop. 2 Quadrat No. 1	Pop. 2 Quadrat No. 2
No. of plants examined	53	51	86	142
Total No. of stems cut	134	89	75	117
Total No. of poss. pickable stems remaining	45	43	60	75
Total % of pickable flowering stems taken	74.8	67.4	55.0	39.0
% of live plants with pickable stems remaining	29.8	43.1	-	-
% of plants killed by being picked	11.3	28.0	-	11.0

From the above results it can be seen that least 11% of plants in a harvested stand can be killed as a result of picking. Additionally, many picked plants are not available for repicking for some years. These facts significantly reduce the viability of the population if too many heads are picked in one season. It is obvious that stands must be carefully managed when being harvested.

Wholesalers comments -

1. All supply is from private property. (2 reports)
2. More than enough available.
3. Some years supplies are harder to get than others. There have been scares but never any problems.
4. Takes 5-6 years to regrow to picking height. Doesn't flower for 5 years.

VERTICORDIA CRYSANTHA 107,942

Distribution - Found extensively in the south east from the Esperance district to Mt. Barker and north to Kalgoorlie and Northampton.

Picking areas - Dongara 1604, 60.3%, Moora 1713, 24.5%, Perth 1811, 7.7%, Perth 1813, 5.9%, Hill River 1704 and 1702, 1.2%.

Picking times - September to December.

No populations were sighted or pickers contacted.

Wholesalers comments -

1. Not much used and there is no shortage.
2. Not used a lot.
3. Used as a fresh flower.
4. A small area available off Tootbardi road (off the Brand Highway) but not good for pickers because it is too spread out.

VERTICORDIA DENSIFLORA 60,132

Distribution - Found from Geraldton to Mt. Barker and Ravensthorpe but excluding the south west corner. Grows as far east as Southern Cross.

Picking areas - See Fig. IV 12a. Perth 1811, 55%, Hill River 1702, 19.3%, Perth 1813, 21.5%, Hill River 1704, 3.8%.

Picking times - November to February.

No populations sighted or pickers contacted.

Wholesalers comments -

1. Obtained from private property west of Gingin.
2. No supply problems.
3. No shortage.

VERTICORDIA DRUMMONDII 210,637

Distribution - Found throughout the wheatbelt from near Geraldton to Esperance and including the Perth area. Also reported as far south west as Mt. Barker.

Picking areas - See Fig. IV 12b. Perth 1813, 44.8%, Dongara 1604, 32.3%, Perenjori 1613, 2.7%, Perth 1811, 18.8%, Moora 1711, Pinjarra 1911 and Hill River 1704 <1% each.

Picking times - October to January.

No populations seen or pickers contacted.

Wholesalers comments -

1. Grows in wetter soil than other Verticordias. Becoming popular.
2. Often confused with V. densiflora.
3. A lot used. No supply problems.
4. No shortage.

VERTICORDIA GRANDIFLORA 89,424

Distribution - Widespread species found from Northampton to near Perth and then through the central and southern wheatbelt to Ravensthorpe. Also recorded from

Coolgardie and Norseman.

Picking areas - See Fig. IV 12c. Dongara 1602, 75.4%, Perth 1811, 17.5%, Dongara 1604, 4.2%, Perth 1813, 1.4%.

Picking times - August to November. Also supposedly taken in March near Perth.

No populations were sighted.

Picking restrictions/methods - (3 pickers) Stems must be at least 25cm long and should be picked before the yellow flowers begin to turn red. Most of the top of the bush can be taken. Stems are cut or snapped.

One picker reported that big areas of the species were not easy to find.

Regeneration/growth- One picker/wholesaler stated that the plant grew back well after picking and that fires are beneficial. It was also reported that this species regenerated to picking height in one year.

Wholesalers comments -

1. Not very thickly available.
2. Species is scattered. Supply has been coming from the same patch for 8 years and is continuing.
3. Not used.
4. The species isn't brought in. Overseas markets do not like the mixed colours.
5. The mixed colour is not popular.

VERTICORDIA GRANDIS GR 4,893

Distribution - Reported from Mingenew, Coorow, Watheroo and Hill River districts.

Picking areas - Hill River 1702, 63.3%, Hill River 1704, 15.7%, Perth 1811, 5.1%, Dongara 1604, 5.1%, Perenjori 1613, 4.4%, Geraldton 1504, 2.4% and Dongara 1602, 2.7%.

Picking times - September to January. This species however, flowers during most of the year and was observed flowering quite heavily in some areas in May and June.

Populations sighted - Scattered populations were seen on and near the Lake Indoon Reserve (Fig. 15 and Map 7) and also in the Alexander Morrison National Park and on the Jurien Bay road. Bushes are open and spreading with terminal flower spikes and ofter appear straggly.

Regeneration/growth - Three sources said the plant was at its best after being burnt.

Wholesalers comments -

1. Stems are often too short for picking.

Fig. 15
Verticordia grandis in flower on road verge near Lake Indoon east of Eneabba.

Fig. 16
Picked plant of Verticordia nitens seen on road verge of the Brand Highway near Regans Ford. The plant was regrowing well from being heavily cut back.

2. Excellent after a burn. The species could be picked out - not found on private property. Is a dying species.
3. Very popular. Can't obtain sufficient supplies. (2 reports)
4. Species is overpriced. Is harder to get than most.

VERTICORDIA LEHMANII GR 23,525

Distribution - Located in the extreme south west corner from Busselton to the Scott River.

Picking areas - The one picking record was supposedly from the Hill River 1704 area. As this is way out of the range it is assumed that the species was misidentified.

No wholesalers reported having heard of or using this species.

VERTICORDIA LINDLEYI GR 5,150

Distribution - Records are from Mogumber to just south of Perth. Mostly found in the Gingin/Muchea area.

No populations seen or pickers contacted.

VERTICORDIA NITENS 1,044,566

Distribution - Found on the Perth to Dongara sandplain and inland to Moora.

Picking areas - Perth 1811, 75.8%, Perth 1813, 23.1%. (See Fig. IV 12d).

Picking times - August to March.

Populations sighted - Because the species was not in flower only one roadside population was seen. This occurred just south of Regans Ford on the Brand Highway and had been picked.

Picking restrictions/methods - Only 2 pickers were contacted. Both snapped stems. Flower stems must be 40cm minimum and flowers should be fully open but not old.

Regeneration/growth - It was reported that cut stems take 2 years to regenerate to a picking stage and that they were available 4 years after a fire. Plants are found on poorer soils which are not cleared for agriculture.

Figure 16 shows the regeneration of a road verge plant which was heavily picked. The new growth is fresh and probably represents 1-2 seasons. Regeneration occurs from the picked stems. Heads will be pickable this season.

Wholesalers comments -

1. 10,000 bunches per year obtained from about 400ha where only 1/4 is picked each season.

2. Plenty available.
3. No problems in obtaining plenty. Some is cultivated.
4. Season can vary but supply is plentiful.

XANTHOSIA ROTUNDIFOLIA GR (Southern Cross)

1000 whole plants taken in October 1980. No mention of harvesting by pickers or wholesalers in the area. Some plants were seen in the Denbarker Forests Department land. (Map 1).

XYLOMELUM ANGUSTIFOLIUM 59,252 fruits, 4,000 fl. stems (Woody Pear)

Distribution - Occurs in a band from Northampton through Eneabba and eastwards into the Northern and central wheatbelt.

Picking areas - Fruits - Perenjori 1613, 82.4%, Corrigin 1922, 4.4%, Dongara 1604, 4.5%. Flowering stems - Perenjori.

Picking times - November to May for fruits.

Populations sighted - Trees of this species were noted in abundance in the Hill River and Moora districts. Trees bear very many fruits and it is unlikely that the collecting of these would have any deleterious effect on the species. Plants grow on the poorer agricultural soils.

Wholesalers comments -

1. Both flowers and nuts are used. No supply problems.
2. Only a few nuts used.
3. Abundance available.
4. Flowers used to be popular but are too heavy to transport.

XYLOMELUM OCCIDENTALE 1200 bunches of flowering stems (Native holly)

Distribution - Occurs in coastal and near coastal areas from Perth to Pemberton and inland to Collie. Disjunct population at Upper Kalgan.

Picking areas - All flowering stems (1 record only) reported as taken from Busselton 2004 and leaves (45 bunches) from Pinjarra 1911.

Picking times - Flowering stems, April. Leaves all year.

No populations sighted. One picker was contacted who stated that X. occidentale was used as substitute 'holly oak' and that a branch of 60-75cm was required. Stems were cut or snapped.

Wholesalers comments -

1. A steady seller as foliage.
2. Don't use it (3 reports).

APPENDIX II

LIST OF SPECIES NOT RECORDED IN BURGMAN AND HOPPER (1982) AS BEING HARVESTED FOR CUT STEMS

These are species listed as taken in picker questionnaires or seen for sale.

Species name	No. of records	Sighted
Adenanthos cuneata	6(Called Native temp.)	yes
Agonis obtusissima	1	-
Banksia media	1	-
Bossiaea dentata	1	-
Caustis dioica	(called Chinese puzzle or Anarthria scabra	yes
Chamelaucium ciliatum	1	-
Daviesia juncea/aphylla	-	yes
Dodonaea filifolia	1	-
Eriostemon spicatus	-	yes
Hakea victoriae	1	-
Juncus caespiticius	1	-
Phebalium cannaliculata	-	yes
Phebalium sp.	1	-
Pithocarpa corymbulosa	2	yes
Verticordia harveyi	1	-

APPENDIX III

LIST OF CONTACTS USED THROUGHOUT THE STUDY PERIOD INCLUDING THEIR AREA OF INVOLVEMENT.

	Questionnaire	Contact	Referred
A. BARROW Picker/Albany/*B. coccinea*	+	+	
D. BATTERSBY Picker/local wholesaler/ Albany			+
H & E BOR Pickers/Manjimup	+		
P. BOYD Picker/Mt. Barker	+		
G. BUSHBY Hill River Farm/*Anigozanthos pulcherrimus*			+
L. BYASS Picker/Cervantes	+	+	
A. CARMICHAEL Picker/bush farmer/ Ravensthorpe	+	+	
D. CHALLINGER Picker/cultivator/ Ravensthorpe	+	+	
S. CONTI Picker/Wanneroo and north		+	+
M. A. COOK Long term picker/Denmark	+		
A.B. DAVEY Picker/Denmark	+		
F. DEACON Wholesaler/picker/Cervantes		+	
S. DECHOW Cultivator/Perth	+		
E. DOLVA Picker/bush farmer/Perth area	+		
L.A. ERIKSEN Picker/Wanneroo	+		
G.A. GREENSLADE Picker/Perth/Banksias	+		
D. HURST Picker/Borden	+		
L. JONES Picker/picker employer/Mt.Barker	+	+	
B.L. KLOEDEN Picker/Salmon Gums	+		
H. KRISPYN Picker/Manjimup	+		
T.G.LEE Cultivator/Wanneroo/Helipterum spp.	+		
B. LEWIS Farmer/picker/Eneabba		+	
A. LITYNSKI Picker/*Boronia megastigma* grower (very interested)	+		
P & K McQUEEN Bush farmer/picker/Eneabba	+	+	
W. PASSAMANI Bush farmer/Coomberdale			+
P. PLOZZER Bush farmer/*B. hookeriana*/ Greenhead Road			+
W.T. RIDLEY Picker/Maida Vale/all areas	+		
A & J SHACKLETON Pickers/Denmark	+		
S.J. STEPHENS Bush farmer/cultivator/ Albany	+		

APPENDIX III

		Questionnaire	Contact	Referred
K. SWALLOW	Picker/Denmark	+	+	
A. THIELE	Long term picker/Mt. Barker			+
A. THORGERSON	Active pickers/Perth & north	+	+	
C. TONKIN	Bush farmer/picker/*V. brownii* 10 years/Coomberdale		+	
R. TONKIN	Wholesaler/pickeremployer/ cultivator/Moora		+	
F & C WAGHORN	Pickers/Albany/*B. coccinea*	+		
M.G.WHITTEM	Property owner/*Cephalotus follicularis*/Albany	+		
B & B WILSON	Local wholesalers/employ many pickers/Mt. Barker			

Perth wholesalers contacted were -

FLOREX PTY. LTD. (A. Meicklejohn - never available)

FLOWER EXPORTERS AUSTRALIA PTY. LTD.

JAMES WILDFLOWER SUPPLIES OF W.A (H. James)

PINE VALLEY FLOWERS (P. Hunt)

WESFLOWERS PTY. LTD. (B. Blizzard)

WOOLCOCK A L AND T B

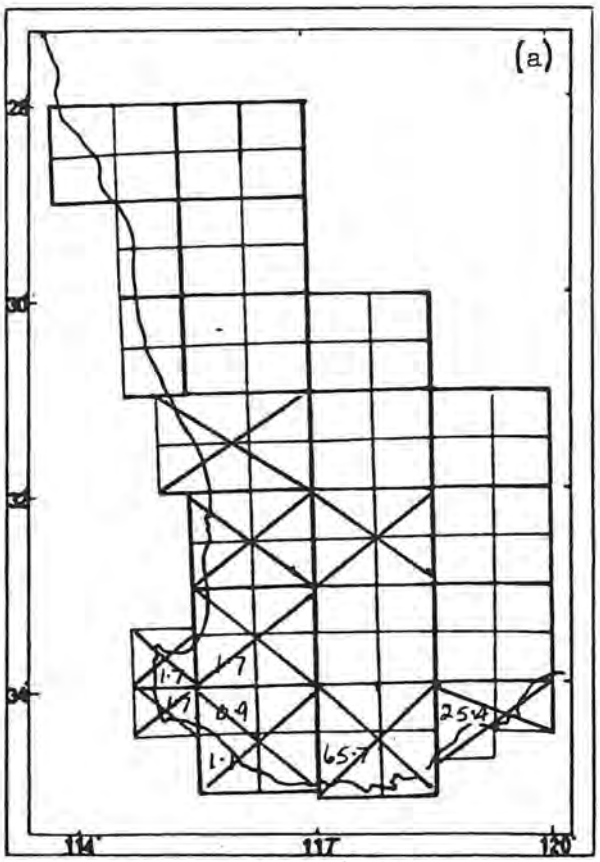
APPENDIX IV

GEOGRAPHICAL DISTRIBUTION AND DISTRIBUTION OF PICKING ACTIVITY OF THE 41 MOST HEAVILY EXPLOITED CUT FLOWER SPECIES.

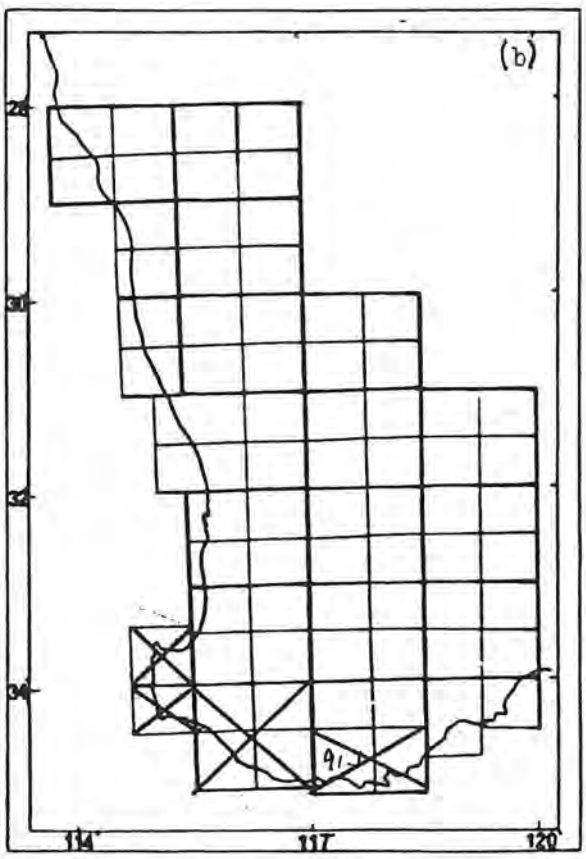
Each map shows the percent of total stems taken for each species from each of the map grid squares shown in Appendix I, Figs A and B. The crosses on grid squares mark known geographical distribution of species. Unless otherwise marked however, distribution is only accurate to 1^{o} x $1\frac{1}{2}^{o}$ grid squares.

(Maps of distribution of picking activity of the 21 most heavily exploited cut flower species are taken directly from Burgman and Hopper (1982)).

Fig. IV 1

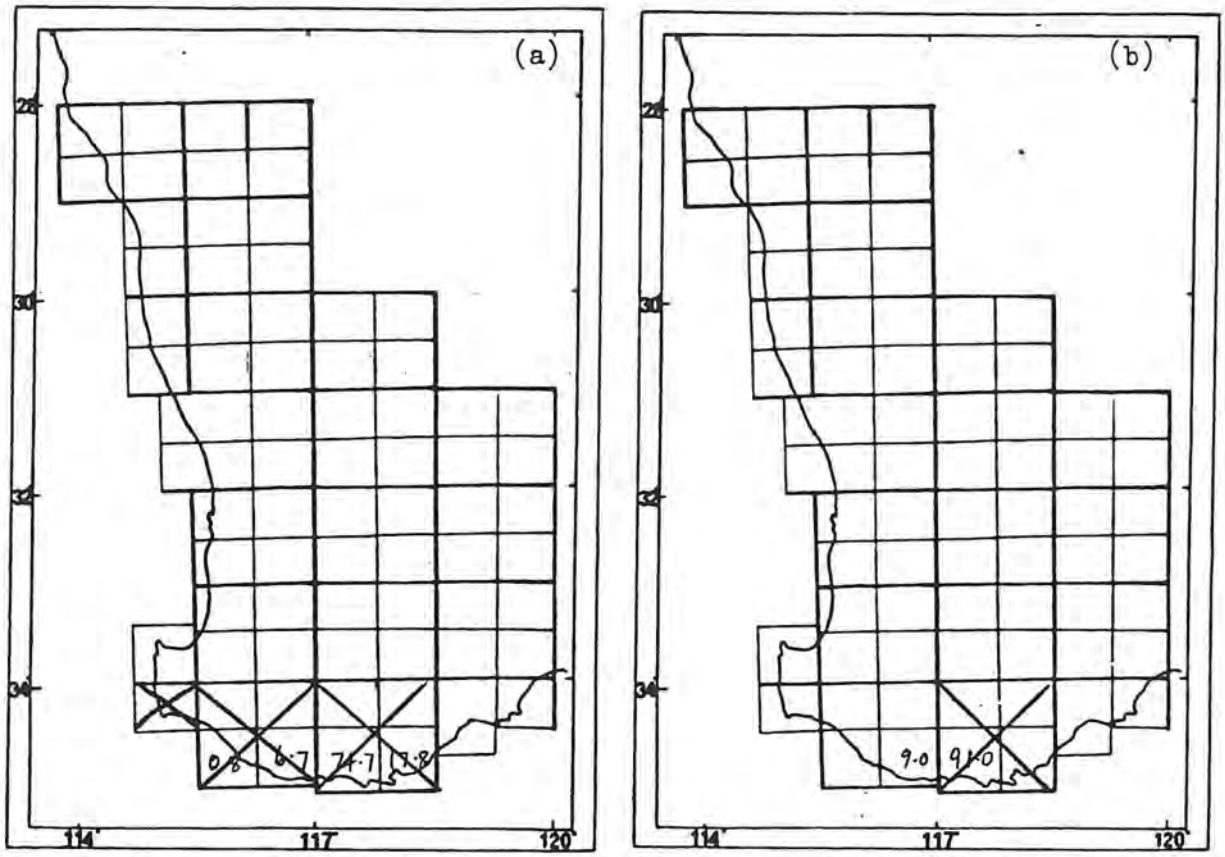


Adenanthos obovatus (280,130 stems)



Agonis juniperina (214,970 stems)

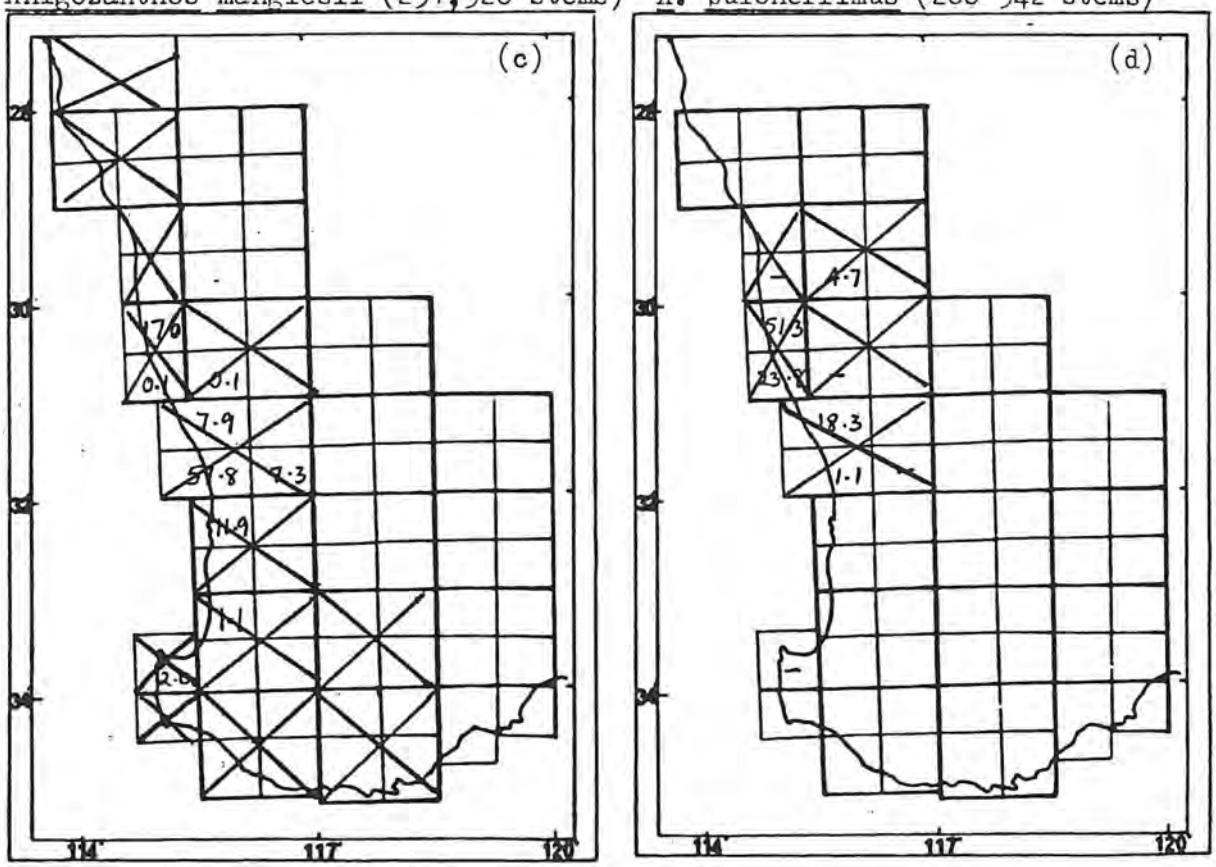
Appendix IV

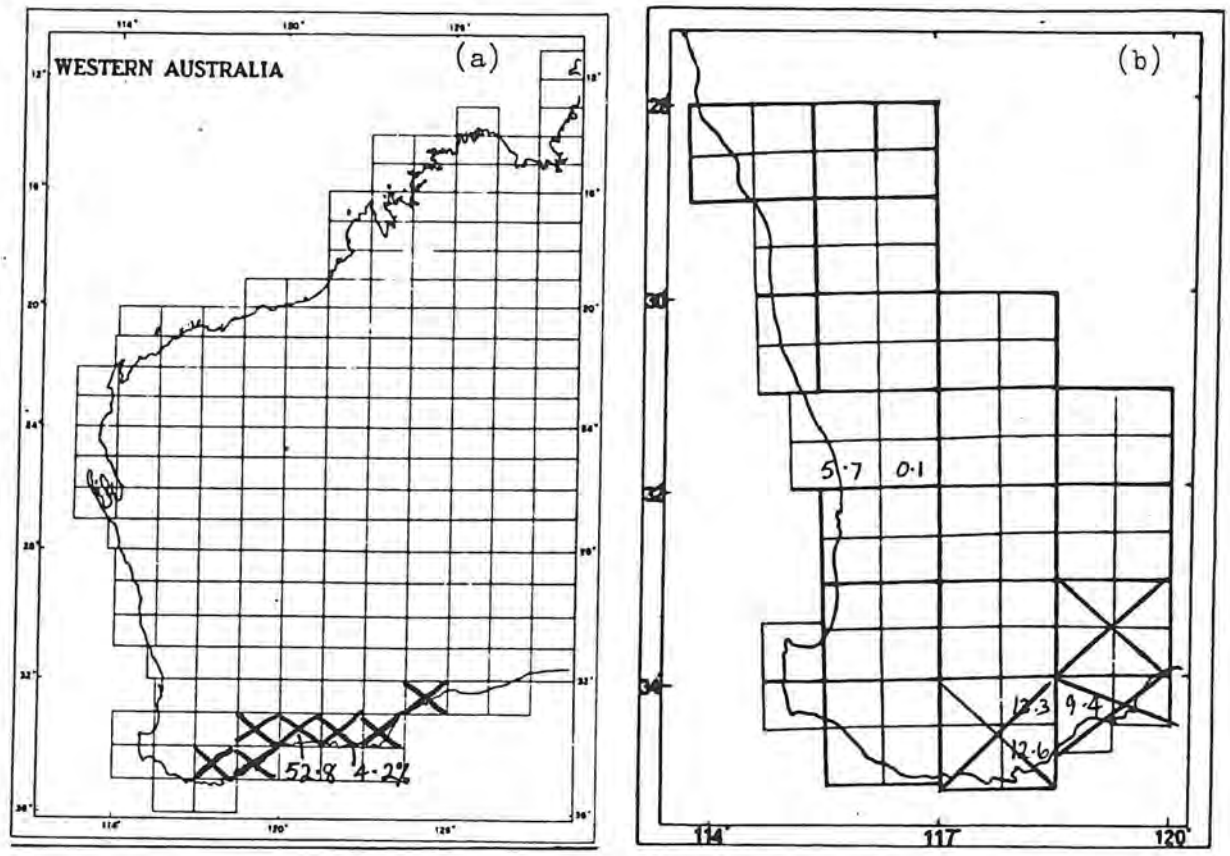


Agonis parviceps (1,172,976 stems) Andersonia simplex (70,000 stems)

Fig. IV 2

Anigozanthos manglesii (231,520 stems) A. pulcherrimus (266 542 stems)



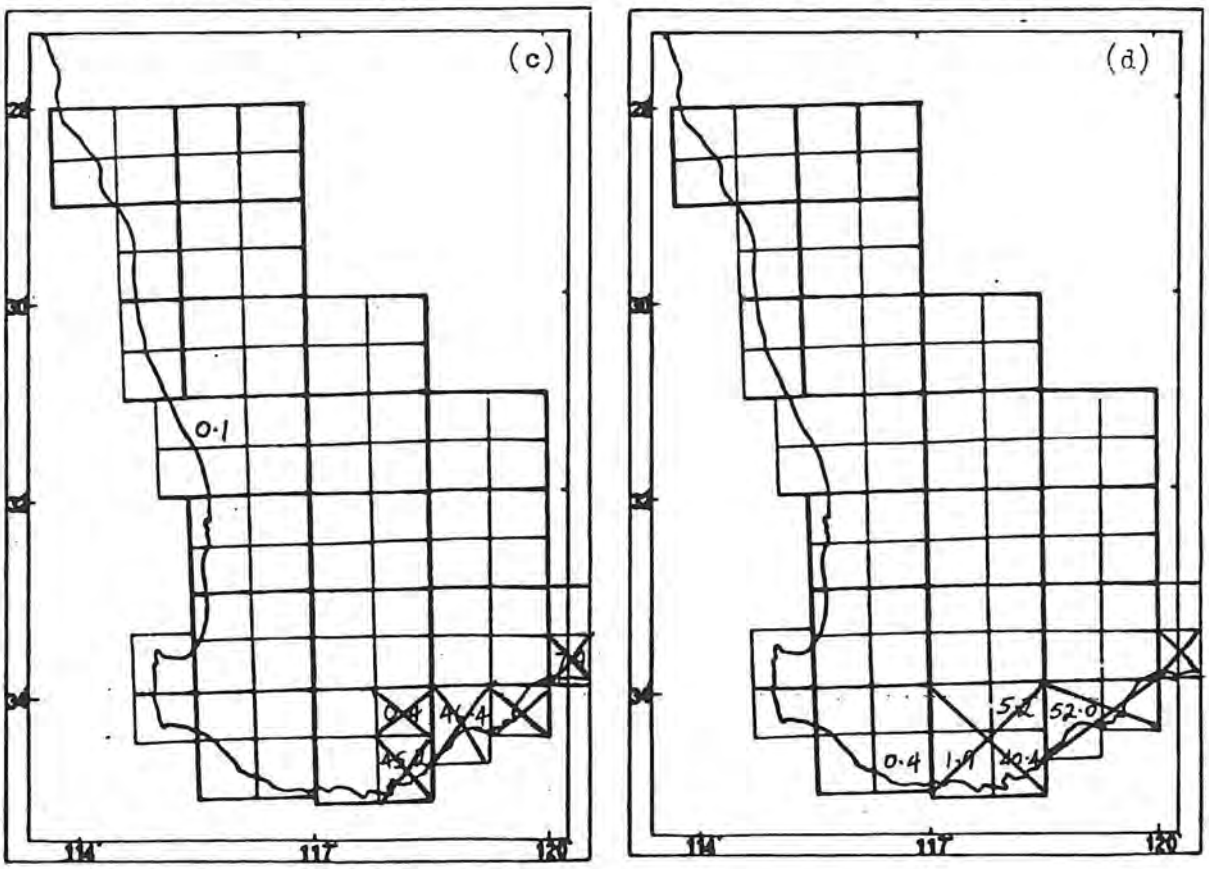


Anigozanthos rufus (158,097 stems)

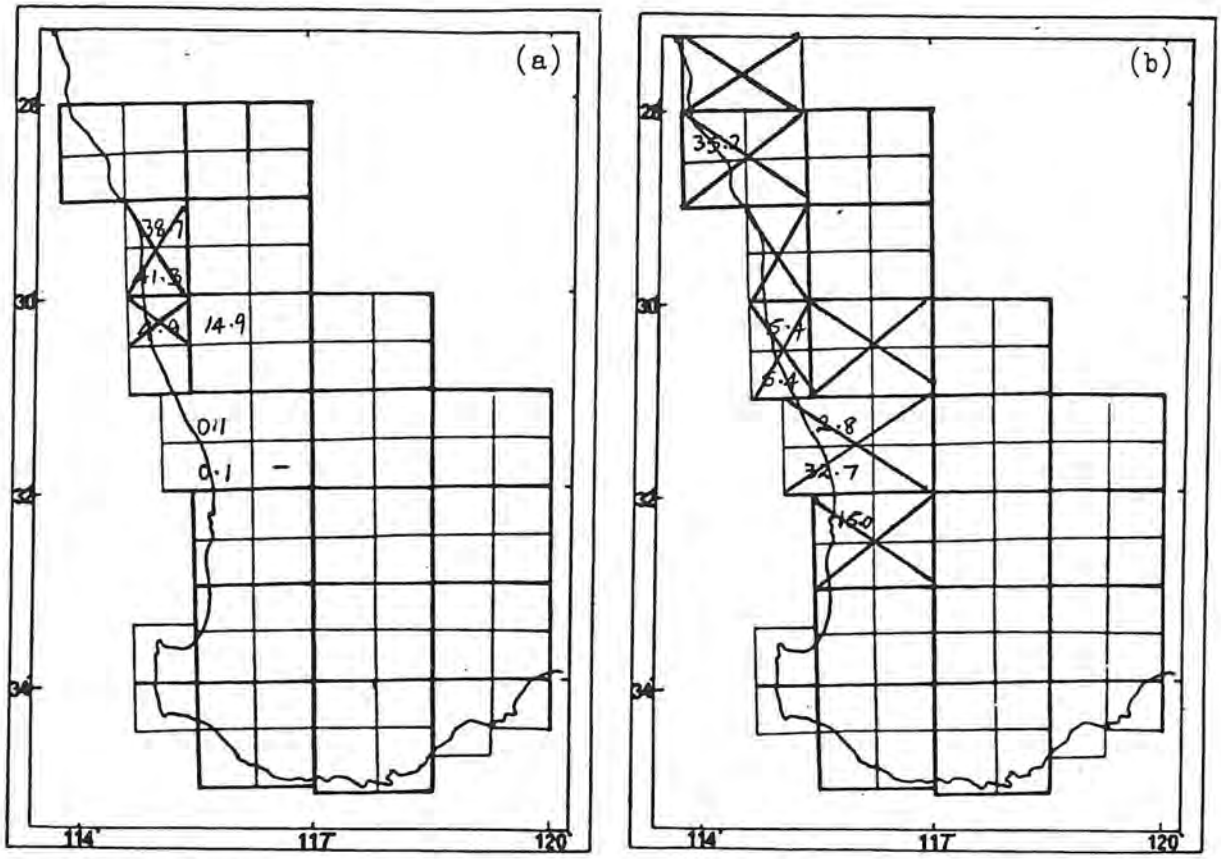
Fig. IV 3

Banksia baxteri (212,133 stems)

Banksia coccinea (516,455 stems)



Appendix IV



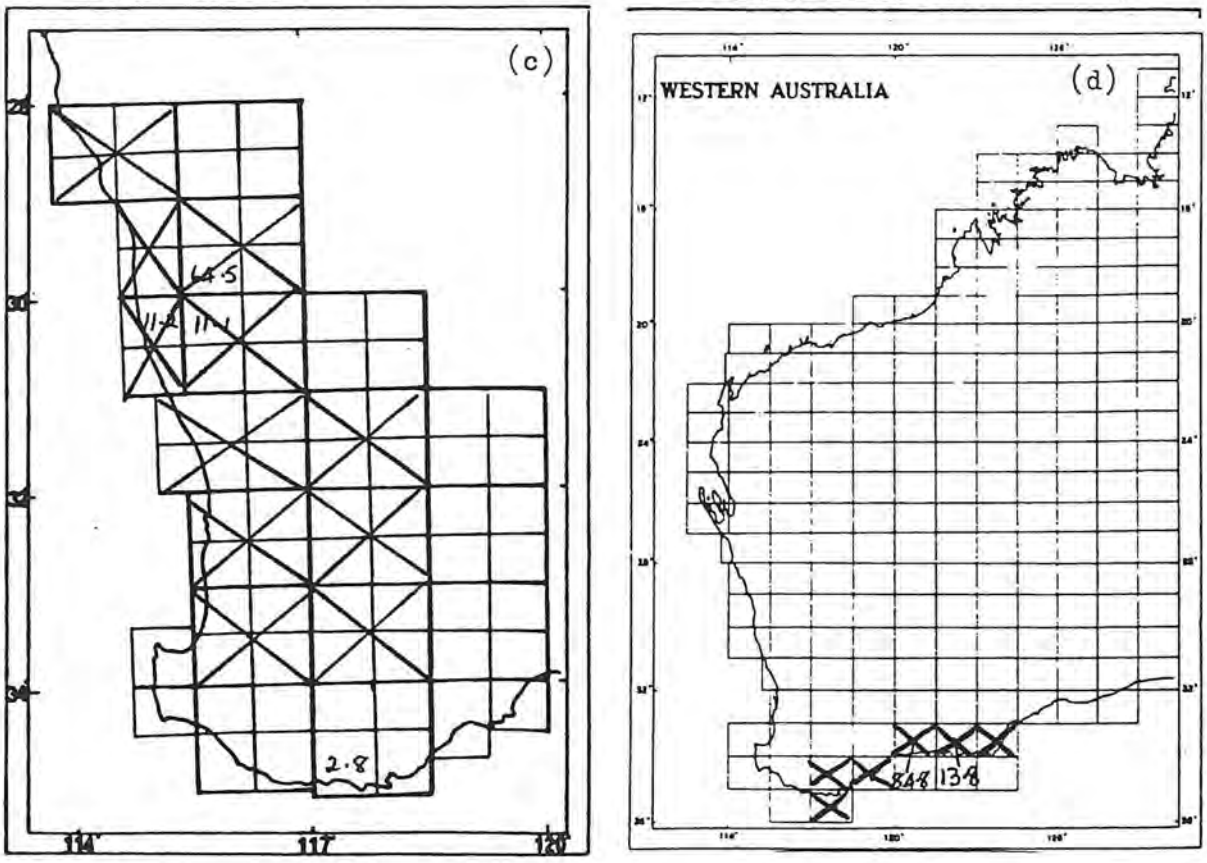
Banksia hookeriana (192,569 stems)

Banksia menziesii (70,690 stems)

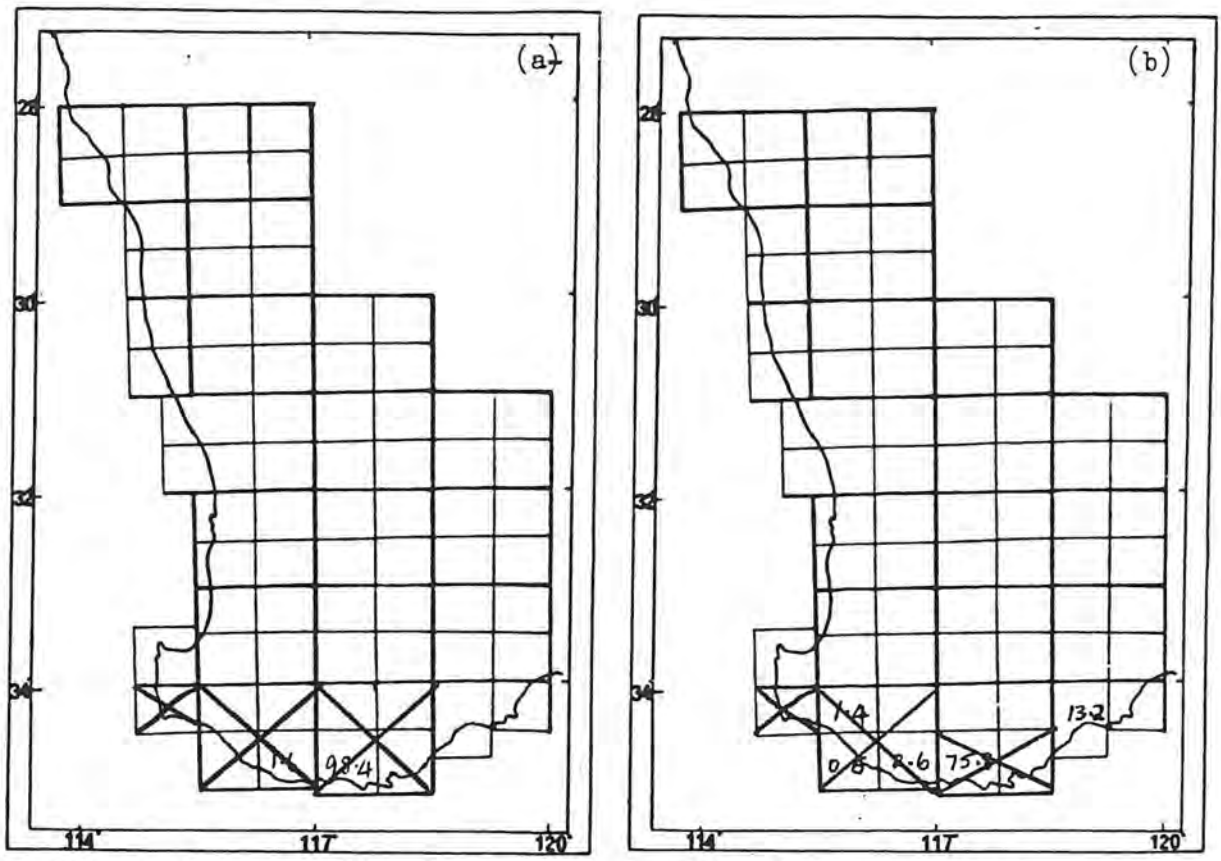
Fig. IV 4

Banksia prionotes (115,400 stems)

Banksia speciosa (73,544 stems)



Appendix IV



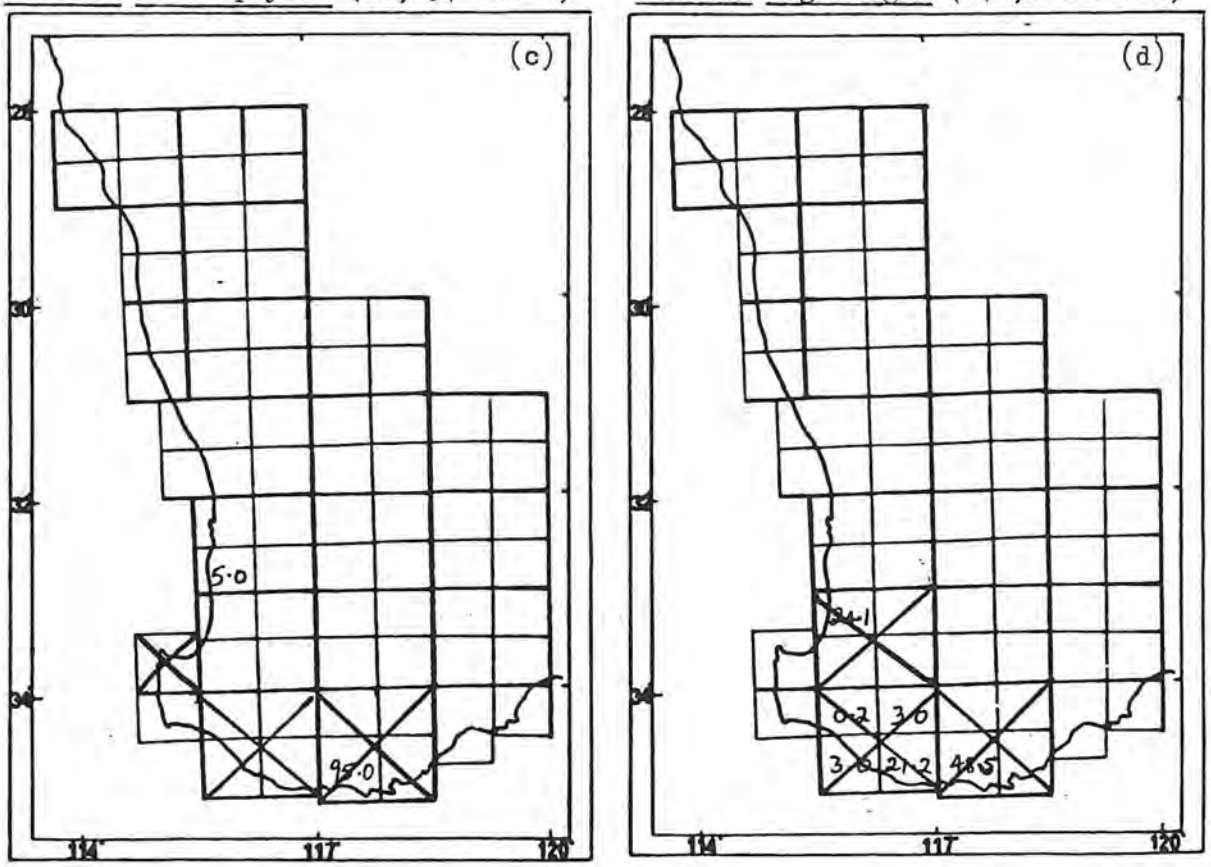
Beaufortia decussata (179,749 stems)

Beaufortia sparsa (566,611 stems)

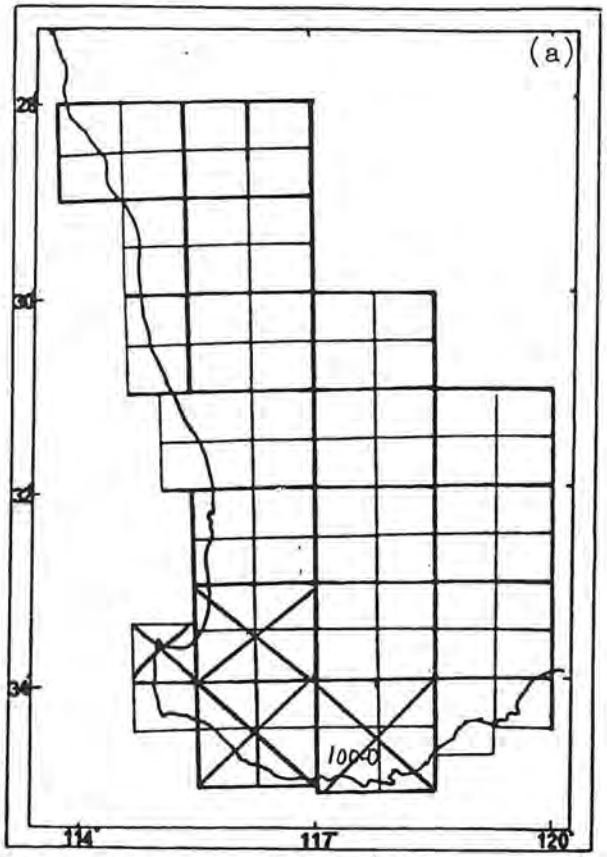
Fig. IV 5

Boronia heterophylla (68,837 stems)

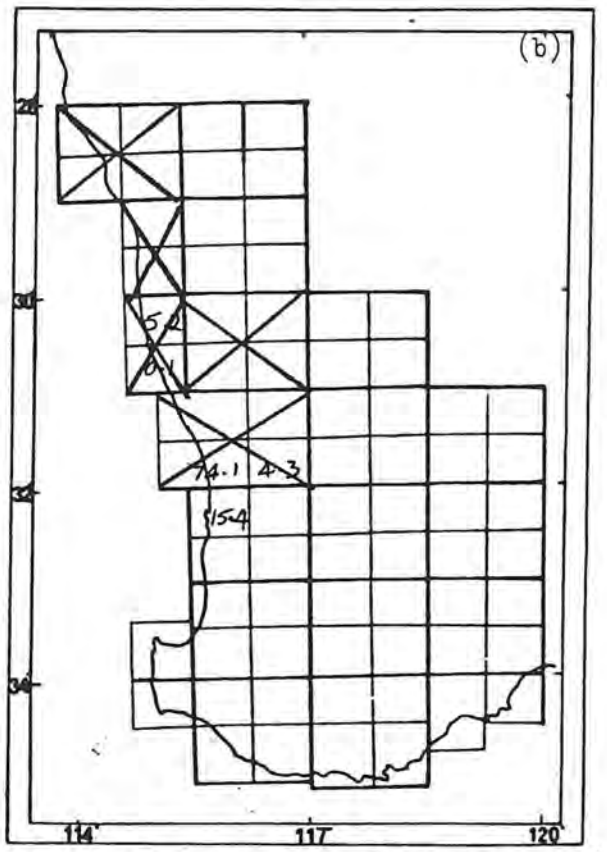
Boronia megastigma (272,020 stems)



Appendix IV



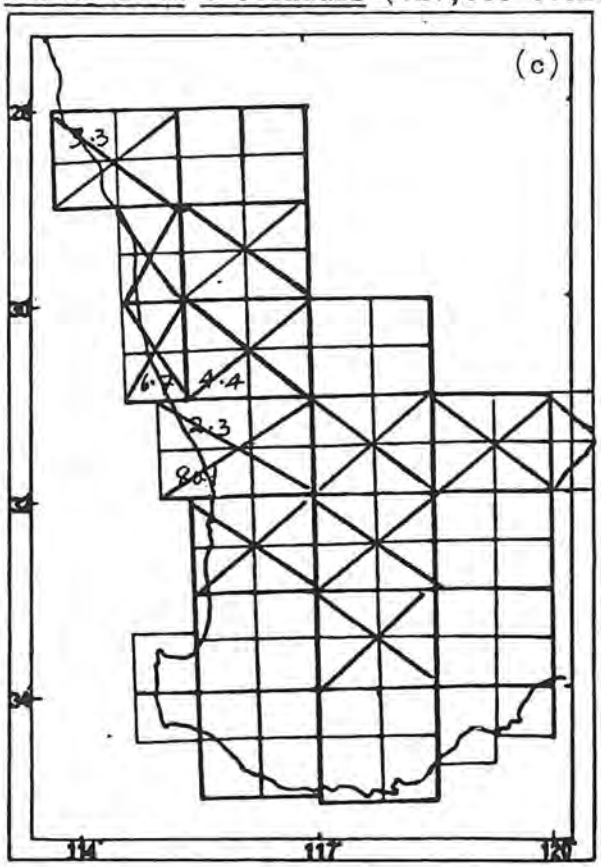
Callistemon speciosus (50,012 stems)



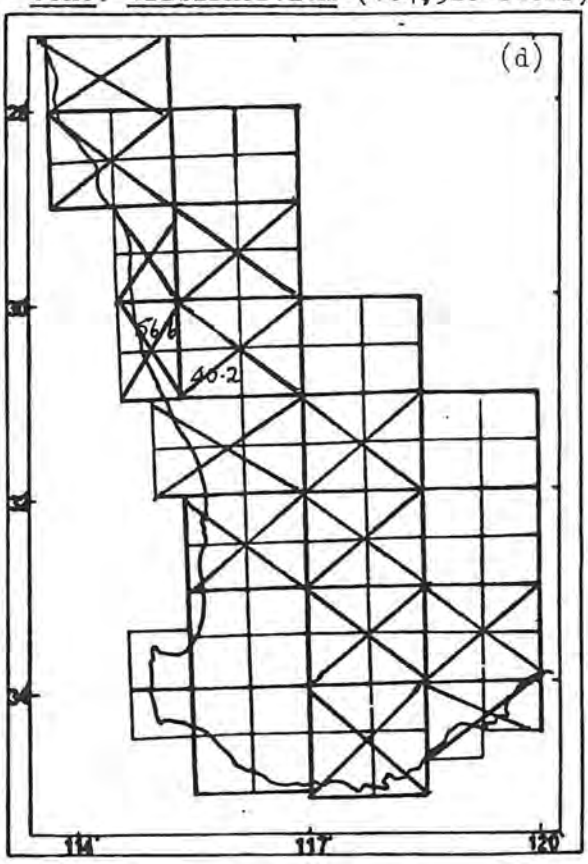
Chamelaucium uncinatum (131,839 stems)

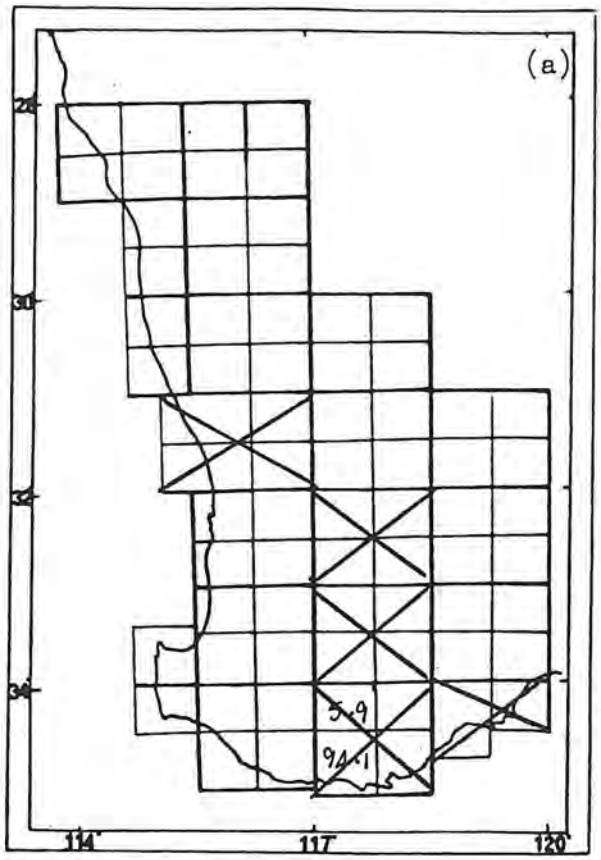
Fig. IV 6

Conospermum stoechadis (121,680 stems)

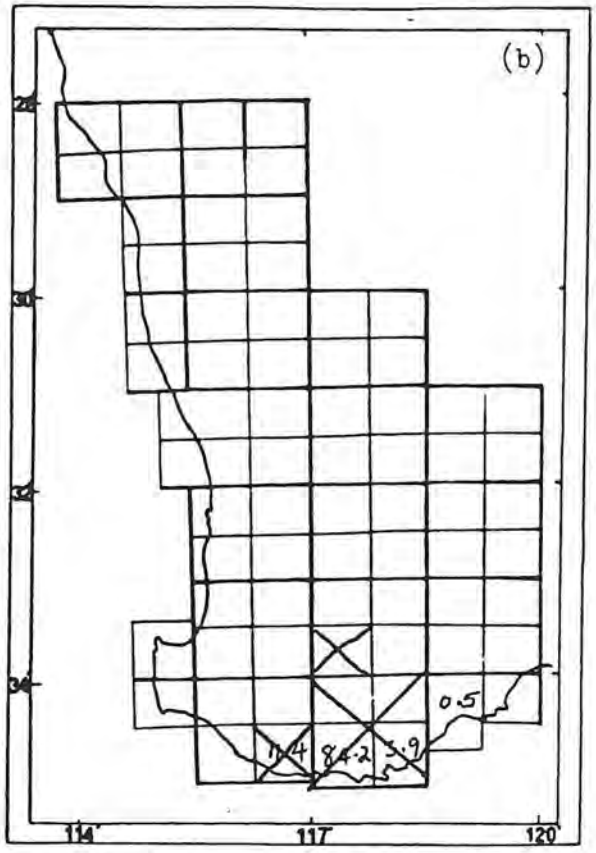


Cono. triplinervium (104,520 stems)





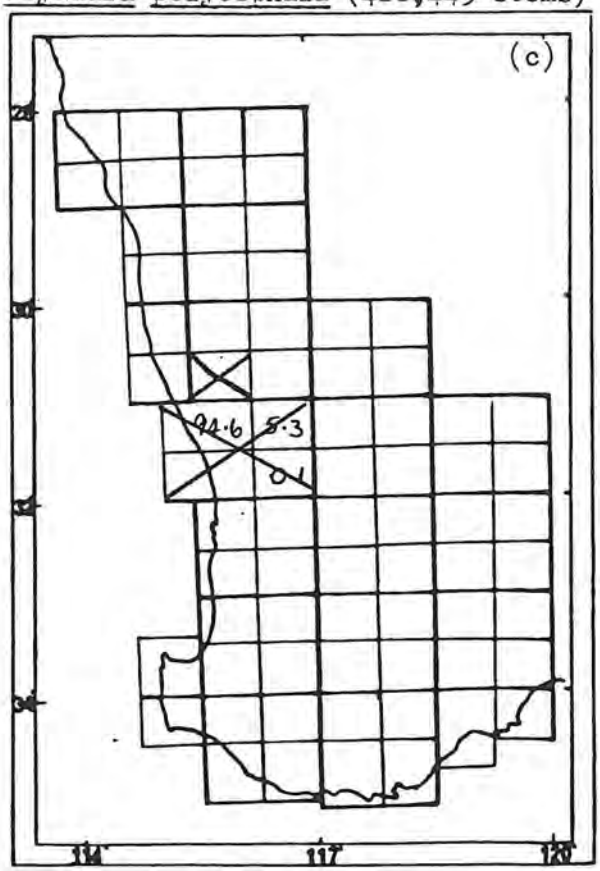
Dryandra drummondii (78,112 stems)



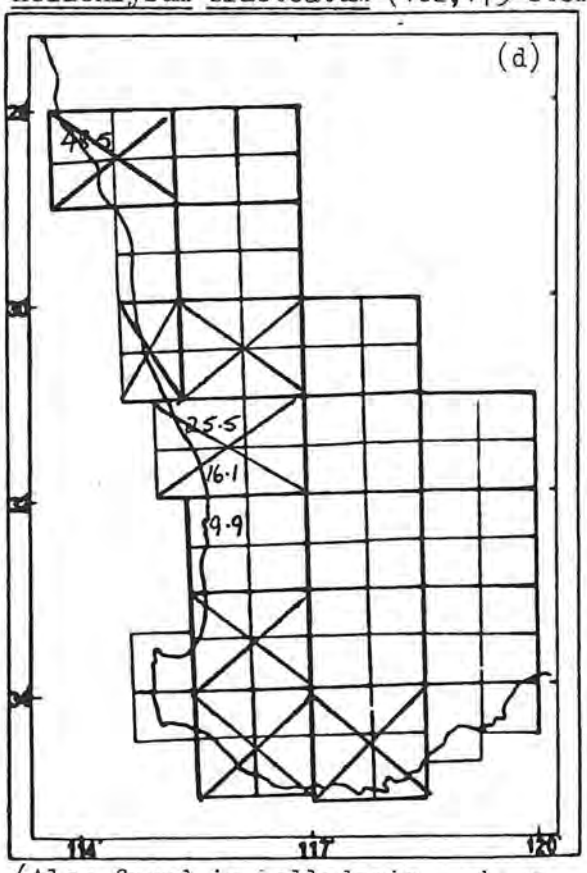
Dryandra formosa (438,119 stems)

Fig. IV 7

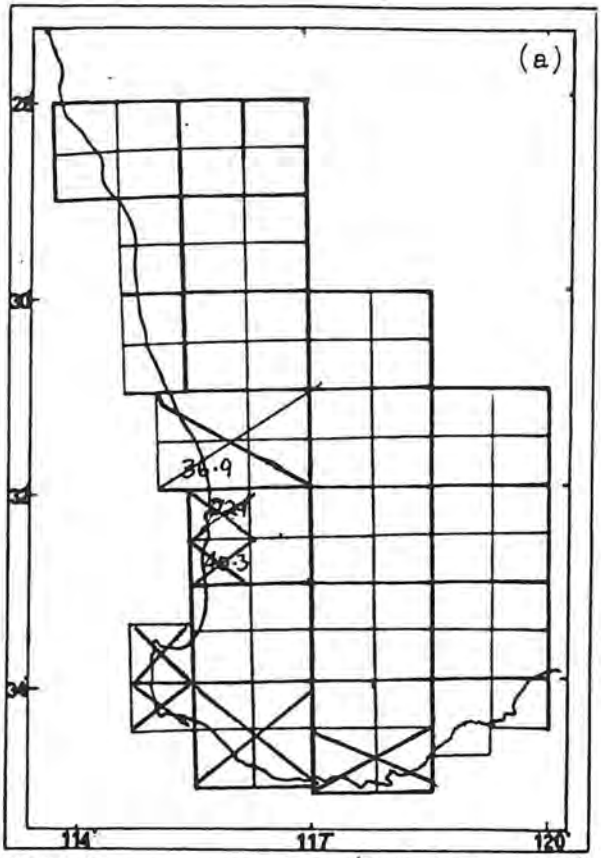
Dryandra polycephala (428,443 stems)



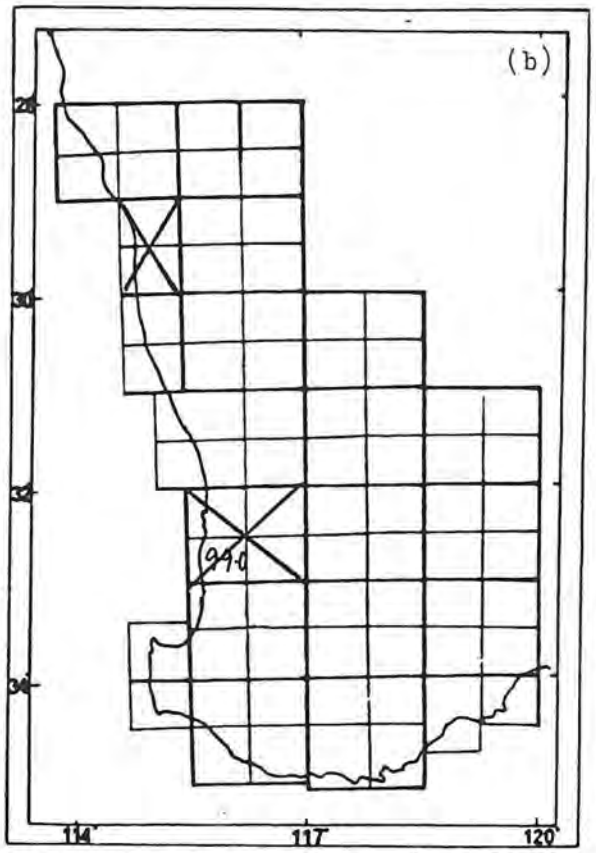
Helichrysum bracteatum (102,173 stems)



(Also found in Walladonia, Fitzgerald and Scott grid squares.)



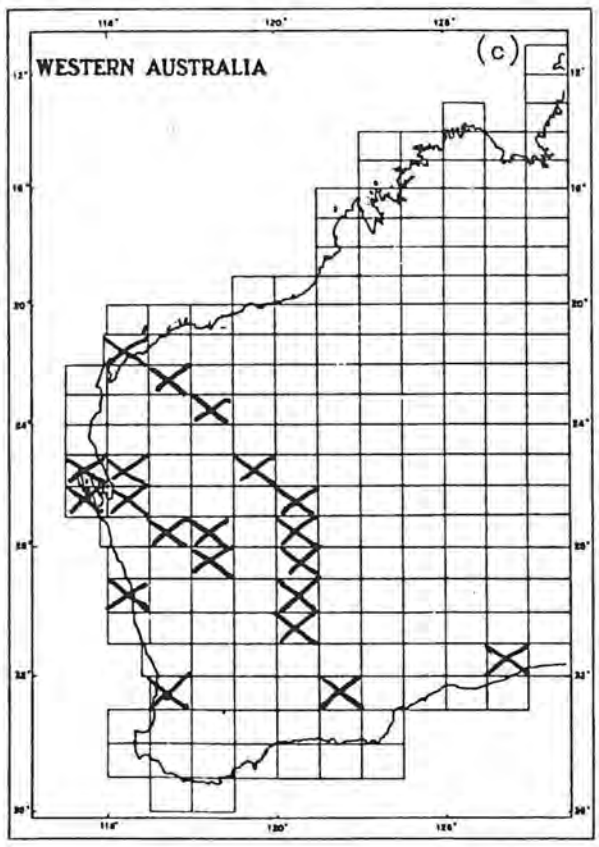
Helichrysum cordatum (208,200 stems)



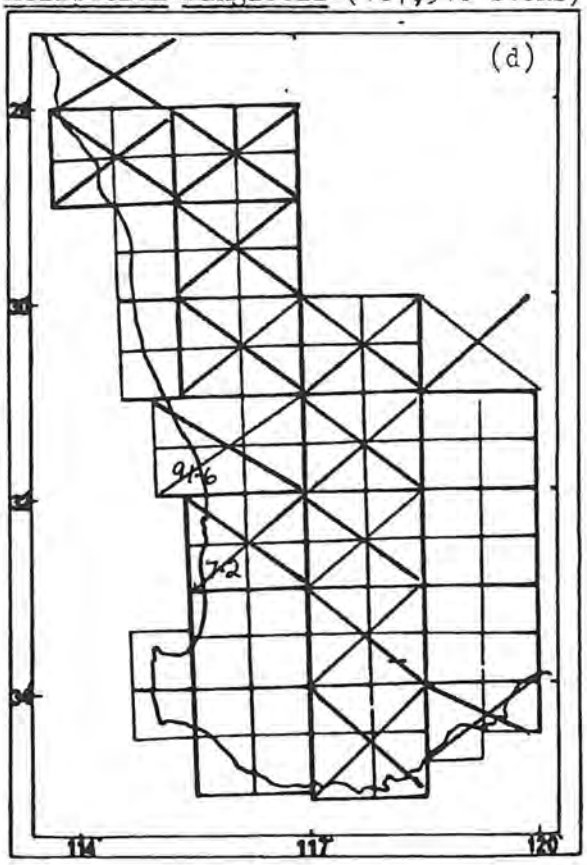
Helipterum humboldtianum (74,360 stems)

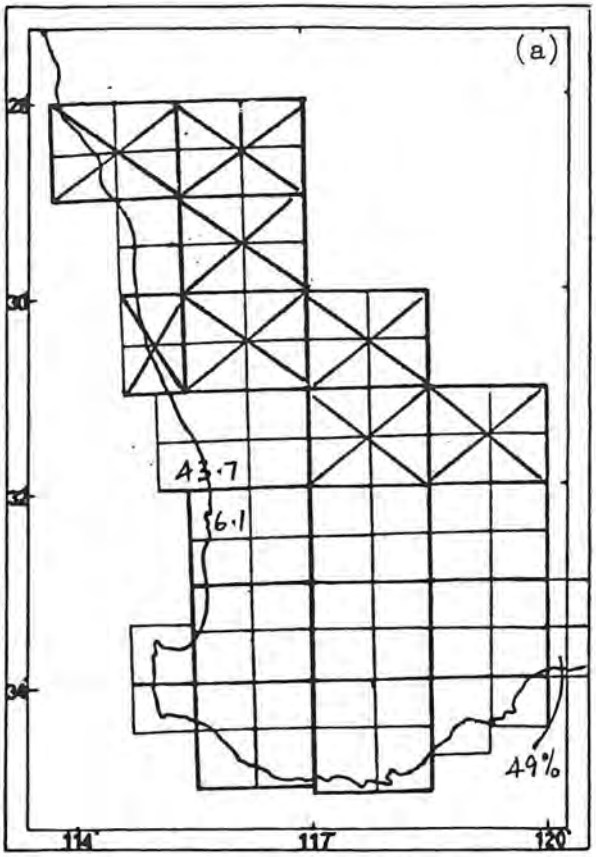
Fig. IV 8

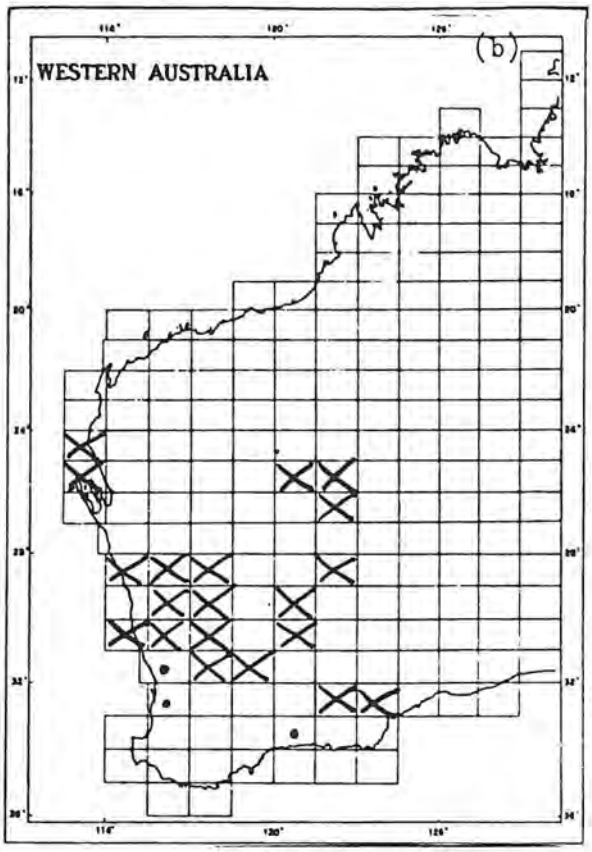
H. humboldtianum



Helipterum manglesii (107,910 stems)



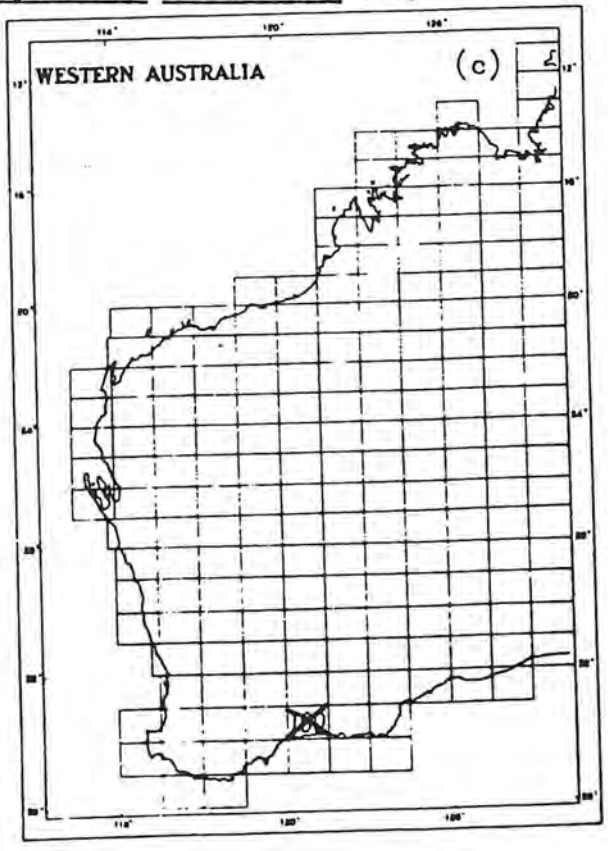


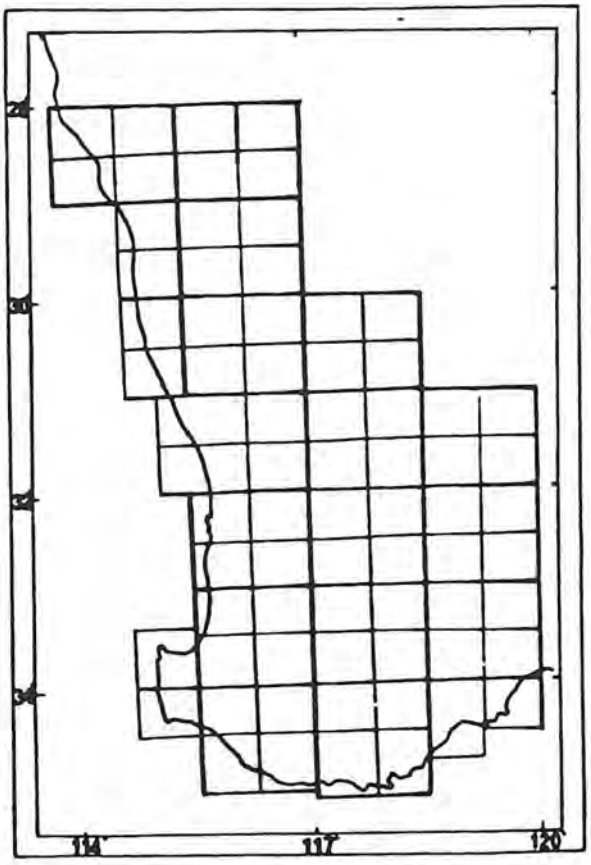


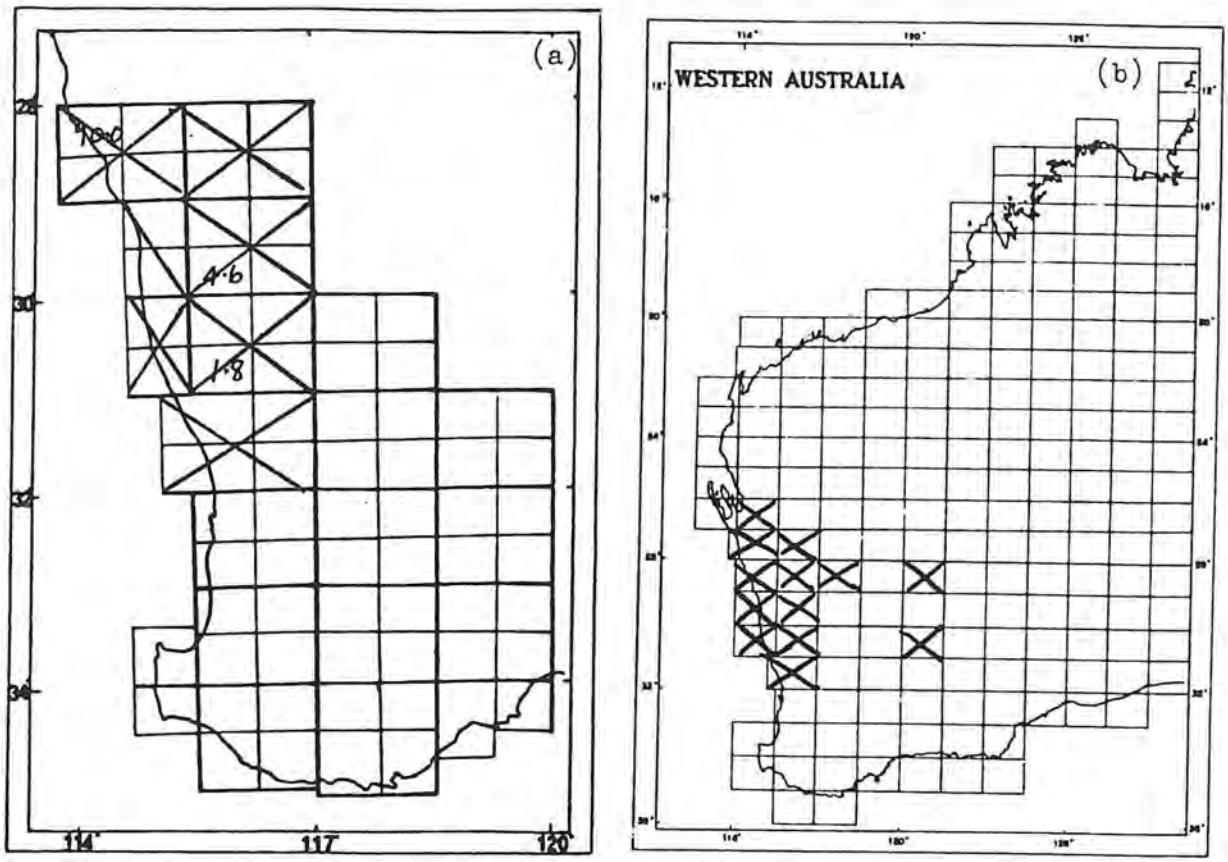
Helipterum roseum (130,960 stems) H. roseum

Fig. IV 9

Hybanthus floribundus (56,012 stems)



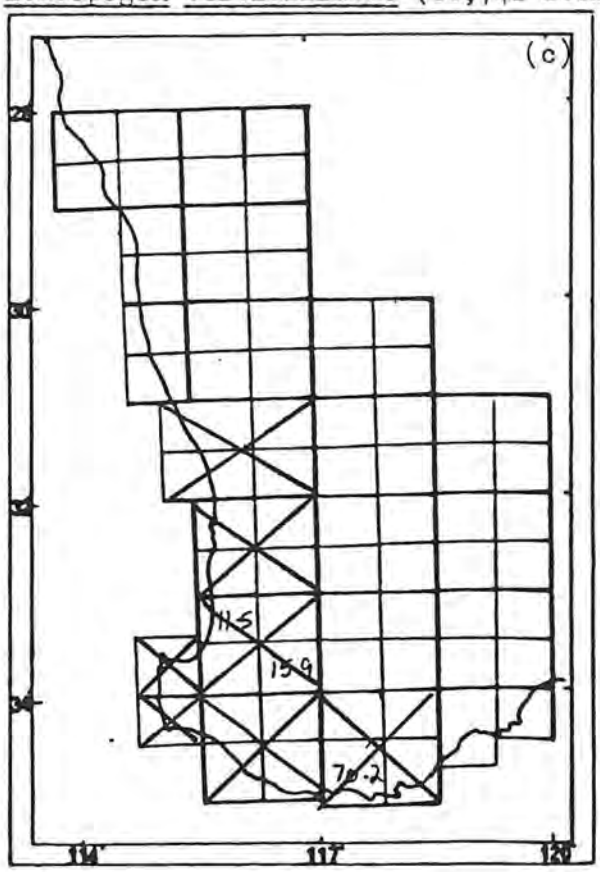




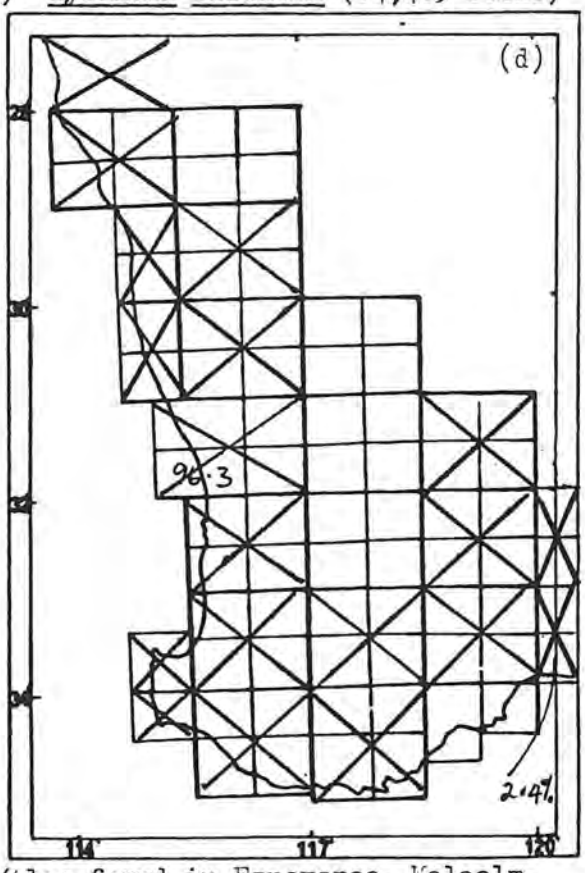
Lachnostachys eriobotrya (168,016 stems)

Fig. IV 10

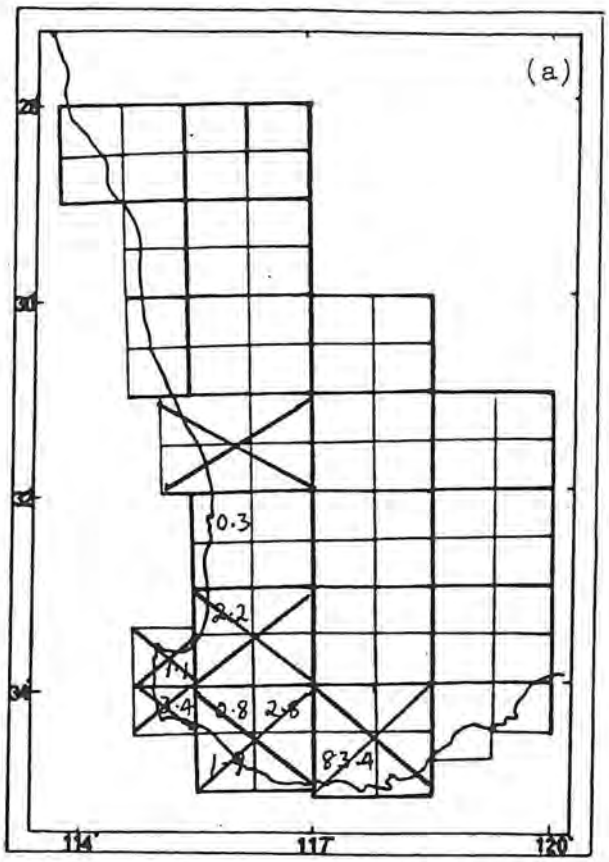
Leucopogon verticillatus (86,742 stems)



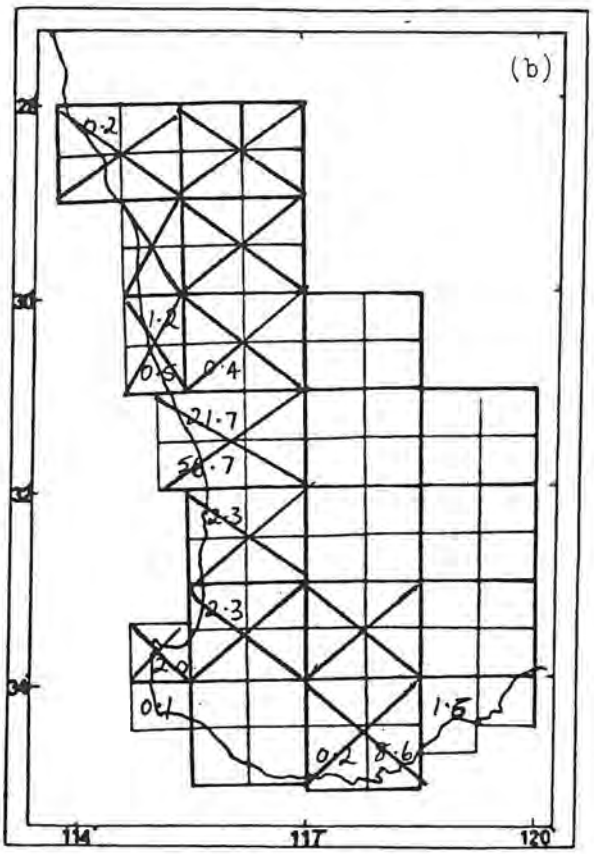
Lysinema ciliatum (64,469 stems)



(Also found in Esperance, Malcolm, Culver and Madura grid squares.)



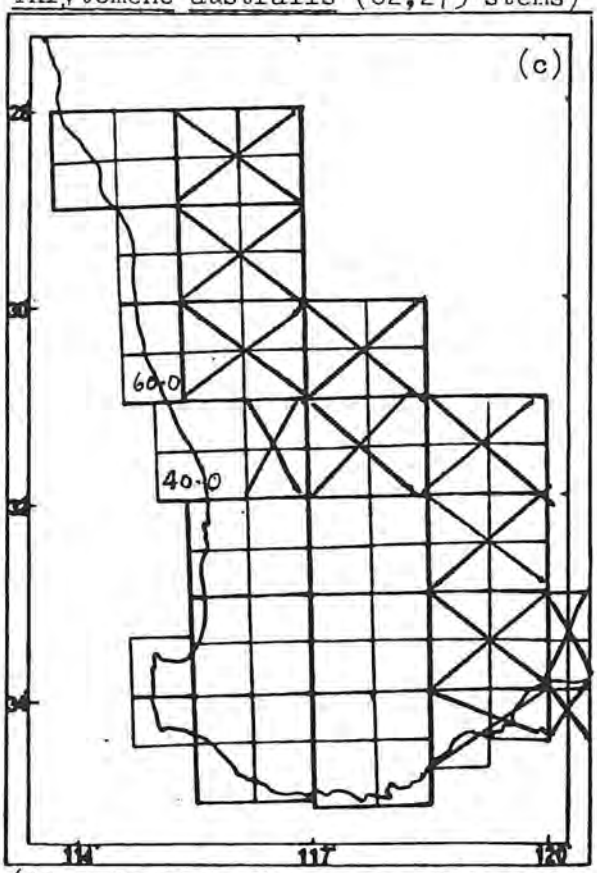
Podocarpus drouyniana (781,222 stems)



Stirlingia latifolia (1,425,184 stems)

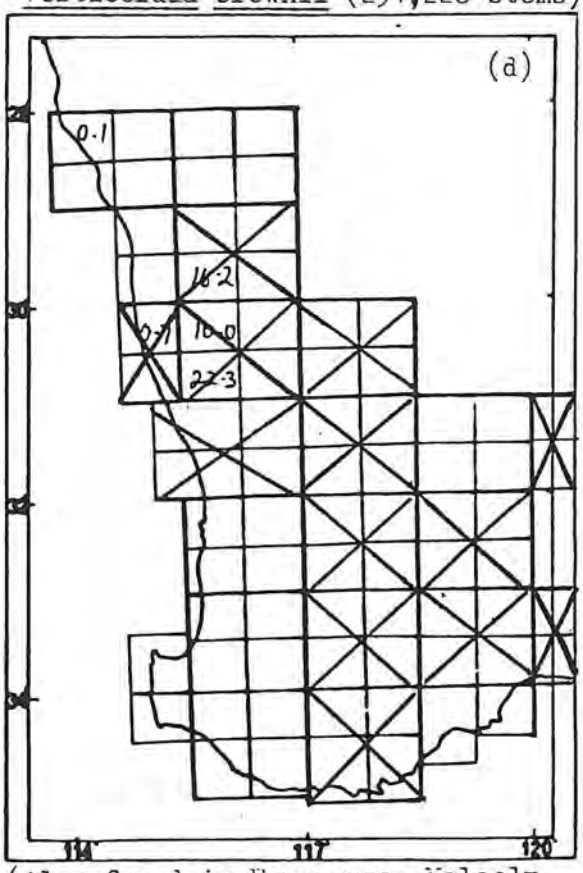
Fig. IV 11

Thrytomene australis (62,275 stems)

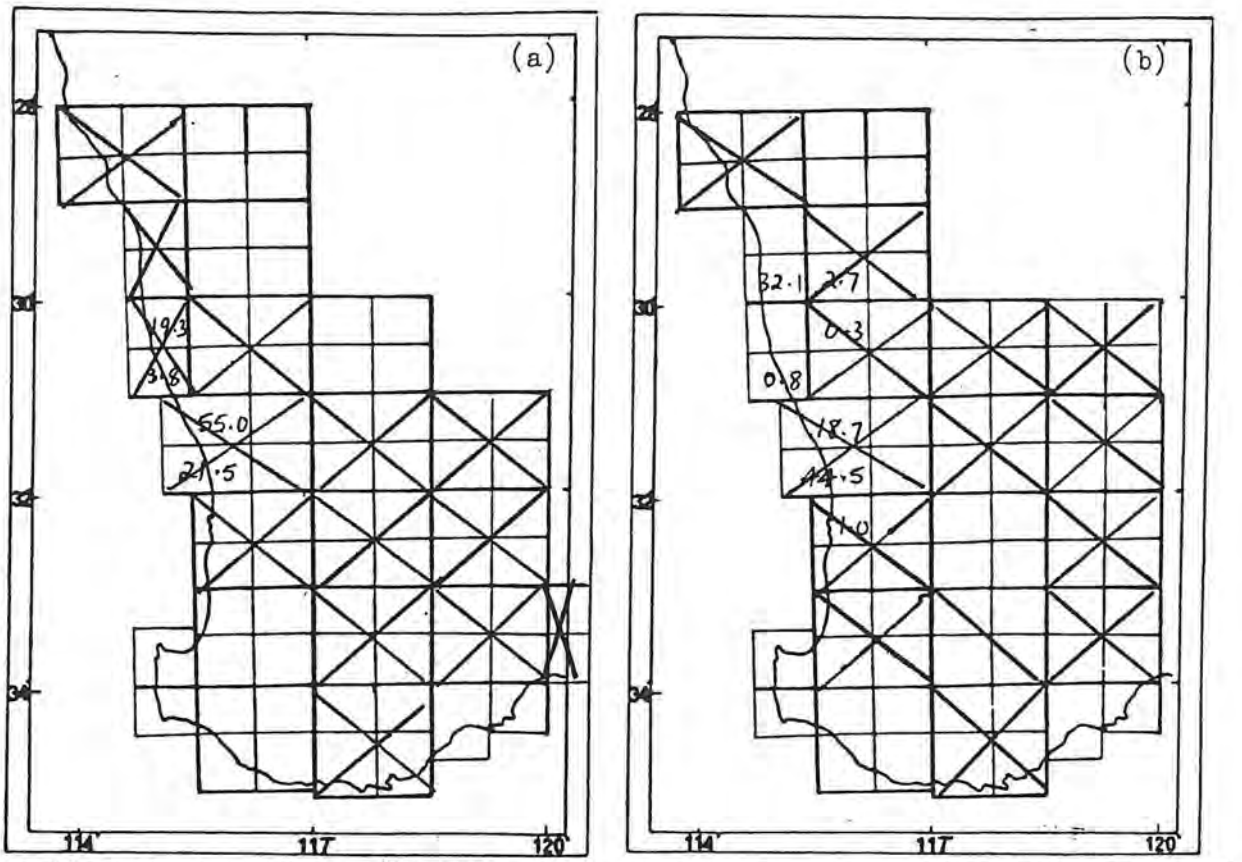


(Also found in Esperance, Kalgoorlie and Meekatharra grid squares.)

Verticordia brownii (291,228 stems)



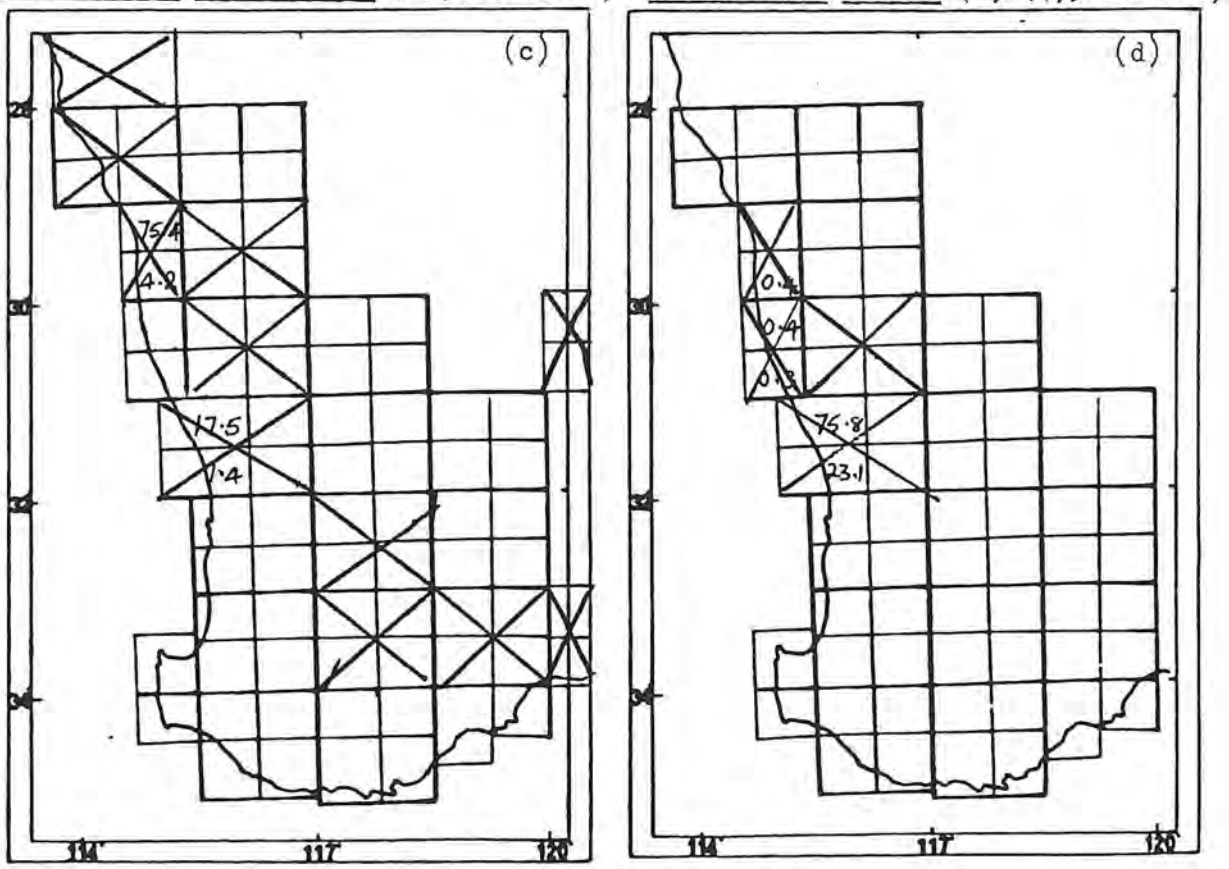
(Also found in Esperance, Malcolm and Culver grid squares.)



Verticordia densiflora (60,132 stems) Verticordia drummondii (210,637 stems)

Fig. IV 12

Verticordia grandiflora (89,424 stems) Verticordia nitens (1,044,566 stems)



APPENDIX V

LOCATION MAPS FOR STANDS OF INDIVIDUAL SPECIES EXAMINED. AREAS SHADED ONLY INDICATE POPULATIONS OR AREAS OBSERVED AND NOT TOTAL DISTRIBUTION FOR A SPECIES WITHIN THE AREA.

APPENDIX VI

LIST OF SPECIES MENTIONED IN QUESTION 5 OF THE PICKERS QUESTIONNAIRE AND THEIR SCORES

a = stems picked in the same 'patch' each year
b = stems picked in the same general area but a different 'patch'
c = stems picked in a different area.

Species	Scores
Adenanthos obovatus	b b/c c
Agonis parviceps	a a b b/c c
Andersonia spp.	c
Anigozanthos rufus	a a c
Banksia attenuata	c
B. baxteri	a a a
B. coccinea	a a a a
B. hookeriana	a a
B. occidentalis	a/b/c
B. speciosa	a b b/c
Banksia spp.	a a a b
Beaufortia decussata	c
B. sparsa	a/b a/c b b
Boronia heterophylla	a a
B. megastigma	a a a
Callistemon speciosus	c
Cephalotus follicularis	a
Conospermum crassinervium	b
Conospermum spp.	c
Crowea sp.	b
Daviesia cordata	a b

Species	Scores
Dryandra formosa	a a a/b
D. quercifolia	a a a
Eucalyptus tetragona	b b/c
Hakea cucculata	b
Helichrysum cordatum	a
Hybanthus floribundus	a a
Leptocarpus scariosus	a b b
Leucopogon verticilllatus	c
Lysinema ciliatum	c c
Podocarpus drouyniana	b b b b
Stirlingia latifolia	b c c c
Verticordia nitens	b
Verticordia spp.	b b c

(Some pickers made mention of the effect of fires, clearing and the season on whether they picked species in the same areas each year.)

APPENDIX VII

UNLISTED SPECIES WHICH MAY WARRANT FURTHER INVESTIGATION

A small number of species not included in the initial list to be examined were found to be of some importance. Their importance was deduced from picker or wholesaler comments.

ADENANTHOS CUNEATA

This is a heavily picked species not listed in Burgman and Hopper (1982). It appears that it was confused with A. obovatus as 'Native temp.'. On enquiry it was found that this common name referred only to A. cuneata and that it is picked in much the same manner as A. obovatus (Basket flower) and in the same area. Large numbers of bunches were seen in wholesalers sheds and picking areas were observed. (See Fig. 17.)

The non-flowering stems are glycerine treated and/or dyed and are used as foliage in dried arrangements.

BORONIA PURDIEANA (Yellow boronia)

Although this is a widespread species it is thought that the population in the Wanneroo-Muchea area is a separate sub-species.

Flowering stems are taken and are sold fresh locally and interstate. No populations were seen or pickers contacted but the species was mentioned by four wholesalers. Seed is also collected in some quantity and many stems must be stripped to acquire sufficient amounts.

One wholesaler stated that supply was limited and harder to get than previously. It was also stated that the plant was killed by a hot fire. A second source claimed that B. purdieana was very heavily picked at Wanneroo and that some plants were pulled out by the roots.

DAVIESIA CORDATA (Bookleaf)

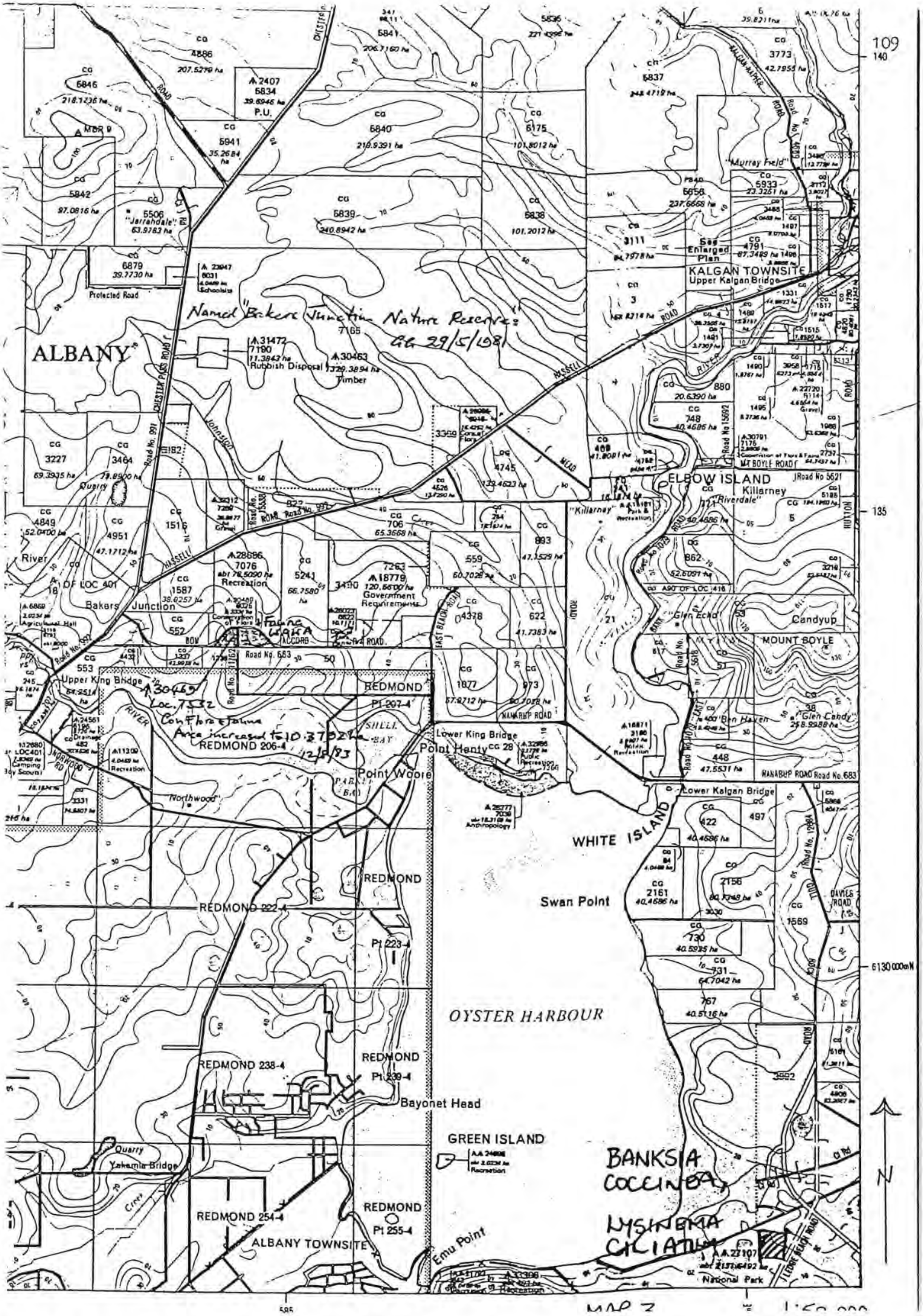
This species appears to be picked in larger quantities than previously. Only 13 bunches were reported picked in the 1980/81 survey but the plant was seen in abundance in all wholesalers sheds and with many florists and suppliers. The stems are taken with seeds (the 'book') or without and are dried and coloured.

HAKEA PLATYSPERMA (Woody peach)

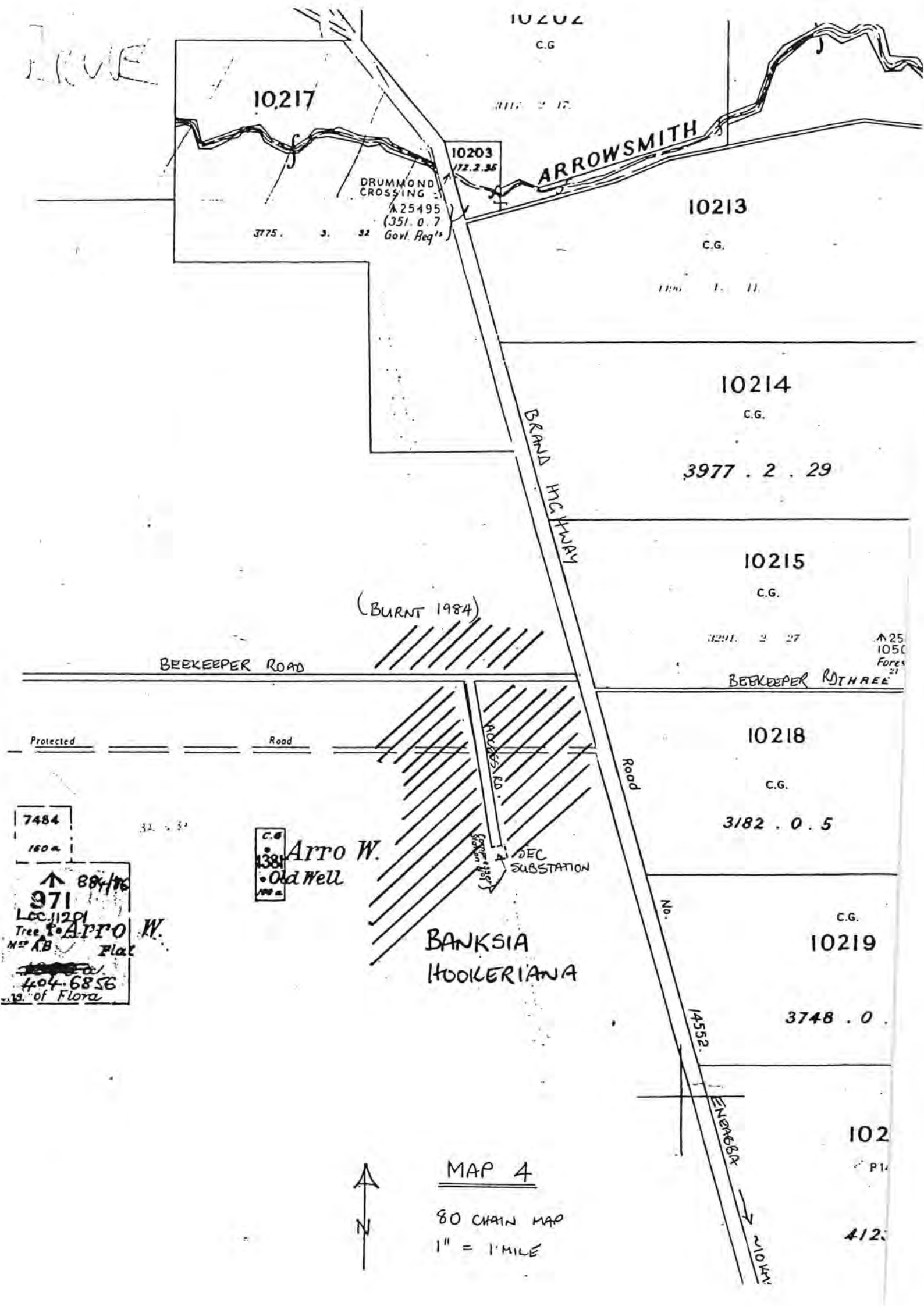
The whole base or large branches of this plant are picked because it is the large, round, old nuts attached to the stem which are required. Nuts are not necessarily taken off individually - often the whole stem is taken with many nuts attached. Two pickers reported that H. platysperma was hard to find and two wholesalers also stated that large stems with nuts were at a premium.

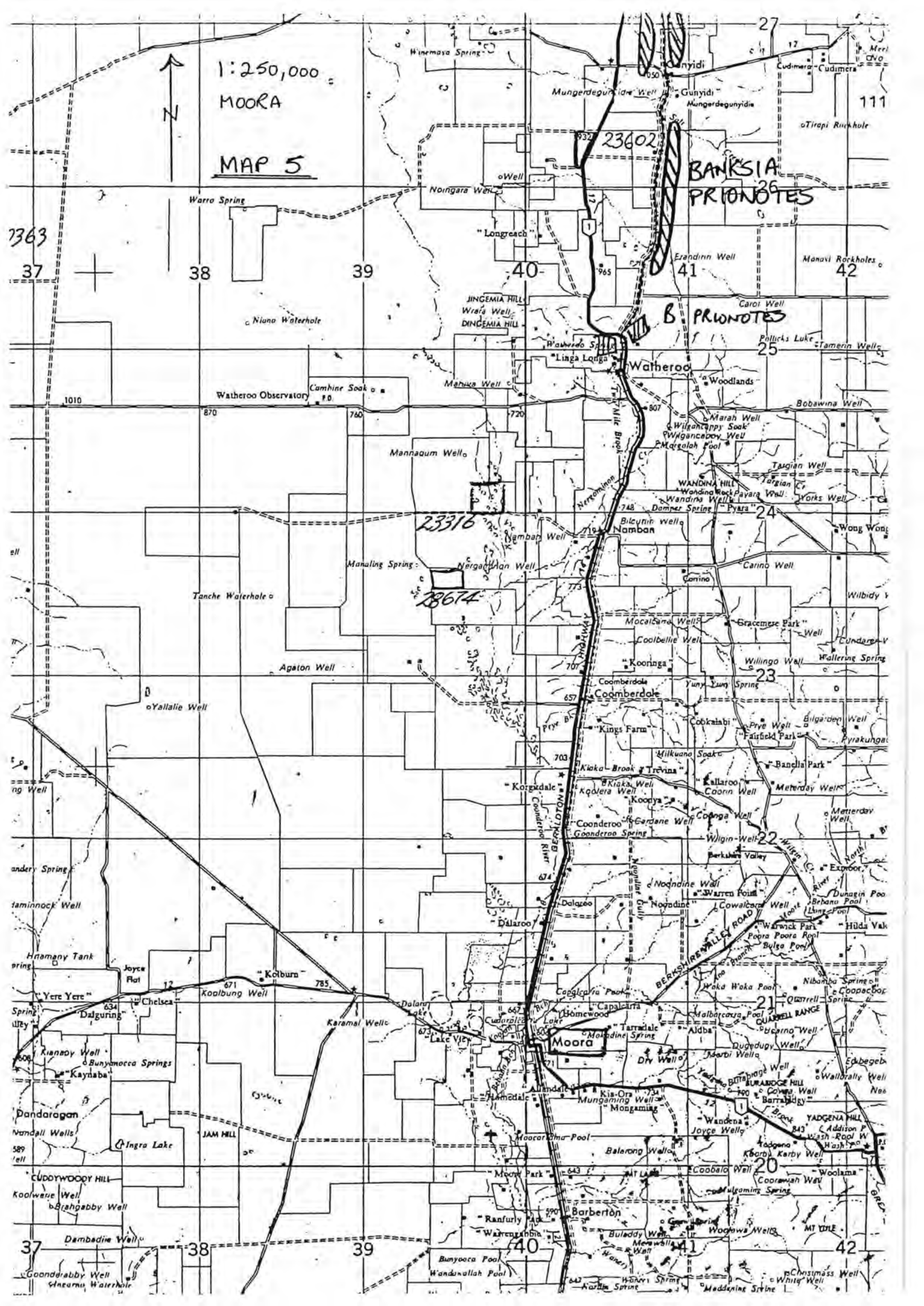
Concern was expressed by two farmers/pickers in the Coorow and Moora areas for the continued safety of the species.

Fig. 17 - Adenanthos cuneata. Extensive populations of this species were observed in Forests Department land at Denbarker.


ALBANY
Named "Bakers Junction Nature Reserve" GG 29/5/1981
A 31472
7190
11.3843 ha
Rubbish Disposal
A 30463
329.3894 ha
Timber
A 30469
Loc. 7532
Con Flora & Fauna
Area increased to 10.3702 ha
12/8/83
Bakers Junction
Upper King Bridge
REDMOND 206-4
REDMOND
Pt 207-4
Lower King Bridge
Point Henty
Point Moore
KALGAN TOWNSITE
Upper Kalgan Bridge
ELBOW ISLAND
Killarney
Candyup
MOUNT BOYLE
Lower Kalgan Bridge
WHITE ISLAND
Swan Point
OYSTER HARBOUR
REDMOND 222-4
Pt 223-4
REDMOND 238-4
Pt 239-4
Bayonet Head
GREEN ISLAND
Quarry
Yakamia Bridge
REDMOND 254-4
Pt 255-4
ALBANY TOWNSITE
Emu Point
BANKSIA COCCINEA
LYSINEMA CILIATUM
A 27107
National Park
6130 000mN
N

MAP 3 1:50 000


10202
C.G
10217
10203
12.2.36
DRUMMOND CROSSING
A25495
(351. 0. 7
3775. 3. 32 Govt. Req'ts)
ARROWSMITH
10213
C.G.
10214
C.G.
3977 . 2 . 29
BRAND HWY
10215
C.G.
(BURNT 1984)
BEEKEEPER ROAD
BEEKEEPER RD THREE
Protected
Road
10218
C.G.
3182 . 0 . 5
ACCESS RD.
DEC SUBSTATION
7484
160a
971
LCC 11201
Tree
Arro W.
Flat
404.6856
C.G.
1381
Old Well
Arro W.
BANKSIA HOOKERIANA
No.
C.G.
10219
3748 . 0 .
14552.
ENEABBA
MAP 4
80 CHAIN MAP
1" = 1 MILE
N


1:250,000
MOORA
N
MAP 5
23602
BANKSIA PRIONOTES
B PRIONOTES
23316
28674
7363
Watheroo
Watheroo Observatory
Namban
Coomberdale
Moora
Dandaragan
Barberton
Gunyidi
Cudimera
Longreach
Linga Longa
Woodlands
Camhine Soak
Mannaqum Well
Manaling Spring
Tanche Waterhole
Agaton Well
Yallalie Well
Niuna Waterhole
Warro Spring
Noingara Well
Erandirin Well
Manavi Rockholes
Carol Well
Pollicks Lake
Tamerin Well
Bobawina Well
Marah Well
Wandina Hill
Damper Spring
Bilcunin Well
Namban Well
Carino Well
Corrino
Gracemere Park
Mocalcana Well
Coolbellie Well
Kooringa
Willingo Well
Yuny Yuny Spring
Kings Farm
Cookalabi
Fairfield Park
Milkuano Soak
Trevina
Kiaka Brook
Korgadale
Kallaroo
Coorin Well
Banella Park
Meterday Well
Coonderoo
Coonderoo Spring
Cardane Well
Coonga Well
Wilgin Well
Berkshire Valley
Noondine Well
Warren Point
Noondine
Cowalcora Well
Dalaroo
Warwick Park
Poora Poora Pool
Bulga Pool
BERKSHIRE VALLEY ROAD
Woka Woka Pool
Nibamba Spring
Coopacooo
Quarrell Spring
QUARRELL RANGE
Capalcarra
Homewood
Tarradale
Aldba
Mokadine Spring
Dry Well
Koolbung Well
Kolburn
Joyce Flat
Chelsea
Yere Yere
Dalguring
Karamal Well
Lake View
Kianaby Well
Bunyanocca Springs
Kaynaba
Allandale
Kia-Ora
Mungaming Well
Mongaming
Joyce Well
BURABIDGE HILL
Barrabidgy
YADGENA HILL
Wandena
Moora Park
Mooramna Pool
Balarong Well
Coobalo Well
Woolama
Coorowan Well
Ranfurly
Warrengabia
Buladdy Well
Merewalli Well
Wooyowa Well
MT YULE
Ingra Lake
JAM HILL
Nundall Wells
CUDDYWOODY HILL
Koolwerie Well
Brahgabby Well
Dambadine Well
Goonderabby Well
Hnearno Waterhole
Bunyooca Pool
Wandanallah Pool
Christmass Well
White Well
Meddening Spring
Kardin Spring
GREAT NORTHERN HIGHWAY
Two Mile Brook
Moore River
37
38
39
40
41
42
27
26
25
24
23
22
21
20
111

AMARILLUP

BLUE LAKE ROAD

BLUE LAKE ROAD

DENBARKER

YMOUR ROAD

SPRINGS ROAD

Sheepwash

Native Flora

2163 2185 2186 2187 2188 2190 139 52 322 88 41 72 Creek 2293 2286 498 30456 2294

BEAUFORTIA SPARSA

CALLISTEMON SPECIOSUS
B. SPARSA

DENBARKER

AGONIS PARVICEPS
A. JUNIPERINA
BEAUFORTIA SPARSA.

DENMARK

Boundary

Denmark River

STAN

TRAPPER CAVE

2295

PODOCARPUS DROUYNIANA
ADENANTHOS OBOVATUS

MITCHELL

MITCHELL RIVER BRIDGE

RIVER

SHEEPWASH

WIDESPREAD

PODOCARPUS DROUYNIANA
ADENANTHOS OBOVATUS
A. CUNEATUS.
BEAUFORTIA DECUSSATA

MT. LINDESAY

Catchment

Boundary

NUTCRACKER ROAD

P.O.

1461 2011 T. Hammersley 1439 Tidmore Pty. Ltd 1441 1438 R. Fitzgerald R. Williams 1457 M. Boccuzzi 1456 R. & G. Boccuzzi 1442 MT. LINDESAY

McNESS RD

WILLIAMS RD

MAP 1 DENMARK

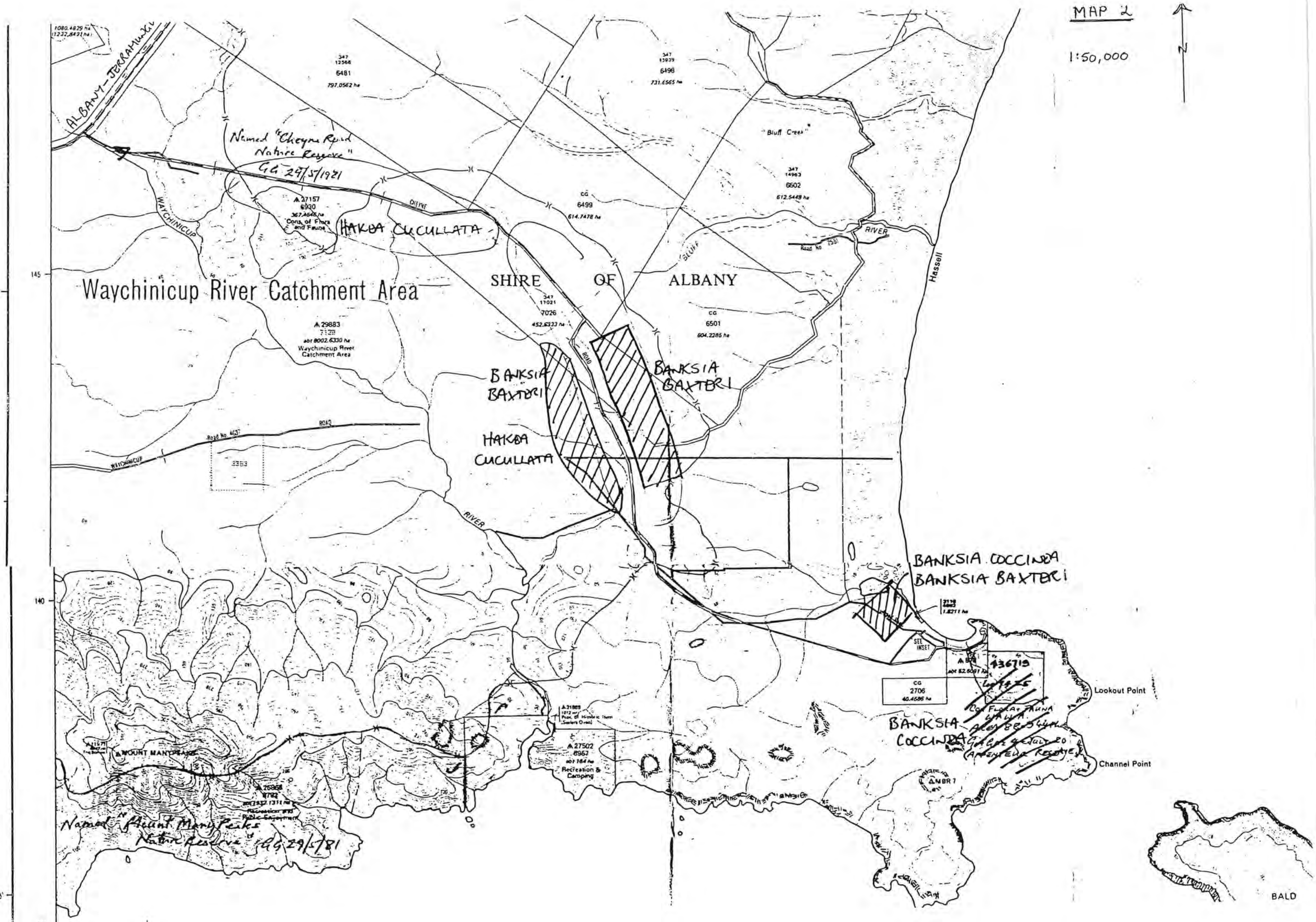
FORESTS DEPARTMENT DENBARKER

MAP 1

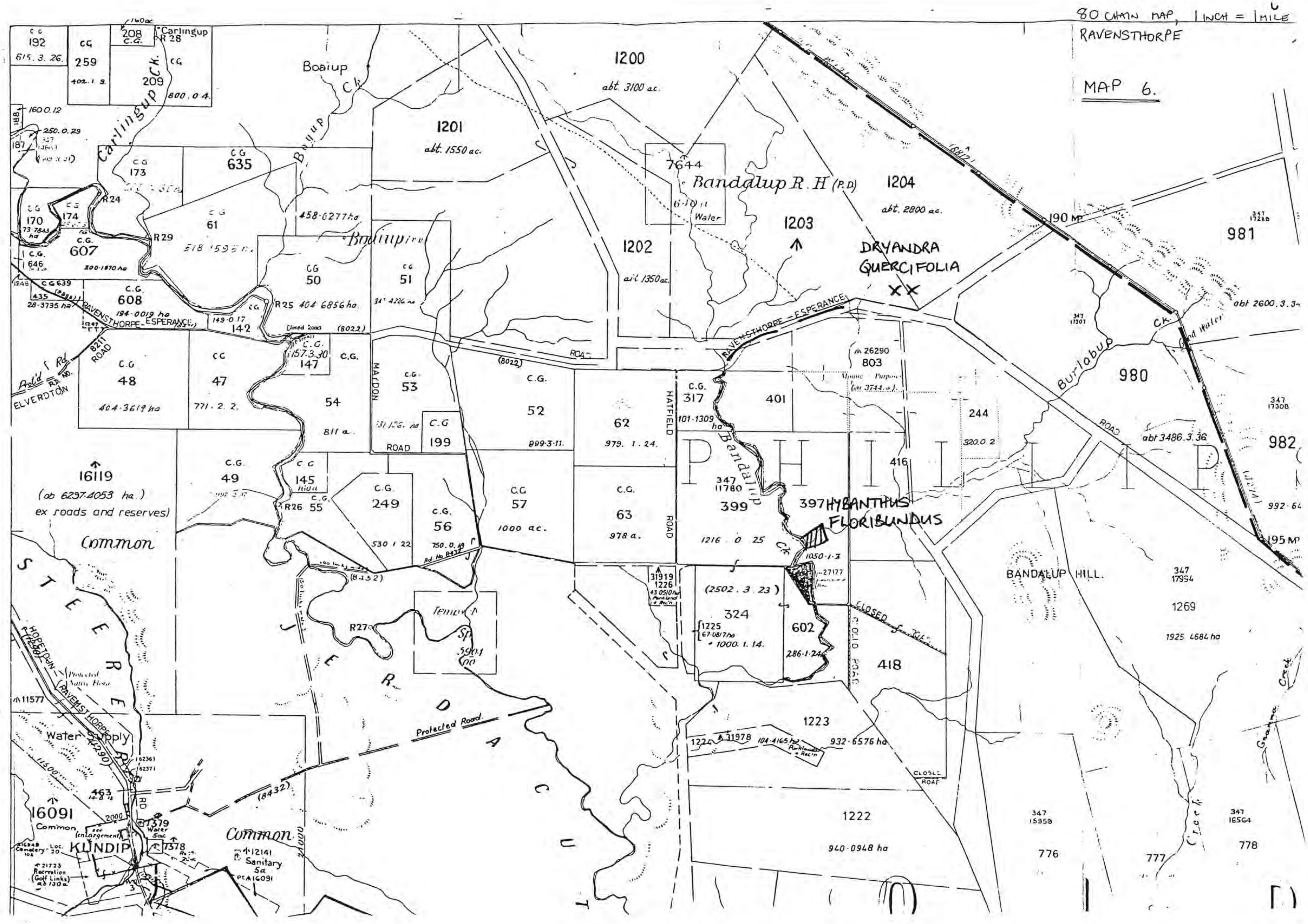
MAP 2

MAP 3

MT BARKER. 1:250,000



MAP 2
1:50,000
N
Waychinicup River Catchment Area
SHIRE OF ALBANY
Named "Cheyne Road Nature Reserve" GG 29/5/1981
HAKEA CUCULLATA
BANKSIA BAXTERI
BANKSIA BAXTERI
HAKEA CUCULLATA
BANKSIA COCCINEA
BANKSIA BAXTERI
BANKSIA COCCINEA
Named "Mount Manypeaks Nature Reserve" GG 29/5/81
6481
797.0562 ha
6498
731.6565 ha
"Bluff Creek"
6502
612.5448 ha
CG
6499
614.7478 ha
A 27157
6930
Cons. of Flora and Fauna
7026
452.6333 ha
CG
6501
604.2285 ha
A 29883
abt 8002.6330 ha
Waychinicup River Catchment Area
WAYCHINICUP
RIVER
ROAD
Road No. 4637
3363
Hassell
RIVER
BLUFF
SEE INSET
CG
2706
40.4686 ha
A 31869
A 27502
6967
Recreation & Camping
MOUNT MANYPEAKS
Lookout Point
Channel Point
BALD
145
140



80 CHAIN MAP, 1 INCH = 1 MILE
RAVENSTHORPE
MAP 6.
DRYANDRA QUERCIFOLIA
HYBANTHUS FLORIBUNDUS
Bandalup R.H (P.D)
BANDALUP HILL.
RAVENSTHORPE - ESPERANCE
Boaiup Ck
Carlingup Ck
Burlabup Ck
HATFIELD ROAD
MALDON ROAD
Protected Road.
Water Supply
KUNDIP
Common
Sanitary
PHILLIPS
STEERE
JERDACUTTUP

404 7767 ha

CG
773
16 1674 ac

Woodada Well

Natural Gas Pipeline

P1409
10220
1668.7718 ha

MAP 7

80 CHAIN MAP
1 INCH = 1 MILE

N

BROAD

P1414
10230
1316.9255 ha
EA 423114

P1413
10221
1307.8226 ha

Road No. 301

8181
810.9723 ha

CG
10971
192.1372 ha

Creek

P1396
10232
1131.3012 ha

Eneabba

EA 423114

ENEABBA
See Enlarged Plan

EA 219

P1410
10233
1320.2060 ha

A 29073
10985
abt. 4886 ha
Cons. of Flora and Fauna

CARNAMAH

B. Hook

BEEKEEPER RESERVE

LAKE LOGUE

CONOSPERMUM TRIPLINERVIUM
C. INCURVUM

A 29073
10984
291.8769 ha

LAKE ERINDOON

B. HOOKERIANA

BANKSIA HOOKERIANA

VERTICORDIA GRANDIS

347
14618
10234
1815.7587 ha

EA 202

10235

SHIRE

HIGHWAY

MAP 8

1:50,000

VERTICORDIA BROWNII

P1614
10250
1402.4002 ha

Road No 10433

P1373
10259
1609.5233 ha

175m ▲ Macs Hill LSR 7

P1374
10252
1373.2921 ha

P1557
10258
1812.1950 ha

CG
10987
238m²

P1486
10254
1750.9255

P1389
10256
972.4368 ha

P1582
10518
818.1960 ha

P1483
10257
918.7123 ha

ROAD

Bindoon Creek

3116
3653
abt. 1987.0065 ha
inc Ea

347
17067
10839
1729.7731 ha

BRAND HIGHWAY

Pipeline Easement A627771

347
17068
10838
1691.5455 ha
inc Ea

WARRADARGE HILL △ 281m

347
17129
10840
1701.6197 ha

10666
56.4966 ha

CG
10667
60.3538 ha

COOROW GREEN HEAD ROAD

347
14944
10614
1670.3906 ha

CG
10641
1745.0399 ha

347
16734
10825
1859.3408 ha

SHIRE

347
16724
10824
1818.9937 ha

347
16705
10826

MOUNT PERON △ LSR6 287m

GAIRDNER

firebreak

al Park