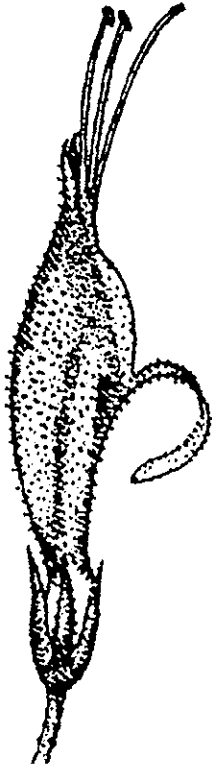


020358

# Declared Rare Flora in the Katanning District

by Mal Graham and Murray Mitchell

---



---

2001

---

**Wildlife Management Program No 25**



DEPARTMENT OF  
**Conservation**  
AND LAND MANAGEMENT  
*Conserving the nature of WA*

# DECLARED RARE FLORA IN THE KATANNING DISTRICT

by

**Mal Graham<sup>1</sup> and Murray Mitchell<sup>2</sup>**

<sup>1</sup>Department of Conservation and Land Management  
Katanning District Headquarters  
56 Clive Street Katanning WA 6317

<sup>2</sup>Department of Conservation and Land Management  
South Western Highway  
Kirup WA 6261

2001

Department of Conservation and Land Management  
Locked Bag 104 Bentley Delivery Centre WA 6983

ISSN 0816-9713

Cover illustration: *Eremophila veneta*  
by  
Bob Chinnock

The Department of Conservation and Land Management's  
Wildlife Management Programs for Declared Rare Flora  
are edited by  
the Western Australian Threatened Species & Communities Unit  
PO Box 51 Wanneroo Western Australia 6946  
Telephone: (08) 9405 5128 Fax (08) 9306 1066

Maps: CALM Information Management Branch  
Illustrations: Sue Patrick, Barbara Rye, Margaret Pieroni,  
Eleanor Bennett, Kingsley Dixon, Bob Chinnock, Tony Orchard

Final preparation by: Jill Pryde

2001

## FOREWORD

Western Australian Wildlife Management Programs are a series of publications produced by the Department of Conservation and Land Management (CALM). The programs are prepared in addition to Regional Management Plans to provide detailed information and guidance for the management and protection of certain exploited or threatened species (eg Kangaroos, Noisy Scrub-bird and Rose Mallee).

This Program provides a brief description and information on the distribution, habitat and conservation status of flora declared as rare under the Western Australian Wildlife Conservation Act (Threatened Flora) in CALM's Katanning District and makes recommendations for research and management actions necessary to ensure their continued survival. By ranking the Declared Rare Flora in priority order according to these requirements, Departmental resources can be allocated to those taxa most urgently in need of attention.

Priority flora that are under consideration for declaration as rare will be dealt with in another publication, but in less detail than the Declared Rare Flora.

This Program has been approved by the Executive Director, Department of Conservation and Land Management, the National Parks and Nature Conservation Authority and the Minister for the Environment.

Approved programs are subject to modification as dictated by new findings, changes in species' status and completion of recovery actions.

Information in this plan is accurate to December 1992.

## ACKNOWLEDGEMENTS

This project could not have been undertaken without the strong support and encouragement of Murray Carter and of the previous Katanning District Managers, Greg Leaman and Murray Carter.

As well as support, Ken Atkins, David Coates and David Mitchell provided technical advice and constructive comment and criticism during an extensive review period.

Specialist advice was sought and promptly given by the following: J. Alford (*Tetralthea*), A. Brown (Orchidaceae), R.J. Chinnock (*Eremophila*), R. Cowan (*Acacia*), S.D. Hopper (*Conostylis*) and B.R. Maslin (*Acacia*). K. Dixon (Botanic Gardens and Parks Authority) provided advice on a number of taxa.

Neville Merchant provided advice on the post-European botanical history of the District, Bert Main enthusiastically promoted the concept of looking at the pre-history in the context of the current flora and discussion with Noel Nannup resulted in consideration of the influence of Aboriginal Australians on the flora.

CALM staff who provided particular assistance were: Ray Cranfield and Beng Siew Mahon (WA Herbarium), Mike O'Donoghue and John Riley (Wildlife Branch) and Carol Messenger (Corporate Information). Melissa Ford (Katanning) undertook all of the word processing using a format provided by Barb Kennington (Narrogin). Andrew Burbidge and Andrew Brown (WA Threatened Species and Communities Unit) reviewed and edited the final draft.

The authors gratefully acknowledge the assistance of all of the above people and last, but by no means least, the support of all of the staff of the Katanning District.

## ILLUSTRATIONS

Line drawings included in this program are reproduced with the kind permission of Sue Patrick, Barbara Rye, Margaret Pieroni, Eleanor Bennett, Kingsley Dixon, Bob Chinnock, Tony Orchard, the Board of the Adelaide Botanic Gardens, and Environment Australia.

## ABBREVIATIONS USED

### DEPARTMENTS AND INSTRUMENTALITIES

AWA	-	Agriculture WA
BFB	-	Bush Fires Board
CALM	-	Department of Conservation and Land Management
DOLA	-	Department of Land Administration
MRD	-	Main Roads Department (Main Roads West Australia)
RAFCOR	-	Rural Adjustment and Finance Corporation of Western Australia
SECWA	-	State Energy Commission of Western Australia (Western Power)
WAWA	-	Water Authority of Western Australia (Water Corporation)

### LOCAL AUTHORITIES

AW	-	West Arthur
Bh	-	Broomehill
Cb	-	Cranbrook
Du	-	Dumbleyung
Gn	-	Gnowangerup
Ka	-	Katanning
Ke	-	Kent
Ko	-	Kojonup
LG	-	Lake Grace
Ta	-	Tambellup
Wa	-	Wagin
Wo	-	Woodanilling

### ESTATE

NR	-	Nature Reserve
OCL	-	Other Crown Land
TR	-	Timber Reserve
VCL	-	Vacant Crown Land

### MISCELLANEOUS

DRF	-	Declared Rare Flora
-----	---	---------------------

## CONTENTS

	Page
FOREWORD.....	iii
ACKNOWLEDGEMENTS .....	iv
ILLUSTRATIONS.....	iv
ABBREVIATIONS.....	v
CONTENTS .....	vi
PART ONE: INTRODUCTION .....	1
1. The need for management.....	1
2. Objective of the program .....	2
3. Rare flora legislation and guidelines for gazettal.....	2
4. Responsibilities within the Department.....	3
5. The Katanning District.....	4
6. Botanical History of the Katanning District.....	6
6.1 Pre-History - the Gondwana link.....	6
6.2 The coming of Humans - Aboriginal Australians.....	6
6.3 Early Europeans 1829 – 1960.....	7
6.4 Contemporary history 1961 – 1992 .....	7
PART TWO: DECLARED RARE FLORA IN THE KATANNING DISTRICT .....	9
<i>Acacia depressa</i> .....	11
<i>Acacia lanuginophylla</i> ms .....	14
<i>Acacia leptalea</i> ms .....	17
<i>Adenanthos pungens</i> subsp. <i>effusa</i> .....	20
<i>Adenanthos pungens</i> subsp. <i>pungens</i> .....	23
<i>Adenanthos velutinus</i> .....	26
<i>Allocasuarina tortiramula</i> .....	29
<i>Banksia oligantha</i> .....	32
<i>Bentleya spinescens</i> .....	35
<i>Caladenia dorrienii</i> .....	38
<i>Caladenia hoffmanii</i> ms .....	41
<i>Caladenia integra</i> .....	44
<i>Calectasia arnoldii</i> ms .....	48
<i>Conostylis drummondii</i> .....	51
<i>Conostylis seorsiflora</i> subsp. <i>trichophylla</i> .....	55
<i>Conostylis setigera</i> subsp. <i>dasys</i> .....	58
<i>Drakaea</i> subsp. <i>isolata</i> ms .....	61
<i>Eremophila inflata</i> .....	64
<i>Eremophila subteretifolia</i> ms .....	67
<i>Eremophila veneta</i> ms .....	70
<i>Eremophila verticillata</i> .....	73
<i>Eucalyptus olivacea</i> ms .....	76

<i>Grevillea cirsiifolia</i> .....	79
<i>Grevillea flexuosa</i> .....	81
<i>Grevillea involucrata</i> .....	83
<i>Grevillea prostrata</i> .....	87
<i>Lechenaultia laricina</i> .....	92
<i>Lechenaultia pulvinaris</i> .....	94
<i>Myriophyllum petraeum</i> .....	98
<i>Nemcia lehmanii</i> .....	101
<i>Roycea pycnophylloides</i> .....	102
<i>Tetradlea fasciculata</i> .....	105
<i>Thelymitra psammophila</i> .....	106
<i>Thelymitra stellata</i> .....	109
<i>Tribonanthes purpurea</i> .....	112
<i>Verticordia fimbriolepis</i> subsp. <i>fimbriolepis</i> .....	115
<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>cylindracea</i> .....	118
<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>erecta</i> .....	121
PART THREE: OTHER SPECIES OF CONSERVATION IMPORTANCE IN THE KATANNING DISTRICT .....	124
PART FOUR: THE PLAN FOR MANAGEMENT .....	129
1. Determining Priorities.....	129
2. Management and Research Actions.....	136
2.1 Monitoring Quadrats .....	136
2.2 Research Requirements .....	136
2.3 Protection from Fire (Fire exclusion) .....	136
2.4 Liaison with Landowners and Managers.....	137
2.5 Germplasm Collection and <i>Ex situ</i> Storage.....	137
2.6 Location of Other Populations .....	138
2.7 Linear Marking .....	138
2.8 Small Population Size .....	139
2.9 Dieback Hygiene .....	139
2.10 Instrumentalities (Protection from accidental damage) .....	139
2.11 Weed Control .....	139
2.12 Fencing/Grazing Control .....	140
2.13 Recreational Damage .....	140
2.14 Fire Access Track Management or Construction .....	140
2.15 Salinity/Drainage .....	141
2.16 Land Acquisition .....	141
2.17 Mining .....	141
2.18 Re-establishment in the Wild .....	141
3. Term of the Management Program .....	141



REFERENCES ..... 142

GLOSSARY ..... 147

TABLES

1. Priority 1 Taxa, Known to Occur in the Katanning District as at December 1992..... 125

2. Priority 2 Taxa, Known to Occur in the Katanning District as at December 1992..... 126

3. Priority 3 Taxa, Known to Occur in the Katanning District as at December 1992..... 127

4. Priority 4 Taxa, Known to Occur in the Katanning District as at December 1992..... 127

5. Declared Rare Flora in the Katanning District as at 1992  
Conservation Status Updated to December 1999..... 128

6. Declared Rare Flora (Extant) in the Katanning District scored (1-3)  
according to the degree of threat or urgency for management and research action..... 130

7. Criteria used for ranking in Table 6... .. 132

8. Katanning District Declared Rare Flora (as at December 1992)  
ranked in priority order for protection and management action..... 135

FIGURES

1. Location of the Katanning District in relation to CALM's administrative Regions ..... 5

2. Distribution of Declared Rare Flora populations in the Katanning District ..... 10

## PART ONE: INTRODUCTION

### 1. THE NEED FOR MANAGEMENT

Western Australia has a unique flora, world renowned for its diversity and high level of endemism. WACENSUS, the database of plant names for the State, listed 12 442 current taxa (species, subspecies and varieties, including undescribed taxa) (July 1997) with the total likely to exceed 13 000 once botanists have completed surveying, searching and describing the flora. A significant proportion of the Western Australian total is concentrated in the south-west of the State, where there is also a large number of endemics due to a long history of isolation and climatic and geological stability (Hopper 1979). According to Briggs and Leigh (1996) the State has 45.9 percent of the Australian total of threatened, rare or poorly known plant taxa, with 79 percent of these restricted to the south-west. Nearly 2 000 Western Australian taxa are currently listed as threatened or have been placed on the Department of Conservation and Land Management's (CALM) Flora Priority List because they are rare or poorly known (K. Atkins, pers. comm.).

Although some plants are rare because of their requirement for a specific restricted habitat, the majority have become rare or threatened because of the activities of humans. Extensive land clearing and modification of the environment have resulted in the extinction of some species and threaten the survival of many others. Continued land clearing, plant diseases (particularly due to *Phytophthora* species), exotic weeds and pests, road works, urbanisation, grazing by domestic stock and increasing salinity continue to threaten the flora.

The State Conservation Strategy, *Wildlife Conservation Act 1950*, and *Conservation and Land Management Act 1984* provide the guidelines and legislative basis for the conservation of the State's indigenous plant and animal species. CALM is responsible for the administration of the Wildlife Conservation Act, and hence, is responsible for the protection and conservation of flora and fauna on all lands and waters throughout the State. Section 23F of the Act empowers the Minister to protect those plant taxa that are threatened by declaring them to be rare flora (ie, threatened taxa). Rare flora cannot be taken without the written consent of the Minister.

This Wildlife Management Program collates the available biological and management information on the Declared Rare Flora in CALM's Katanning District (as at 31 December 1992) and provides lists of other species within the District in need of special protection. In 1992, 306 plant taxa were listed as Declared Rare Flora. CALM's Policy Statement No. 9, *Conservation of Threatened Flora in the Wild* outlines the legislation and Departmental policy and guidelines for Declared Rare Flora conservation. Brown *et al.* (1998) provide illustrations of declared rare (threatened) flora as at 1998.

Despite considerable progress in recent years, there is still much to be learnt about the taxonomy, distribution, population biology and other factors influencing the survival of threatened species of flora. Such information is essential if appropriate management and protection strategies are to be implemented. In addition, successful conservation of those species declared to be rare can only be achieved through co-operation and assistance between CALM, private landowners, local Shires and other authorities, government agencies and research institutions.

Figure 1 shows the location of the Katanning District in relation to CALM's management regions.

## 2. OBJECTIVE OF THE PROGRAM

The objective of this program for the Katanning District is:

- To ensure and enhance, by appropriate management, the continued survival in the wild of populations of Declared Rare Flora.

It aims to achieve this by:

- providing a useful reference document to CALM staff and other land managers for the day to day management and protection of Declared Rare Flora populations;
- directing Departmental resources within the Region to those taxa most urgently in need of attention;
- assisting in the identification of Declared Rare Flora and their likely habitats;  
and
- fostering an appreciation and increased awareness of the importance of protecting and conserving Declared Rare Flora.

## 3. RARE FLORA LEGISLATION AND GUIDELINES FOR GAZETTAL

The *Wildlife Conservation Act 1950* protects all classes of indigenous flora throughout the State. Protected flora includes:

Spermatophyta	-	flowering plants, conifers and cycads
Pteridophyta	-	ferns and fern allies
Bryophyta	-	mosses and liverworts
Thallophyta	-	algae, fungi and lichens.

Section 23F of the Act provides special protection to those taxa (species, subspecies, varieties, hybrids) considered by the Minister to be:

- In danger of extinction - the taxon is in serious risk of disappearing from the wild state within one or two decades if present land use and other causal factors continue to operate;
- Rare - less than a few thousand adult plants of the taxon existing in the wild;
- Deemed to be threatened and in need of special protection - the taxon is not presently in danger of extinction but is at risk over a longer period through continued depletion, or occurs largely on sites likely to experience changes in land use which could threaten its survival in the wild;  
or
- Presumed Extinct - taxa which have not been collected, or otherwise verified over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.

In addition, hybrids or suspected hybrids which satisfy the above criteria also must be:

- a distinct entity, that is, the progeny are consistent with the agreed taxonomic limits for that taxon group;
- capable of being self perpetuating, that is, not reliant on the parental taxa for replacement;  
and
- the product of a natural event, that is, both parents are naturally occurring and cross fertilisation was by natural means.

Protection under Section 23F is achieved by the Minister declaring flora to be 'rare flora' by notice published in the Government Gazette. CALM's Policy Statement No. 9 discusses the legislation relating to Declared Rare Flora and outlines the criteria for gazettal.

Under the provisions of Section 23F, the 'taking', by any person, of Declared Rare Flora is prohibited on any category of land throughout the State without the written consent of the Minister. A person breaching the Act is liable to a penalty of up to \$10 000. The legislation refers only to wild populations and applies equally to government officers and private citizens on Crown and private lands.

To 'take' in relation to any flora includes 'to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means'. This includes not only direct destruction or injury by human hand or machine but also such activities as allowing grazing by stock, introducing pathogens, altering water tables so as to inundate or deprive the flora of adequate soil moisture, allowing air pollutants to harm foliage, and burning.

The schedule published in the *Government Gazette* is revised annually to accommodate additions and deletions to the list of Declared Rare Flora. To qualify for gazettal, plants must satisfy certain requirements as defined in Policy Statement No 9 namely:

- The taxon (species, subspecies, variety) must be well-defined, readily identified and represented by a voucher specimen in a State or National Herbarium. It need not necessarily be formally described under conventions in the International Code of Botanical Nomenclature, but such a description is preferred and should be undertaken as soon as possible after listing on the schedule;
- Have been searched for thoroughly in the wild by competent botanists during the past five years in the most likely habitats, according to guidelines approved by the Executive Director; and
- Searches have established that the plant in the wild is either rare; in danger of extinction; deemed to be threatened and in need of special protection; or presumed extinct (ie the taxon has not been collected from the wild, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently).

Plants may be deleted from the schedule of Declared Rare Flora Schedule where:

- recent botanical survey has shown that the taxon is not rare, in danger of extinction or otherwise in need of special protection;
- the taxon is shown to be a hybrid that does not comply with the inclusion criteria;
- or
- the taxon is no longer threatened because it has been adequately protected by reservation of land on where it occurs or because its population numbers have increased beyond the danger point.

#### **4. RESPONSIBILITIES WITHIN THE DEPARTMENT**

- Reviewing Departmental policy on Declared Rare Flora is the responsibility of the CALM Corporate Executive;
- Identification of Declared Rare Flora is the initial responsibility of Herbarium staff, but should, with appropriate training, become a Regional responsibility also;
- Locating Declared Rare Flora is the responsibility of CALM Science and Regional Services Division staff;
- Determination of land status and preparation of material for notification to landowners is the responsibility of Wildlife Branch;
- Hand-delivered notification to landowners of Declared Rare Flora populations is the responsibility of Regional staff and Wildlife Branch;
- Maintenance of Declared Rare Flora information and database, and dissemination of these data are the responsibility of Wildlife Branch;

- Advice on management prescriptions is the responsibility of Bioconservation Group (CALMScience), Regional Ecologists (Regional Services Division), Wildlife Branch and the Western Australian Threatened Species and Communities Unit (WATSCU) (Nature Conservation Division);
- Coordination of Recovery Plans and Interim Recovery Plans for threatened taxa is the responsibility of WATSCU;
- Management, protection and regular inspection of Declared Rare Flora populations is the responsibility of staff of the Katanning District;
- Enforcement matters relating to the provisions of the Wildlife Conservation Act are the responsibility of Wildlife Officers in the Wheatbelt Region;
- Implementation and revision of this management program is the responsibility of the Katanning District Threatened Flora Recovery Team.

## 5. THE KATANNING DISTRICT

The Katanning District occupies the southern one-third (approximately) of CALM's Wheatbelt Region (Figure 1) and includes all of the Shires of Broomehill, Dumbleyung, Katanning, Kent, Kojonup, Lake Grace, Tambellup, Wagin and Woodanilling and the central one-third (approximately) of the Shire of Cranbrook, the northern half (approximately) of the Shire of Gnowangerup and the eastern half (approximately) of the Shire of West Arthur. The population of the District is estimated as being 19 150 people (Western Australian Municipal Directory 1991-92), with the towns of Katanning, Gnowangerup, Kojonup, Lake Grace and Wagin being the main population centres.

The total area of the Katanning District is approximately 35 million hectares, within which CALM manages 188 nature reserves covering about 274 540 hectares, approximately 0.78% of land within the District. In addition CALM has management input relating to a further 23 reserves with a total area of 8 309 hectares, which are vested in various authorities and which include 'conservation' in their purpose. There are 20 unvested timber reserves in the District with a total area of 10 280 hectares. These reserves range in size from 2 hectares to 107 616 hectares, although over 86% are under 1 000 hectares (CALM, unpublished).

The District has seven staff, all of whom are based at the District Headquarters in Katanning. The Wheatbelt Region Management Plan (in preparation) will outline the management and conservation strategies for land and water in the District vested under the CALM Act, together with wildlife conservation responsibilities across all lands in accordance with the CALM and the Wildlife Conservation Acts.

The Katanning District lies within the South Western Botanical Province (Beard 1980a) and includes parts of the Avon, Dale, Menzies, Eyre and Roe Botanical Districts. Rainfall in the District decreases south-west to north-east and annual average rainfall ranges from 560 mm (Kojonup) and 635 mm (Cranbrook) to 223 mm (Varley).

An estimated 93% of the District is alienated land (Beard 1990), which has been largely cleared for farming. As a consequence the remnants are by and large land which was deemed to be unsuitable for agriculture and most of the original vegetation types of the District are poorly represented in the conservation reserve system. Jarrah, marri and wandoo (*Eucalyptus marginata*, *E. calophylla*, *E. wandoo*) woodlands dominate the western edge of the District to be replaced by woodland of other species (eg, *E. loxophleba*, *E. longicornis*, *E. occidentalis*, *E. salmonophloia*) east of the Albany Highway through to about Nyabing. East of an imaginary line passing through Nyabing and Kukerin, mallee-scrub associations predominate in a complex mosaic that includes several kwongan types. Extensive ephemeral salt lakes are common in this area and only remnants of the diverse woodlands, which originally surrounded many of the larger lake systems, now remain.

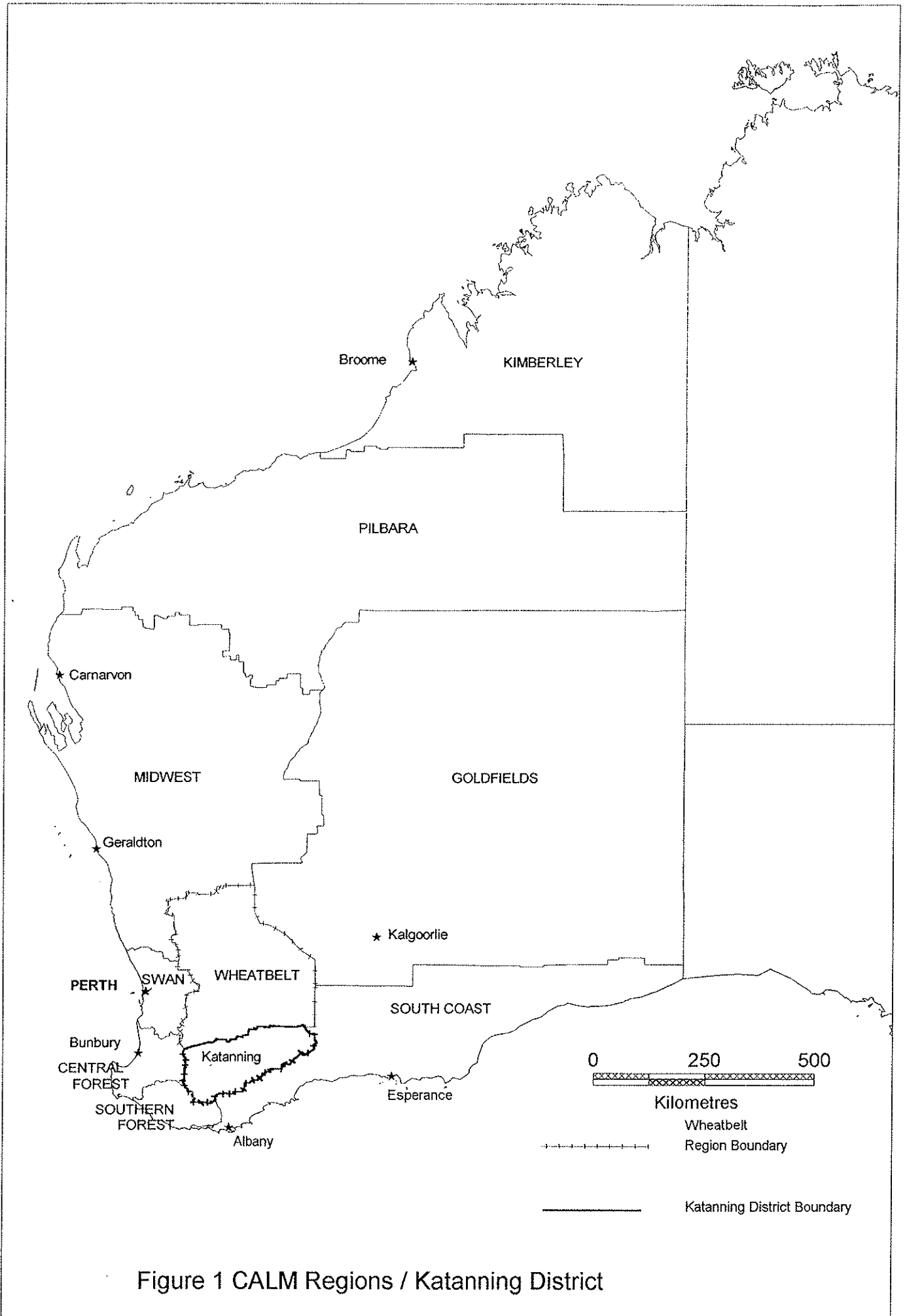


Figure 1 CALM Regions / Katanning District

## 6. BOTANICAL HISTORY OF THE KATANNING DISTRICT

### 6.1 Pre-History - the Gondwana link

Botanical history began with the emergence of life from the sea some 400 million years ago (White 1986). For most of the present land surfaces, this history commenced following a period of inundation which may have lasted for millions of years. There are few areas on earth for which the continuous botanical history can be dated as commencing with the advent of terrestrial life. The area of the south-west of Western Australia, referred to as the Great Plateau of Western Australia (Hopper 1979) and which includes all of CALM's Katanning District (Figure 1) is one such place. Palaeogeographical information indicates that the Katanning District has probably not been inundated by the sea since the pre-Cambrian era some 570 million years ago, and almost certainly not since Australia separated from Gondwana about 45 million years ago.

Isolation as an island continent and subsequent isolation from other parts of Australia by marine or climatic barriers have been primarily responsible for the high rate of endemism of the south-west flora (White 1990 and Hopper 1979).

During the Tertiary period from about 60 million to 20 million years ago the vegetation of the region was dominated by rainforest with a very low frequency of fire (Kemp 1981) although ancient Gondwanan plant groups with a high-tolerance to fire, eg, *Banksia*, were present (White 1986). The extensive formation of lateritic soils in the Great Basin from about 20 million years ago and their subsequent and continuing weathering gave rise to nutrient-deficient sands and gravels. This favoured a sclerophyllous vegetation (Hopper 1979) which was pre-adapted to progressive aridity as the continent moved northward.

With aridity came an increase in the frequency of naturally occurring fire from lightning strikes (Kemp 1981), and the natural selection of ancient Gondwanan plant families with fire-tolerance adaptations, eg, *Proteaceae*, *Myrtaceae*, *Epacridaceae*, became a feature of the vegetation (White 1986). The reasons for the high levels of local speciation are complex and critical information on particular evolutionary developments remains fragmentary (Hopper 1979).

### 6.2 The coming of Humans - Aboriginal Australians

The selection of fire-tolerance in the flora that evolved with the advent of sclerophyllous vegetation undoubtedly had a profound effect on the structure and content of vegetation types due to natural fire regimes (White 1990). Recent evolution of the vegetation has been further influenced by the arrival of Aboriginal people 40,000 (and possibly 60,000) years ago, as they used fire extensively to manage the land and for other purposes such as hunting (Hallam 1975).

The interaction between the Aboriginal people and the flora was not restricted to fire. Plants were used for food, the manufacture of weapons and other artefacts, as hunting aids, ie fish poisons, and for medicinal purposes. This knowledge of plants extended to the use of the flowering of certain species as indices of the availability of both plant and other natural resources both in the immediate area and at other locations. The knowledge of the flora and its distribution was not considered in botanical terms but as an integral part of totemic and tribal laws, which in turn led to management and the prevention of over-exploitation of a range of species (Isaacs 1987).

Although there is mention of the cultivation of some species of plants by Aboriginal people in the south-west there is no real evidence that this did occur (P. Bindon WA Museum, pers. comm.). The authors have observed strong circumstantial evidence that Aboriginal people did affect the distribution of at least some species especially in the occurrence of plant population outliers at confirmed or probable Aboriginal sites. Examples include the occurrence of *Eucalyptus buprestium* at Twonkup and *Cassia nemophila* at Lake Cairlocup.

### 6.3 Early Europeans 1829 - 1960

In 1829, the same year the Swan River Colony was founded, Lieutenant W. Preston and Ensign R. Dale became the first Europeans to pass through what is now the Katanning District, on a trip from Albany to Perth. An exploratory trip in the opposite direction in 1830-31 was led by Captain T. Bannister using a route which traversed the extreme north-west corner of the District. T. Turner and H.G. Smith pioneered the more direct route through Kojonup in 1834 and in the following year, 1835, Captain J. Stirling and Surveyor-General J.S. Roe passed through the middle of the District en-route to Albany (Beard 1980). With the exception of Roe, evidence of botanical collections by these early explorers is scarce.

The first attempt at settlement in the District at Kojonup in 1839 was abandoned due to stock losses. Plant collections in this area in 1839 by James Drummond and visiting German botanist Ludwig Priess led to their identification of poisonous plants in 1840. Re-settlement at Kojonup commenced soon after (Beard 1980).

In 1843 some botanical collections were made in the Dumbleyung area by explorers Landers and Lefroy on a trip during which they discovered Dumbleyung Lake, the largest naturally occurring, permanent body of water in inland Western Australia. James Drummond also visited this area, en-route to the eastern districts in 1846.

Although more or less the whole of the available land area of the Katanning District west of Newdegate was taken up as pastoral leases by 1870, settlement in earnest did not begin until 1907 (Beard 1976, 1980) and there are no further precise records of botanical collecting in this area for the rest of the 19th century.

In 1900 German botanists Ludwig Diels and Ernst Pritzel travelled the main York-Albany railway line and made collections, including some from short excursions away from the railway (Beard 1980).

Botanical knowledge gradually accumulated after the establishment of the post of Government Botanist and the appointment of Dr A. Morrison in 1903. He was succeeded in turn by Dr F. Stoward, Mr W.M. Carre and Mr C.A. Gardner (Beard 1980). During the period 1930-42 no detailed ecological studies were carried out (Grieve 1975), probably as a result of the Great Depression and World War II.

### 6.4 Contemporary history 1961 - 1992

The 1960s saw a considerable expansion in the botanical knowledge of the District with field surveys by J.S. Beard in 1964-66 and 1968. He worked in association with A.S. George in 1965 and with Miss M. Burrows in 1966 (Beard 1972, 1976). Further field work was undertaken by Beard in the Spring of 1977.

During the 1970s biological surveys of nature reserves and proposed nature reserves were undertaken by the Western Australian Museum and the former Department of Fisheries and Wildlife. Areas surveyed included Dragon Rocks (McKenzie *et al* 1973), the Shire of Kent (McKenzie 1973), Lake Grace and Lake Chinocup (McKenzie and Youngson 1975), Tarin Rock (Muir 1976), Dongolocking (Muir 1978) and Lake Magenta (Crook and Burbidge 1982).

The Katanning Nature Reserve Management Team was established in 1983. One of the first steps taken was to initiate a series of flora and vegetation surveys at selected nature reserves throughout the District using contract botanists. The most recent example is an intensive flora and vegetation survey of the Dragon Rocks Nature Reserve (Coates 1992). Copies of unpublished reports for all of these surveys are held at CALM libraries and at the Katanning District office.



Botanical knowledge of the District has also been aided by the work of visiting botanists and volunteers undertaking taxonomic and distribution studies, and the late Ken Newbey collected extensively in the area. Minor site surveys and opportunistic collections have also been made by CALM staff employed in the District.

Although knowledge of the botany of the District has increased dramatically in the period 1961-1992 there are many areas of bushland, particularly in eastern areas around Lake King, for which virtually nothing is known.

## PART TWO: DECLARED RARE FLORA IN THE KATANNING DISTRICT

Thirty-six taxa of extant Declared Rare Flora were known to occur within the boundaries of the Katanning District as at 31 December, 1992. In addition two taxa of presumed extinct Declared Rare Flora were known from early collections within the District. A brief description of the morphology, distribution, habitat and conservation status is provided for each of these taxa. Illustrations of some species are provided. The response of each taxon to fire, soil disturbance, weed invasion and grazing, its susceptibility to disease and the effects of salinity are noted, as are research requirements. Management and protection requirements and actions to be undertaken are given for each of the extant taxa. Illustrations and/or photographs of most of the Declared Rare species are included in a book on Western Australia's Endangered Flora (Hopper *et al.* 1990).

Descriptions of taxa were compiled by consulting references and following discussion with botanists. The distribution and habitat of each taxon was recorded from Departmental Rare Flora files and from collection records at the Western Australian Herbarium, with emphasis being placed on particular habitat characteristics of locations in the Katanning District. Information on the number of plants and their condition is given for each population and from this it appears that some populations have disappeared since the time of collection. In very few instances have populations been assumed to be extinct as the viability of seed and root material in the soil is generally unknown.

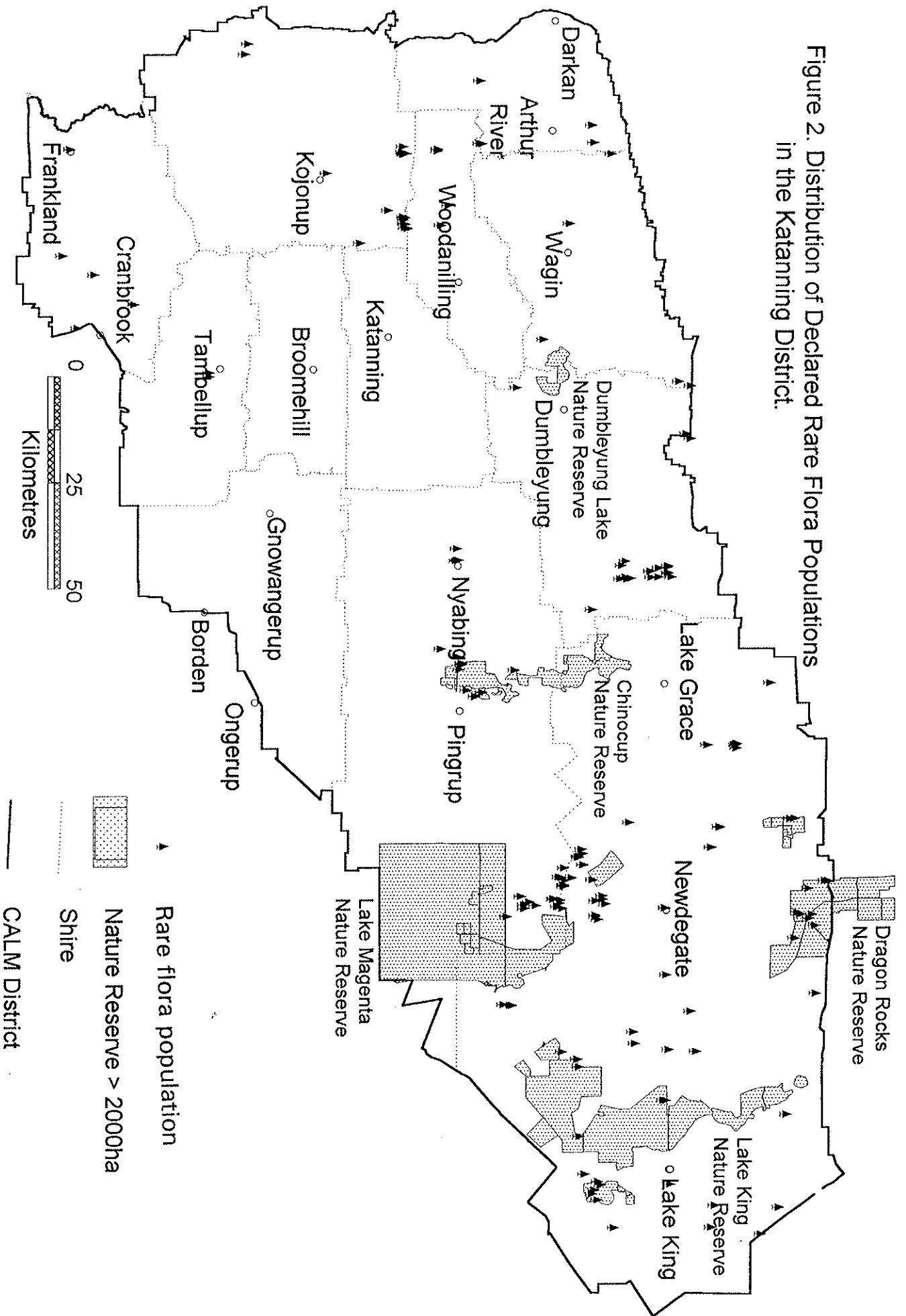
Conservation status is determined by declaration under the Wildlife Conservation Act with comment on occurrence of a taxon outside the boundaries of the Katanning District and/or in cultivation. A detailed table for each taxon lists its population numbers, date of most recent survey, occurrence in local government authorities, population(s) location and land status, and population size and condition. Precise locality details are contained in a computerised database and Departmental files.

Each taxon's response to fire, disturbance, grazing and the effects of weed invasion, disease and salinity is noted (where known) from observation in the field, information on Departmental files and from discussion with research personnel. Research requirements were determined from the taxon's conservation status and its perceived management needs.

Sixteen of the 38 taxa treated in this Program are endemic to the Katanning District. Four of these, *Adenanthos velutinus*, *Drakaea isolata* ms, *Eremophila verticillata* and *Verticordia staminosa* subsp. *cylindracea* var. *erecta* are recorded from a single locality. Nine taxa have not been recorded from land reserved for conservation purposes anywhere throughout their range.

Figure 2 maps the distribution of all Declared Rare Flora populations in the Katanning District which have been surveyed since 1982.

Figure 2. Distribution of Declared Rare Flora Populations in the Katanning District.



**ACACIA DEPRESSA** Maslin

Family: Mimosaceae (163)

Echidna Wattle

*Acacia depressa* is a cushion-like prostrate shrub, up to 5 cm tall and 50+ cm in diameter. Short, spiny branchlets bear stalked pinnate leaves with 3-4 pairs of leaflets. Flower heads are yellow, solitary, spherical, ca 04 cm in diameter, with 12-15 flowers and are borne on 1-2 cm long stalks.

**FLOWERING PERIOD**

December - January

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Restricted to lateritic hills in the Tarin Rock area, west of Lake Grace.

**CONSERVATION STATUS**

Current: Declared Rare Flora

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	250183	Du	Tarin Rock	NR	138+	Good
2	250183	Du	Tarin Rock	NR	142	Fair (7 dead)
3	160885	Du	Tarin Rock	NR	93	Healthy
4	250183	Du	Tarin Rock	NR	58	Good
5	250183	Du	Tarin Rock	NR	7	Good
6	170887	Du	Tarin Rock	Road	39	Previously disturbed (1984)
7	250887	Du	Tarin Rock	Private	114	Some buried from wind erosion
8	080888	Du	Tarin Rock	Private	330	Some plants
9A	?	Du	Tarin Rock	OCL	?	?
9B	?	Du	Tarin Rock	Road	?	?
10A	251191	Du	Tarin Rock	NR	}ca. 100	Healthy
10B	251191	Du	Tarin Rock	Road		}
11	080888	Du	Tarin Rock	Road	20+	Healthy
12	080888	Du	Tarin Rock	Private	ca. 570	Burnt 1985
13A	161188	Du	Tarin Rock	NR	}143	Healthy
13B	161188	Du	Tarin Rock	Road		}

**RESPONSE TO FIRE**

Good seed germination has been noted following early autumn fires.

**RESPONSE TO SOIL DISTURBANCE**

Adult plants killed Low seedling numbers following disturbance.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

## RESPONSE TO GRAZING

Appears not to be grazed by wildlife or livestock.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER							
	1	2	3	4	5	6	7	8
LAND MANAGER NOTIFIED	X	X	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	?	-	-
SECWA	-	-	-	-	-	?	-	-
WAWA	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-	X	-	-
FIREBREAK MARKERS	-	(2)	-	-	-	-	-	-
FENCING	-	-	-	-	-	-	X	X
FIRE MANAGEMENT	-	-	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-	-	-

	POPULATION NUMBER							
	9A	9B	10A	10B	11	12	13A	13B
LAND MANAGER NOTIFIED	?	X	X	X	X	X	X	X
UTILITIES Telstra	?	-	-	X	-	-	-	X
SECWA	-	-	-	-	-	-	-	-
WAWA	?	-	-	-	-	-	-	-
Other	-	-	(1)	-	-	-	-	-
ROAD MARKERS	X	-	X	-	-	-	-	X
FIREBREAK MARKERS	-	-	(2)	-	-	-	(2)	-
FENCING	-	-	-	-	X	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-	-	-

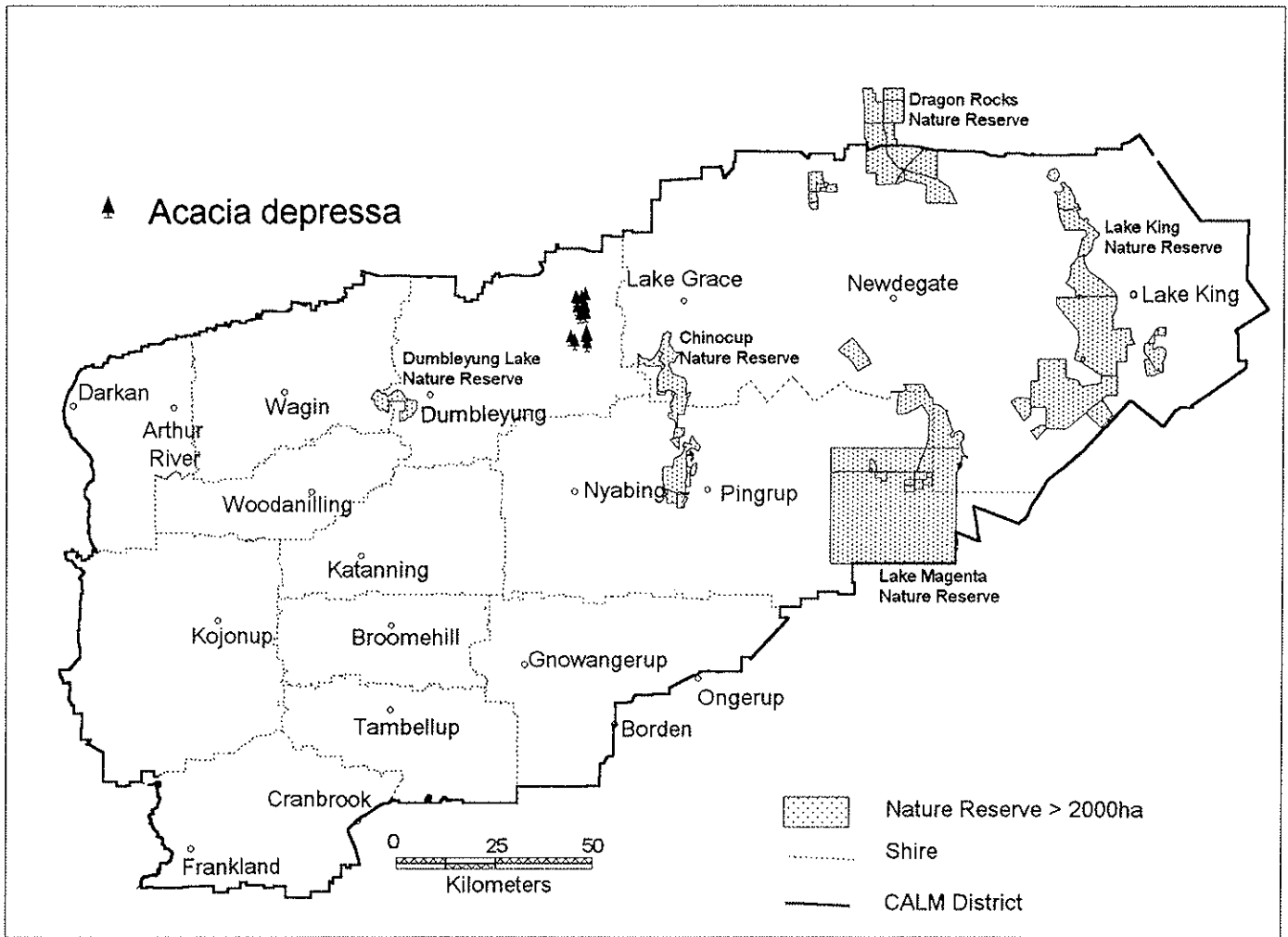
- NO ACTION NEEDED
- X ACTION COMPLETED
- ? ASSESSMENT REQUIRED
- (1) DEPARTMENT OF AVIATION
- (2) STANDARD MARKERS TO BE INSTALLED

## RESEARCH REQUIREMENTS

Nil

## REFERENCES

Maslin (1975), Rye and Hopper (1981), Burgman and Sokolowski (1983).



*Branch form with flowers*



*Enlargement of six pinnate leaf*



Woolly Wattle

*Acacia lanuginophylla* is a moderately open low shrub 60 cm in height and spreading to 2 m. The distinctive woolly foliage is blue-grey with white hairs, although the hairs may be golden yellow on new growth.

**FLOWERING PERIOD**

Variable between June-February but most commonly August-October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known only from the Katanning District where it grows in grey-white sand over clay in broad drainage channels in association with open low scrub of various *Melaleuca* and *Eremophila* species.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition	
1	271190	LG	Buniche	Railway	9	Healthy	
2A	140591	LG	Lockhart	NR	}10000+	Healthy	
2B	140591	LG	Lockhart	Private			}
2C	140591	LG	Lockhart	NR			}

**RESPONSE TO FIRE**

Not known

**PART THREE: OTHER SPECIES OF CONSERVATION IMPORTANCE IN THE**

**RESPONSE TO SOIL DISTURBANCE**

The presence of plants in private bushland which was "chained" but not burnt and also plants on firebreaks indicate seedling regeneration following disturbance

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Epicormic regrowth after light grazing by sheep noted Grazing by wildlife not recorded.

**SALINITY EFFECTS**

Not salt tolerant Appears to withstand short-term fresh water inundation.

## MANAGEMENT

	POPULATION NUMBER			
	1	2A	2B	2C
LAND MANAGER NOTIFIED	X	X	X	X
UTILITIES Telstra	X	-	-	-
SECWA	-	-	-	-
WAWA	-	-	-	-
Other	-	-	-	-
ROAD MARKERS	X	-	-	-
FIREBREAK MARKERS	-	(2)	-	(2)
FENCING	-	-	(3)	-
FIRE MANAGEMENT	-	-	-	-
WEED MANAGEMENT	-	-	-	-
DRAINAGE	(1)	-	-	-

- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) WESTRAIL CULVERT BISECTS POPULATION
- (2) STANDARD MARKERS TO BE INSTALLED
- (3) TO BE FENCED IN CONSULTATION WITH LANDHOLDER

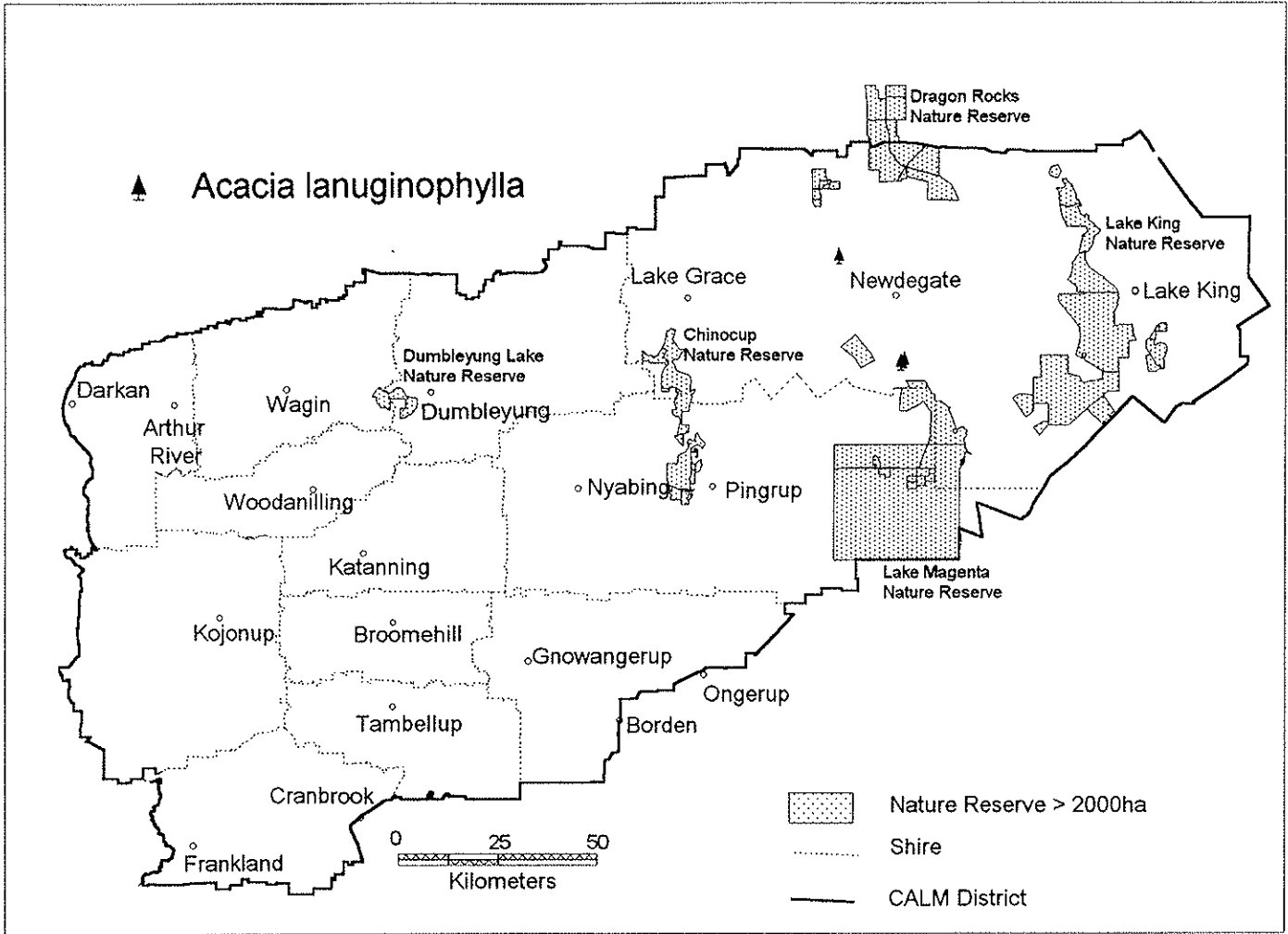
## RESEARCH REQUIREMENTS

- Response to fire.

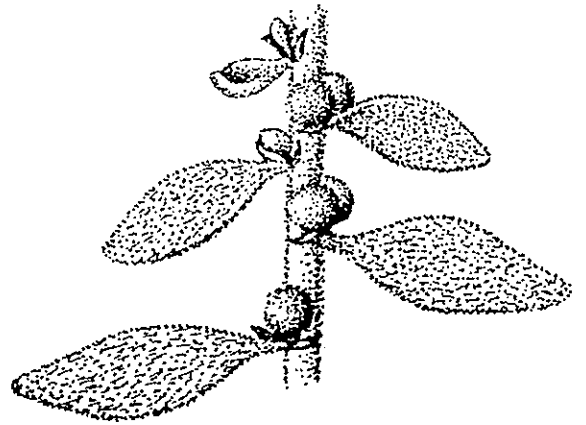
## REFERENCES

Miller (1982).





*Branching form*



*Mature seed pod*



*Leaf shape*



*ACACIA LEPTALEA* Maslin ms

Family: Mimosaceae (163)

Chinocup Wattle

*Acacia leptalea* is a dense round shrub to 17 m tall and up to 20 m across, branching at ground level. It is distinguished by crowded, somewhat sticky, thin phyllodes up to 1 cm long. These phyllodes are finely hairy, particularly when young. Flower heads are globular, usually singular, and are borne on short peduncles along the outer branchlets.

### FLOWERING PERIOD

July - October

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Confined to sandy-loam slopes near Chinocup, in open mallee with a dense understorey of *Melaleuca* species.

### CONSERVATION STATUS

Current: Declared Rare Flora.

### POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	230792	Ke	Chinocup	OCL	}	Healthy
					} 120	
1B	230792	Ke	Chinocup	Road	}	Healthy
2A	140890	Ke	Chinocup	OCL	}	Healthy
2B	140890	Ke	Chinocup	Road	} 430+	Healthy
2C	140890	Ke	Chinocup	Private	}	Healthy

### RESPONSE TO FIRE

Unknown.

### RESPONSE TO SOIL DISTURBANCE

Some tolerance to site disturbance indicated by old (10+ years) evidence of roadworks, etc.

### SUSCEPTIBILITY TO WEED INVASION

Unknown Minimal weed invasion at known sites.

### SUSCEPTIBILITY TO DISEASE

Unknown.

### RESPONSE TO GRAZING

Unknown No evidence of grazing noted.

### SALINITY EFFECTS

Unknown.

## MANAGEMENT

	POPULATION NUMBER				
	1A	1B	2A	2B	2C
LAND MANAGER NOTIFIED	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-
SECWA	-	-	-	-	-
WAWA	-	-	X	-	-
Other	-	-	-	-	-
ROAD MARKERS	-	X	-	X	-
FIREBREAK MARKERS	-	-	(1)	-	-
FENCING	-	-	-	-	X
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-
DRAINAGE	-	-	-	-	-

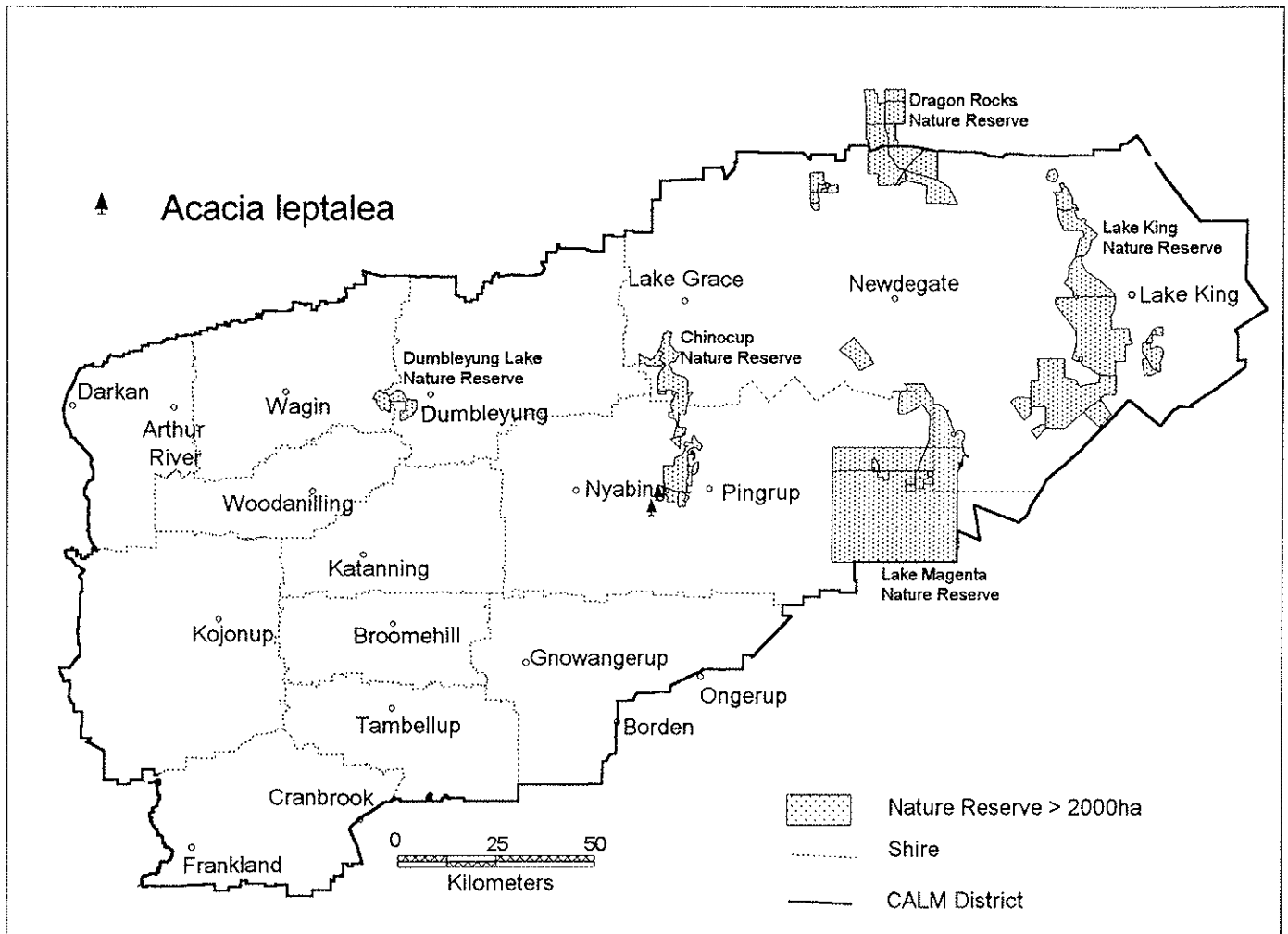
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) INSTALLATION REQUIRED

## RESEARCH REQUIREMENTS

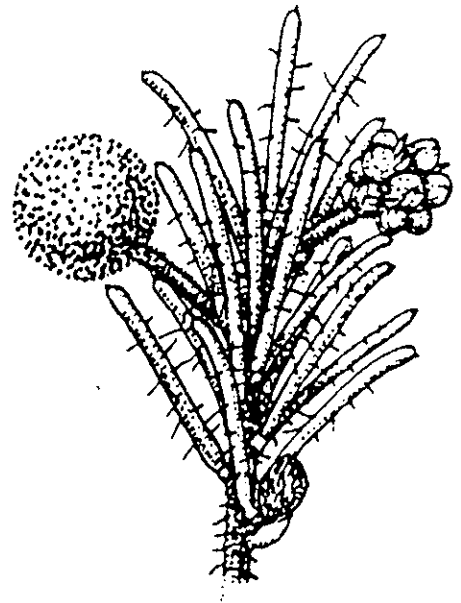
- Response to fire and site disturbance.
- Susceptibility to disease.
- Search for additional populations on conservation estate.

## REFERENCES

R. Cowan (pers. comm.).



*Mature flower head*



*Seed pod*



*Old seed pod*



Spiky Adenanthos

*Adenanthos pungens* subsp. subsp. *effusa* is a compact to moderately open prostrate shrub up to 25m in diameter. Its leaves are up to 3 cm long and are rigid, sharply pointed and are usually divided into 3 segments, on hairy branchlets. The flowers are clustered at the ends of the branchlets and vary from pale-pink to red.

**FLOWERING PERIOD**

August – November.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Confined to deep white sands in association with *Banksia* - *Melaleuca* - *Regelia* scrub. This sub-species is known only from the Katanning District.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	240987	Ta	Tambellup	Road	88	Healthy
1B	240987	Ta	Tambellup	Railway	713	Healthy
2	120990	Ko	Marribank	OCL	115	Healthy

**RESPONSE TO FIRE**

Adult plants killed, good seedling regeneration after fires Needs burning on a ca 20 year cycle (E. Nelson/S. Patrick, pers. comm.).

**RESPONSE TO SOIL DISTURBANCE**

Poor regeneration after site disturbance.

**SUSCEPTIBILITY TO WEED INVASION**

Seedling regeneration suppressed by Veldt Grass (*Ehrharta calycina*) in road verge populations.

**SUSCEPTIBILITY TO DISEASE**

A high level of plant deaths due to *Phytophthora* sp. reported in a population of *A pungens* subsp. subsp. *pungens* (E. Nelson, pers. comm.). A similar high susceptibility is assumed for subsp. subsp. *Effusa*.

**RESPONSE TO GRAZING**

Not known.

## SALINITY EFFECTS

Increasing salinity and water-logging may have contributed to the extinction of a population at Wansborough.

## MANAGEMENT

	POPULATION NUMBER		
	1A	1B	2
LAND MANAGER NOTIFIED	X	X	(1) (2)
UTILITIES Telstra	-	-	-
SECWA	-	-	-
WAWA	-	-	-
Other	-	-	-
ROAD MARKERS	X	-	-
FIREBREAK MARKERS	-	-	-
FENCING	-	-	(5)
FIRE MANAGEMENT	-	(3)	-
WEED MANAGEMENT	(4)	-	-
DRAINAGE	-	-	-

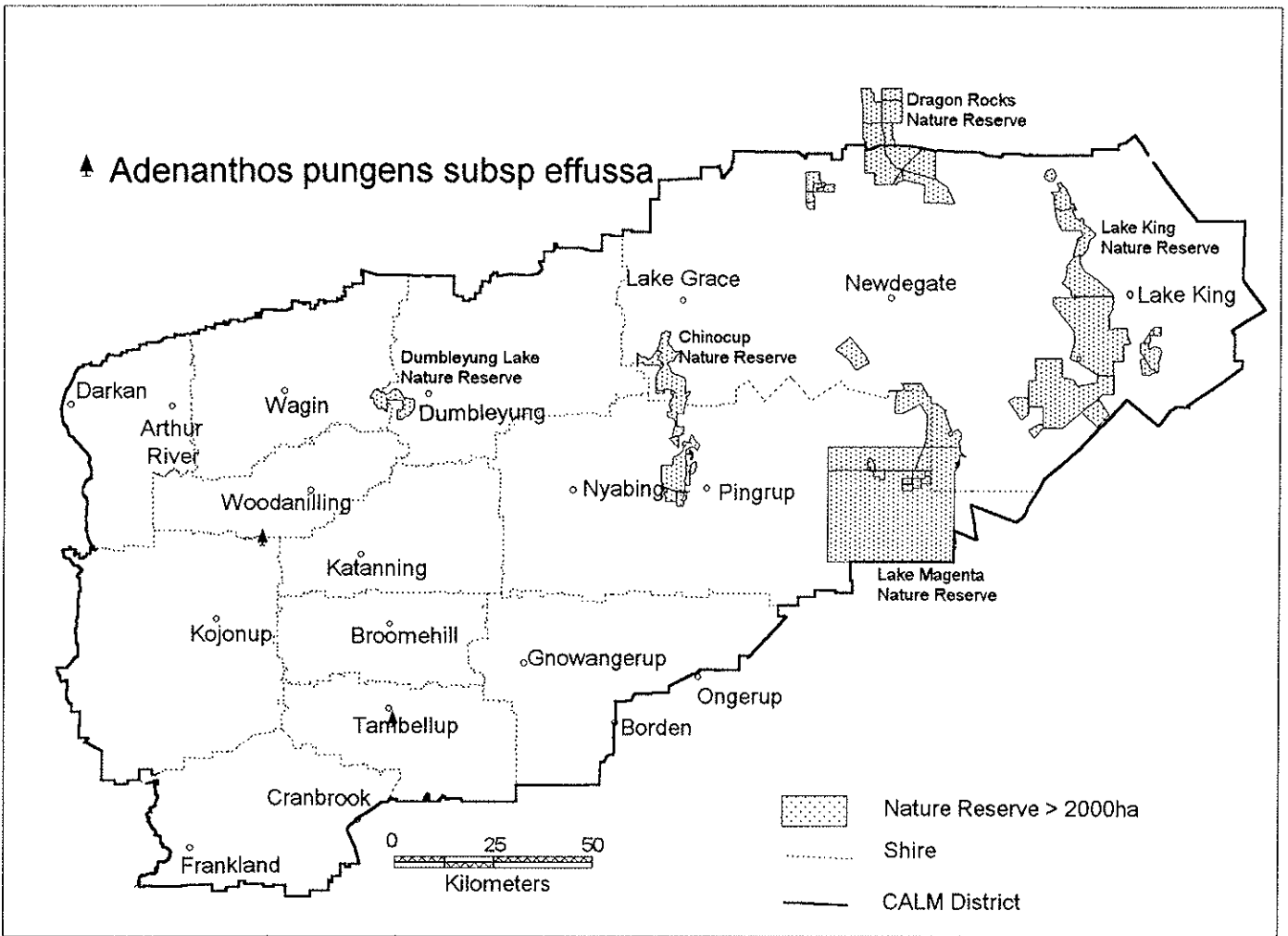
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) ABORIGINAL LANDS TRUST
- (2) SOUTHERN ABORIGINAL CORPORATION (Lessee)
- (3) MAINTAIN CLOSE LIAISON WITH WESTRAIL AND TAMBELLUP BUSHFIRE ADVISORY COMMITTEE RE - ANNUAL BURNING OF RAILWAY RESERVE
- (4) MAINTAIN CLOSE LIAISON WITH MRD RE - ROADVERGE WEED CONTROL
- (5) TO BE FENCED IN CONSULTATION WITH LANDHOLDER

## RESEARCH REQUIREMENTS

- Susceptibility to Phytophthora species.
- Weed control, particularly Veldt Grass.
- Search for populations on conservation estate.

## REFERENCES

Nelson (1978a), Rye and Hopper (1981).



*Branchlet with flowers*



*Typical branching form*



## **ADENANTHOS PUNGENS Meisn SUBSP PUNGENS**

**Family:** Proteaceae (90)

### Spiky Adenanthos

This *Adenanthos* is a tall, erect shrub up to 3m with rigid, terete leaves (3 cm long and 1-2 mm in diameter), usually divided into three pungent pointed segments up to 12 mm. The flowers are pale to dark pink, numerous and aggregated at the tips of whorled branchlets on 4 mm peduncles and surrounded by up to 6 ovate-triangular involucre bracts. When flowering it is very attractive and obvious species. When not in flower it could easily be mistaken for an *Isopogon* or *Daviesia*.

Nelson (1978) recognised and described *Adenanthos pungens* subspecies *pungens* and *effusus* based upon erect and prostrate habits respectively. However the population in the Katanning District has erect, semi erect and prostrate plants, and taxonomic separation may not be warranted.

### **FLOWERING PERIOD**

August – November.

### **DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

In the Katanning District it occurs in deep, white, gypsum bearing, sand dunes in association with *Leptospermum* sp, *Eremaea pauciflora* and *Melaleuca* ssp. In the Albany District (Stirling Ranges), it is reported as occurring in rocky soils among tall *Banksia* - *Melaleuca* scrub.

### **CONSERVATION STATUS**

Current: Declared Rare Flora.

### **POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2A	120292	Ke	Chinocup	NR	}1230+	Undisturbed
2B	120292	Ke	Chinocup	Road	}	Undisturbed

### **RESPONSE TO FIRE**

Adult plants killed, good seedling regeneration after fires. Needs burning on a ca 20 year cycle (E. Nelson/S. Patrick, pers. comm.).

### **RESPONSE TO SOIL DISTURBANCE**

Not known, however *Adenanthos pungens* subsp. subsp. *effusa* has been noted as regenerating poorly after site disturbance.

### **SUSCEPTIBILITY TO WEED INVASION**

Not known.

### **SUSCEPTIBILITY TO DISEASE**

A high level of plant deaths from *Phytophthora* sp. has been reported (E. Nelson, pers. comm.).



## RESPONSE TO GRAZING

Not Known.

## SALINITY EFFECTS

Increasing salinity and water-logging may have contributed to the extinction of a population of *Adenanthos pungens* subsp. subsp. *effusa*, however the population of *Adenanthos pungens* subsp. subsp. *effusa* at Chinocup is exposed to wind-borne salts from the lake yet appears unaffected. The species may have some salt tolerance provided that soils are well drained.

## MANAGEMENT

	POPULATION NUMBER	
	2A	2B
LAND MANAGER NOTIFIED	X	X
UTILITIES Telstra	-	-
SECWA	-	-
WAWA	-	-
Other	-	-
ROAD MARKERS	-	X
FIREBREAK MARKERS	-	-
FENCING	-	-
FIRE MANAGEMENT	-	-
WEED MANAGEMENT	-	-
DRAINAGE	-	-

- NO ACTION NEEDED
- X ACTION COMPLETED

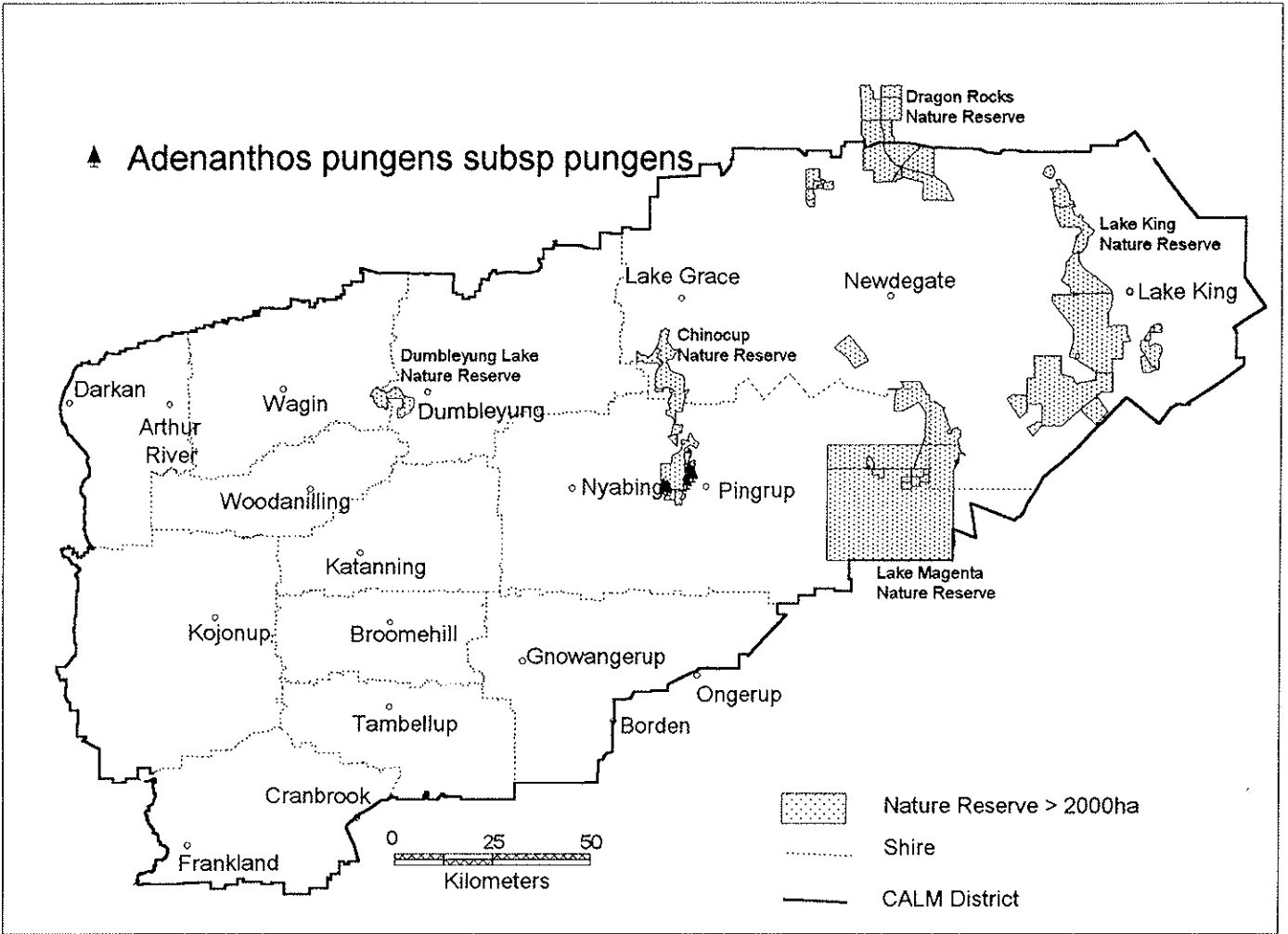
## RESEARCH REQUIREMENTS

- Effects of salinity and water-logging.

## REFERENCES

Nelson (1978a), Rye and Hopper (1981).

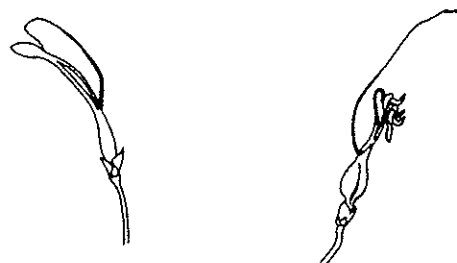
▲ *Adenanthos pungens* subsp. *pungens*



*Portion of plant bearing spiky divided leaves*



*Flower bud with looped style and open flower*



Velvet Woollybush

*Adenanthos velutinus* is an erect shrub with a single main stem to 3 m in height with erect or slightly spreading branches. Young shoots and leaves bright red with dense, felty indumentum of white hairs. The leaves are shortly stalked, up to 2 cm long and are divided into 3-6 segments. Flowers are cream with grey-black upper portions and are usually in terminal groups of 3-5 flowers. It has glandular hairs on the flowers, distinguishing it from other *Adenanthos* species in the vicinity.

Differs from *A. meisneri* in the absence of a lignotuber and in the flower colour.

**FLOWERING PERIOD**

July – September.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known only from one locality where it grows in peaty soils among rocks. Associated vegetation includes *Eucalyptus marginata* and *Lachnostachys* sp.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	120592	Cb	Cranbrook	NR	}ca 1000 }	Healthy
1B	120592	Cb	Cranbrook	Private		Healthy

**RESPONSE TO FIRE**

Adults plants killed Heavy seedling regeneration. Approximately 4 years reported between seedling and first flowering, time to viable seed not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Presumed highly susceptible to *Phytophthora cinnamomi* (G. Keighery, pers. comm.).

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER	
	1A	1B
LAND MANAGER NOTIFIED	X	X
UTILITIES Telstra	-	-
SECWA	-	-
WAWA	-	-
Other	-	-
ROAD MARKERS	-	-
FIREBREAK MARKERS	-	-
FENCING	X	X
FIRE MANAGEMENT	(1)	(1)
WEED MANAGEMENT	-	-
DRAINAGE	-	-

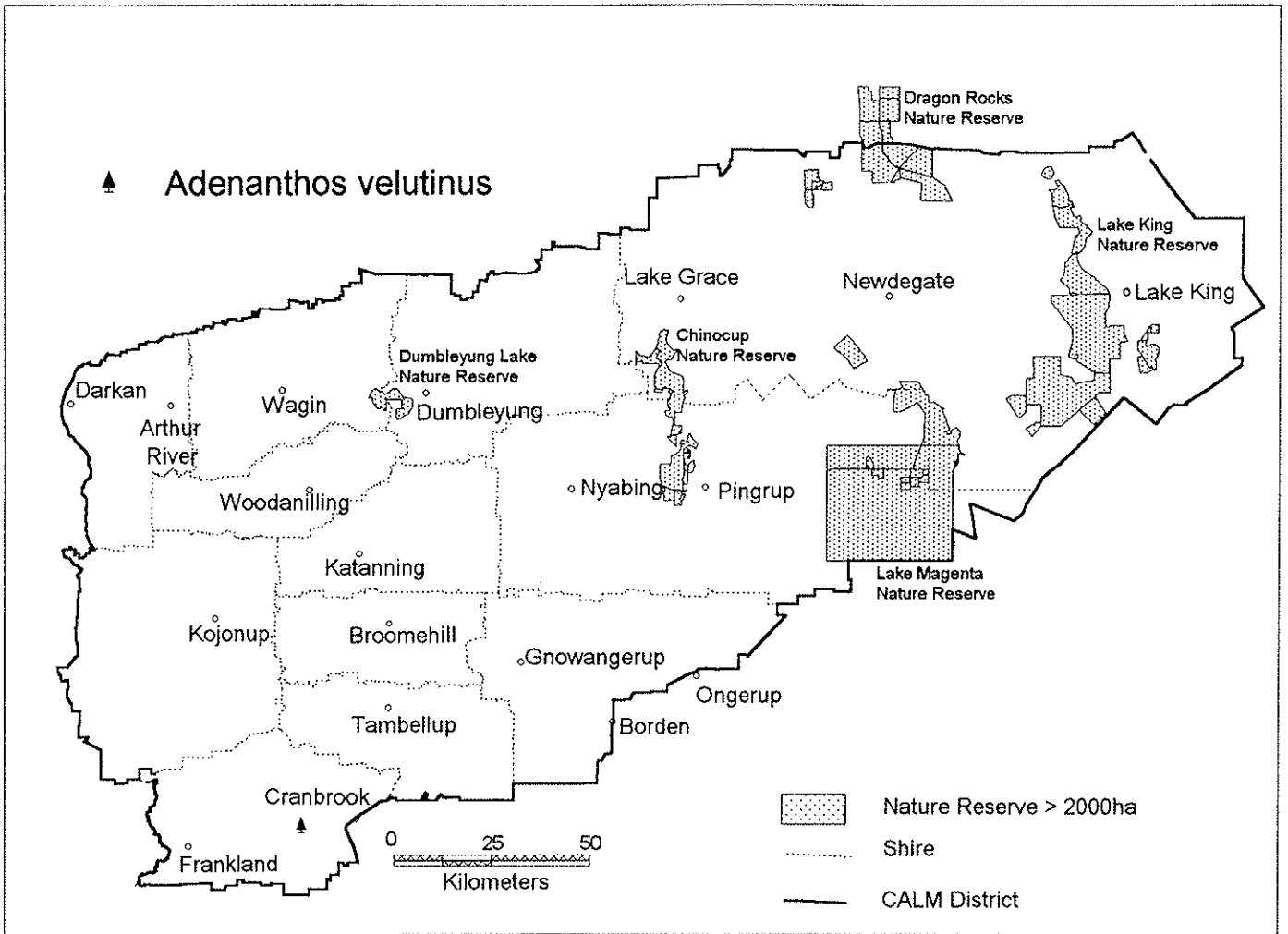
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) LIAISE CLOSELY WITH LANDHOLDER, ACCESS RESTRICTED, WILDLIFE SUPPRESSION FROM PERIMETER ONLY DUE TO SMALL AREA AND HIGH DISEASE RISK

## RESEARCH REQUIREMENTS

- Search for further populations.
- Optimum fire regime.

## REFERENCES

Nelson (1978a, 1978b), Rye and Hopper (1981), Leigh *et al* (1984).



*Branch bearing clusters of leaves, flower buds and open flowers*



*Hairy divided leaf*



*ALLOCASUARINA TORTIRAMULA* E Bennett

**Family:** Casuarinaceae (70)

Woolly Sheoak

*Allocasuarina tortiramula* is a dense-canopied shrub 17 m in height with spreading, twisted branchlets. Variations in branchlet surface from smooth to shortly pubescent gives a mixed green to blue-grey appearance to the shrub.

### **FLOWERING PERIOD**

July – September.

### **DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Newdegate-Lake King, growing as dense thickets in red-brown loam over granite. A single plant is also known to occur in the Narrogin District.

### **CONSERVATION STATUS**

Current: Declared Rare Flora.

### **POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	220787	LG	Lake King	NR	ca 5000	Healthy
1B	041187	LG	Lake King	NR	ca 2000	Healthy

### **RESPONSE TO FIRE**

Not Known.

### **RESPONSE TO SOIL DISTURBANCE**

Some seedling establishment noted on an old bulldozed firebreak at Lake King.

### **SUSCEPTIBILITY TO WEED INVASION**

Not known.

### **SUSCEPTIBILITY TO DISEASE**

Not known.

### **RESPONSE TO GRAZING**

Not known.

### **SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER	
	1A	1B
LAND MANAGER NOTIFIED	X	X
UTILITIES Telstra	-	-
SECWA	-	-
WAWA	-	-
Other	-	-
ROAD MARKERS	-	-
FIREBREAK MARKERS	(1)	(1)
FENCING	-	-
FIRE MANAGEMENT	-	-
WEED MANAGEMENT	-	-
DRAINAGE	-	-

- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) STANDARD MARKERS TO BE INSTALLED

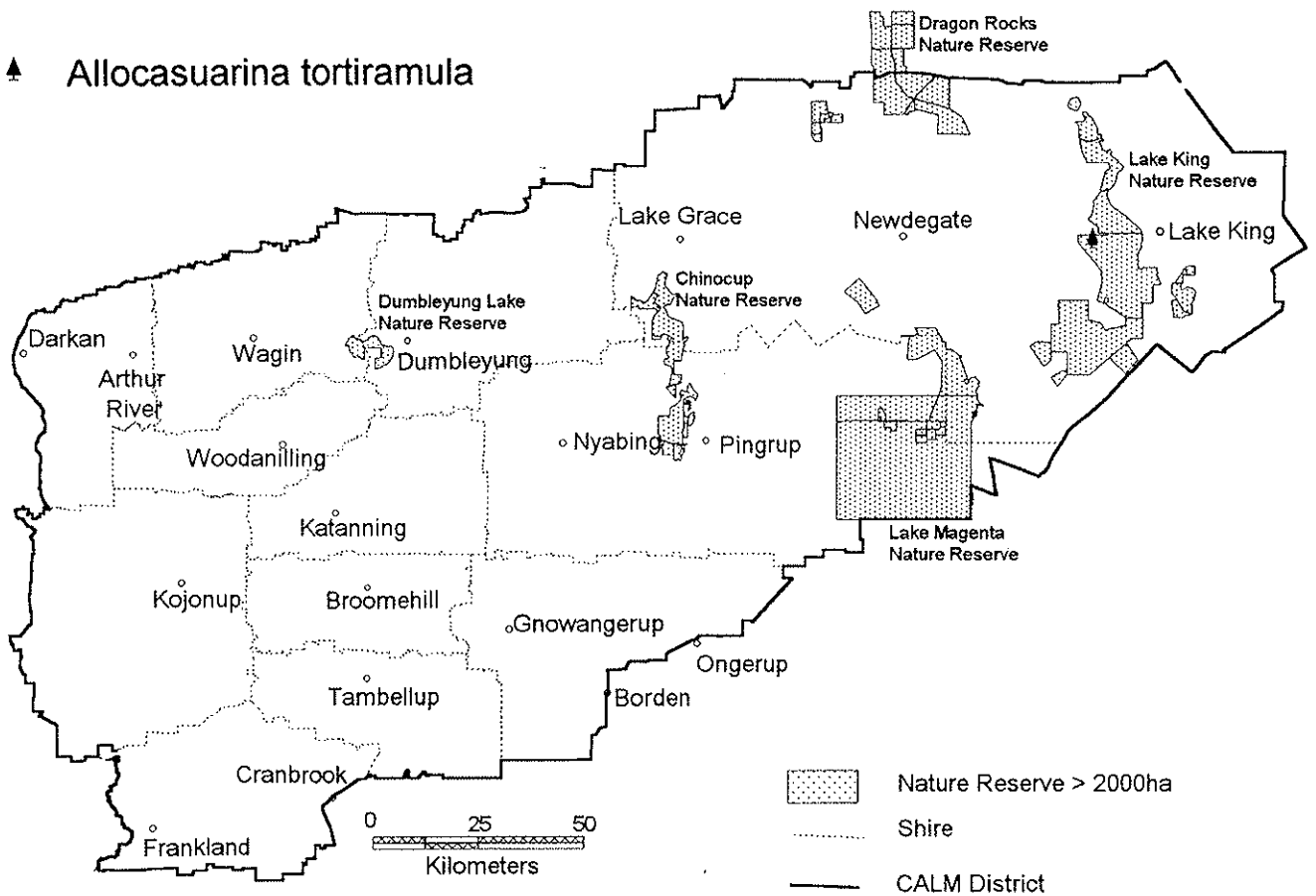
## RESEARCH REQUIREMENTS

- Response to fire.
- Susceptibility to disease.

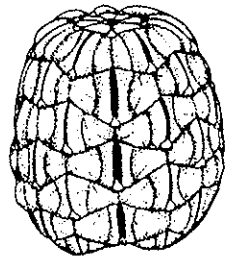
## REFERENCES

Bennett (1989), Hopper *et al* (1990).

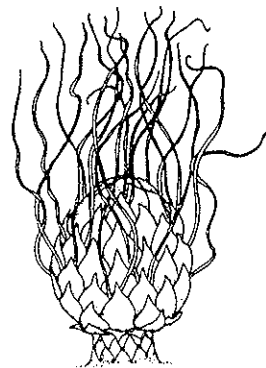
▲ *Allocasuarina tortiramula*



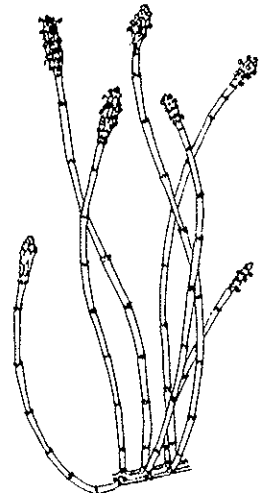
*Cone*



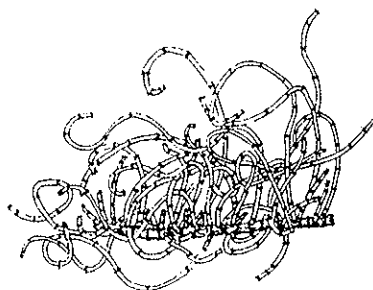
*Inflorescence*



*Branching habit*



*Habit*





Wagin Banksia

*Banksia oligantha* is an erect shrub or small tree to 4 m high with a superficial resemblance to *Dryandra sessilis* when not in flower. The leaves are angular-obovate, 2-3 cm long, very concave and have 2-4 sharp points along each side. Flower heads at the ends of branchlets hold 20-35 flowers which are cream with a red base.

Closely related to *B. cuneata*, differing in its fewer flowered inflorescences, creamy yellow flowers, roughened basal bark and its follicles which open readily in the absence of fire.

**FLOWERING PERIOD**

October – November.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Occurs in deep white to yellow-brown sands close to river systems west of Wagin and Katanning, generally in tall scrub, in which it is sometimes dominant. Associated with *Banksia attenuata*, *B. prionotes*, *Leptospermum erubescens*, *Eremaea pauciflora* and *Regelia cymbifolia*.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	240388	Wa	Wagin	NR	ca 750	Some damage
1B	240388	Wa	Wagin	Private	ca 25	from sheep
1C	240388	Wa	Wagin	Road	ca 50	and rabbits
2	050789	Ko	Marribank	OCL	171+	Fair
3	050789	Ko	Marribank	OCL	35+	Healthy
4	050789	Ko	Marribank	OCL	15+	Healthy
5	050789	Ko	Marribank	OCL	200+	Healthy

**RESPONSE TO FIRE**

Even age structure of some populations indicates adult plants killed by fire with post-fire seedling regeneration, however it has been noted that fire may not be essential for seedling establishment.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Limited invasion by various pasture grasses at some sites is not a current problem. Monitoring required.

## SUSCEPTIBILITY TO DISEASE

Presumed highly susceptible. The closely related species *B cuneata* is highly susceptible to *Phytophthora cinnamomi*.

## RESPONSE TO GRAZING

Seedlings killed by grazing by sheep and rabbits. Mature plants severely stressed from root grazing by rabbits in warrens.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER						
	1A	1B	1C	2	3	4	5
LAND MANAGER NOTIFIED	X	X	X	(1)(2)	(1)(2)	(1)(2)	(1)(2)
UTILITIES Telstra	-	-	-	-	-	-	-
SECWA	-	-	-	-	-	-	-
WAWA	-	-	-	-	-	-	-
Other	(3)	(3)	(3)	(3)	(3)	(3)	(3)
ROADSIDE MARKERS	-	-	-	-	-	-	-
FIREBREAK MARKERS	-	-	-	-	-	-	-
FENCING	-	X	X	(5)	(5)	(5)	(5)
FIRE MANAGEMENT	-	-	-	-	-	-	-
WEED MANAGEMENT	-	(4)	-	(4)	(4)	(4)	-
DRAINAGE	-	-	-	-	-	-	-

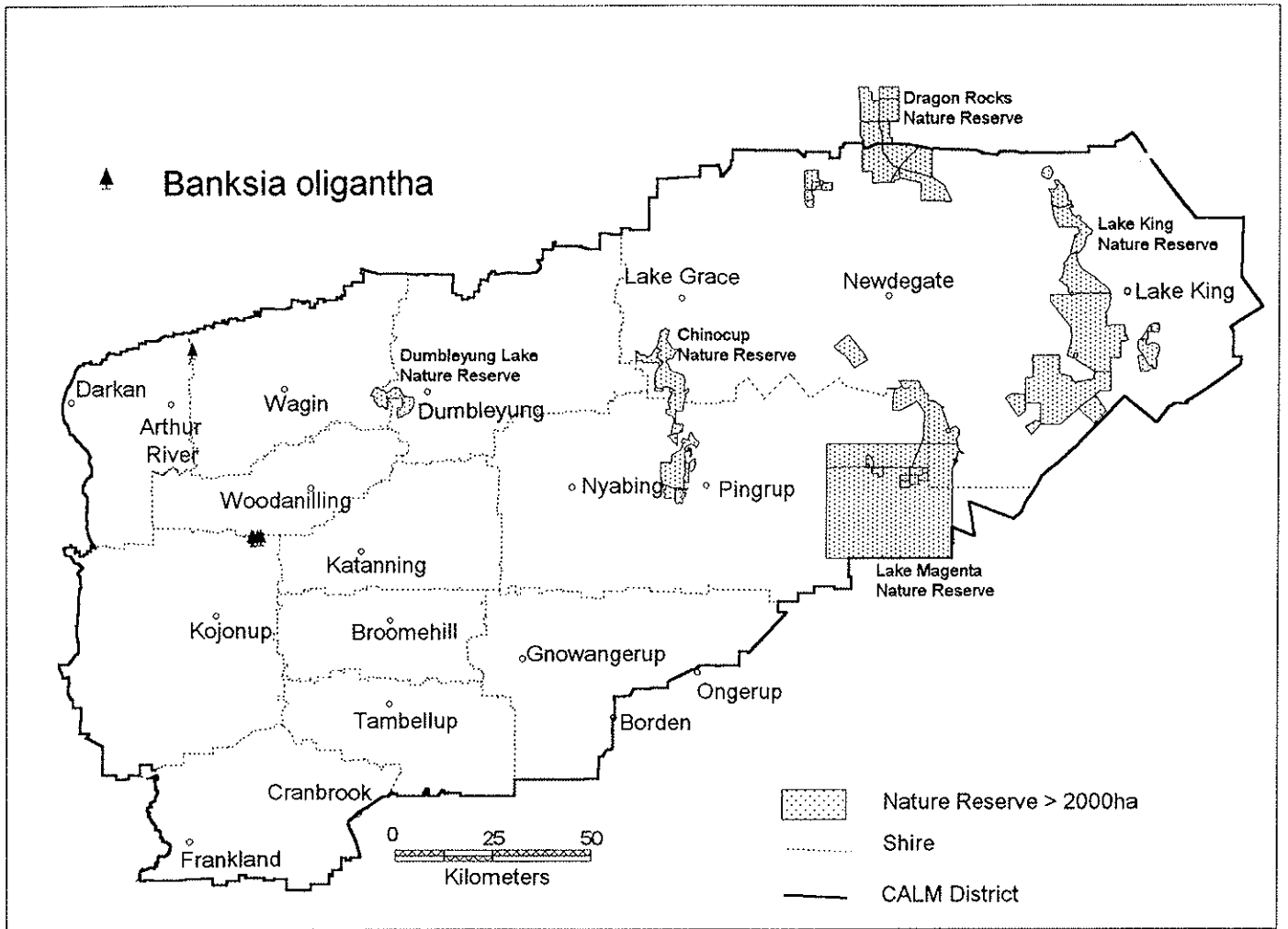
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) ABORIGINAL LANDS TRUST
- (2) SOUTHERN ABORIGINAL CORPORATION (Lessee) - CLOSE LIAISON REQUIRED
- (3) AGRICULTURE WA NOTIFIED - CLOSE LIAISON REQUIRED TO CONTROL RABBITS
- (4) MONITORING REQUIRED
- (5) TO BE FENCED, IN CONSULTATION WITH LANDHOLDER

## RESEARCH REQUIREMENTS

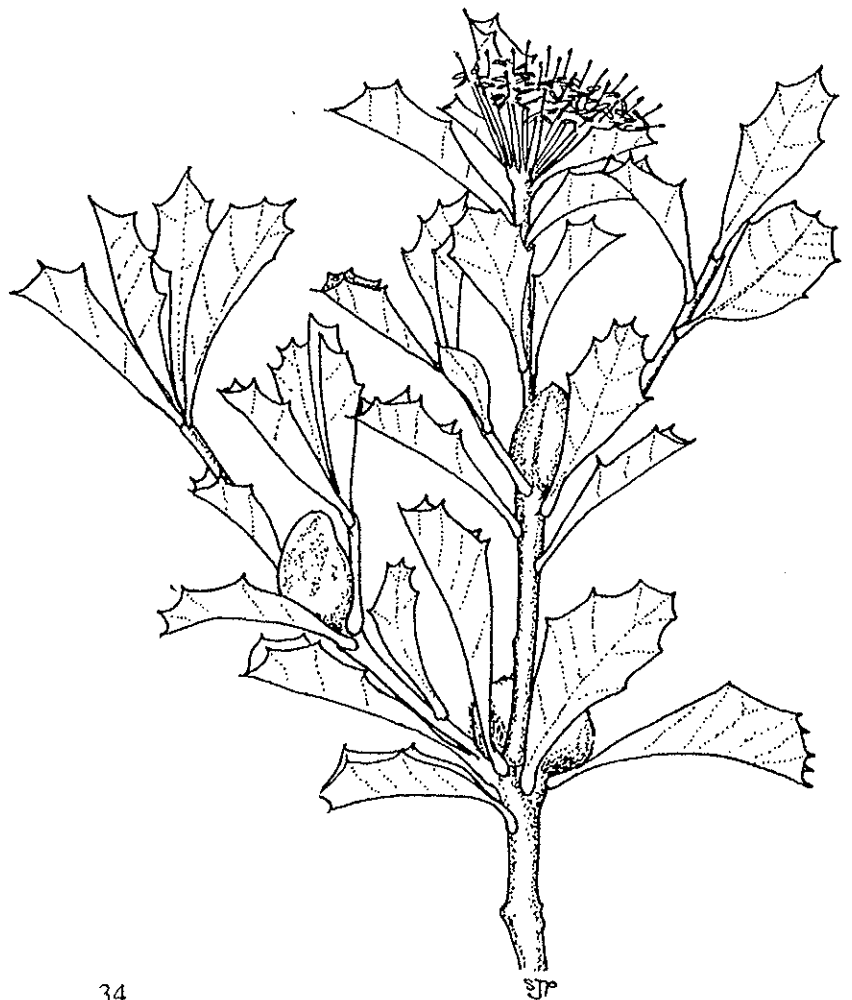
- Susceptibility to disease.
- Weed control.

## REFERENCES

Taylor and Hopper (1988), Hopper *et al* (1990).



*Branching form with flowers*



## Spiny Bentleya

*Bentleya spinescens* is a small much-branched shrub 5-20 cm tall and 2-20 cm across with branches ending in prominent spines. Leaves in clusters of up to 7, each with revolute margins and a pubescent lower surface. The flowers are whitish-green to cream, tubular, up to 2 cm in length and are generally clustered on stems close to ground level.

**FLOWERING PERIOD**

September – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known only from the Newdegate area where it grows in sandy clay soil in association with open mallee and mixed *Melaleuca* scrub. Not known from any conservation reserve.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	040892	LG	Newdegate	Road	}	Healthy
1B	240991	LG	Newdegate	OCL	}	Healthy
1C	240991	LG	Newdegate	OCL	} 250+	Some damaged
1D	240991	LG	Newdegate	VCL	}	Healthy
2	140991	LG	South-east Newdegate	Road	?	Couldn't be found 1990-91

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Adult plants killed, no regeneration noted.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER				
	1A	1B	1C	1D	2
LAND MANAGER NOTIFIED	X	X	X	X	X
UTILITIES Telstra	X	X	X	X	-
SECWA	-	-	-	-	-
WAWA	X	X	X	X	-
Other	-	-	-	-	-
ROAD MARKERS	X	-	-	-	(1)
FIREBREAK MARKERS	-	-	-	-	-
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-
DRAINAGE	-	-	-	-	-

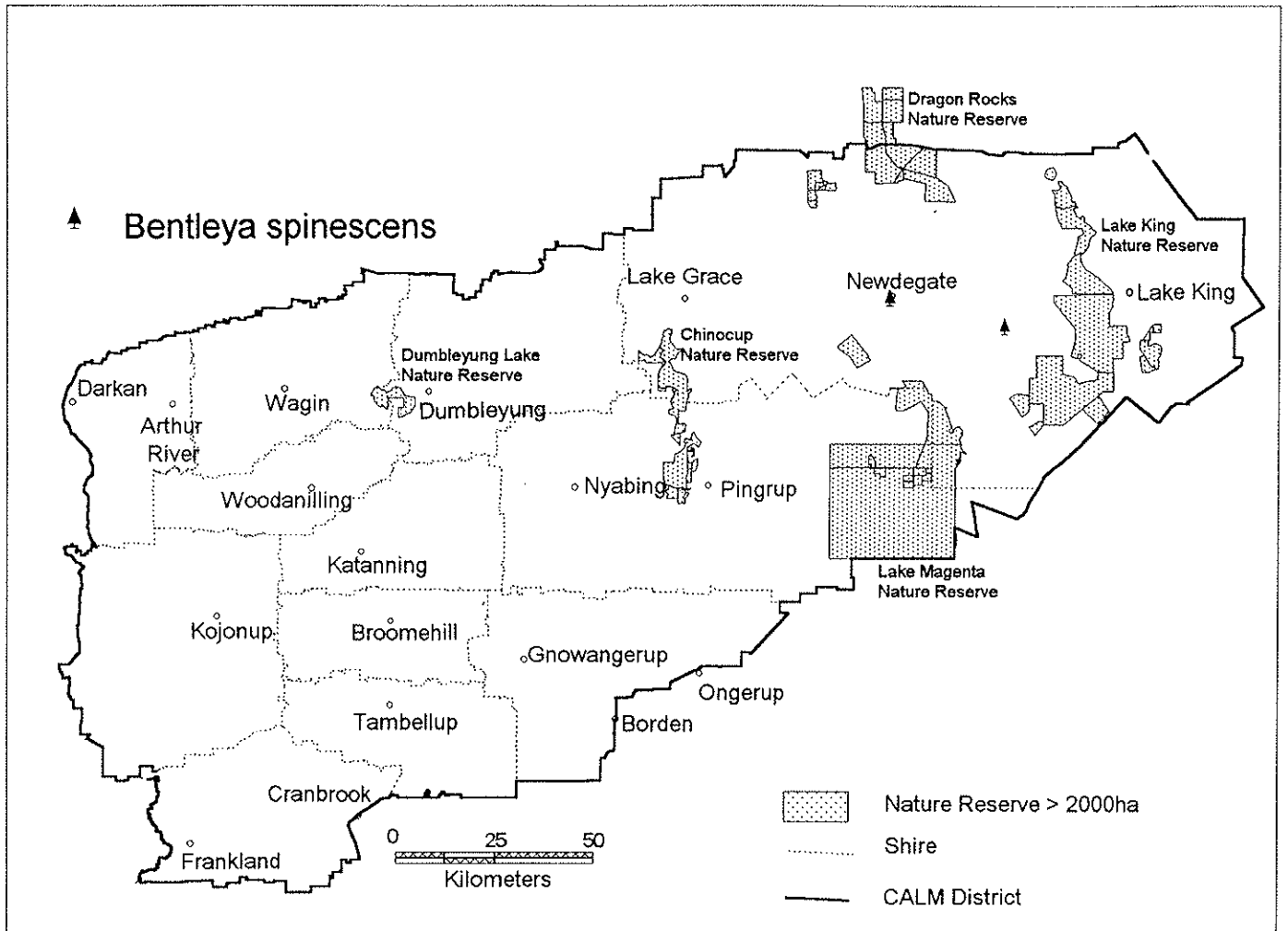
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) INSTALL STANDARD MARKERS WHEN POPULATION RELOCATED

## RESEARCH REQUIREMENTS

- Search for further populations, particularly in conservation estate.
- Response to fire.
- Susceptibility to disease.
- Maintain in cultivation.

## REFERENCES

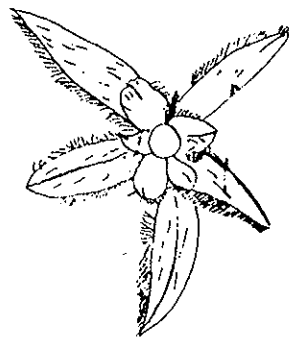
Bennett (1986).



*Branching form with buds*

*Open flower*

*Closed flower enlarged*



Cossack Spider Orchid

*Caladenia dorrienii* was described and named by Domin in 1912 from collections in the Kojonup-Cranbrook area. It was reduced to a variety of *C. filamentosa* in 1971 but has since been recognised as distinct species. Often growing in clusters or clumps, it can be distinguished from members of the *C. filamentosa* group by its shorter perianth segments, crossed lateral sepals and labellum splashed with red. The slender stem (up to 15 cm) is erect and hairy, with a narrow, linear leaf clasping the base and a short bract midway along its length. Narrow, linear sepals and petals are greenish white, with longitudinal red veins and darkly coloured, glandular, hairy tips. The erect dorsal sepal is 25-30 mm in length. The ovate labellum, on a short claw, has a few obtuse teeth along its margin and two rows (7-8 each) of closely set calli along the middle.

**FLOWERING PERIOD**

September – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Previously recorded in the Bridgetown-Kojonup-Cranbrook area and known in recent years from only three localities in the Wheatbelt Region near Frankland and Chowerup. A collection in the Dale area of the Northern Forest Region has extended its range to over 240 km. Populations in the Katanning District occur in the Wandoo-Jarraah woodland with low shrubs.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	181090	Ko	Chowerup	Private	Nil	150+ plants (1983)
2A	181090	Cb	Frankland	Private	20	200+ plants (1983)
2B	111090	Cb	Frankland	VCL	Nil	1 plant in 1989
4	181090	Ko	Mettanbinup	NR	Nil	ca 10 plants (1982)

**RESPONSE TO FIRE**

Killed if burnt when above ground parts present (ca July-November). Hot fires during summer appear to stimulate flowering (A.P. Brown, pers. comm.) Other fire regimes (eg cool burns or increased frequency) are possibly detrimental to species survival.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Growth suppressed.

## SUSCEPTIBILITY TO DISEASE

Not known.

## RESPONSE TO GRAZING

Subject to grazing, including insect damage, eliminating maturity of individual flowers.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER			
	1	2a	2b	4
LAND MANAGER NOTIFIED	X	X	-	X
UTILITIES Telstra	-	-	-	-
SECWA	-	-	-	-
WAWA	-	-	-	-
Other	-	(1)	(1)	-
ROAD MARKERS	-	-	-	-
FIREBREAK MARKERS	-	-	-	-
FENCING	-	-	-	-
FIRE MANAGEMENT	(2)	(2)	(2)	(3)
WEED MANAGEMENT	-	-	-	-
DRAINAGE	-	-	-	-

- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) SHIRE OF CRANBROOK
- (2) DO NOT BURN DURING VEGETATIVE/FLOWERING PHASE (APPROXIMATELY JULY-NOVEMBER), LIAISE CLOSELY WITH LOCAL BUSHFIRE BRIGADES
- (3) CONSULT WITH RESEARCHERS PRIOR TO ANY BURNING PROPOSAL IF PRACTICAL, AVOID USE OF MACHINERY IN WILDFIRE SUPPRESSION

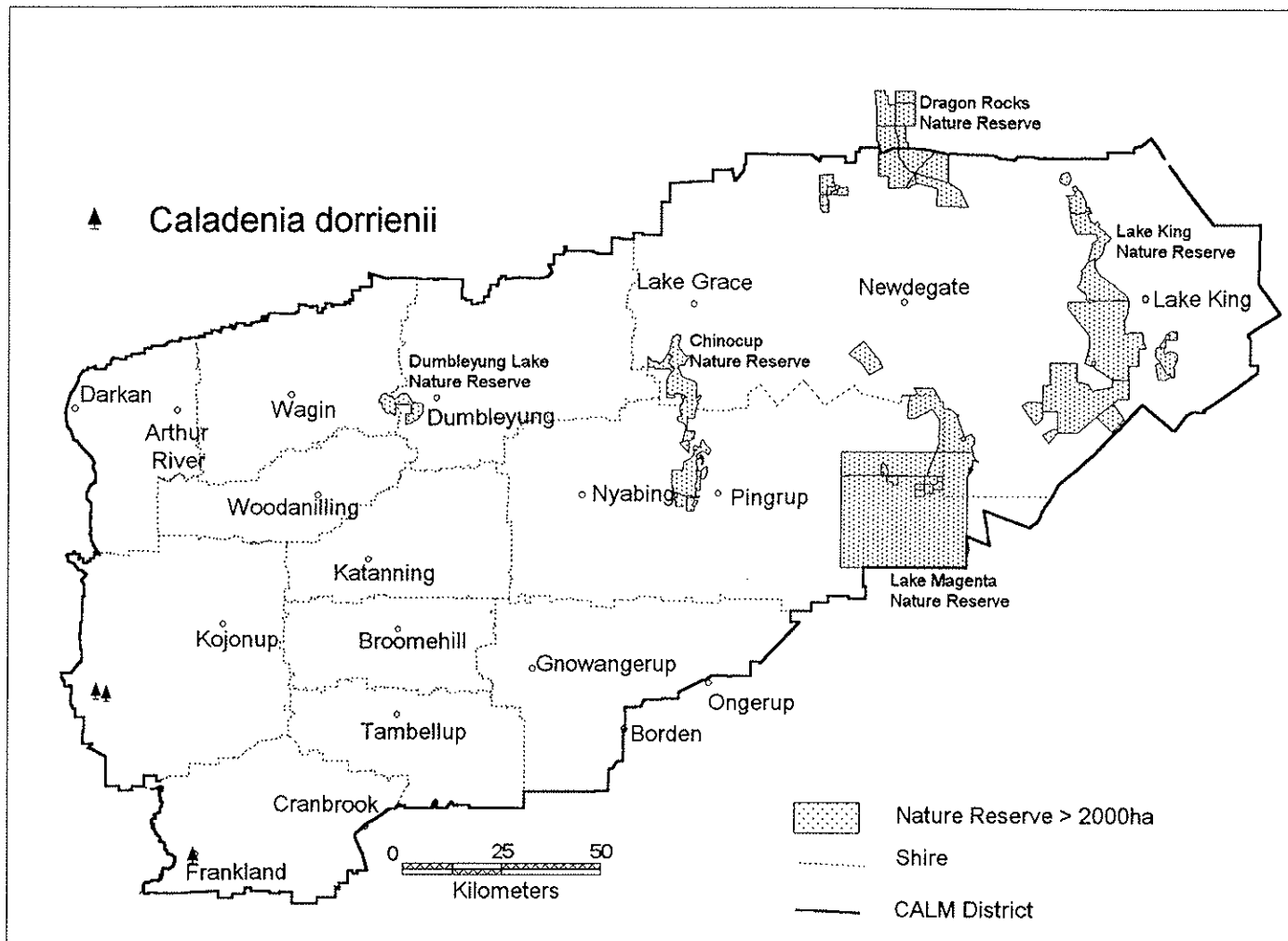
## RESEARCH REQUIREMENTS

- Search for additional populations.
- Monitor and research known populations to determine cause of highly variable seasonal abundance.
- Optimum fire regime.
- Weed control.
- Impact of grazing by insects.

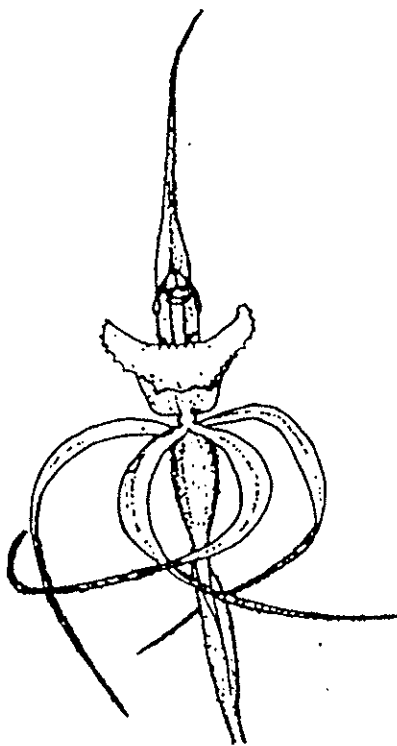
## REFERENCES

Pelloc (1930), Erickson (1979\8), Hoffman and Brown (1984), Kelly *et al*, (1990).





*Open flower, typical form*



*Typical plant form*



Hoffman's Spider Orchid

*Caladenia hoffmanii* ms is a tuberous herb to 30 cm high with sepals to 3 cm long terminating in abbreviated glandular "tails". Plants have 1-3 flowers (3-7 cm long and 3-5 cm wide) with leaves 8-15 cm long and 5-10 mm wide.

**FLOWERING PERIOD**

August – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Grows in sandy loams in close proximity to granite outcrops, usually in association with *Allocasuarina huegeliana*, *A campestris* and *Leptospermum erubescens*. Further populations are known from the Narrogin District (Wheatbelt Region), and also in the Geraldton-Kalbarri (Midwest Region) area.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
5	September 1991	LG	Dragon Rocks	NR	Nil	1 plant (1987)
7	September 1991	LG	Dragon Rocks	NR	Nil	30+ plants (1986)
9	190991	LG	Dragon Rocks	NR	10	Healthy

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Possibly subject to grazing by rabbits.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER		
	5	7	9
LAND MANAGER NOTIFIED	X	X	X
UTILITIES Telstra	-	-	-
SECWA	-	-	-
WAWA	-	-	-
Other	-	-	-
ROAD MARKERS	-	-	-
FIREBREAK MARKERS	-	-	-
FENCING	-	-	-
FIRE MANAGEMENT	-	-	-
WEED MANAGEMENT	-	-	-
DRAINAGE	-	-	-

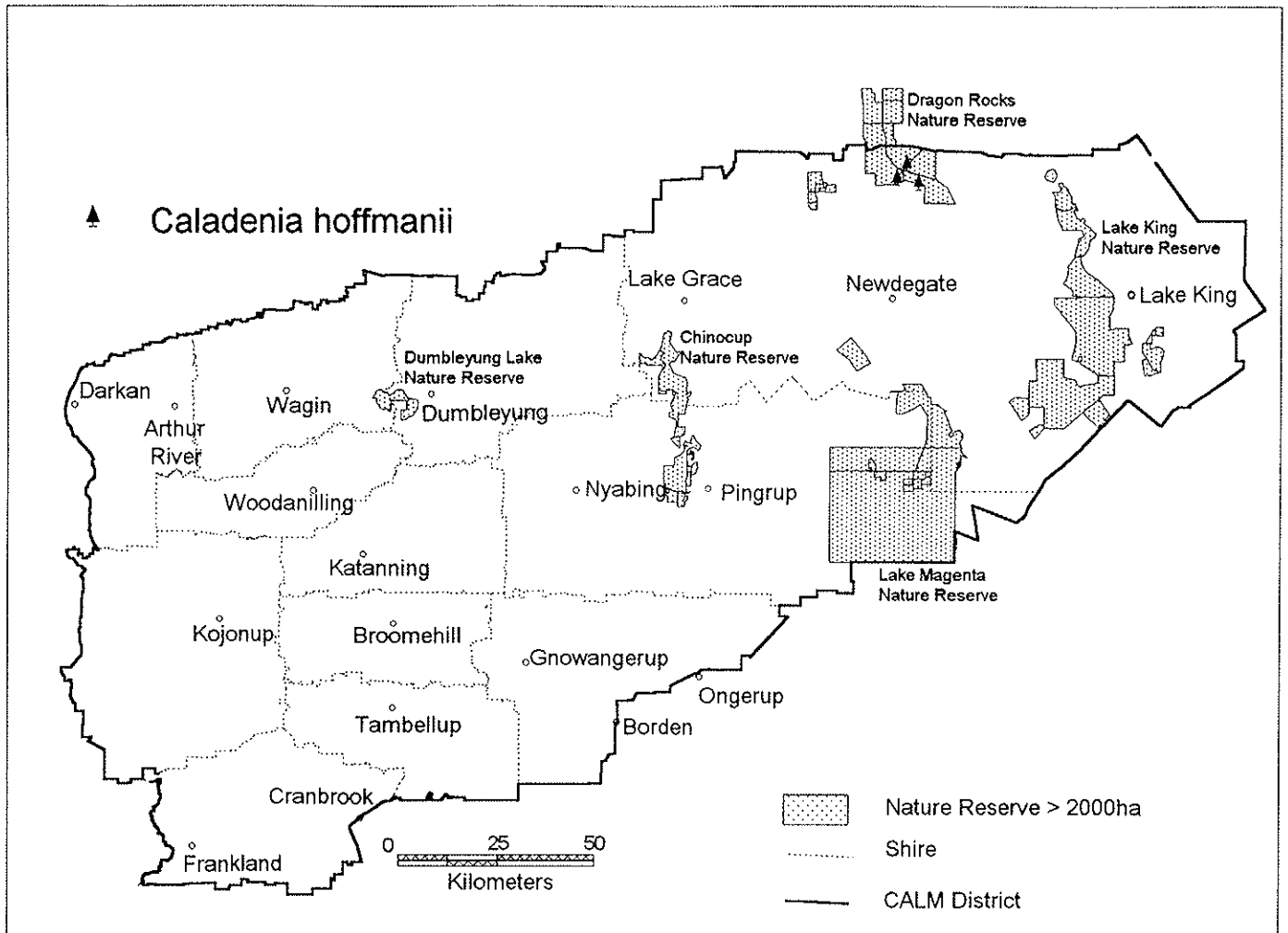
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

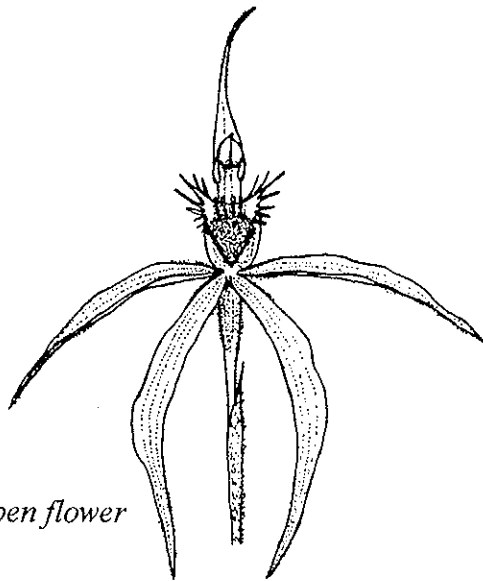
- Response to fire.
- Susceptibility to disease.

## REFERENCES

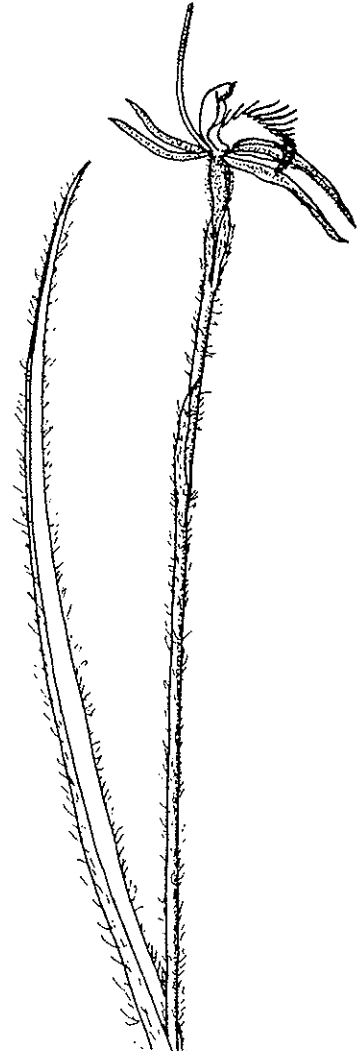
Hopper, *et al* (1990).



*Mature flower*



*Plant with leaf and open flower*



Smooth-lipped Spider Orchid

This spider orchid, characterised by its upswept lateral sepals and smooth edged labellum, was described in 1933 by Edith Coleman from collections from Mt Bakewell and the Kendenup area. It has an erect stem, varying in height from 30-70 cm, with two conspicuous bracts and a hairy, broadly lanceolate leaf 10-20 cm long. The large solitary flower has cream and green perianth segments with red central portions. The dorsal sepal (45-70 mm) is erect and then reflexed. Lateral sepals are longer and bent upwards. Petals are short (about 50 mm) and pointed. The tri-lobed labellum, on a short narrow claw, is yellowish-green with a maroon tip and delicate red veins. Dark 'golf-stick' calli are arranged irregularly. The column is much incurved *Caladenia integra* can be distinguished from the closely related *C. falcata* by its entire, not serrate, labellum.

**FLOWERING PERIOD**

September – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

*C. integra* is known from nine populations in six widespread localities. At Wagin the species is found growing in *Allocasuarina* woodland on shallow soils surrounding granite outcrops. In other localities it has also been found in open Jarrah-Marri-Wandoo woodland in shallow soils over laterite.

On a statewide basis *C. integra* is known from populations between York and Tenterden of which only five are in conservation reserves. Human activity and weed encroachment threaten most populations and in particular the larger populations which are not in conservation estate

**CONSERVATION STATUS**

Current: Declared Rare Flora<sup>#</sup>

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	October 1982	Ko	Kojonup	NR	2	Healthy, undisturbed
2	291090	Cb	Tenterden	NR	0	3 plants in Oct 1983
3	120988	Wa	Wagin	Various*	500+	Healthy
7	041089	Cb	Tenterden	NR	Nil	Site disturbed 1989
12	October 1983	Cb	Cranbrook	OCL	?	
13	291089	Cb	Tenterden	NR	430	Not recorded
14	011092	Ke	Nyabing	OCL	70	Healthy
15	011092	Ke	Nyabing	OCL	20	Healthy
16A	011092	Ke	Nyabing	OCL	9	Healthy
16B	011092	Ke	Nyabing	Railway	2	Healthy
17	071092	Ko	Kojonup	OCL	5	Healthy
18	231092	Ke	Nyabing	NR	4	Healthy

<sup>#</sup> now Priority 4 (updated at December 1999)

**RESPONSE TO FIRE**

Killed if burnt when above-ground parts are present (July-November).

**RESPONSE TO SOIL DISTURBANCE**

Killed No regeneration found two years after a known incident.

**SUSCEPTIBILITY TO WEED INVASION**

Suppresses growth, to exclusion stage in severe cases.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Flowering terminated.

**SALINITY EFFECTS**

Not known.

**MANAGEMENT**

	POPULATION NUMBER					
	1	2	3	7	12	13
LAND MANAGER NOTIFIED	X	X	(1)	X	?	X
UTILITIES Telstra	-	-	X	-	-	-
SECWA	-	-	X	-	-	-
WAWA	-	-	X	-	-	-
Other	-	-	(2)	(3)	-	-
ROAD MARKERS	-	-	X	-	-	-
FIREBREAK MARKERS	-	(8)	-	-	-	-
FENCING	-	-	-	-	-	-
FIRE MANAGEMENT	(4)	(4)(5)	(6)	(4)	-	(4)
WEED MANAGEMENT	-	-	(7)	-	-	-
DRAINAGE	-	-	-	(3)	-	-

	POPULATION NUMBER					
	14	15	16A	16B	17	18
LAND MANAGER NOTIFIED	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-
SECWA	-	-	-	-	-	-
WAWA	-	-	X	-	-	-
Other	-	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-	-
FIREBREAK MARKERS	-	-	-	X	-	-
FENCING	-	-	-	-	-	-
FIRE MANAGEMENT	-	(4)	(4)	(4)	(4)	(4)
WEED MANAGEMENT	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-

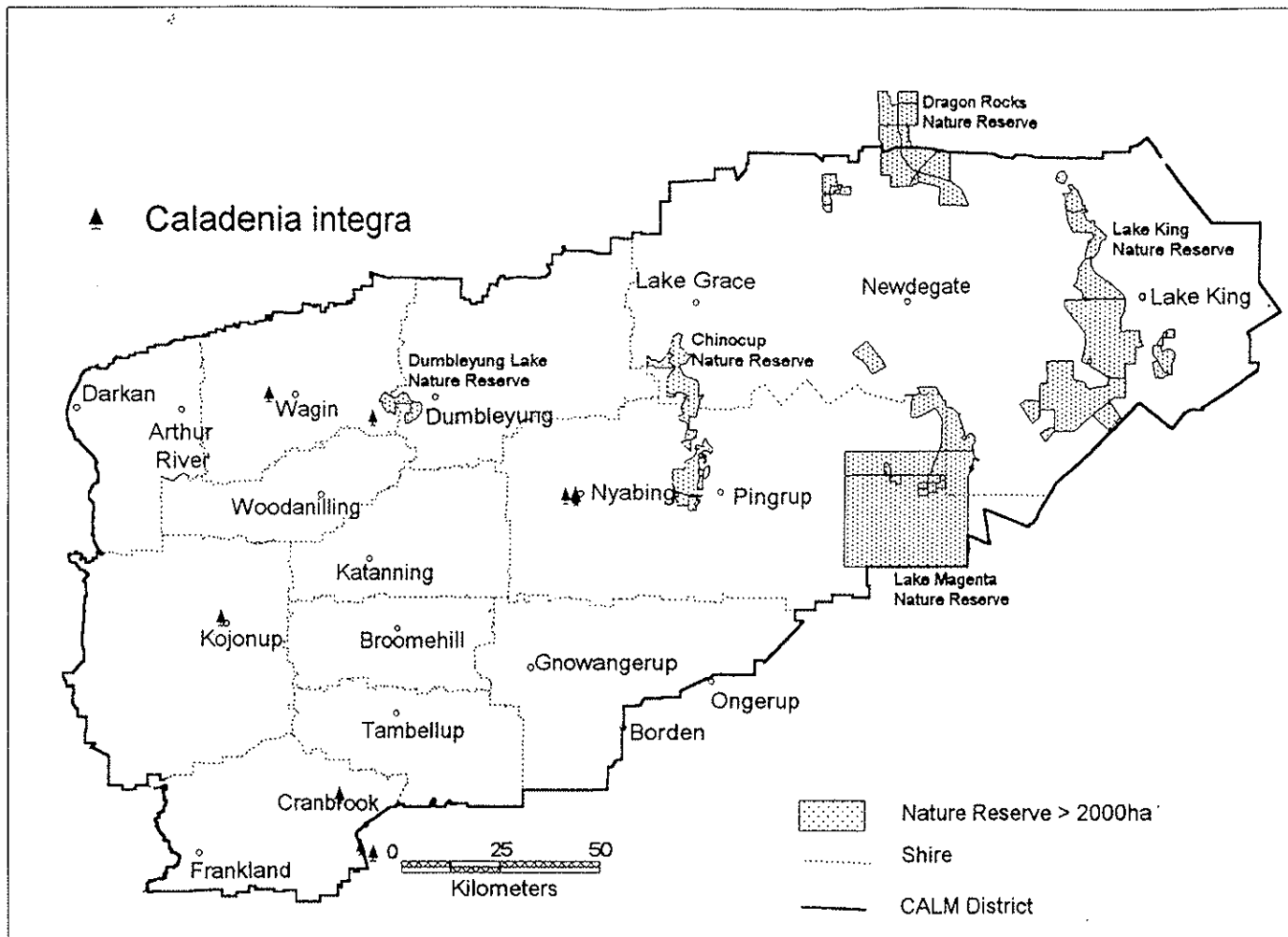
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) SHIRE OF WAGIN, SECWA, WAWA AND DOLA NOTIFIED
- (2) MRD, TELSTRA AND WAGIN SCOUTS AND GUIDES GROUP (AS HONORARY PARK MANAGERS) NOTIFIED CLOSE LIAISON TO BE MAINTAINED
- (3) SHIRE OF CRANBROOK NOTIFIED RE - LOADING RAMP AND ROAD DRAINAGE
- (4) LIAISON WITH RESEARCHERS NEEDED PRIOR TO ANY BURNING PROPOSALS POST-FIRE WEED PROBLEMS TO BE CONSIDERED
- (5) CLOSE LIAISON WITH SHIRE OF CRANBROOK AND TENTERDEN BUSHFIRE BRIGADE IN RESPECT TO TOWNSITE PROTECTIVE BURNING
- (6) LIAISE WITH SHIRE OF WAGIN AND BUSH FIRES BOARD IN RESPECT TO SHIRE FIRE PLAN
- (7) SOME SEVERE WEED INFESTATION, FIRE EXCLUSION TO BE CONSIDERED PENDING RESEARCH INTO WEED CONTROL
- (8) STANDARD MARKERS TO BE INSTALLED

### **RESEARCH REQUIREMENTS**

- Search for additional populations in conservation estate.
- Monitor known populations.
- Weed control.
- Optimum fire regimes.

### **REFERENCES**

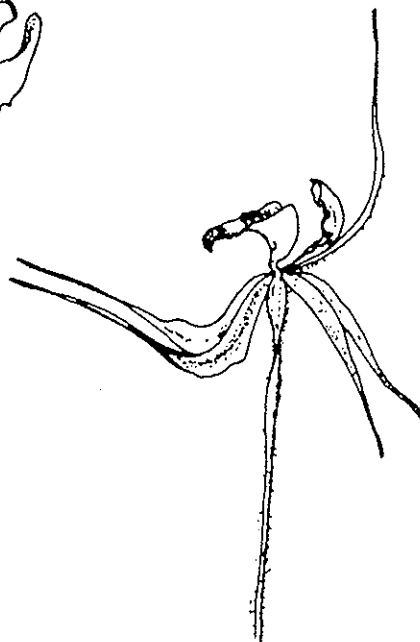
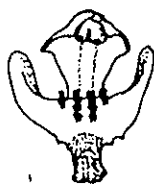
Coleman (1993), Erickson (1978), Hoffman and Brown (1984), Kelly *et al* (1990).



*Whole plant*

*Labellum (front view)*

*Flower with upswept lateral sepals*





*CALECTASIA ARNOLDII* K Dixon ms

**Family:** Dasypogonaceae (54C)

Quairading or Stilted Tinsel Lily

*Calectasia arnoldii* ms is closely related to the common *C grandiflora*. It is distinctive in its very erect growth, to 30 cm high, and numerous stilt roots, some projecting from upper branches.

### FLOWERING PERIOD

August - October

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Grows among Low Heath and Dwarf Scrub in white-yellow sand near Dragon Rocks.

### CONSERVATION STATUS

Current: Declared Rare Flora

### POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
3	091191	LG	Dragon Rocks	NR	?	Rare in vegetation association

### RESPONSE TO FIRE

Appears to be fire sensitive, and recruitment is from a soil seed bank (K. Dixon, pers. comm.).

### RESPONSE TO SOIL DISTURBANCE

Not known.

### SUSCEPTIBILITY TO WEED INVASION

Not known.

### SUSCEPTIBILITY TO DISEASE

Not known.

### RESPONSE TO GRAZING

Not known.

### SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER
	1
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	-
SECWA	-
WAWA	-
-	-
ROAD MARKERS	-
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	-
WEED MANAGEMENT	-
DRAINAGE	-

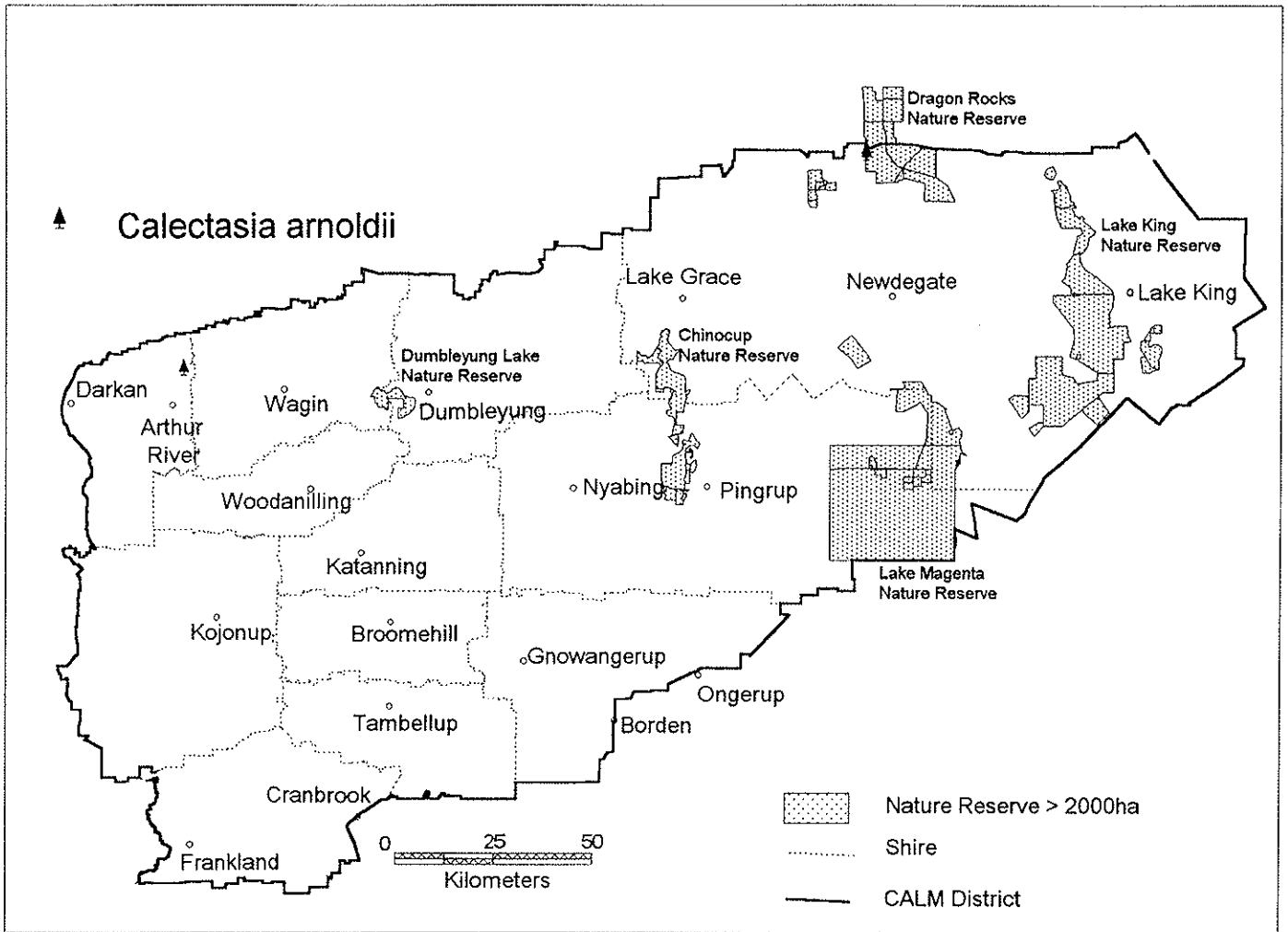
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

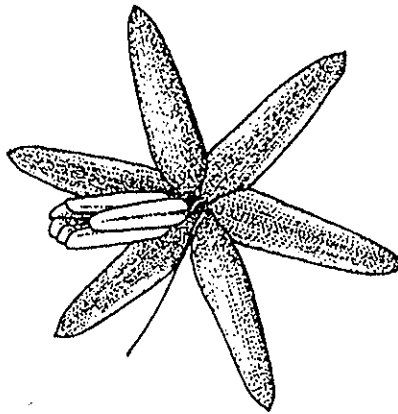
- Survey for additional populations.
- Confirm fire response.
- Life history.

## REFERENCES

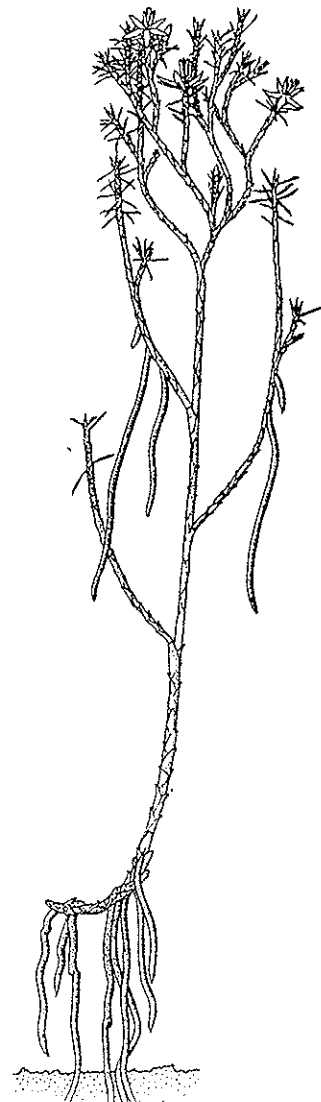
K. Dixon (pers. comm.).



*Open flower*



*Whole plant*



*CONOSTYLIS DRUMMONDII* Benth.

Family: Haemodoraceae (55)

Drummond's Conostylis

A tufted herb with erect, finely hairy, rounded leaves to 30 cm long, faintly blue-grey in appearance. The yellow flowers are characterised by having stamens at two levels.

### FLOWERING PERIOD

October – November.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Occurs in Banksia Woodlands on sandy soils in the Boscabel-Arthur River-Wagin area. Usually in association with *Banksia prionotes*, *B attenuata*, *Leptospermum erubescens* and *Regelia cymbifolia*. Only one of eight known populations is on a conservation reserve.

### CONSERVATION STATUS

Current: Declared Rare Flora.

### POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	021188	Wa	Wagin	NR	250+	Damage by rabbits
2A	191190	Ko	Boscabel	Road	26	Undisturbed
2B	191190	Ko	Boscabel	Road	4	Undisturbed
2C	261088	Ko	Boscabel	Private	ca 1000	Some disturbance
3	140289	Ko	Kojonup	OCL	50+	Grazing by kangaroos
4A	310389	Wo	Beaufort	Road	141	Minor grazing
4B	310389	Wo	Beaufort	OCL	125	by kangaroos
5	050789	Ko	Marribank	OCL	1	Undisturbed
6A	050789	Ko	Marribank	OCL	1	Undisturbed
6B-	120990	Ko	Marribank	OCL	18	Undisturbed
7	191191	Wo	Beaufort	OCL	230+	Some grazed by rabbits
8	151189	AW	Arthur River	Road	Nil	Population destroyed 8388
9	170892	AW	Chittinup	TR	25	Undisturbed

### RESPONSE TO FIRE

Not known.

### RESPONSE TO SOIL DISTURBANCE

Adult plants killed, variable seedling response noted: no seedlings at Population 8, good seedling regeneration at Population 2C.

### SUSCEPTIBILITY TO WEED INVASION

Not known.

## SUSCEPTIBILITY TO DISEASE

Not known. Resistance to *Phytophthora* sp reported in some *Conostylis* species (S.D. Hopper, pers. comm.).

## RESPONSE TO GRAZING

Able to withstand light grazing by kangaroos and rabbits.

## SALINITY EFFECTS

Not known

## MANAGEMENT

	POPULATION NUMBER				
	1	2A	2B	2C	3
LAND MANAGER NOTIFIED	X	X	X	X	(1)
UTILITIES Telstra	-	-	-	-	-
SECWA	-	X	X	X	-
WAWA	-	-	-	-	-
Other	(3)	-	-	-	-
ROAD MARKERS	-	X	(6)	-	-
FIREBREAK MARKERS	-	-	-	-	-
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-
DRAINAGE	-	-	-	-	-

	POPULATION NUMBER				
	4A	4B	5	6A	6B
LAND MANAGER NOTIFIED	X	?	(2)	(2)	(2)
UTILITIES Telstra	-	-	-	-	-
SECWA	-	-	-	-	-
WAWA	-	-	-	-	-
Other	-	(5)	(1)	(1)	(1)
ROAD MARKERS	-	-	-	-	-
FIREBREAK MARKERS	-	-	-	-	-
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-
DRAINAGE	-	-	-	-	-

	POPULATION NUMBER		
	7	8	9
LAND MANAGER NOTIFIED	X	X	X
UTILITIES Telstra	-	-	-
SECWA	-	-	-
WAWA	-	-	-
Other	(3)	-	-
ROAD MARKERS	-	-	-
FIREBREAK MARKERS	-	-	-
FENCING	(4)	-	-
FIRE MANAGEMENT	-	-	-
WEED MANAGEMENT	-	-	-
DRAINAGE	-	-	-

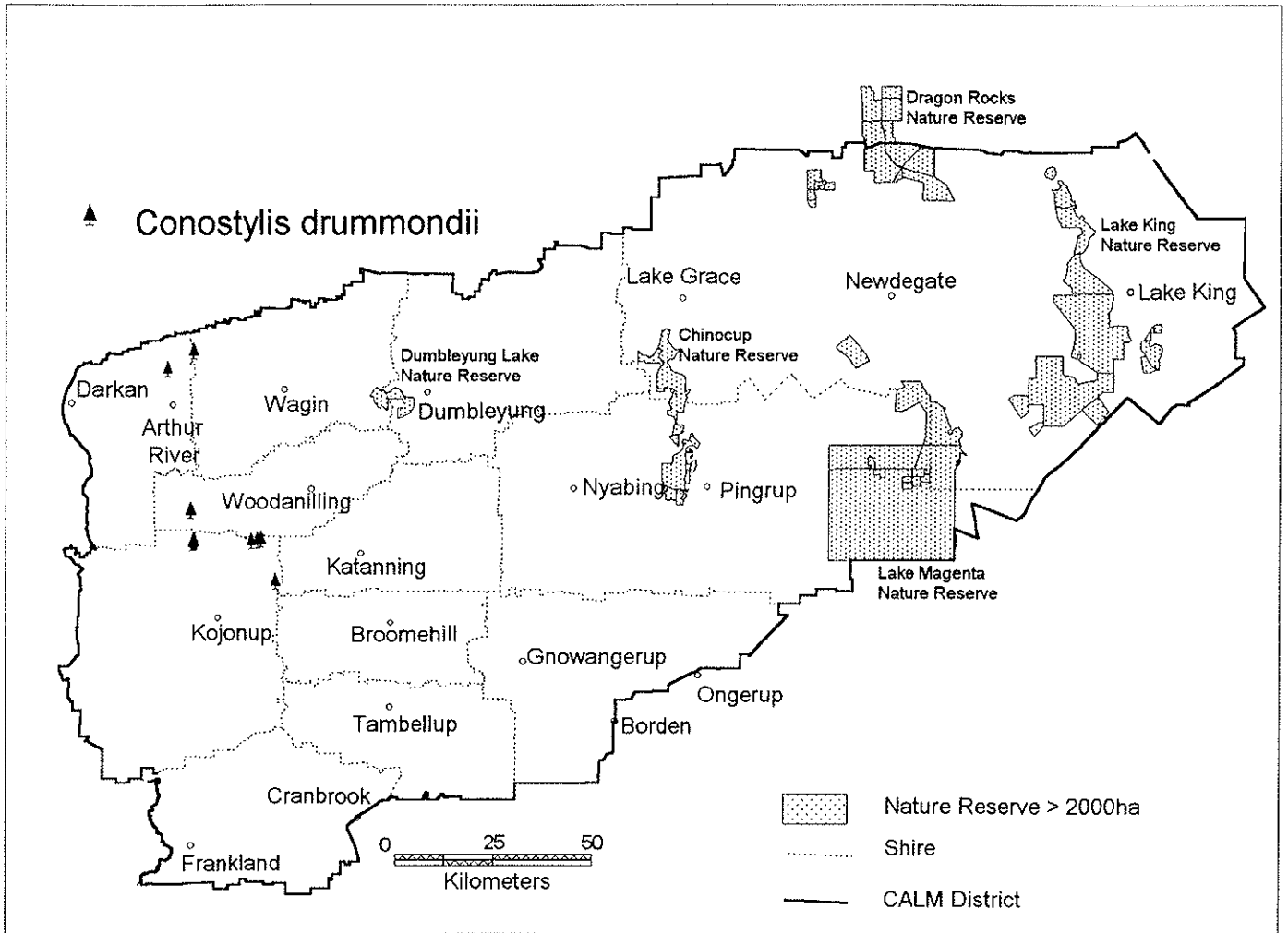
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) DOLA NOTIFIED
- (2) ABORIGINAL LANDS TRUST (VESTED AUTHORITY) AND SOUTHERN ABORIGINAL CORPORATION (Lessee) BOTH NOTIFIED
- (3) AGRICULTURE WA, MAINTAIN CLOSE LIAISON RE - RABBIT CONTROL
- (4) BUSH FIRES BOARD NOTIFIED, MAINTAIN CLOSE LIAISON WITH BOARD AND LOCAL AUTHORITY IN RESPECT TO FIRE CONTROL AT RUBBISH TIP
- (5) MRD NOTIFIED
- (6) STANDARD MAREKRS TO BE INSTALLED

#### RESEARCH REQUIREMENTS

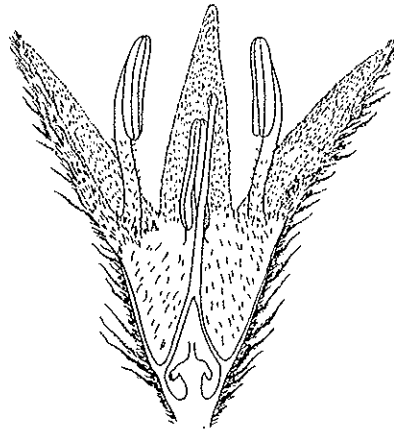
- Survey for additional populations on conservation reserves.
- Susceptibility to disease.
- Response to fire and optimum fire regimes.

#### REFERENCES

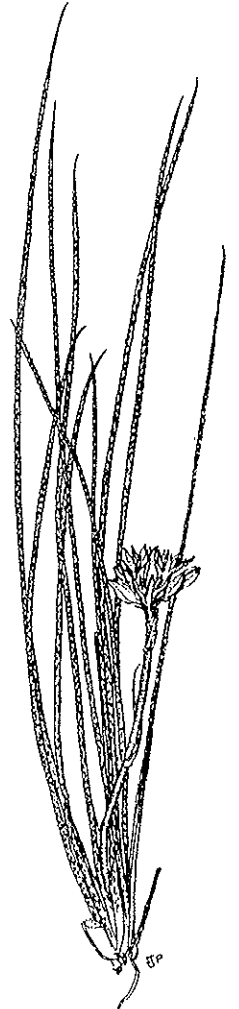
Hopper *et al* (1987), Hopper *et al* (1990).



*Cross section of open flower*



*Far Whole plant*



*Close up of hairy leaves*



**CONOSTYLIS SEORSIFLORA** F. Muell. **SUBSP TRICHOPHYLLA** Hopper

**Family:** Haemodoraceae (55)

Hairy Mat Conostylis

A prostrate, mat-forming herb with solitary flowers and flat, silvery-grey, densely hairy leaves up to 8 cm long.

**FLOWERING PERIOD**

October – November.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known from only one location in the Katanning District, a dual purpose Water and Flora reserve, which is not under CALM management. The plants are growing in grey-white sand in Mallee scrub. Only two populations known, the other being in the Narrogin District where plants occur in seasonally wet, sandy-loam. Not known from any conservation reserve.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2	290989	Du	Merilup	OCL*	6+	Undisturbed

**RESPONSE TO FIRE**

Not known. The subsp. subsp. *seorsiflora* has been reported as generating well after fire (S.D. Hopper pers. comm.).

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Tincurrin population recovered from heavy grazing in 1982 (L. Silvester pers. comm.).



## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER
	2
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	-
SECWA	-
WAWA	X
Other	-
ROAD MARKERS	-
FIREBREAK MARKERS	X
FENCING	-
FIRE MANAGEMENT	-
WEED MANAGEMENT	-
DRAINAGE	-

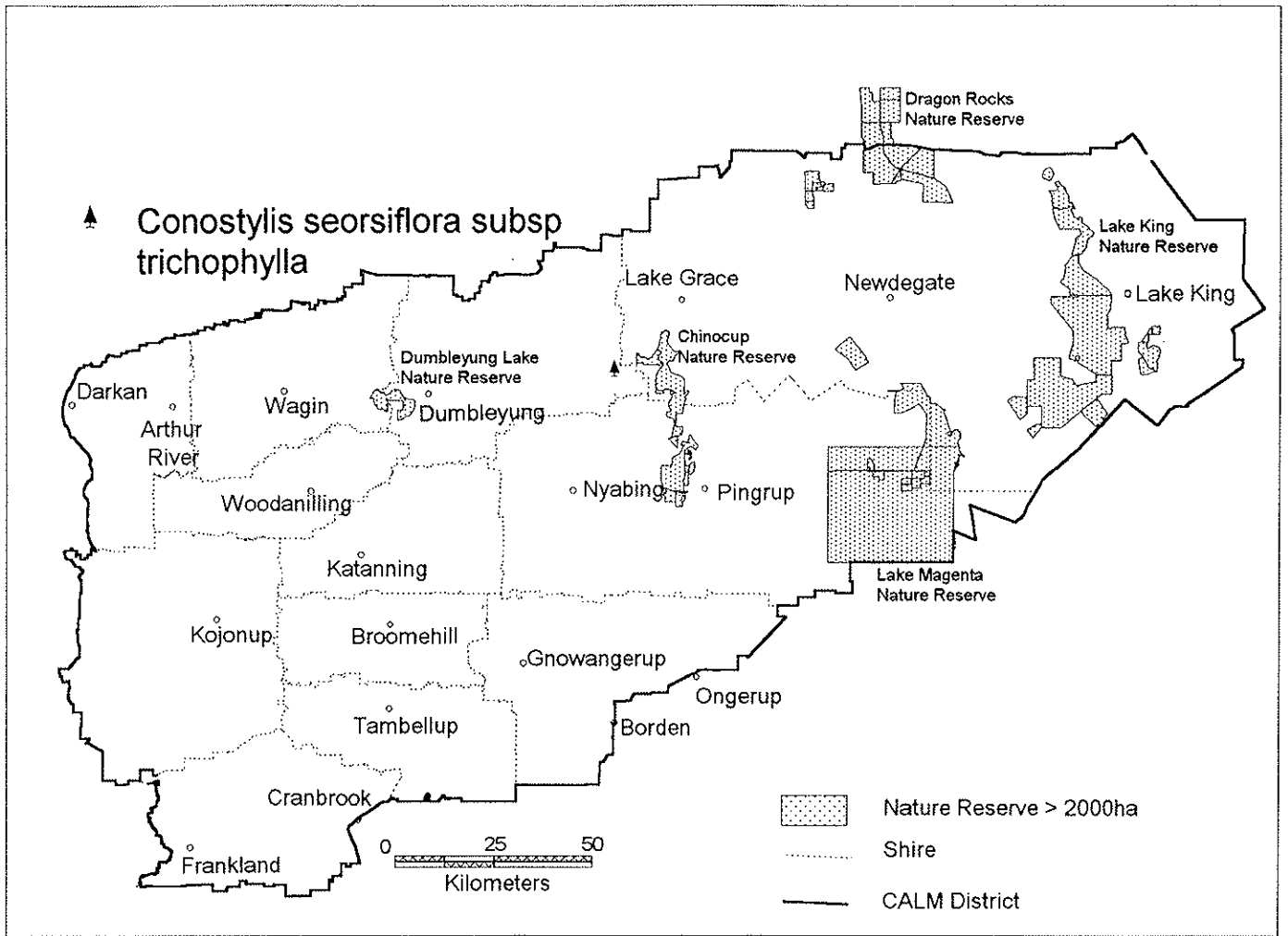
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

- Response to fire.
- Response to disturbance.
- Susceptibility to disease.
- Survey for further populations, particularly on conservation estate.

## REFERENCES

Patrick (1983), Hopper *et al* (1987), Hopper *et al* (1990).



*Whole plant*

*Stem*

*Open flower*



Boscabel Conostylis

A tufted herb with flat leaves to 30 cm high. Distinguished by shaggy hairs over the leaf surface which are white on new growth, aging to black.

**FLOWERING PERIOD**

October – November.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known from only a single locality where it grows in gravelly loam and sand in Jarrah-Wandoo open woodland and low heath. Not known to occur on any conservation estate.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	191190	Ko	Boscabel	Road	105	Undisturbed
1B	201088	Ko	Boscabel	Private	ca 1000	Some disturbance (approved)
1C	191190	Ko	Boscabel	OCL	15	Undisturbed
1D	220992	Ko	Boscabel	Road	2	Undisturbed
2	191190	Ko	Boscabel	VCL	50+	Undisturbed

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Some seedling regeneration noted in an area previously bulldozed.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER				
	1A	1B	1C	1D	2
LAND MANAGER NOTIFIED	(1)	X	(1)	X	(2)
UTILITIES Telstra	X	X	X	X	X
SECWA	X	X	X	X	X
WAWA	-	-	-	-	-
Other	-	-	-	-	(3)
ROAD MARKERS	X	-	-	(4)	-
FIREBREAK MARKERS	-	-	-	-	-
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-
DRAINAGE	-	-	-	-	-

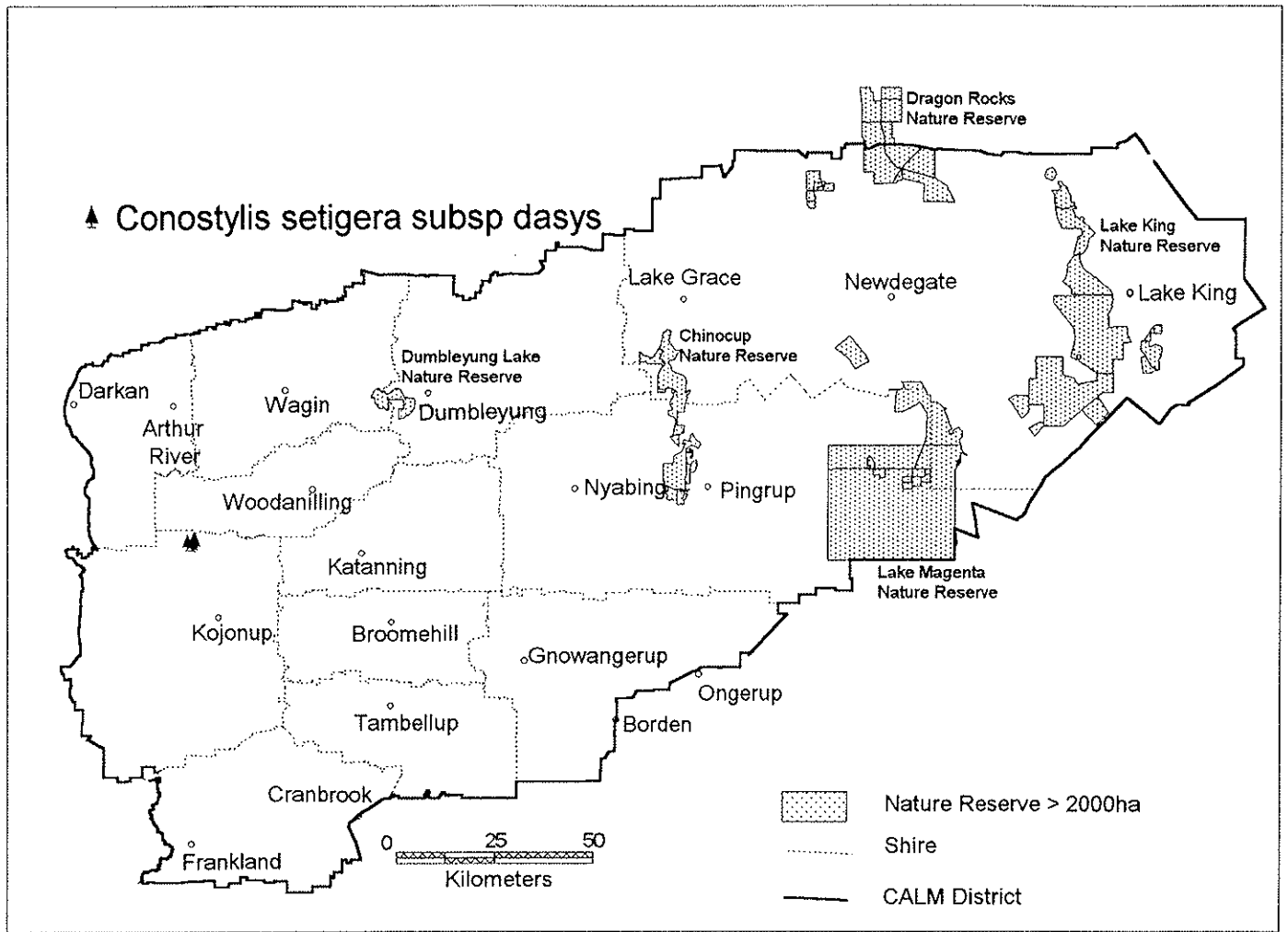
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MRD AND SHIRE OF KOJONUP
- (2) DOLA AND SHIRE OF KOJONUP
- (3) AWA NOTIFIED, NO RIPPING OF RABBIT WARRENS
- (4) STANDARD MARKERS TO BE INSTALLED

## RESEARCH REQUIREMENTS

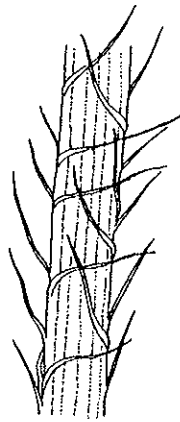
- Survey for additional populations.
- Response to fire and appropriate fire regime.
- Susceptibility to disease.
- Response to soil disturbance.

## REFERENCES

Hopper *et al* (1987), Hopper *et al* (1990).



*Hairy leaf*



*Typical whole plant*



**DRAKAEA** Lindl. *ISOLATA* Hopper and AP Brown ms

**Family:** Orchidaceae (66)

Chinocup Hammer Orchid

This *Drakaea* is an erect tuberous herb to 25 cm high arising from a single, heart-shaped, dull green basal leaf. The labellum, or “hammer”, is two-coloured and usually has two dark spots on its swollen section.

### FLOWERING PERIOD

September – October.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Known from only one location near Chinocup where it grows in white, sandy-clay in open Mallee and *Melaleuca* Scrub Heath.

### CONSERVATION STATUS

Current: Declared Rare Flora.

### POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	111089	Ke	Chinocup	NR	}	Undisturbed
1B	111089	Ke	Chinocup	VCL	}ca 500	Undisturbed

### RESPONSE TO FIRE

Not known.

### RESPONSE TO SOIL DISTURBANCE

Not known.

### SUSCEPTIBILITY TO WEED INVASION

Not known.

### SUSCEPTIBILITY TO DISEASE

Not known.

### RESPONSE TO GRAZING

Not known.

### SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER	
	1A	1B
LAND MANAGER NOTIFIED	X	(1)
UTILITIES Telstra	-	-
SECWA	-	-
WAWA	-	-
Other	(3)	(3)
ROAD MARKERS	(2)	(2)
FIREBREAK MARKERS	-	-
FENCING	-	-
FIRE MANAGEMENT	-	-
WEED MANAGEMENT	-	-
DRAINAGE	-	-

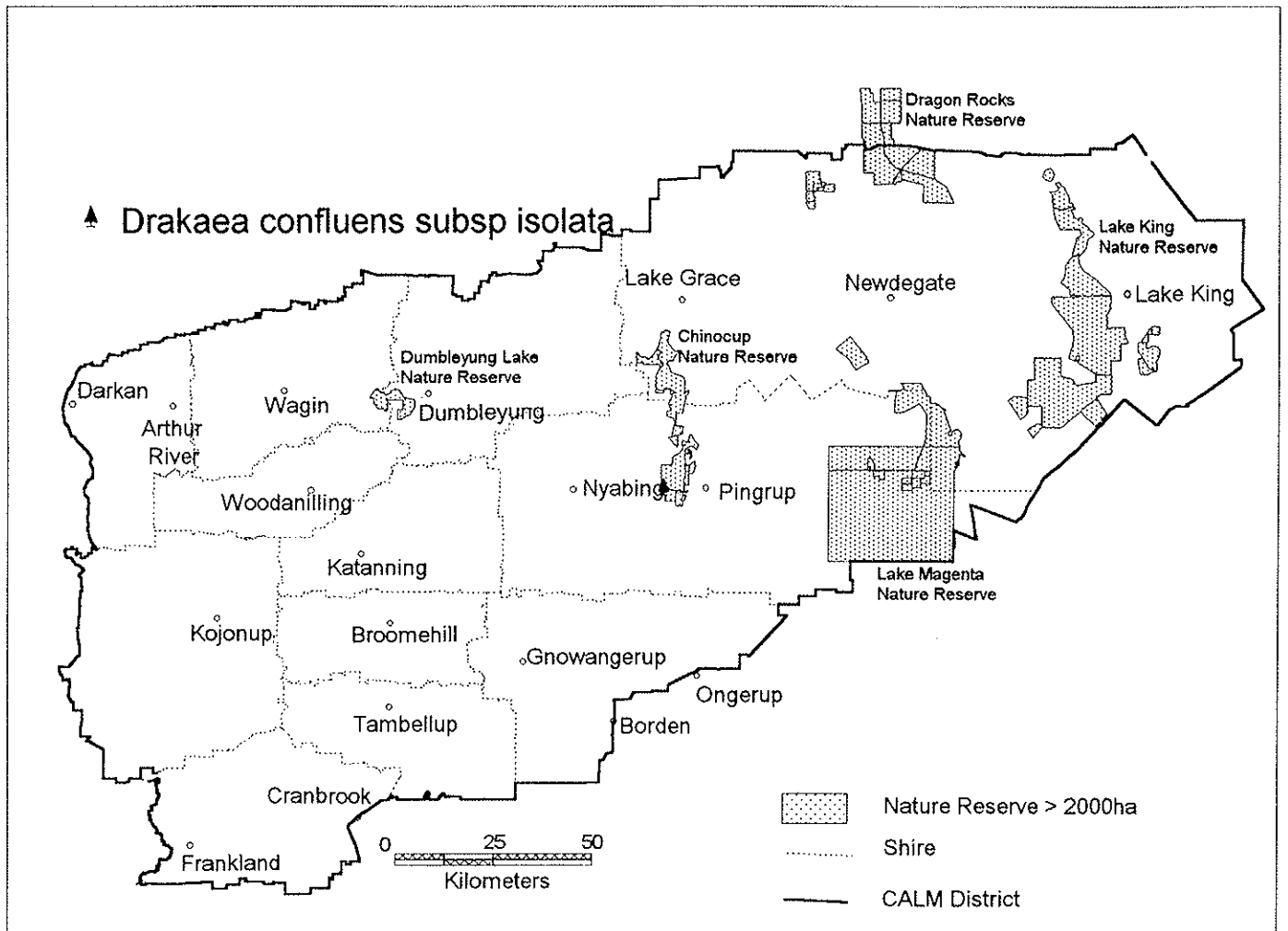
- NO ACTION REQUIRED
- X ACTION COMPLETED
- (1) SHIRE OF KENT
- (2) STANDARD MARKERS TO BE INSTALLED
- (3) DOLA NOTIFIED

## RESEARCH REQUIREMENTS

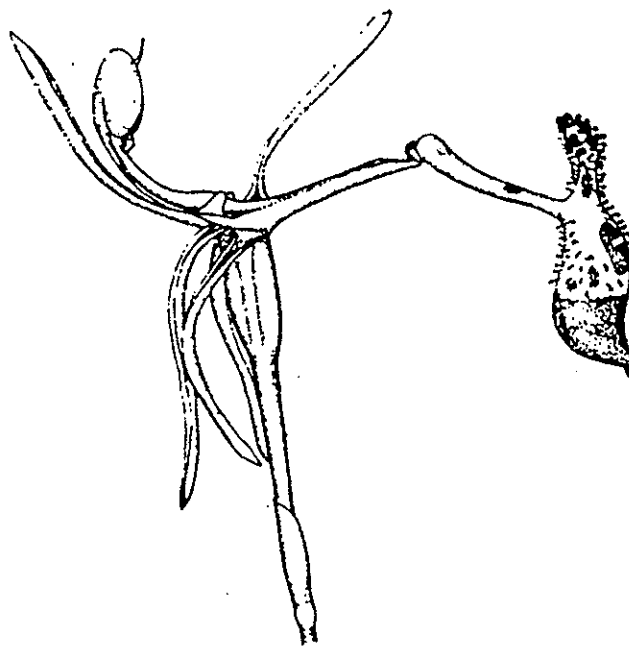
- Survey for additional populations.
- Response to fire.
- Response to disturbance.
- Susceptibility to disease.

## REFERENCES

Erickson (1978), Hopper *et al* (1990).



*Mature flower*



*Full mature plant*



*Mature leaf*





## Swollen or Bell Flowered Eremophila

Spreading erect shrub to 2 m high, hairless except for the flowers, the branches sparingly resinous and warty. Leaves are linear-oblongate, up to 3 cm long and 35 mm wide, with a blunt and sometimes shortly-hooked tip, narrowed at the base, stalkless or shortly-stalked, only the central vein conspicuous. Flowers are pale violet, borne singly or sometimes in pairs on slender, curving peduncles arising in the leaf axils. Each flower is shortly-tubular and more or less cup-shaped but much inflated at the base. Fruit ovoid, 0.3 x 0.25 cm, beaked, hairy.

**FLOWERING PERIOD**

May – December.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

One population near Lake King growing in brown clay-loam in Shrub Mallee of *Eucalyptus eremophila*, *E. pileata* and *E. calycogona*. Now known from five populations in the Wheatbelt Region including one in Katanning District.

**CONSERVATION STATUS**

Current: Declared Rare Flora<sup>#</sup>

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	180189	LG	Lake King	Private	Nil	15 plants in 1980 Land since cleared and developed
1B	180189	LG	Lake King	Road	13	Site disturbed 55 plants 3785

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

This species is favoured by physical disturbance, with known occurrences being on disturbed road verges and adjacent disturbed area. Species declines in other populations suggest that it is not a long lived taxon; perhaps up to ten years. Drought appears to be implicated in plant loss from population 3 (Merredin District).

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

<sup>#</sup> now Priority 4 (updated at December 1999)

## RESPONSE TO GRAZING

Not known.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER	
	IA	1B
LAND MANAGER NOTIFIED	*	X
UTILITIES Telstra	-	(1)
SECWA	-	(1)
WAWA	-	-
Other	-	-
ROAD MARKERS	-	X
FIREBREAK MARKERS	-	-
FENCING	-	-
FIRE MANAGEMENT	-	-
WEED MANAGEMENT	-	-
DRAINAGE	-	-

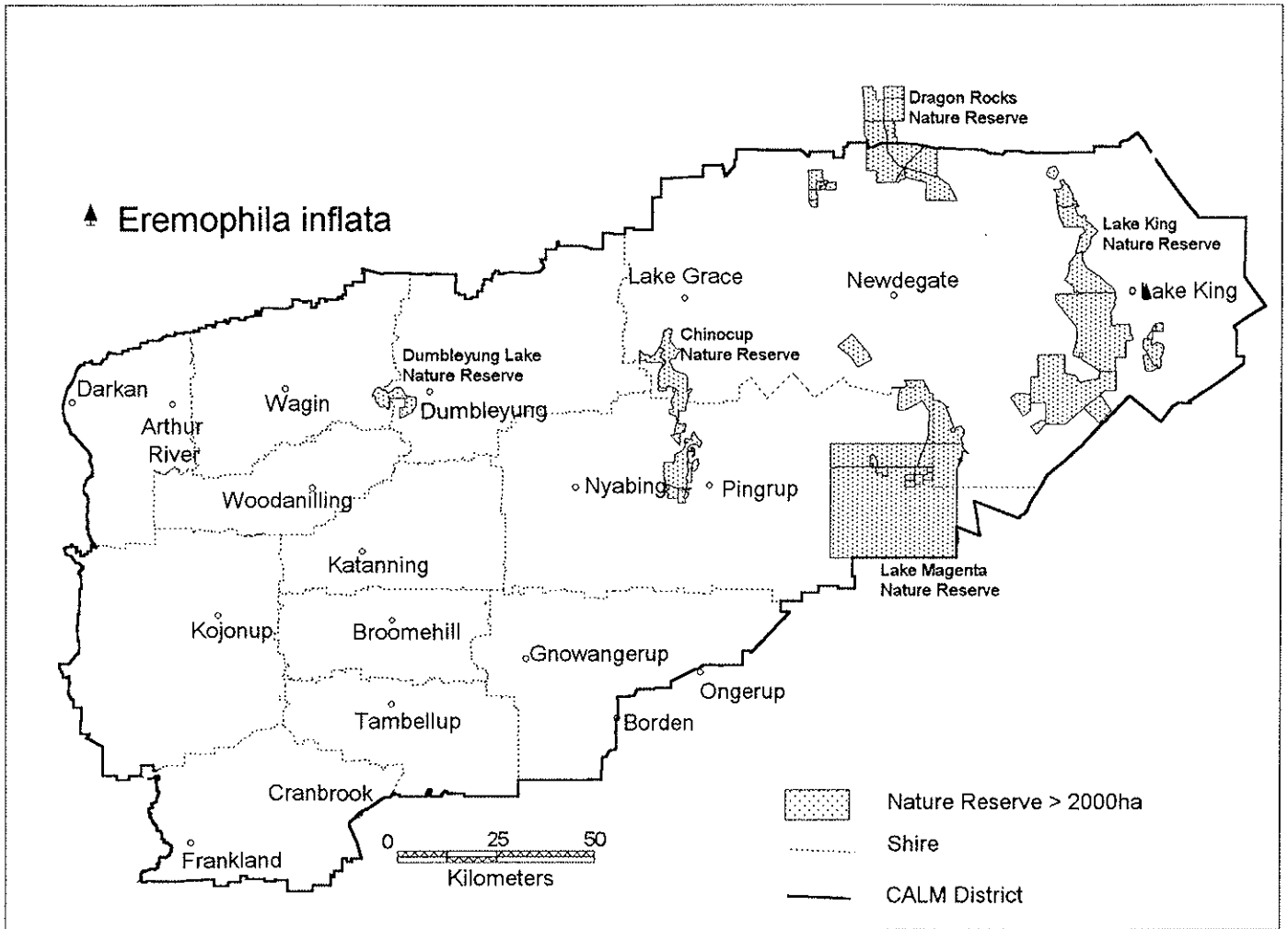
- NO ACTION NEEDED
- X ACTION COMPLETED
- \* SUB-POPULATION PRESUMED EXTINCT
- (1) SURVEY ON-SITE AND NOTIFY AS REQUIRED

## RESEARCH REQUIREMENTS

- Survey for further populations, particularly in conservation estate.
- Response to disturbance and recruitment patterns.
- Regular monitoring.

## REFERENCES

Gardner (1942), Leigh *et al* (1984), Patrick and Hopper (1982), Hopper *et al* (1990), Mollemans, *et al* (1993).



*Flower with reflexed calyx segments and inflated corolla*



*Branch with leaves and flowers*



**EREMOPHILA SUBTERETIFOLIA** RJ Chinnock ms

**Family:** Myoporaceae (326)

Lake King Eremophila

*Eremophila subteretifolia* ms is a prostrate, mat-like plant up to 10 cm high and 15 m in diameter. The erect, orange flowers emerge above the glossy, green leaves.

### FLOWERING PERIOD

July - March, possibly throughout the year.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Known from four populations at three localities in the Lake King area. A population in the Esperance District has not been sighted since 1968. The species grows in light, sandy-loams over clay under a range of *Eucalyptus* species.

### CONSERVATION STATUS

Current: Declared Rare Flora.

### POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	190989	LG	Pallerup	NR	12	Undisturbed
2	190989	LG	Pallerup	NR	6	Undisturbed
3	140290	LG	Dunn Rock	NR	6	Disturbed site
4	060690	LG	Lake Ace	NR	3	Disturbed site

### RESPONSE TO FIRE

Not known.

### RESPONSE TO SOIL DISTURBANCE

Probable disturbance opportunist.

### SUSCEPTIBILITY TO WEED INVASION

Not known.

### SUSCEPTIBILITY TO DISEASE

Not known.

### RESPONSE TO GRAZING

Not known.

### SALINITY EFFECTS

Not known, occurs in slightly saline soils.

## MANAGEMENT

	POPULATION NUMBER			
	1	2	3	4
LAND MANAGER NOTIFIED	X	X	X	X
UTILITIES Telstra	-	-	-	-
SECWA	-	-	-	-
WAWA	-	-	-	X
Other	(1)	-	-	-
ROAD MARKERS	X	-	-	-
FIREBREAK MARKERS	-	-	X	-
FENCING	-	-	-	-
FIRE MANAGEMENT	-	-	-	-
WEED MANAGEMENT	-	-	-	-
DRAINAGE	-	-	-	-

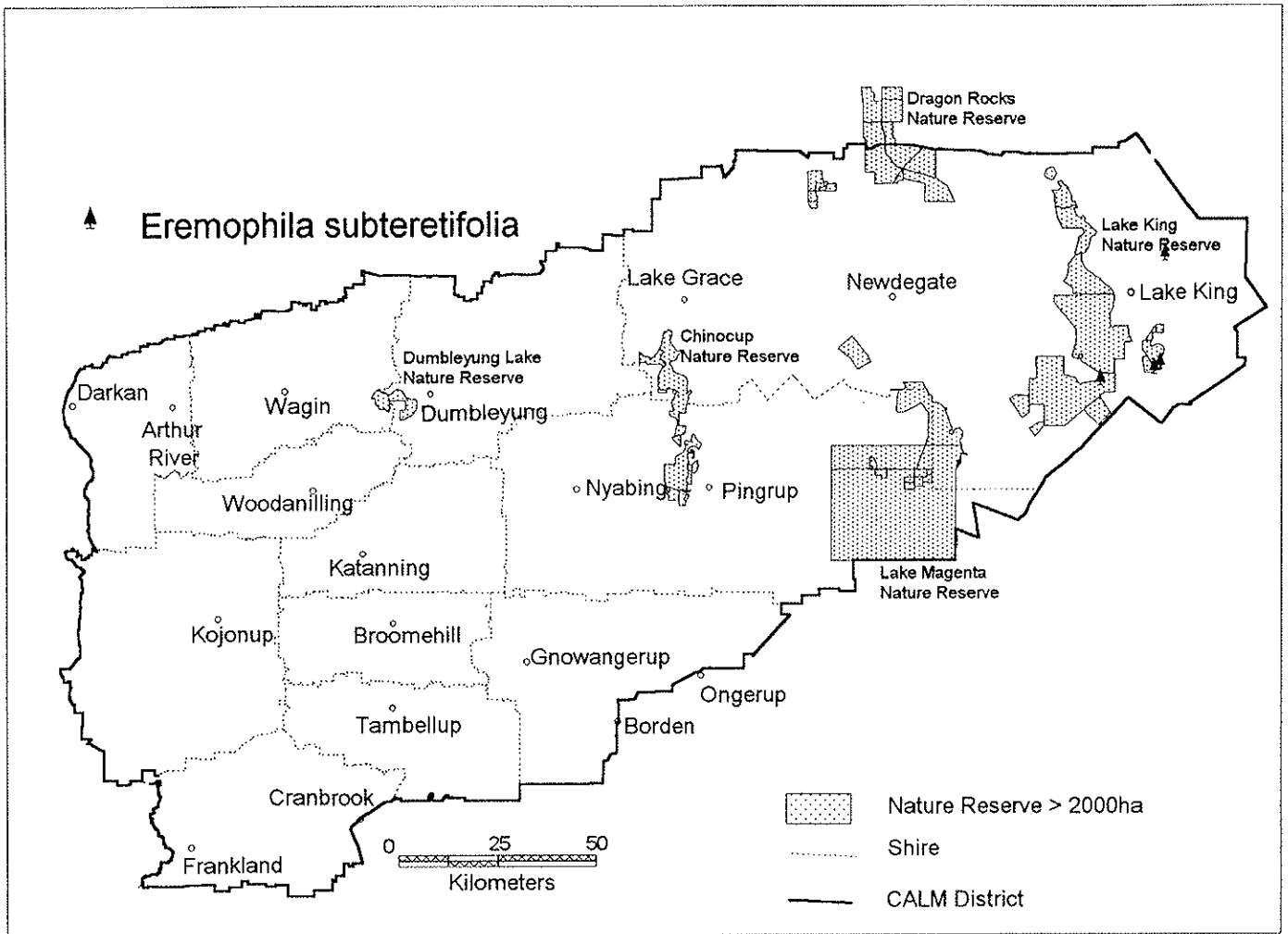
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) SHIRE OF LAKE GRACE AND MRD

## RESEARCH REQUIREMENTS

- Survey for further populations.
- Examine response to disturbance.

## REFERENCES

Hopper *et al* (1980).



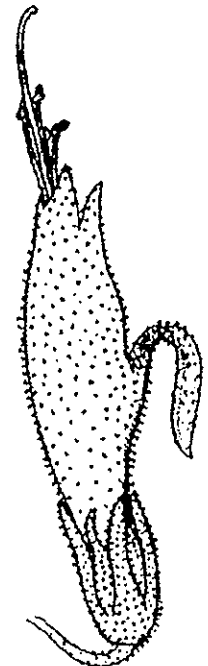
*Leaf form*



*Mature Flower*



*Branch form*



*EREMOPHILA VENETA* RJ Chinnock ms

**Family:** Myoporaceae (326)

Metallic-flowered Eremophila

*Eremophila veneta* ms is a low, open shrub to 60 cm high and up to 1 m in diameter. Branches are glandular-resinous bearing densely-clustered, oblanceolate leaves. The singular flowers are blue-green with a distinctive metallic sheen on the upper surface.

#### **FLOWERING PERIOD**

October – December.

#### **DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known from only one small population on a white, sandy-clay flat where it grows amongst open *Melaleuca* scrub. A total of three populations at two locations in the Newdegate -Kondinin area with two populations on a conservation reserve. Populations at Kondinin occur in *Eucalyptus annulata* Woodland.

#### **CONSERVATION STATUS**

Current: Declared Rare Flora.

#### **POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	27/12/90	LG	Buniche	Railway	6	Undisturbed, under threat from salinity encroachment

#### **RESPONSE TO FIRE**

Not known.

#### **RESPONSE TO SOIL DISTURBANCE**

Not known.

#### **SUSCEPTIBILITY TO WEED INVASION**

Not known.

#### **SUSCEPTIBILITY TO DISEASE**

Not known.

#### **RESPONSE TO GRAZING**

Not known.

#### **SALINITY EFFECTS**

Not known, but possibly adversely affected.

## MANAGEMENT

	POPULATION NUMBER
	1
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	X
SECWA	X
WAWA	-
Other	-
ROAD MARKERS	X
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	(1)
WEED MANAGEMENT	-
DRAINAGE	(2)

- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) WESTRAIL ADVISED TO EXCLUDE BURNING IN THIS AREA MAINTAIN CLOSE LIAISON WITH WESTRAIL AND LOCAL BFB VOLUNTEERS

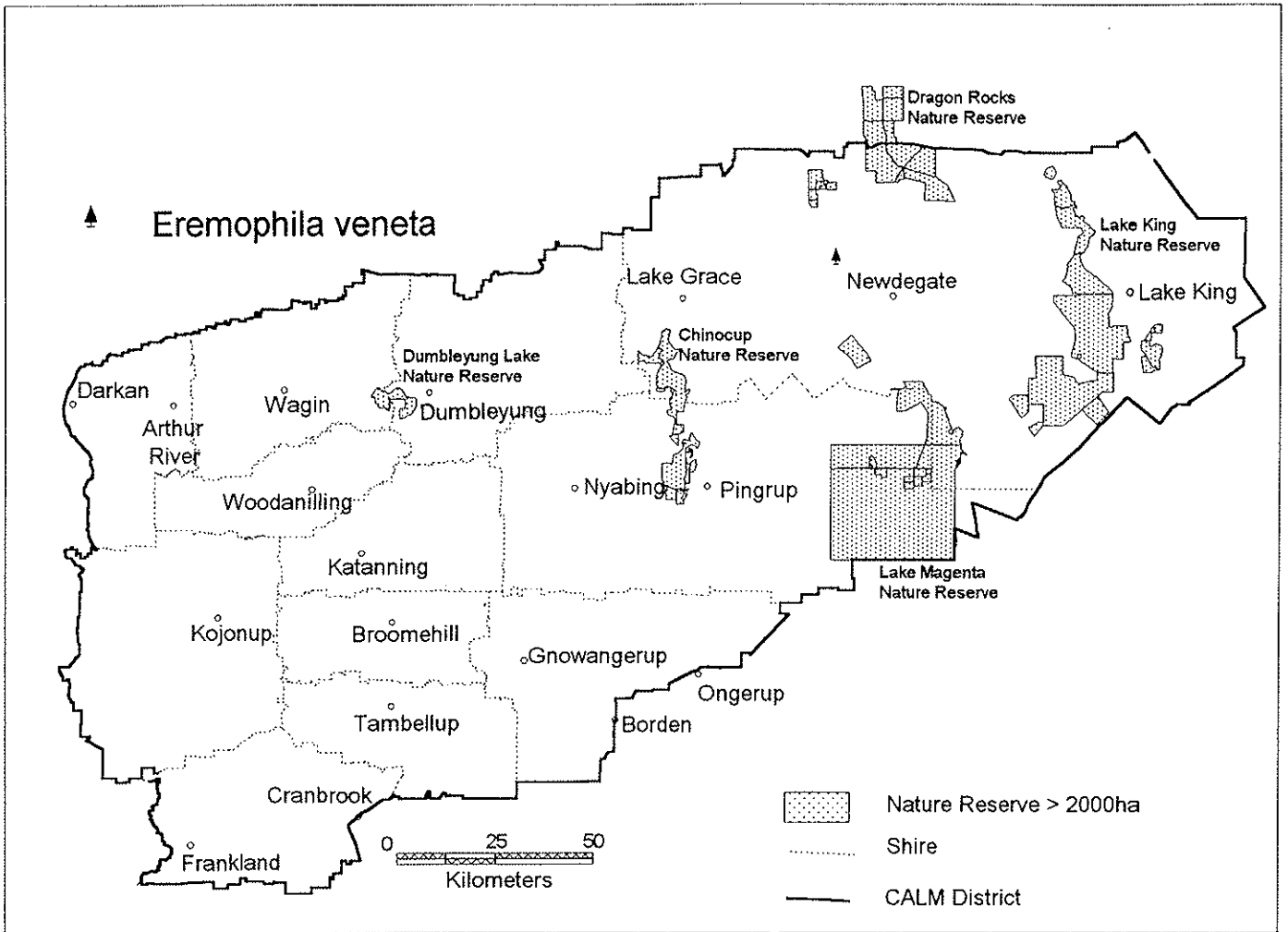
## RESEARCH REQUIREMENTS

- Survey for additional populations.
- Ecology, including response to fire, etc.

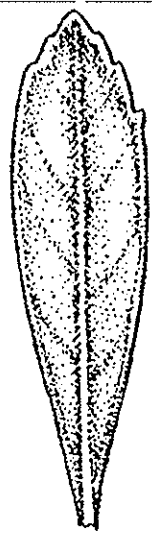
## REFERENCES

Hopper *et al* (1990).

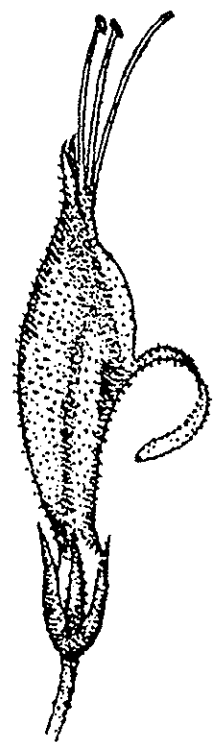




*Leaf Shape*



*Mature Flower*



*Branch form*



**Whorled Eremophila**

Recognised by its strong, slightly offensive odour, *E verticillata* is a low shrub with erect branches to 1 m high and sometimes spreading to 80 cm in width. The branches are covered with narrow, closely appressed leaves in whorls of 3, although the lower section of the branches may be bare on older plants. Solitary violet flowers have a white interior with purple spots.

**FLOWERING PERIOD**

October – January.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Formerly known from 5 populations of which at least 2 were destroyed by land clearing. Now known from only two populations near Lake Cobham where it grows in powdery, brown loam in woodland of *Eucalyptus longicornis* and *E flocktoniae*. Not known to occur on any conservation reserve

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	140591	LG	Lake Cobham	VCL	18	Numbers declining
2	140591	LG	Lake Cobham	VCL	ca 2000	Healthy
3	291287	LG	Lake Cobham	VCL	Nil	3 Plants in 1980
5	130187	LG	Newdegate	Road	Nil	Area cleared pre-1980, last seen 1968

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Dense regeneration after soil disturbance in some instances, however populations have been destroyed by repeated disturbance.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not grazed when occasionally accessible to sheep.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER			
	1	2	3	5
LAND MANAGER NOTIFIED	(1)(2)	(2)(3)(4)	(2)(3)	-
UTILITIES Telstra	-	-	-	-
SECWA	-	-	-	-
WAWA	-	-	-	-
Other	(5)(6)	(5)	(5)	-
ROAD MARKERS	X	-	-	-
FIREBREAK MARKERS	-	-	-	-
FENCING	(7)	-	-	-
FIRE MANAGEMENT	-	-	-	-
WEED MANAGEMENT	-	-	-	-
DRAINAGE	-	-	-	-

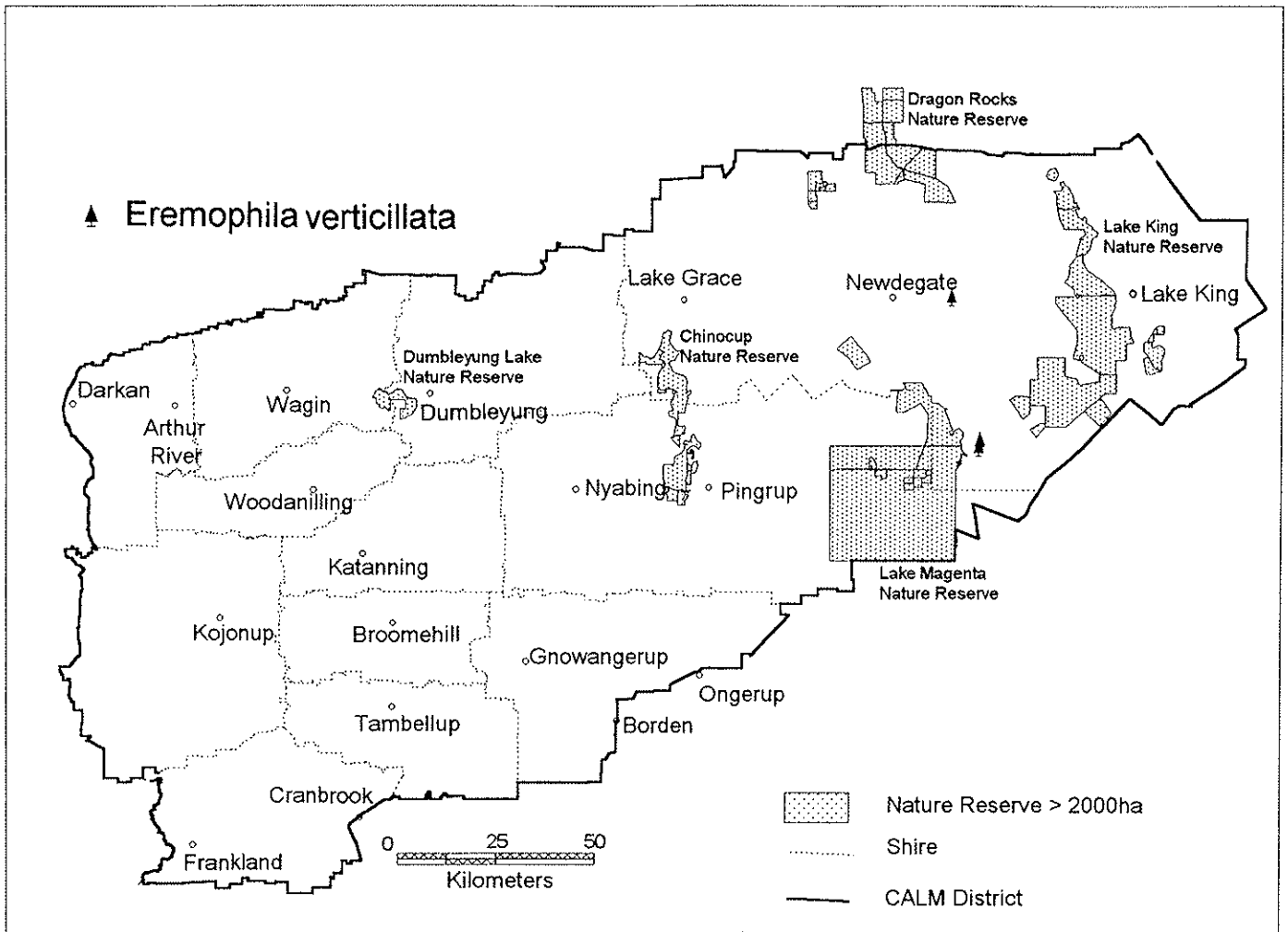
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) DOLA AND SHIRE OF LAKE GRACE NOTIFIED
- (2) J WATTERS NOTIFIED RE - GRAZING LEASE (LEASE EXPIRED 1989)
- (3) DOLA NOTIFIED
- (4) KP GREEN NOTIFIED RE - MINING LEASE
- (5) DIRECTOR GENERAL OF MINES NOTIFIED
- (6) MRD NOTIFIED
- (7) REVIEW REQUIREMENT FOR FENCING ANNUALLY

## RESEARCH REQUIREMENTS

- Continue surveys for further populations.
- Response to disturbance, including fire, and recruitment patterns.

## REFERENCES

Chinnock (1985), Hopper *et al*(1990).



*Mature flower*



*Close appressed leaves*



*Branch form*



Granite Mallee

*Eucalyptus olivacea* is a tall smooth-barked erect mallee to 7 m with olive-green shiny leaves to 12 cm long by 25 cm wide, horn-shaped buds up to 38 cm long by 06 cm in diameter, and hemispherical to cupular fruit to 7 mm long by 9 mm in diameter.

**FLOWERING PERIOD**

November – December.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known only from the Katanning District, north of Lake Grace where it occurs as small populations in shallow, sandy soil on the edge of large granite outcrops.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	251191	LG	Dragon Rocks	NR	ca 47	Undisturbed
2A	251191	LG	Dragon Rocks	NR	ca 41	Undisturbed
2E	200991	LG	Dragon Rocks	NR	ca 14	Undisturbed
3	090792	LG	Pingaring	Private	ca 37	Undisturbed
4	300988	LG	Pingaring	NR	ca 100	Undisturbed
5	300998	LG	Pingaring	NR	30+	Undisturbed
6	271191	LG	Dragon Rocks	NR	9	Undisturbed
7	181191	LG	Dragon Rocks	NR	2	Undisturbed

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER							
	1	2A	2B	3	4	5	6	7
LAND MANAGER NOTIFIED	X	X	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-	-	-
SECWA	-	-	-	-	-	-	-	-
WAWA	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-	-	-	-
FIREBREAK MARKERS	(2)	-	-	-	-	-	-	-
FENCING	-	-	-	-	-	-	-	-
FIRE MANAGEMENT	(1)	(1)	(1)	-	(1)	(1)	(1)	(1)
WEED MANAGEMENT	-	-	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-	-	-

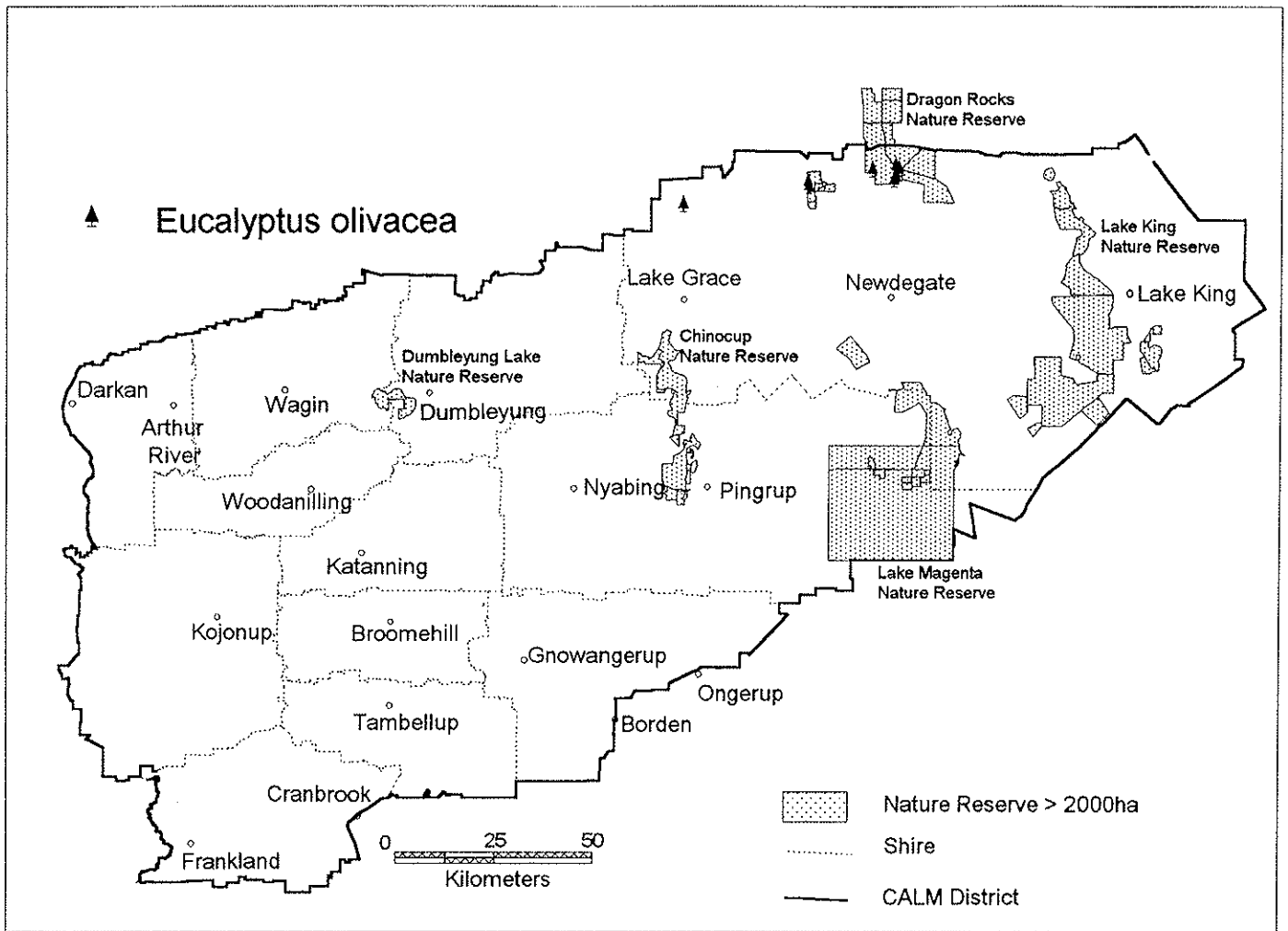
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) EXCLUDE FROM PRESCRIBED BURNS UNTIL FIRE RESPONSE KNOWN AVOID USE OF MACHINERY IN FIRE SUPPRESSION
- (2) INSTALL STANDARD MARKERS

## RESEARCH REQUIREMENTS

- Response to fire and optimum fire regimes.
- Response to disturbance.

## REFERENCES

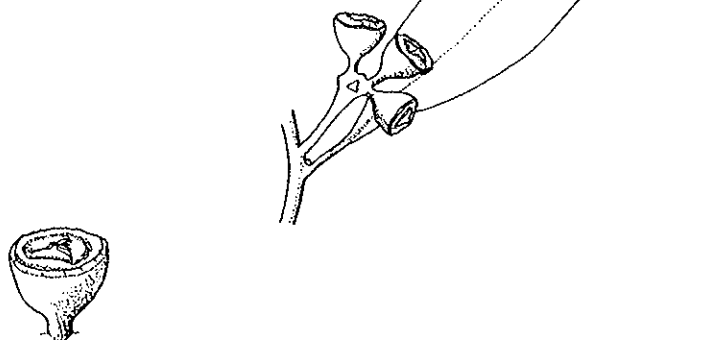
Brooker and Kleinig (1990), Hopper *et al* (1990), Napier *et al* (1987).



*Mature leaves and immature buds*



*Fruit capsules*



## Varied-leaf Grevillea

*Grevillea cirsiifolia* was described and named by Meissner in 1848 from an earlier collection made by Drummond. It is a prostrate shrub with few branches and narrow, erect leaves up to 20 cm long it is covered with short hairs, particularly on the young growth and underside of the leaves. Leaf margins are entire, toothed or deeply divided and are rolled under slightly. Numerous small, pale yellow flowers, up to 05 cm long, are arranged loosely along erect, leafless stalks. The perianth tube is hairy inside and the glabrous stigma is thick but flattened. Fruits (1 cm X 08 cm) are rather flat.

**FLOWERING PERIOD**

September -- December.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

*Grevillea cirsiifolia* has been recorded from two localities in the Katanning District, both on road verges, however the species has not been found at either site since 1968 and 1976 respectively. The 1968 site was found to be highly degraded and the species has been considered as extinct at this site since 1990. Known from 25 populations between Jarrahdale, Darkan and Denmark with most of these occurring in State forest.

**CONSERVATION STATUS**

Current: Declared Rare Flora.<sup>#</sup>

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
6	310190	Ko	Kojonup	Road	Nil	Site undisturbed and long unburnt Last collected 2461976 Highly degraded Population extinct last collected 1968
7	310190	AW	Arthur River	Road	Nil	

**RESPONSE TO FIRE**

Appears to be a resprouter in southern forest areas and a seeder in northern forest.

**RESPONSE TO SOIL DISTURBANCE**

Not known. Although found growing on a disturbed road verge near Manjimup the species was eliminated at the Arthur River site.

<sup>#</sup> now Priority 4 (updated at December 1999)



## SUSCEPTIBILITY TO WEED INVASION

Not known.

## SUSCEPTIBILITY TO DISEASE

Not known. Members of this genus are generally susceptible to *Phytophthora* species.

## RESPONSE TO GRAZING

Not known to be grazed, spiny leaves may deter herbivores.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

Nil, pending confirmation of the Kojonup population or discovery of new populations.

## RESEARCH REQUIREMENTS

- Survey of suitable habitats in the District.
- Fire response and optimum fire regimes.

## REFERENCES

Bentham (1870), Rye and Hopper (1981), Kelly *et al* (1990).

*Branch form with  
flowers*



***GREVILLEA FLEXUOSA*** (Lindl) Meisn

**Family:** Proteaceae (90)

Tangled Grevillea

*Grevillea flexuosa* is a more or less prostrate hairless shrub to 30 cm high and 70 cm in diameter, with trailing elongated tangled branches. Greyish-green leaves are up to 15 cm long and are deeply divided into 8-12 (or more) well-spaced leaflets. The flowers are pink, somewhat loosely arranged in cylindrical racemes 25-4 cm long.

#### **FLOWERING PERIOD**

October – January.

#### **DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Collection sites reputed on lateritic soils in woodlands between Kojonup and Wagin have not been confirmed in recent years. Also occurs near Gidgegannup in the Swan Region.

#### **CONSERVATION STATUS**

Current: Declared Rare Flora.

#### **POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Nil.

#### **RESPONSE TO FIRE**

Not known.

#### **RESPONSE TO SOIL DISTURBANCE**

Not known.

#### **SUSCEPTIBILITY TO WEED INVASION**

Not known.

#### **SUSCEPTIBILITY TO DISEASE**

Not known.

#### **RESPONSE TO GRAZING**

Not known.

#### **SALINITY EFFECTS**

Not known.

## MANAGEMENT

Nil, pending rediscovery in Katanning District.

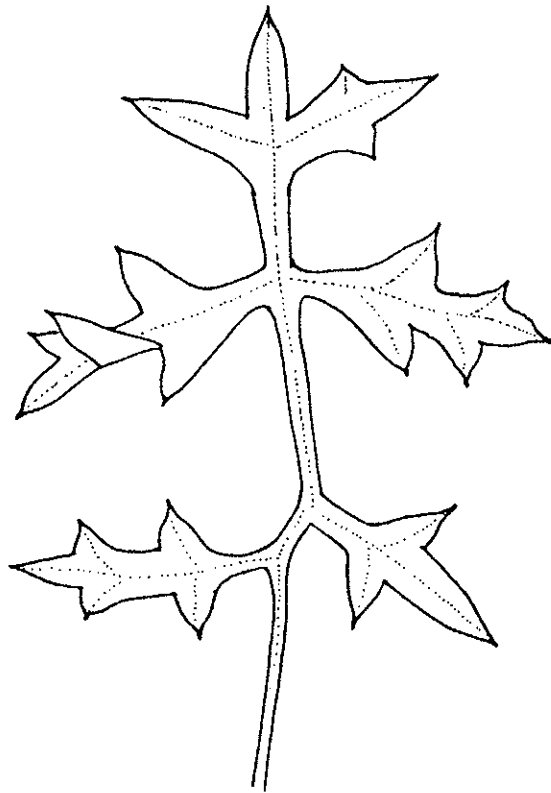
## RESEARCH REQUIREMENTS

- Review collections and re-survey sites.

## REFERENCES

Bentham (1880), Leigh, J. *et al* (1984).

*Mature leaf shape*



## Pink Bract Grevillea

*Grevillea involucrata* is a spreading shrub up to 50 cm high and 2 m in diameter with hairy branches and deeply divided leaves to 3 cm long. The 15-30 leaf segments, usually 05 cm long, have margins curled under towards a prominent, central vein. Clusters of 1-3 deep-pink flowers with a whorl of deep-pink persistent bracts are distinctive.

## FLOWERING PERIOD

June – November.

## DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Between Pingaring and Lake Magenta-Dunn Rock where it occurs in open heath growing in white sand over laterite. Known from 16 populations, with only 2 populations having more than 50 plants. Of the 5 populations on conservation reserves, only one contains more than 20 plants.

## CONSERVATION STATUS

Current: Declared Rare Flora.

## POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	020288	LG	Lockhart	Road	1	20 plants in 1985, road graded
2	200587	LG	Lockhart	Road	6	15-20 plants in 1985, road graded
3A	040889	LG	Lockhart	Road	1	3 plants in 1987
3B	040889	LG	Lockhart	Road	1	
3C	040889	LG	Lockhart	Road	2	8 plants in 1985
4	020288	Ke	Lockhart	Road	5	ca 12 plants in 1985
5	210889	LG	Lockhart	Road	1	
6A	150885	LG	Lockhart	Road	3	
6B	210685	LG	Lockhart	Road	2	
7	200591	Ke	Lockhart	Private	78	Population fenced
8	281287	Ke	Magenta	Road	23	Healthy
9	160588	Ke	Magenta	Private	6	Healthy
10	040889	LG	Lockhart	Road	1	Healthy
11A	261089	LG	Dunn Rock	Private	64	Population fenced
11B	261089	LG	Dunn Rock	NR	64	Healthy
12	020290	LG	Dunn Rock	NR	14	Healthy
13	120292	Ke	Lockhart	Road	1	Healthy
16	291091	LG	Pingaring	NR	9	

## RESPONSE TO FIRE

Regenerates from root stock and seed following late summer-autumn fires.

## RESPONSE TO SOIL DISTURBANCE

Known to become established on road verges and firebreaks; seedlings and immature plants killed by subsequent disturbance within 4 years (minimum).

## SUSCEPTIBILITY TO WEED INVASION

Not known.

## SUSCEPTIBILITY TO DISEASE

Not known.

## RESPONSE TO GRAZING

Epicormic regrowth noted after light browsing by sheep. Readily grazed by livestock.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER								
	1	2	3A	3B	3C	4	5	6A	6B
LAND MANAGER NOTIFIED	X	X	X	X	X	X	X	X	X
UTILITIES Telstra	-	-	X	X	X	-	-	-	-
SECWA	-	-	X	X	X	-	-	-	-
WAWA	-	-	-	-	-	-	-	-	-
Other	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
ROAD MARKERS	(2)	(2)	X	X	X	X	(2)	(2)	(2)
FIREBREAK MARKERS	-	-	-	-	-	-	-	-	-
FENCING	-	-	-	-	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-	-	-	-

	POPULATION NUMBER								
	7	8	9	10	11 A	11 B	12	13	16
LAND MANAGER NOTIFIED	X	X	X	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-	-	-	-
SECWA								-	-
WAWA	-	-	-	-	-	-	-	-	-
Other	-	(1)	-	(1)	-	-	-	-	-
ROAD MARKERS	-	X	-	X	-	-	-	X	-
FIREBREAK MARKERS	-	-	-	-	-	X	X	-	(2)
FENCING	X	-	X	-	X	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-	-	-	-

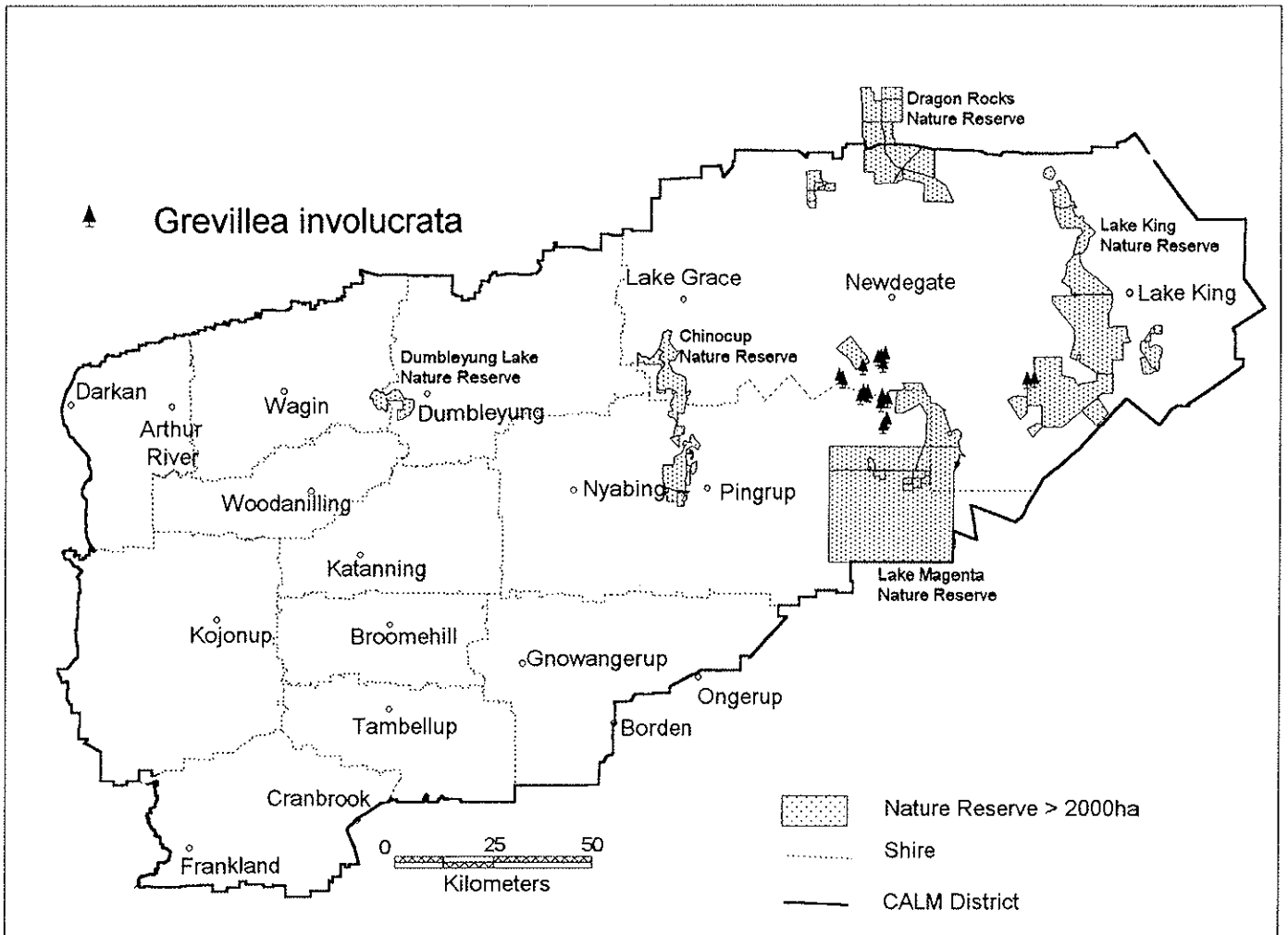
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MAIN ROADS DEPARTMENT NOTIFIED
- (2) INSTALL MARKERS AS REQUIRED

#### RESEARCH REQUIREMENTS

- Optimum fire regimes.
- Response to disturbance and recruitment patterns.

#### REFERENCES

George (1974), Rye and Hopper (1981), Hopper *et al* (1990).



*Branching form with flowers*



Pallarup Grevillea

A prostrate shrub. Stems hirsute, becoming glabrous, not much branched. Leaves 2-45 cm long, petiolate, pectinate. Flowers in short, dense racemes on terminal and lateral branchlets. Style curved, glabrous. Young fruit ovoid, almost sessile, sparsely glandular.

**FLOWERING PERIOD**

August – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

*Grevillea prostrata* grows in low shrubland on white-yellow sands over laterite in the Newdegate-Lake King region. Known from 25 populations within a range of 110 km, plus one remote population 160 km away. Most populations contain less than 100 plants and all occur on previously disturbed sites. Only four, small populations are known on conservation estate.

**CONSERVATION STATUS**

Current: Declared Rare Flora.<sup>#</sup>

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	281287	Ke	Magenta	Road	8	
2	281287	Ke	Magenta	Road	49	
3	050690	Ke & LG	Magenta	Road	20+	Disturbed 1989
4	050690	Ke	Magenta	Road	28	
5	160192	LG	Pallarup	Road	72	
6	060690	LG	Newdegate	Road	Nil	Disturbed 1985 and 1989
7A	060690	LG	Newdegate	Road	109	
7B	060690	LG	Newdegate	Private	1	
8	050690	Ke	Magenta	Road	1	7 plants in 1988
9	020288	LG	Magenta	Road	Nil	Disturbed since 1985
10	281287	LG	Magenta	Road	Nil	ca 4 plants in 1985
11	050690	LG	Magenta	Private	Nil	Several plants in 1985
12	280287	Ke	Magenta	Road	16	
13A	160192	LG	Pallarup	NR	3	14 in 1989, road graded
13B	160192	LG	Pallarup	NR	11	Healthy
14	300987	LG	Pallarup	Road	40+	
16	140788	Ke	Magenta	NR	4	
17	140788	LG	Lake King	Road	83	
18	270788	LG	Newdegate	Road	155	30 plants in 1984
19	200587	KE	Magenta	Private	8	
20	140788	LG	Lake King	Road	3	
21	140788	LG	Lake King	Road	2	
22	040889	LG	Newdegate	Road	3	Disturbed site
23	111089	LG	Newdegate	Road	10	
24	111089	LG	Newdegate	Road	9	
25	070990	LG	Newdegate	Private	6	On firebreak ploughed in 1968
26	200991	LG	Dragon Rocks	NR	1	Edge of firebreak

<sup>#</sup> now Priority 4 (updated at December 1999)



## RESPONSE TO FIRE

Not known.

## RESPONSE TO SOIL DISTURBANCE

The species is known only from sites subject to physical disturbance where regeneration from both seed and root stock has been noted. Lignotuberous regeneration has been noted after above-average rainfall. In three instances the species appears to have become locally extinct, when repeated site disturbance has occurred within 4-5 years.

## SUSCEPTIBILITY TO WEED INVASION

Not known.

## SUSCEPTIBILITY TO DISEASE

Not known

## RESPONSE TO GRAZING

Not known.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER					
	1	2	3	4	5	6
LAND MANAGER NOTIFIED	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-
SECWA	-	-	-	-	-	-
WAWA	-	-	-	-	-	-
Other	(1)	(1)	(1)	(1)	(1)(2)	(1)
ROAD MARKERS	x	x	PART	X	X	-
FIREBREAK MARKERS	-	-	-	-	-	-
FENCING	-	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-

	POPULATION NUMBER					
	7A	7B	8	9	10	11
LAND MANAGER NOTIFIED	X	X	X	X	X	-
UTILITIES Telstra	-	-	-	-	-	-
SECWA	-	-	-	-	-	-
WAWA	-	-	-	-	-	-
Other	(1)	-	(1)	-	-	-
ROAD MARKERS	X	-	X	(5)	(5)	-
FIREBREAK MARKERS	-	-	-	-	-	-
FENCING	-	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-
WEED MANAGEMENT	(3)	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-

	POPULATION NUMBER					
	12	13A	13B	14	16	17
LAND MANAGER NOTIFIED	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-
SECWA	-	-	-	-	-	-
WAWA	-	-	-	-	-	-
Other	(1)	(4)	-	(4)	-	(1)
ROAD MARKERS	X	X	-	X	-	X
FIREBREAK MARKERS	-	-	X	-	X	-
FENCING	-	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-

	POPULATION NUMBER					
	18	19	20	21	22	23
LAND MANAGER NOTIFIED	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-
SECWA	-	-	-	-	-	-
WAWA	-	-	-	-	-	-
Other	-	-	(1)	(1)	(1)	(1)
ROAD MARKERS	X	-	X	X	X	-
FIREBREAK MARKERS	-	-	-	-	-	-
FENCING	-	-	X	-	-	-
FIRE MANAGEMENT	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-
DRAINAGE	-	-	-	-	-	-

	POPULATION NUMBER		
	24	25	26
LAND MANAGER NOTIFIED	X	X	X
UTILITIES Telstra	-	-	-
SECWA	-	-	-
WAWA	-	-	-
Other	(1)	-	-
ROAD MARKERS	-	-	-
FIREBREAK MARKERS	-	-	(5)

FENCING	-	-	-
FIRE MANAGEMENT	-	-	-
WEED MANAGEMENT	-	-	-
DRAINAGE	-	-	-

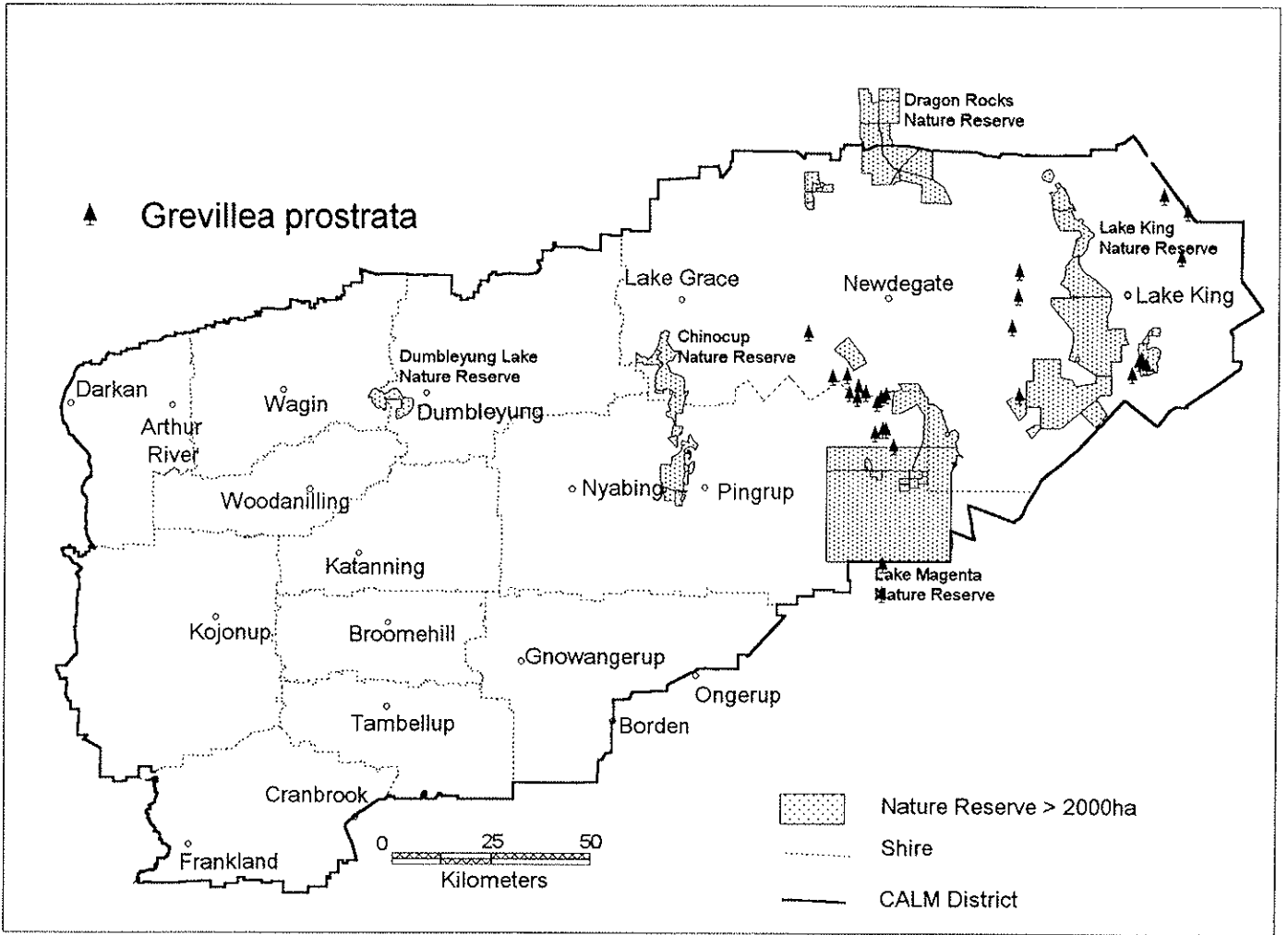
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MRD ALSO NOTIFIED
- (2) RAFCOR ALSO NOTIFIED
- (3) RABBIT CONTROL TO BE CONSIDERED TO PREVENT INTRODUCTION OF WEEDS
- (4) SHIRE OF LAKE GRACE (AS ROAD MANAGER) ALSO NOTIFIED
- (5) STANDARD MARKERS TO BE INSTALLED

### RESEARCH REQUIREMENTS

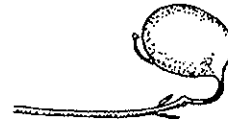
- Regenerative capacity in response to soil disturbance.
- Response to fire.

### REFERENCES

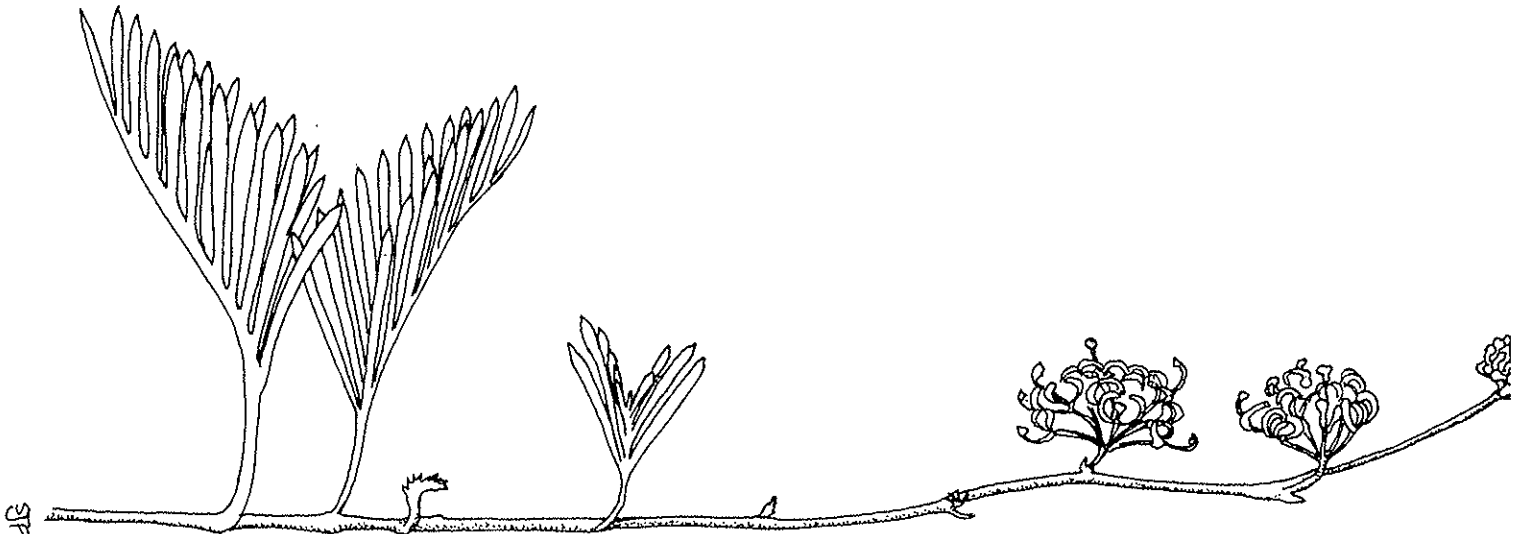
Gardner and George (1963), Rye and Hopper (1981), Hopper *et al* (1990), Mollemans, *et al* (1993).



*Mature fruit*



*Branching form*



Scarlet Lechenaultia

*Lechenaultia laricina* was described and named by Lindley in 1839 based on a collection of James Drummond's in 1837. It is an erect, much branched, bushy shrub with small, fine leaves 50-11 mm long. Leaves are densely crowded, terete and somewhat fleshy. The bark is rough except on new growth. Flowers vary from scarlet to orange-red, usually more orange in the centre. Petal lobes have broad wings with a small point between. The inside of the petals are hairy only at the base. Two of the petals are erect above that tube but not joined. The style is straight.

**FLOWERING PERIOD**

Late October - late December.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Collected twice in the Kukerin area in 1962, one being shown as growing "in mallee". No plants found in 1985 survey. Several populations known in the Northam-Beverley area.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Not recorded since 1962.

**RESPONSE TO FIRE**

Regenerates from woody rootstock.

**RESPONSE TO SOIL DISTURBANCE**

A pioneering species on disturbed sites.

**SUSCEPTIBILITY TO WEED INVASION**

Growth suppressed.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

Nil, pending re-discovery in the District.

## RESEARCH REQUIREMENTS

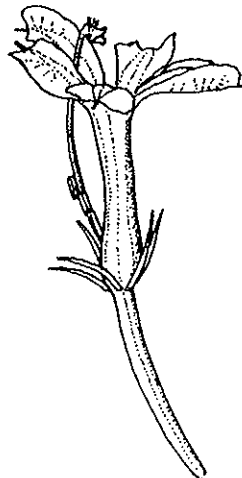
- Survey for suitable habitats in Kukerin area.

## REFERENCES

Bentham (1869), Blackall and Grieve (1974), Morrison (1987), Kelly *et al* (1990), Hopper *et al* (1990).



*Branch and mature flower*



*Side and front view of  
mature flower*

Cushion Lechenaultia

This prostrate sub-shrub was first collected by E.M. Cronin near Lake Lefroy in 1893. The specimen was sent to Ferdinand von Mueller in Melbourne who intended describing it as *Lechenaultia croniniana*. It remained undescribed when he died in 1896. In 1961, it was rediscovered south of Corrigin by Charles Gardner and subsequently described by him in 1964.

Its specific name referred to the characteristic pulvinate (cushion-like) growth habit. Fine, greyish green foliage forms low, rounded cushions up to 7 cm in height and 30 cm in diameter. Pointed, hairy, linear leaves (up to 1 cm in length) are densely clustered at the branchlet ends. The stems are often solitary in the upper leaf axils and cover the plant when in full flower. Five petals, hairy on the inner side, form a tube 8 mm long, the lobes 3 mm long. Each lobe ends in a narrow point and has two broad wings on either side. Petals are not erect and the flowers, similar to those of *L. expansa*, are open along one side. Green sepals are narrow and hairy. The style has an enlarged pink stigma. When not in flower it resembles *L. tubiflora* which has a similar habit and scarlet or cream to yellow flowers. The fruit, an elongated capsule (4-5 mm in length) containing a few brown ridged seeds remains hidden among the leaves.

### FLOWERING PERIOD

October to January.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

*L. pulvinaris* has been recorded at seven sites in the Dongolocking area, north of Dumbleyung. It grows on deep, white sand, occurring high in the landscape.

Known from 15 populations south west of Beverley and Dumbleyung. It is difficult to assess the conservation status of this species as it appears to experience cycles of decline in the wild. In the Wickepin-Wagin-Dumbleyung area, an estimated 4400 plants had been recorded (since 1982) on nature reserves, private land and road verges over a 19 km range. Large populations had flourished in open areas created by a fire in 1980. Some of these populations have not been seen during recent surveys and once-large, healthy populations have declined to a few individuals.

### CONSERVATION STATUS

Current: Declared Rare Flora.

## POPULATIONS KNOWN IN THE KATANNING DISTRICT

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2	220992	Du	Dongolocking	NR	4	ca 50 plants in 1982
4A	220992	Du	Dongolocking	NR	Nil	91 plants in 1982
4B	220992	Du	Dongolocking	Private	Nil	"Few" plants in 1982
5	220992	DU	Dongolocking	NR	Nil	16 plants in 1983
6	220992	Du	Dongolocking	NR	2	ca 2000 plants in 1982
7	220992	Du	Dongolocking	NR	Nil	ca 750 plants
8	220992	Du	Dongolocking	NR	Nil	30 plants in 1982
9	220992	Du	Dongolocking	NR	Nil	24 plants in 1982
10	220992	Du	Dongolocking	NR	Nil	1 plant in 1982
11	220992	Du	Dongolocking	NR	5	Looking poor

### RESPONSE TO FIRE

Appears to encourage regeneration from rootstock and seed.

### RESPONSE TO SOIL DISTURBANCE

A disturbance opportunist, growing on firebreaks, road verges and in open patches among low scrub.

### SUSCEPTIBILITY TO WEED INVASION

Suppresses growth and may eliminate this species from a site.

### SUSCEPTIBILITY TO DISEASE

Not known.

### RESPONSE TO GRAZING

Heavily grazed (kangaroos and rabbits) at some localities.

### SALINITY EFFECTS

Not known.



## MANAGEMENT

	POPULATION NUMBER				
	2	4A	4B	5	6
LAND MANAGER NOTIFIED	X	X	(1)	X	X
UTILITIES Telstra	-	-	-	-	-
SECWA	-	-	-	-	-
WAWA	-	-	-	-	-
Other	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-
FIREBREAK MARKERS	(2)	(2)	-	(2)	(2)
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	(3)	(3)	(3)	(3)	(3)
DRAINAGE	-	-	-	-	-

	POPULATION NUMBER				
	7	8	9	10	11
LAND MANAGER NOTIFIED	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-
SECWA	-	-	-	-	-
WAWA	-	-	-	-	-
Other	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-
FIREBREAK MARKERS	(2)	(2)	(2)	(2)	(2)
FENCING	-	-	-	-	-
FIRE MANAGEMENT	-	-	-	-	-
WEED MANAGEMENT	(3)	(3)	(3)	(3)	(3)
DRAINAGE	-	-	-	-	-

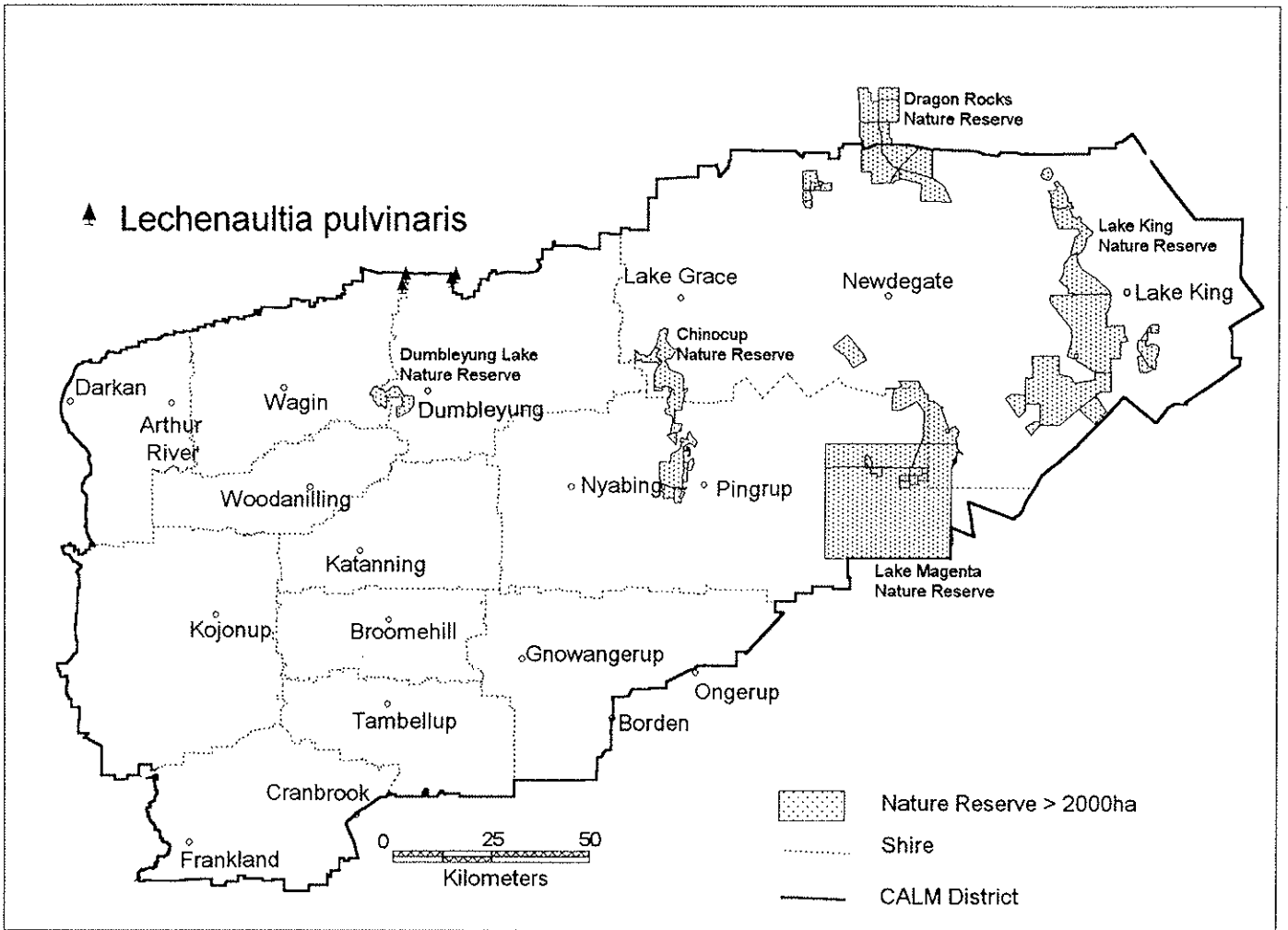
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) TO BE NOTIFIED IF PLANTS RE-FOUND
- (2) SURVEY POPULATIONS AND PLACE AS REQUIRED
- (3) MONITOR, IMPLEMENT WEED CONTROL AS REQUIRED

## RESEARCH REQUIREMENTS

- Set up permanent monitoring quadrats and assess annually.
- Fire response and recruitment patterns.
- Survey for further populations.

## REFERENCES

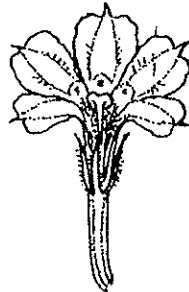
Gardner (1964), Morrison (1987), Patrick (1983), Rye and Hopper (1981), Kelly *et al* (1990).



*Typical branch form*



*Mature flower*



*Pointed hairy linear leaf*



## Granite Myriophyllum

Annual aquatic herb (5-)15-30 cm tall; stems weak, 1-2 mm diameter, sparingly branched, mainly at the base. Leaves monomorphic, all alternate, linear to oblanceolate, (3-67) mm long, (04-)8-9(-25) mm wide (emergent leaves longer and broader than submerged ones), acute to obtuse, margins entire. Plants monoecious or dioecious. Inflorescence a simple spike with unisexual flowers borne singly in the axis of the upper leaves. Male and female flowers on separate stems of the same plant, or on different plant, or together on the same stem with male flowers above the female flowers. Female flowers 4-merous, sessile. Fruit sessile, yellow-brown to red-brown.

**FLOWERING PERIOD**

August (flowers) - December (fruits).

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

In the Katanning District known only from granite rocks south-east of Lake King. *M. petraeum* is restricted to ephemeral rock pools 10-30 cm deep on granite outcrops where it dries and collapses in summer and then re-establishes from seed with the next season's rainfall. It is endemic to southern Western Australia from Southern Cross to east of Esperance, a geographical range of over 400 km. At least 12 populations are known within the range.

**CONSERVATION STATUS**

Current: Declared Rare Flora.<sup>#</sup>

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2	270988	LG	Lake King	OCL	20+	Undisturbed

**RESPONSE TO FIRE**

Not applicable.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

<sup>#</sup> now Priority 4 (updated at December 1999)

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER
	2
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	-
SECWA	-
WAWA	-
Other	-
ROAD MARKERS	-
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	-
WEED MANAGEMENT	-
DRAINAGE	-

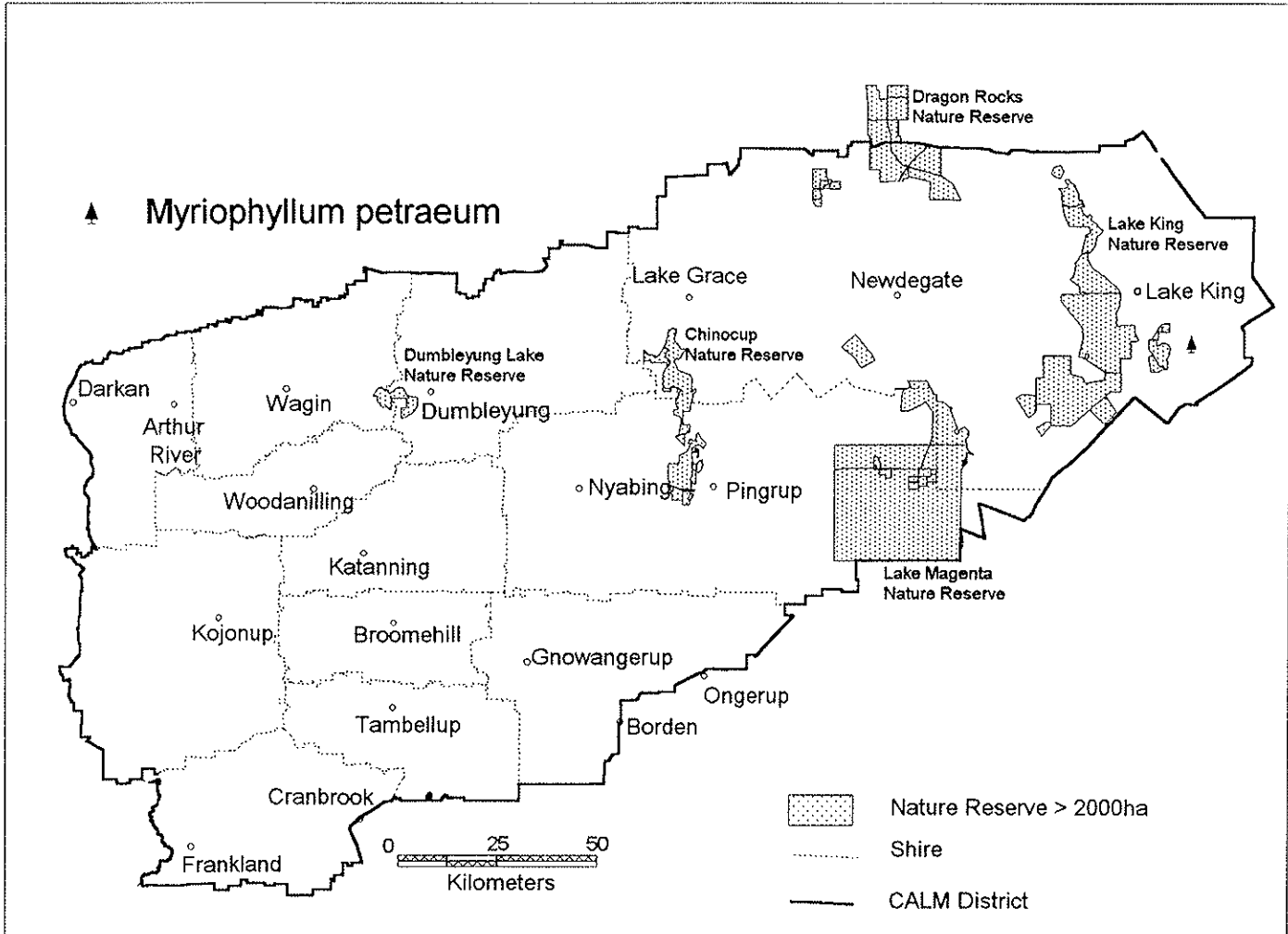
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

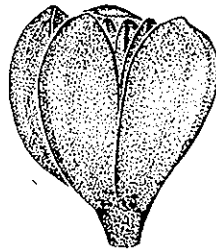
- Surveys to locate additional populations.
- Monitoring to document population dynamics.

## REFERENCES

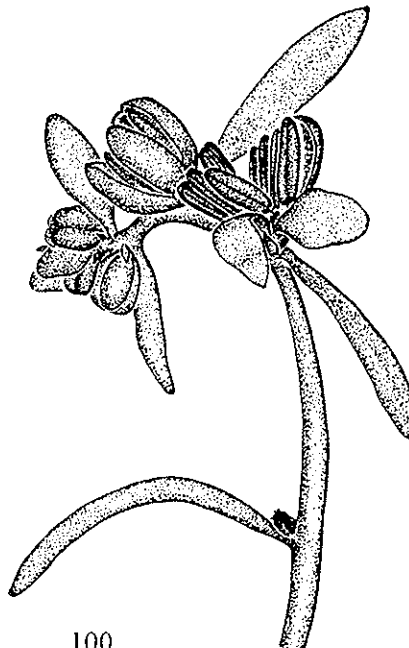
Orchard (1990), Hopper *et al* (1990), Mollemans *et al* (1993).



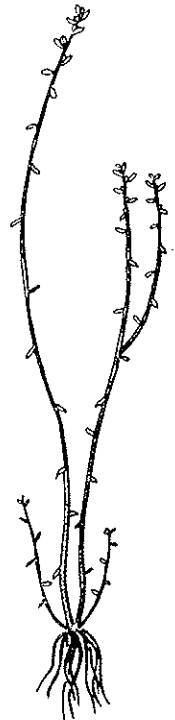
*Mature bud*



*Complete plant*



*Branch and flower*



*NEMCIA LEHMANII* (Meisn) Crisp

Family: Papilionaceae (165)

Cranbrook Pea

An erect, 'fairly tall', shrub with softly hairy branches bearing leaves to 5 cm long with soft dense hairs on their underside. Flowers are fairly small, yellow and purple with silky calyces and are found in clusters in the axils of the leaves.

### FLOWERING PERIOD

September – October.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Habitat unknown. Collections from "the interior of West Australia", Cranbrook and between Cranbrook and the Stirling Ranges. First collected by J. Drummond in 1841. Other collections were by C.A. Gardner near Cranbrook between 1916-1918.

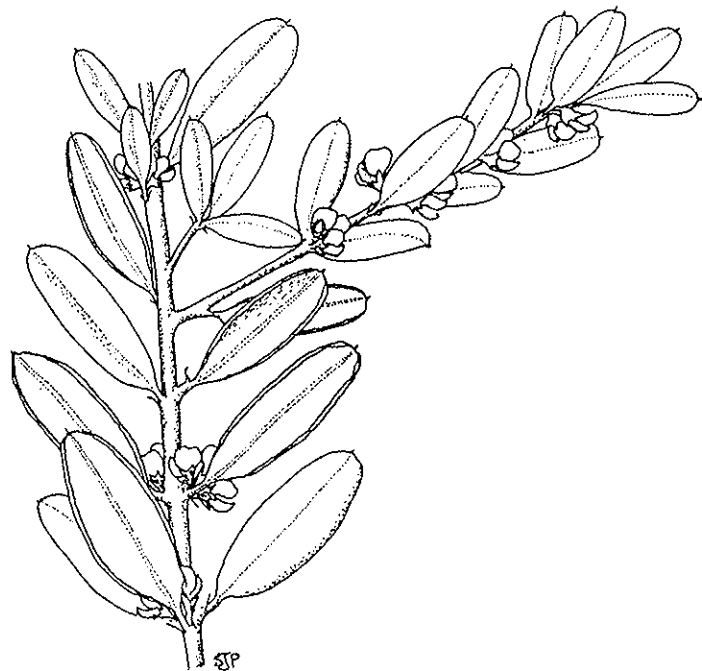
### CONSERVATION STATUS

Current: Declared Rare Flora (Presumed Extinct).

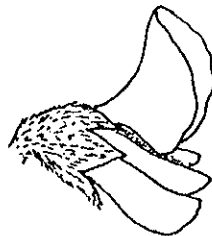
### REFERENCES

Bentham (1863), Blackall and Grieve (1974), Crisp and Weston (1987), Hopper *et al* (1990).

*Mature leaves and buds*



*Side view of flower*



*Unripe pod*



Saltmat

Much-branched mat-like subshrub with hairy, more or less parallel branchlets. Leaves are densely and spirally arranged and tightly overlapping, ovate-oblong or ovate, stalkless, about 2 mm long, more or less concave, bluish-grey in colour, the edges membranous and with very minute hairs. Flowers are green, small and inconspicuous, unisexual, borne either singly in the upper leaf axils or at the ends of the stems with the male and female flowers in separate plants. Fruit has not been seen.

**FLOWERING PERIOD**

Infrequent, mainly September - November and possibly through to February.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Margin of a salt lake east of Pingrup where the species dominates on bare grey-brown clay. Other than east of Pingrup, the only other population known is a very small one near Meckering.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2	120985	Ke	Pingrup	NR	2000+	Healthy

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Salt tolerant, specifics unknown.

## MANAGEMENT

	POPULATION NUMBER
	2
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	-
SECWA	-
WAWA	-
Other	-
ROAD MARKERS	-
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	-
WEED MANAGEMENT	-
DRAINAGE	(1)

- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MONITOR POPULATION FOR EFFECTS OF LOCAL SALINITY CONTROL PRACTICES AND GYPSUM AND SALT MINING

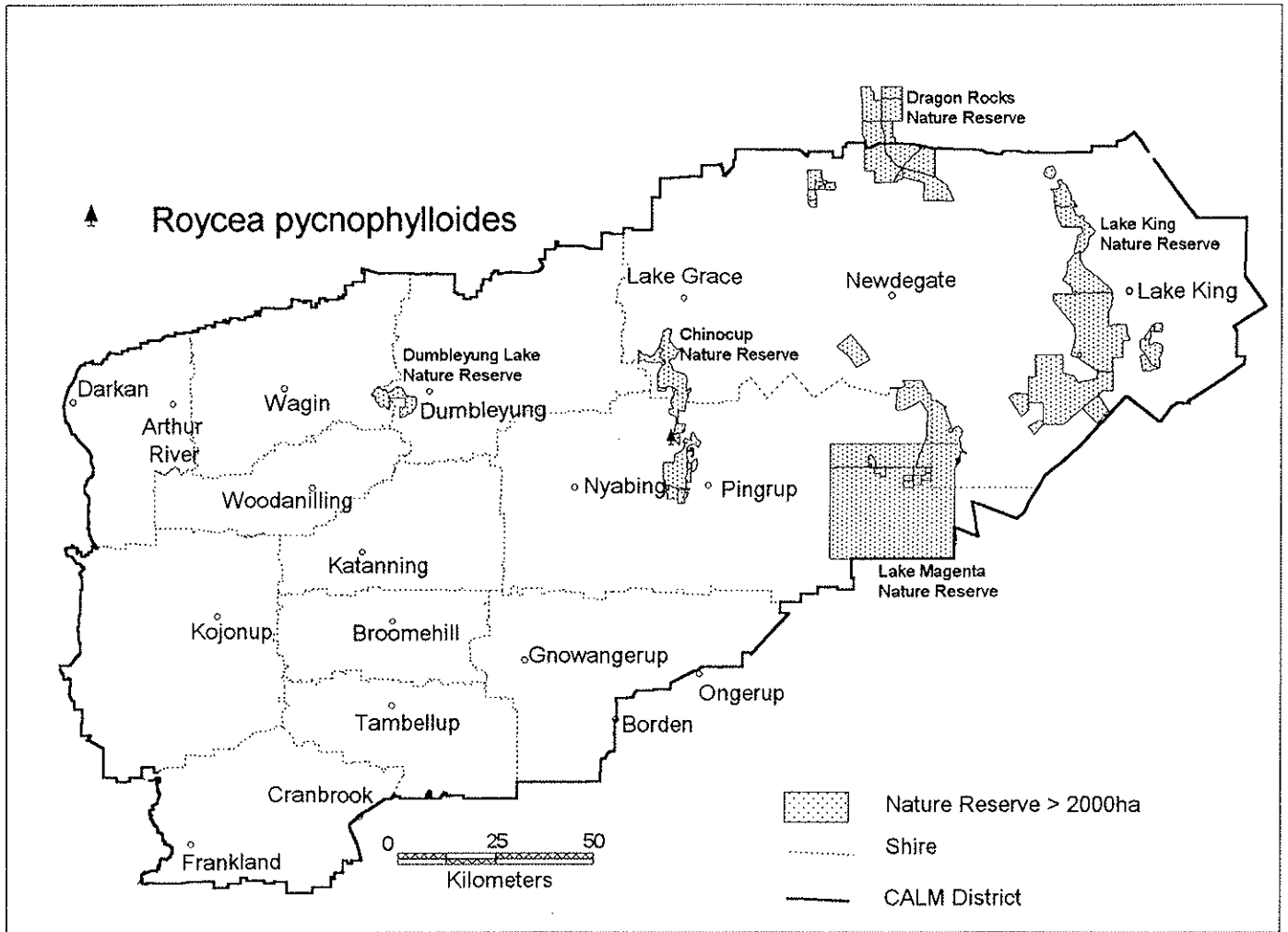
## RESEARCH REQUIREMENTS

- Survey for additional populations, particularly in conservation estate.

## REFERENCES

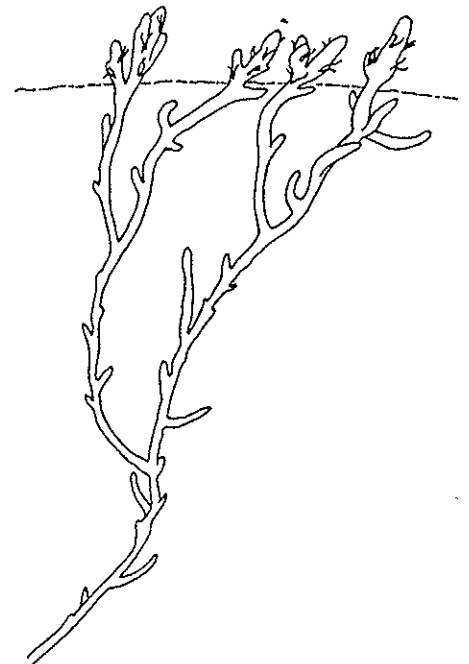
Gardner (1946), Rye and Hopper (1981), Leigh *et al* (1984) Hopper *et al* (1990), Mollemans *et al* (1993).





*Mature Branch with buds, showing ground level*

*Flowers at end of stems*



*TETRATHECA FASCICULATA* J. Thompson

Family: Tremandraceae (182)

Cronin's Tetratheca

A compact shrub less than 20 cm high with small leaves to 5 mm long and numerous slender stems arising from a very stout woody stock. Flowers are dark pink with four petals to 8 mm long.

### FLOWERING PERIOD

Unknown.

### DISTRIBUTION AND HABITAT IN KATANNING DISTRICT

Habitat unknown. Collections from 'near Lake Wagin' and 'sources of the Blackwood River'. The only collections were by Miss Cronin in 1889 and 1895.

### CONSERVATION STATUS

Current: Declared Rare Flora (Presumed Extinct).

### REFERENCES

Hopper *et al* (1990)

*Mature plant with flowers*



*Hairy stem*



Sandplain Sun Orchid

*Thelymitra psammophila* is a small, herbaceous perennial, up to 20 cm in height with a narrow, 8 cm long leaf. There are two to four yellow flowers, each about 2 cm in diameter, per plant. The yellow column has two triangular, brown, lateral lobes and the middle lobe is shorter than the other, which is prominent and downy. The backs of the perianth segments are tinged with red, particularly whilst in bud *T psammophila* is similar to *T antennifera* and *T flexuosa*, and regarded by some as a hybrid between these two species.

**FLOWERING PERIOD**

September – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

In the Katanning District known from a single population north of Newdegate where it grows in shallow soils adjacent to granite rocks. Known from a further six localities in the Albany District, only two of which are in conservation estate.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
7	September 1991	LG	Dragon Rocks	NR	Nil	2 plants in 1986

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Above ground parts of plant killed, the extent of regeneration is unknown.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER
	7
LAND MANAGER NOTIFIED	X
UTILITIES Telstra	-
SECWA	-
WAWA	-
Other	-
ROAD MARKERS	-
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	(1)
WEED MANAGEMENT	-
DRAINAGE	-

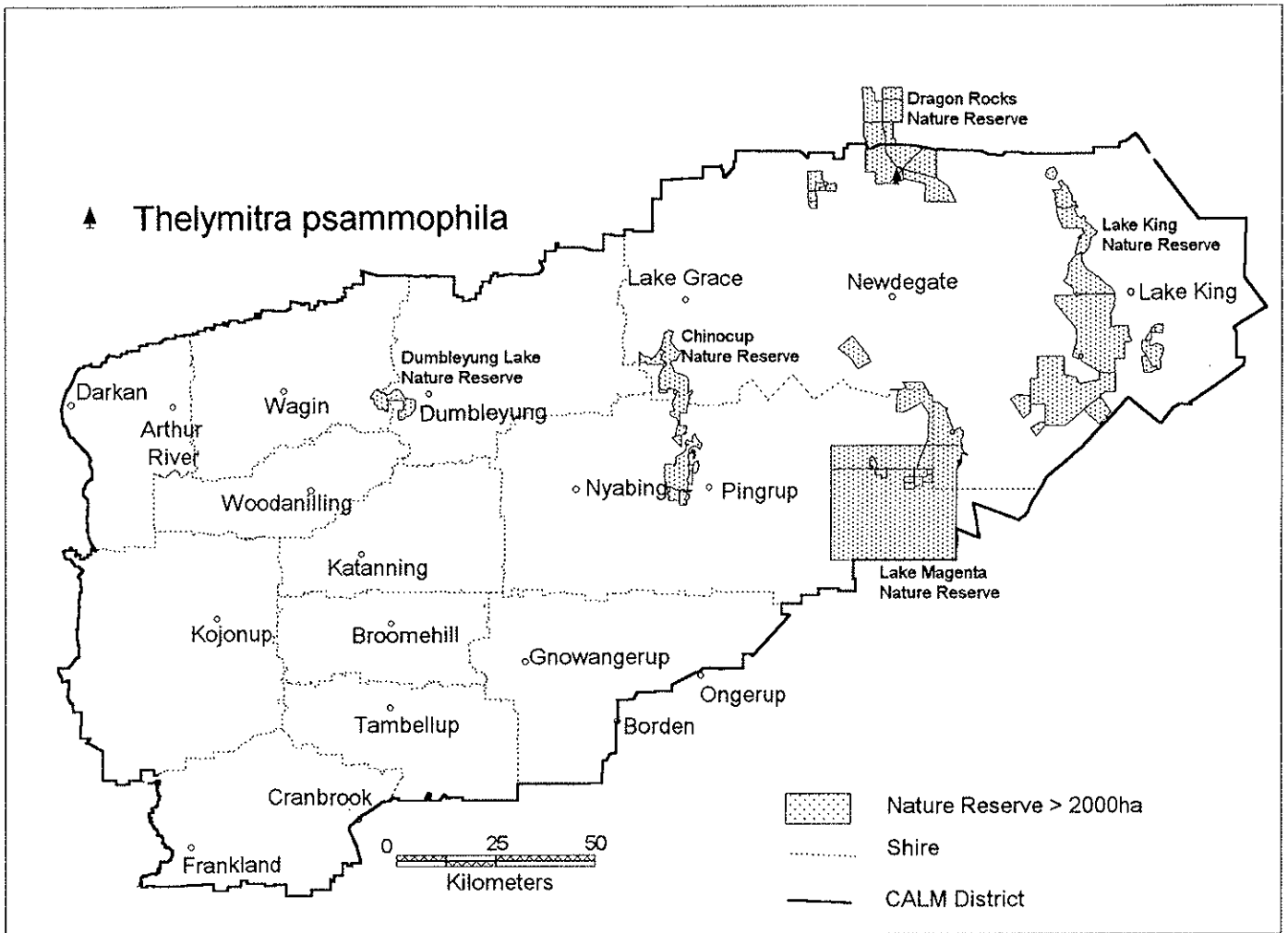
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) EXCLUDE FROM PRESCRIBED BURNS AVOID USE OF MACHINERY IN WILDFIRE SUPPRESSION IF PRACTICAL

## RESEARCH REQUIREMENTS

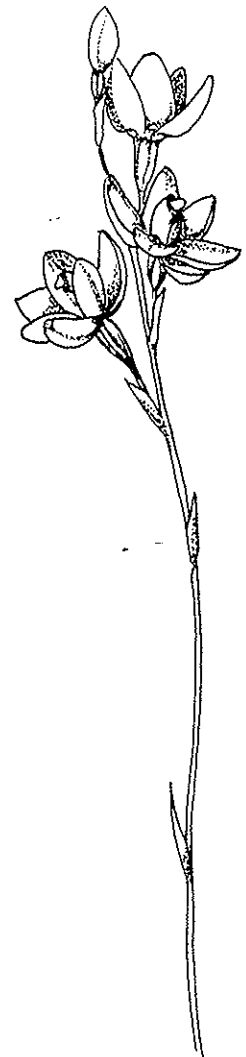
- Monitor known site annually.
- Search for additional populations.
- Optimum fire regime.

## REFERENCES

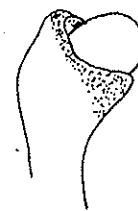
Andrews (1905), Erickson (1978), Patrick and Hopper (1982), Hopper *et al* (1990).



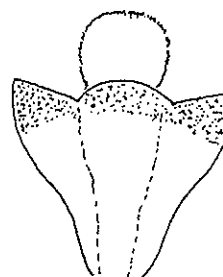
*Whole plant with flowers*



*Side view of column with triangular lateral lobes*



*Column from the rear opened out to show shape of lateral lobes*



**THELYMITRA STELLATA** Lindl

**Family:** Orchidaceae (66)

Star Orchid

This attractive orchid with conspicuous star-like flowers was described and named as *Thelymitra stellata* by Lindley in 1840 from a Drummond collection. It is very similar to the leopard orchid, *T fuscolutea*, and was reduced to a variety of this species in 1971. It has recently been recognised as a distinct species.

Unlike most orchids, species in this genus have symmetrical flowers with similar sepals and petals and a simple, unmodified labellum. *T stellata* has as many as six flowers (2.5-3 cm in diameter) on a robust stem growing to 50 cm in height. They are predominantly golden-brown in colour, sometimes yellow with orange stripes on the sepals and petals. The column hood is deeply fringed on either side and usually bright orange in colour. The central portion is woolly with dense papillate glands. A single, broad lily-like leaf, up to 9 cm long and 4 cm wide clasps the stem at the base.

*T stellata* can be distinguished from the widespread leopard orchid by its smaller leaf and flowers, and less blotched more uniformly golden-brown sepals and petals. The leaf is usually shrivelled by the time of flowering. The stem dies back below ground level after seed set. Flowers remain closed during cool overcast weather and are probably pollinated by pseudocopulating beetles as observed in *T fuscolutea*.

**FLOWERING PERIOD**

October – November.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

A population near Bokal grows in gravelly loam among low scrub in *Eucalyptus wandoo* woodland. A collection site between Kukerin and Lake Grace in 1931 has not been relocated. This widespread species is known from numerous small populations from Eneabba and Mt Lesueur in the north, and along the Darling Range.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
2	151189	AW	Bokal	Road	10	Undisturbed

**RESPONSE TO FIRE**

Killed if burnt when above ground parts are present (August-December).

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Suppresses growth.

## SUSCEPTIBILITY TO DISEASE

Not known.

## RESPONSE TO GRAZING

A succulent plant susceptible to grazing.

## SALINITY EFFECTS

Not known.

## MANAGEMENT

	POPULATION NUMBER
	2
LAND MANAGER NOTIFIED	-
UTILITIES Telstra	-
SECWA	-
WAWA	-
Other	(1)
ROAD MARKERS	(2)
FIREBREAK MARKERS	-
FENCING	-
FIRE MANAGEMENT	(3)
WEED MANAGEMENT	-
DRAINAGE	-

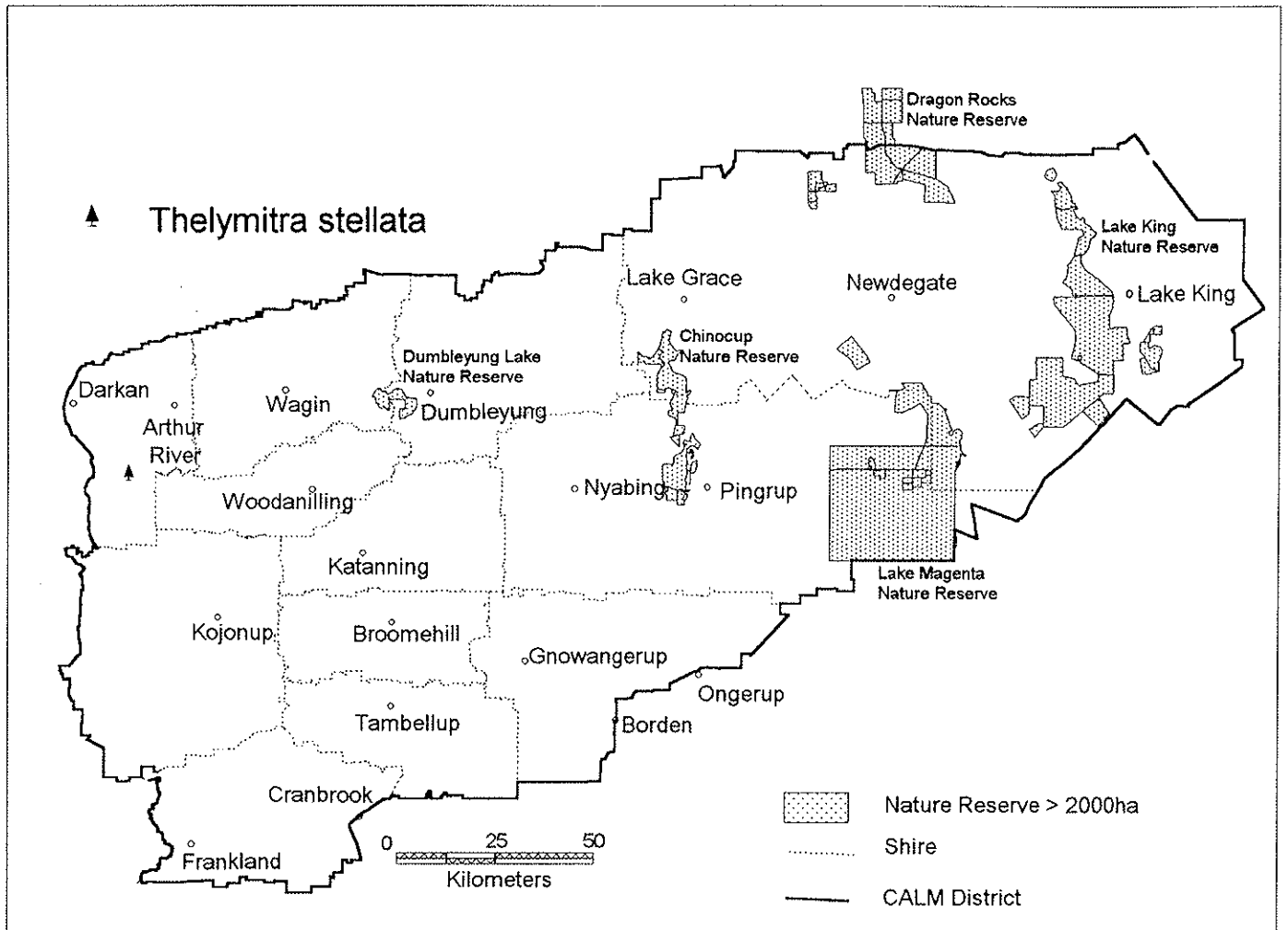
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MRD AND ADJOINING LANDHOLDER NOTIFIED
- (2) INSTALL STANDARD ROADSIDE MARKERS
- (3) MAINTAIN CLOSE LIAISON WITH BFB VOLUNTEERS

## RESEARCH REQUIREMENTS

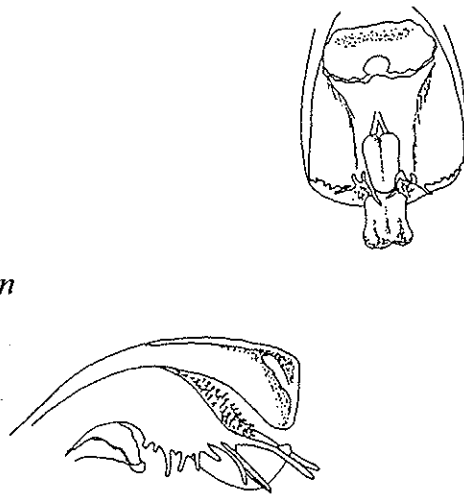
- Survey suitable habitats for additional populations.
- Research pollination biology.

## REFERENCES

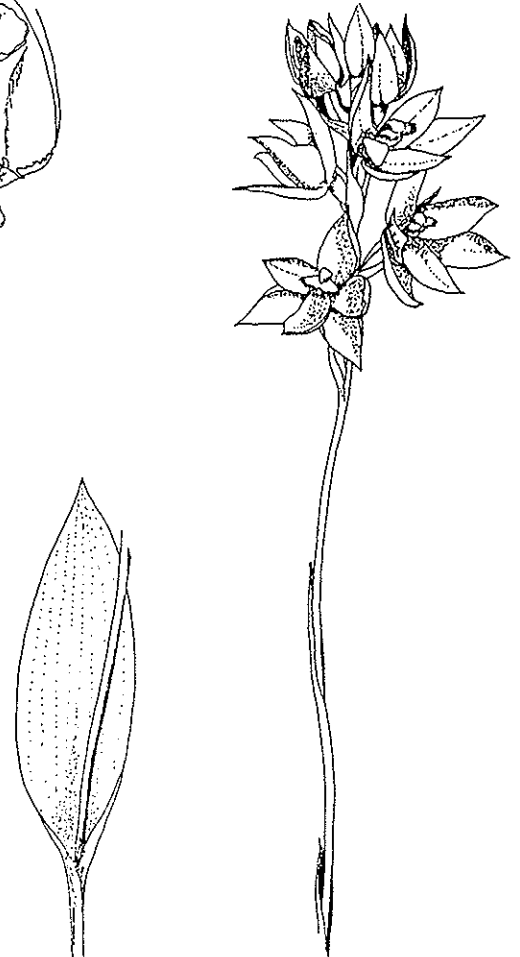
Bentham (1873), Erickson (1978), George (1971), Patrick and Hopper (1982), Kelly *et al* (1990), Hopper *et al* (1990).



*Side and front view of column*



*Mature leaf and mature plant*





Granite Pink

This species is unlike others of the genus *Tribonanthes* in that it is virtually glabrous and has colourful flowers with erect perianth lobes. It is a dwarf, perennial herb with solitary flowers enclosed in two broad, overlapping leaf-like pinkish bracts. The pink perianth lobes (75-8 mm long by 23-34 mm wide) are narrowly elliptic to narrowly ovate, erect and minutely ciliate.

**FLOWERING PERIOD**

August – September.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Occurs in seasonally saturated soil pockets on granite outcrops to the north of Lake Grace and Newdegate. The wide range of this species was recently extended with the discovery of a population north of Albany.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	200989	LG	Newdegate	NR	200+	Undisturbed
2A	060988	LG	Lake Grace	VCL	300+	Undisturbed
2B	060988	LG	Lake Grace	Private	3	Undisturbed

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not known.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Small succulent herb, above ground parts killed by grazing (rabbits). The extent of regeneration from grazing unknown.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER		
	1	2A	2B
LAND MANAGER NOTIFIED	X	X	X
UTILITIES Telstra	-	-	-
SECWA	-	-	-
WAWA	-	-	-
Other	-	-	-
ROAD MARKERS	-	-	-
FIREBREAK MAREKRS	-	-	-
FENCING	-	-	X
FIRE MANAGEMENT	-	-	-
WEED MANAGEMENT	-	-	-
DRAINAGE	-	-	-

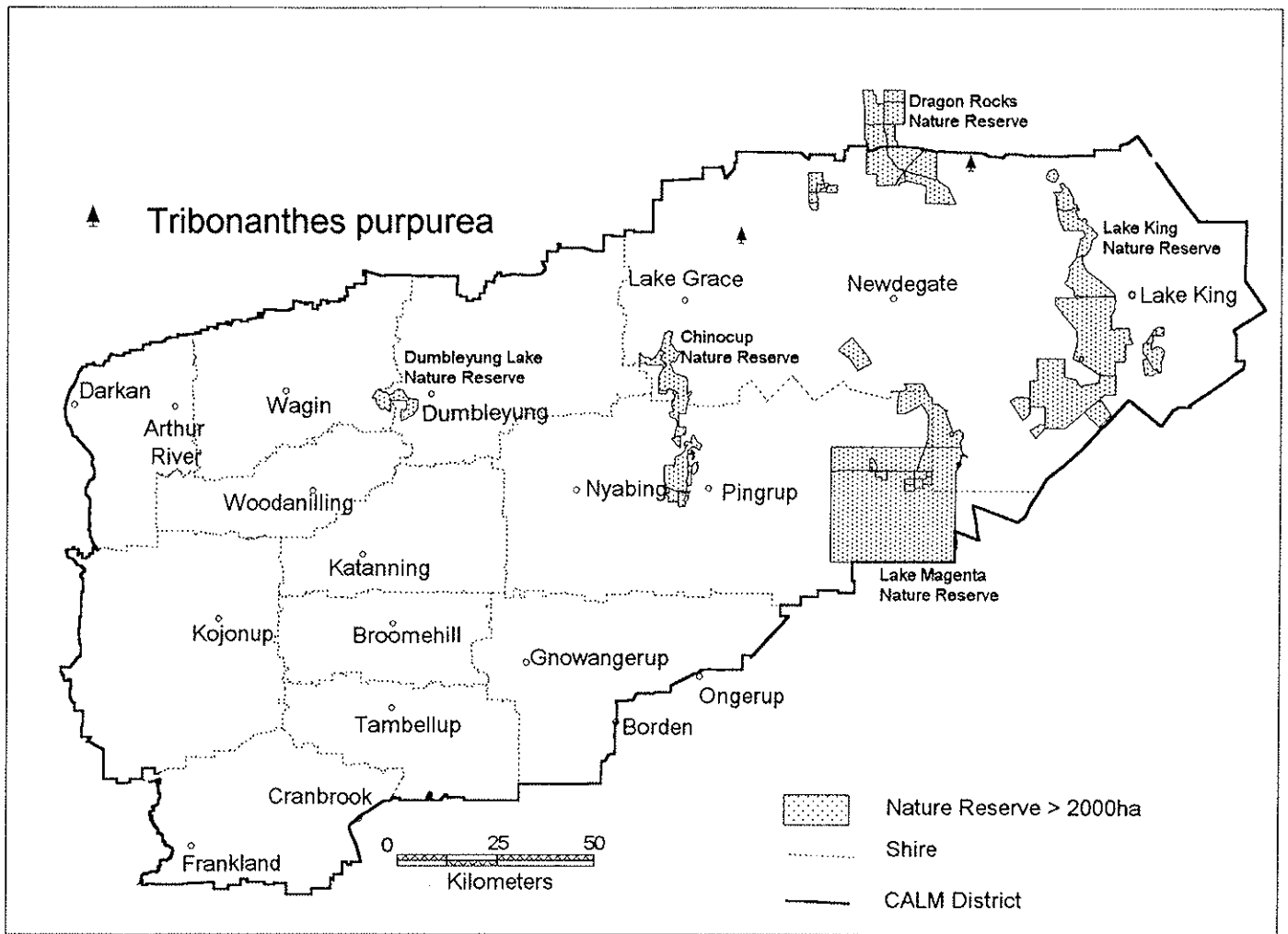
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

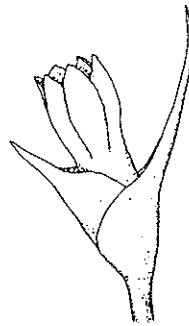
- Survey for additional populations.
- Life history.

## REFERENCES

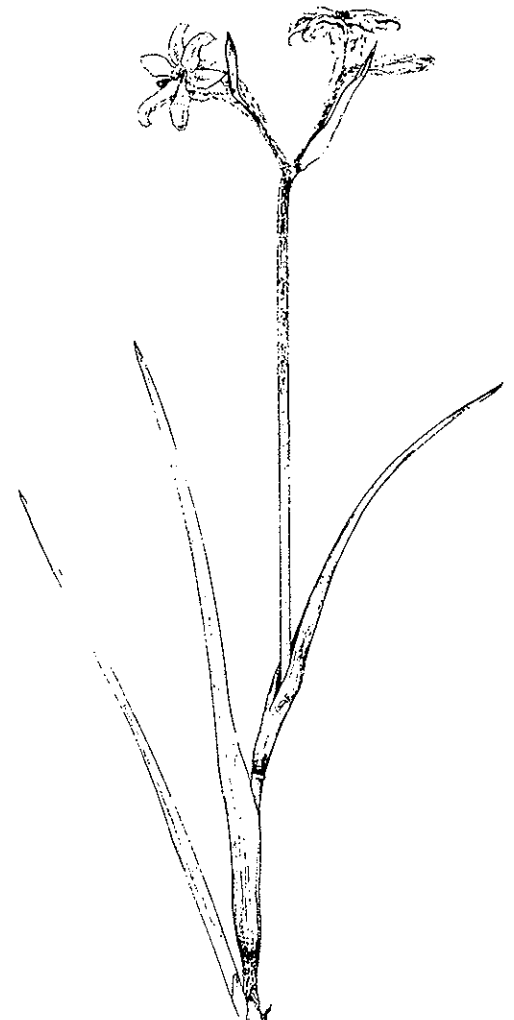
MacFarlane and Hopper (1987) *et al*, Hopper *et al* (1990).



*Side view of flower*



*Mature plant*



Shy Featherflower

An erect, small shrub to 60 cm high with slender branches and clusters of purplish-pink flowers. Distinguished by fringed, petal-like staminodes and deeply fringed petals. This species is one of the rarest in the genus and for more than a century was known only from the type collection until its re-discovery in 1983.

**FLOWERING PERIOD**

November – December.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Grows in shallow sand over gravel among low mixed heath near Woodanilling. Less than 50 plants in total known from four localities and all populations under pressure from weed invasion, road maintenance, etc.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	191191	Wo	Woodanilling	Road	13	Heavy Veldt Grass
2	191191	Wo	Woodanilling	Road	Nil	7 plants in 1987, site undisturbed
3	251191	Wo	Woodanilling	OCL*	28	Below SEC line

\* - Water and Conservation of Flora and Fauna, vested in the Water Authority of WA

**RESPONSE TO FIRE**

Not known.

**RESPONSE TO SOIL DISTURBANCE**

Adult plants killed, low levels of seedling regeneration have been noted.

**SUSCEPTIBILITY TO WEED INVASION**Population decline noted in dense Veldt Grass (*Ehrharta calycina*) infestation.**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

**SALINITY EFFECTS**

Not known.

## MANAGEMENT

	POPULATION NUMBER		
	1	2	3
LAND MANAGER NOTIFIED	X	X	X
UTILITIES Telstra	-	-	-
SECWA	-	-	X
WAWA	-	-	-
Other	(1)	(1)	-
ROAD MARKERS	X	X	-
FIREBREAK MARKERS	X	X	(2)
FENCING	-	-	-
FIRE MANAGEMENT	-	-	-
WEED MANAGEMENT	(3)	-	-
DRAINAGE	-	-	(4)

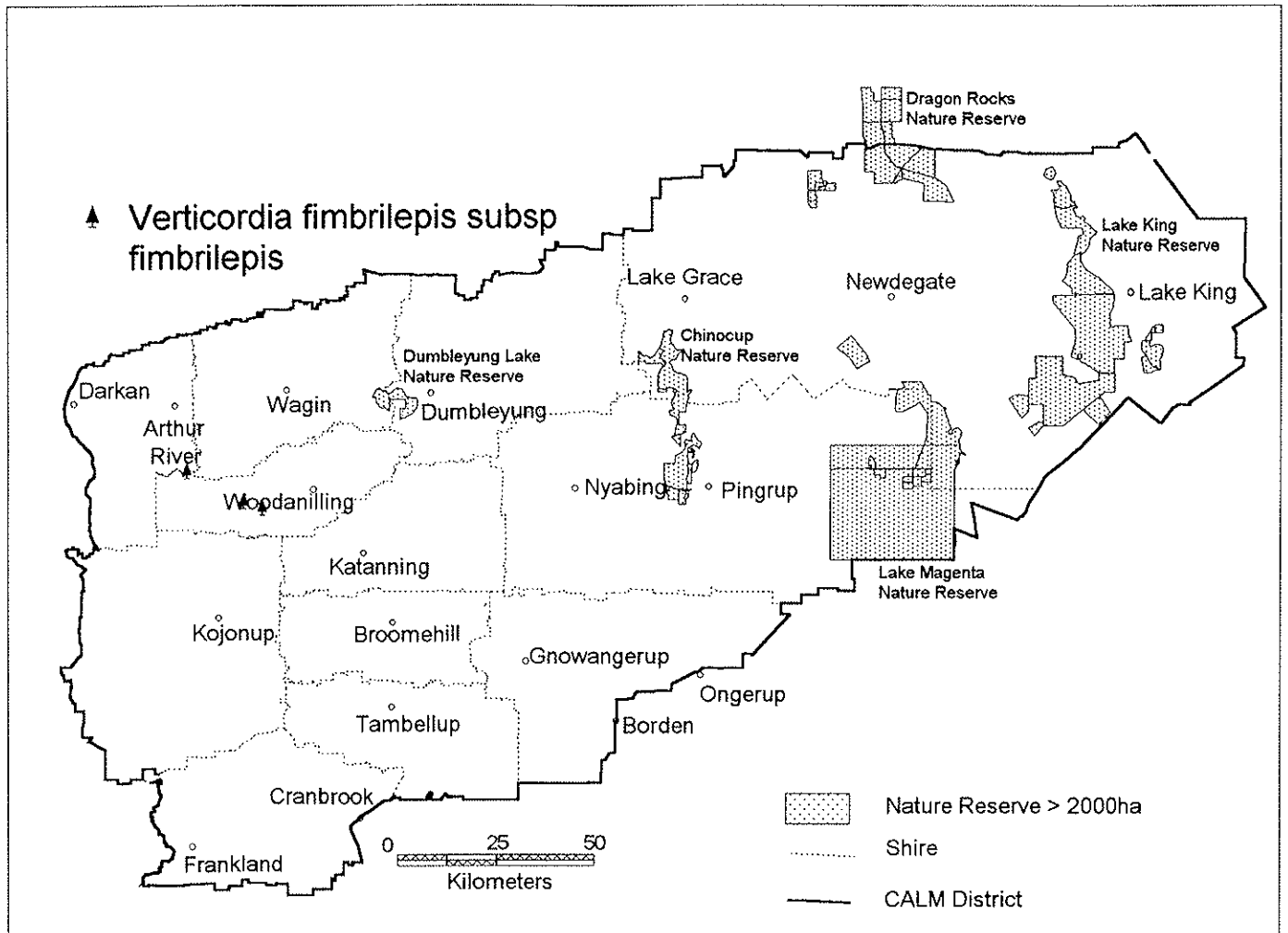
- NO ACTION NEEDED
- X ACTION COMPLETED
- (1) MRD AND ADJACENT LANDHOLDERS NOTIFIED
- (2) INSTALL STANDARD MARKERS
- (3) INITIATE WEED CONTROL (VELDT GRASS) IN CONJUNCTION WITH RESEARCHERS
- (4) MONITOR ENCROACHING SOIL SALINITY, INITIATE CONTROL MEASURES AS REQUIRED

## RESEARCH REQUIREMENTS

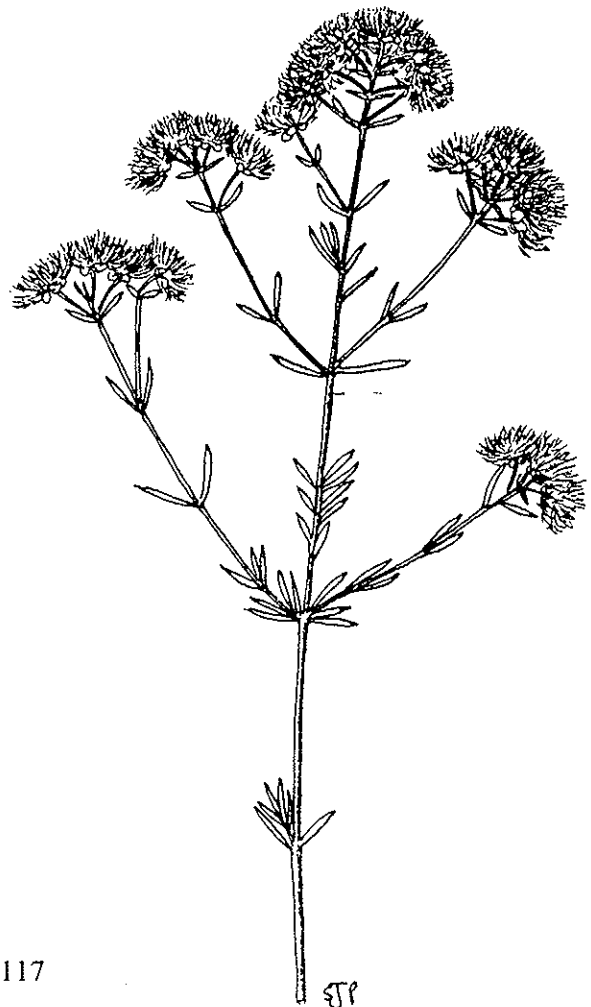
- Survey for additional populations.
- Species life history and recruitment patterns.
- Response to disturbance, including fire.
- Weed control, including use of selective herbicides.

## REFERENCES

Bentham (1867), Blackall and Grieve (1980), George (1991), Hopper *et al* (1990).



*Mature branch with flowers*



*Flower*



**VERTICORDIA STAMINOSA** C. Gardner and A.S. George  
**SUBSP CYLINDRACEA VAR. CYLINDRACEA**

**Family:** Myrtaceae (273)

Wongan Featherflower

*Verticordia staminosa* subsp. *cylindracea* is a small spreading shrub to 30 cm high. The subspecies is distinguished by its solitary yellow flowers with 10 protruding stamens, which are bright red with yellow tips, and 2 bright red persistent bracts. Subspecies *cylindracea* differs from subspecies *staminosa* in its shorter stamens (6-76 mm long) and in having staminodes between the stamens rather than outside the staminal tube. Variety *cylindracea* is distinguished by its widely spreading habit.

**FLOWERING PERIOD**

July – October.

**DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known from five localities between Pingaring and Varley where it grows in very shallow soils on exposed granite outcrops. Not known from estate which is managed for conservation.

**CONSERVATION STATUS**

Current: Declared Rare Flora.

**POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1	240688	LG	Varley	OCL (1)	207	Some recent deaths
3	210685	LG	Newdegate	OCL (1)	51	
4	160885	LG	Lake Grace	OCL (2)	300	
5A	060988	LG	Pingaring	Private	}	Undisturbed
5B	210689	LG	Pingaring	Private	}240+	Undisturbed
5C	060988	LG	Pingaring	Private	}	Undisturbed
5D	060988	LG	Pingaring	VCL	}	Undisturbed

(1) - Water and Conservation of Flora and Fauna, vested Minister for Water Resources

(2) - Water, vested Minister for Water Resources (under review)

**RESPONSE TO FIRE**

Not known, but not at risk due to habitat.

**RESPONSE TO SOIL DISTURBANCE**

Not known.

**SUSCEPTIBILITY TO WEED INVASION**

Not at risk due to habitat.

**SUSCEPTIBILITY TO DISEASE**

Not known.

**RESPONSE TO GRAZING**

Not known.

## SALINITY EFFECTS

Not at risk due to habitat.

## MANAGEMENT

	POPULATION NUMBER						
	1	3	4	5A	5B	5C	5D
LAND MANAGER NOTIFIED	X	X	X	X	X	X	X
UTILITIES Telstra	-	-	-	-	-	-	-
SECWA	-	-	-	-	-	-	-
WAWA	-	-	-	-	-	-	-
Other	-	(1)	-	-	-	-	-
ROAD MARKERS	-	-	-	-	-	-	-
FIREBREAK MARKERS	-	-	-	-	-	-	-
FENCING	-	-	-	X	X	X	X
FIRE MANAGEMENT	-	-	-	-	-	-	-
WEED MANAGEMENT	-	-	-	-	-	-	-
DRAINAGE	(2)	(2)	-	-	-	-	-

- NO ACTION NEEDED

X ACTION COMPLETED

(1) UNDER SECRETARY FOR WORKS NOTIFIED

(2) MAINTAIN CLOSE LIAISON WITH WATER AUTHORITY IN RESPECT TO MAINTENANCE OR UPGRADING OF ROCK CATCHMENT CHANNELLING WALL

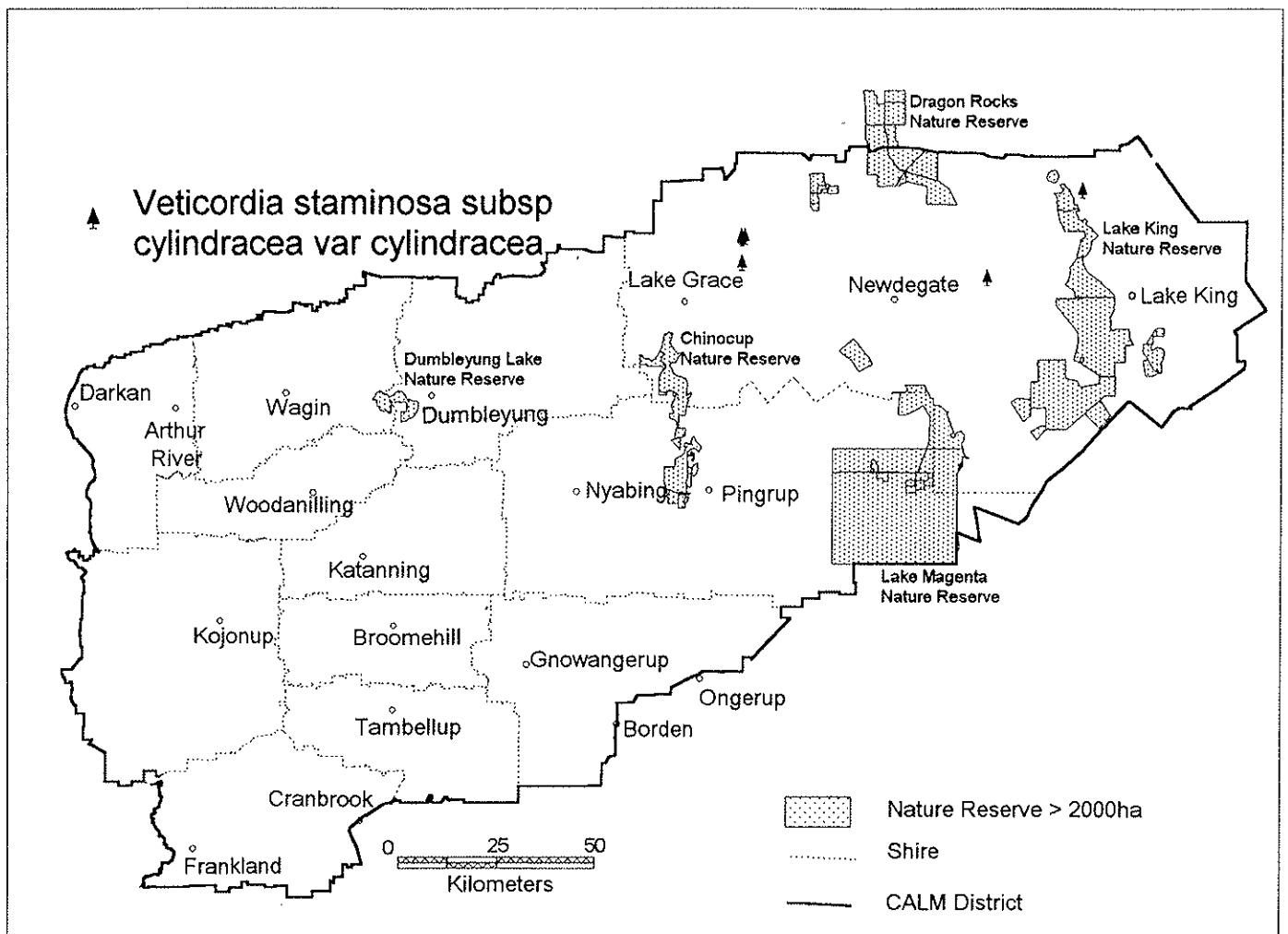
## RESEARCH REQUIREMENTS

- Survey for additional populations, particularly on conservation estate.

## REFERENCES

Gardner and George (1963), Rye and Hopper (1981), Hopper *et al* (1990), George (1991).

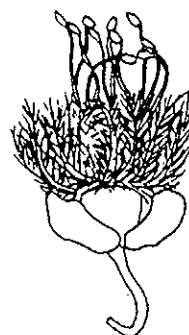




*Leafy branch bearing one bud, two flowers and the persistent bracts of a fallen flower*



*Flower*



**VERTICORDIA STAMINOSA** C. Gardner and A.S. George  
**SUBSP CYLINDRACEA** A.S. George **VAR ERECTA** A.S. George

**Family:** Myrtaceae (273)

Wongan Featherflower

Var *erecta* of *Verticordia staminosa* subsp. *cylindracea* differs from var. *cylindracea* in its erect habit, growing to 1 m in height.

#### **FLOWERING PERIOD**

July – October.

#### **DISTRIBUTION AND HABITAT IN KATANNING DISTRICT**

Known from a single locality near Pingaring where it occurs on exposed granite slopes in association with *Borya* sp. Not known from conservation reserves Not known to be in cultivation.

#### **CONSERVATION STATUS**

Current: Declared Rare Flora.

#### **POPULATIONS KNOWN IN THE KATANNING DISTRICT**

Pop No	Date of Last Survey	Local Authority	Population	Land Status	No of Plants	Condition
1A	130990	LG	Pingaring	Private }	}240+	Grazed by sheep, since fenced
1B	130990	LG	Pingaring	Private }		Undisturbed

#### **RESPONSE TO FIRE**

Not known, not at risk due to habitat.

#### **RESPONSE TO SOIL DISTURBANCE**

Not known.

#### **SUSCEPTIBILITY TO WEED INVASION**

Not at risk due to habitat.

#### **SUSCEPTIBILITY TO DISEASE**

Not known.

#### **RESPONSE TO GRAZING**

Growth suppressed, some mature plants killed when grazed by sheep.

#### **SALINITY EFFECTS**

Not at risk due to habitat.

## MANAGEMENT

	POPULATION NUMBER	
	1A	1B
LAND MANAGER NOTIFIED	?	?
UTILITIES Telstra	-	-
SECWA	-	-
WAWA	-	-
Other	-	-
ROAD MARKERS	-	-
FIREBREAK MARKERS	-	-
FENCING	X	X
FIRE MANAGEMENT	-	-
WEED MANAGEMENT	-	-
DRAINAGE	-	-

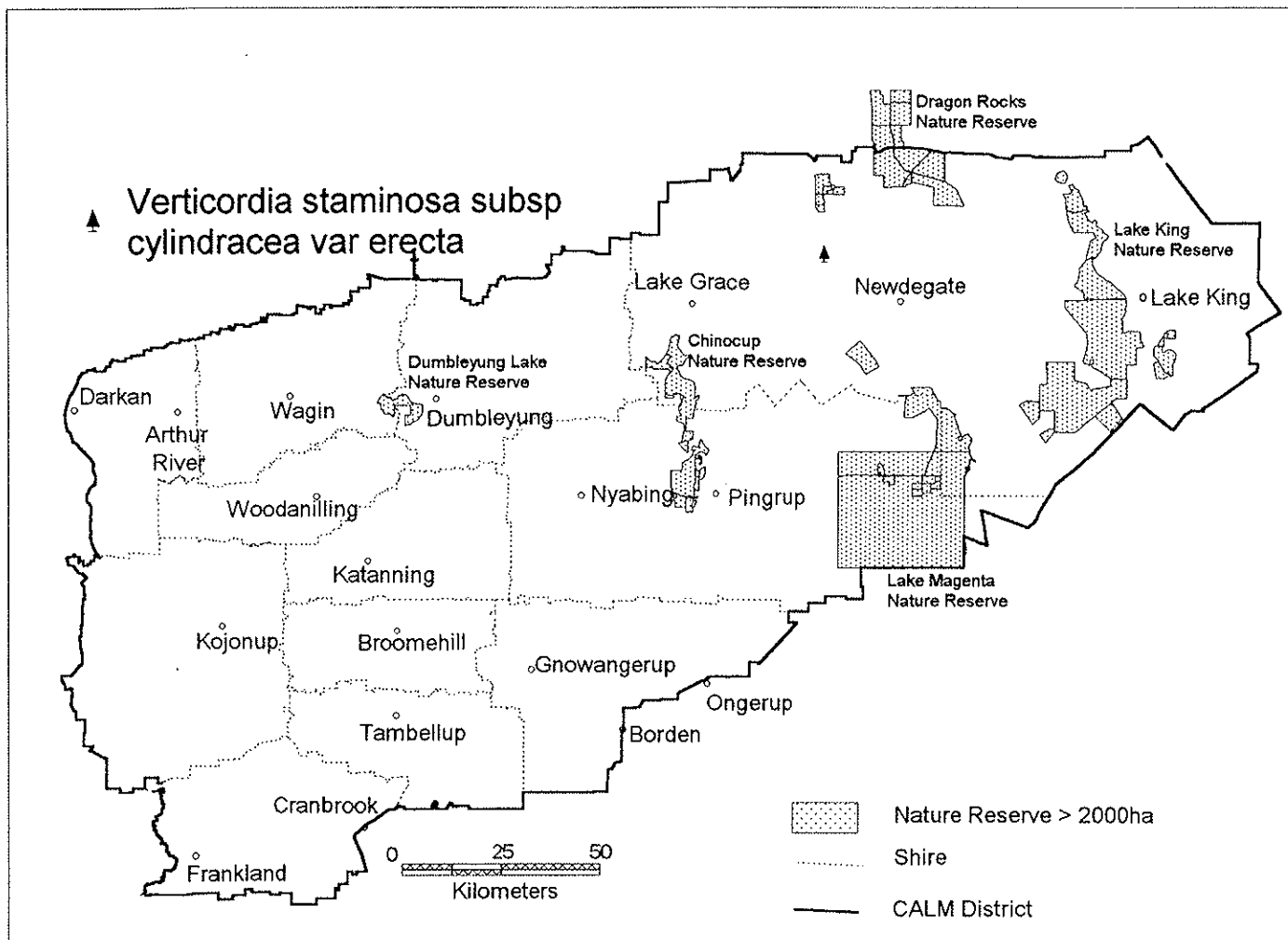
- NO ACTION NEEDED
- X ACTION COMPLETED

## RESEARCH REQUIREMENTS

- Survey for additional populations, particularly on conservation estate.

## REFERENCES

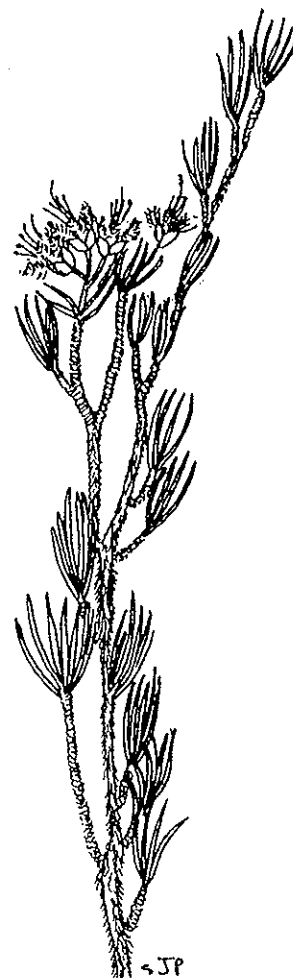
Gardner and George (1963), Rye and Hopper (1981), Hopper *et al* (1990), George (1991).



*Flower*



*Branch with flowers*



*Hairy stem*



**PART THREE  
OTHER SPECIES OF CONSERVATION IMPORTANCE IN THE  
KATANNING DISTRICT**

In addition to the 38 taxa of Declared Rare Flora in this Program, 127 other taxa of conservation importance occur within the Katanning District. These taxa are divided into Priority categories using the following criteria:

R: Declared Rare Flora - Extant Taxa

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

X: Declared Rare Flora - Presumed Extinct Taxa

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

1: Priority One - Poorly known Taxa

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

2: Priority Two - Poorly Known Taxa

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

3: Priority Three - Poorly Known Taxa

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

4: Priority Four - Rare Taxa

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

Lists of taxa included in the Priorities described above and that were known to occur in the Katanning District as at 31 December, 1992 are given in the following Tables. Another Wildlife Management Program (in preparation) will address Priority taxa in similar detail to that given to Declared Rare Flora in this Program. It is anticipated that the number of taxa and their nomenclature in the following tables will change as a result of field surveys and taxonomic reviews prior to publication of the Program dealing with Priority taxa.

## TABLE 1

### PRIORITY 1 TAXA KNOWN TO OCCUR IN THE KATANNING DISTRICT AS AT DECEMBER 1992

*Acacia auratiflora* ms  
*Acacia kingiana*  
*Acacia microneura*  
*Acacia mutabilis* subsp. *incurva* ms  
*Acacia mutabilis* subsp. *stipulifera* ms  
*Acacia sclerophylla* var. *teretiuscula*  
*Acacia uncinella* var. *albipes* ms  
*Baeckea* sp. (Ongerup) A. Scougall and C. Garawanta E35 ( var. *crispiflora*)  
*Caladenia caesarea* subsp. *subdita* ms  
*Caladenia melanema* ms  
*Coleanthera coelophylla*  
*Dampiera orchardii*  
*Drosera grieviei*  
*Dryandra* sp. 38 (A.S. George 16695) (aff. *drummondii*)  
*Dryandra* sp. 41 (A.S. George 16879) (aff. *calophylla*)  
*Eremophila* sp. (Lake Magenta) M.S. Graham 7/3/90 (aff. *serpens*)  
*Eucalyptus microschemata*  
*Eucalyptus mimica* ms  
*Gastrolobium rotundifolium*  
*Goodenia integerrima* ms  
*Grevillea crowleyae* ms  
*Gryostemon ditrigynus*  
*Hakea oldfieldii*  
*Hydrocotyle muriculata*  
*Lachnostachys ferruginea* var. *ferruginea* form *reticulata*  
*Lachnostachys ferruginea* var. *paniculata* form *obtusifolia*  
*Lepidium aschersonii*  
*Leucopogon blepharolepis*  
*Melaleuca agathosmoides*  
*Melaleuca ordinifolia*  
*Melaleuca pritzelii*  
*Microcorys tenuifolia*  
*Mirbelia densiflora*  
*Mitrasacme palustris*  
*Pimelea halophila*  
*Symonanthus bancroftii*  
*Thomasia dielsii*  
*Thysanotus acerosifolius*  
*Thysanotus lavanduliflorus*  
*Thysanotus sabulosus*  
*Verticordia brevifolia* subsp. *brevifolia* ms  
*Verticordia gracilis*  
*Verticordia huegelii* var. *tridens* ms  
*Verticordia multiflora* subsp. *solox*

## TABLE 2

### PRIORITY 2 TAXA KNOWN TO OCCUR IN THE KATANNING DISTRICT AS AT DECEMBER 1992

*Acacia drewiana* subsp. *minor*  
*Acacia sclerophylla* var. *pilosa* ms  
*Acacia tuberculata* ms  
*Acacia undosa* ms  
*Andersonia carinata*  
*Conospermum filifolium* subsp. *sigmoideum*  
*Conostylis seorsiflora* subsp. Nyabing (A Coates sn)  
*Crassula helmsii*  
*Daviesia lineata* ms  
*Dryandra* sp. 1 (A.S. George 16647) ( var. *hewardiana*)  
*Dryandra* sp. 44 (K. Alcock 486) ( var. *serratuloides*)  
*Dryandra* sp. 50 (A.S. George 16713)  
*Dryandra cyanroides*  
*Dryandra erythrocephala* var. 44 (A.S. George 16743)  
*Dryandra foliosissima*  
*Eucalyptus angustissima* subsp. *quaerenda*  
*Fitzwillia axilliflora*  
*Frankenia glomerata*  
*Gastrolobium densifolium*  
*Gastrolobium rigidum*  
*Gonocarpus ericifolius*  
*Goodenia trichophylla*  
*Grevillea wittweri*  
*Lechenaultia acutiloba*  
*Melaleuca fissurata*  
*Melaleuca viminea* subsp. *appressa*  
*Olearia laciniifolia*  
*Opercularia rubioides*  
*Persoonia brevirhachis* ms  
*Persoonia hakeiformis*  
*Petrophile crispata*  
*Phyllota gracilis*  
*Pimelea graniticola*  
*Restio ornatus*  
*Rinzia affinis*  
*Stylidium emarginatum* subsp. *exappendiculatum*  
*Thysanotus cymosus*  
*Thysanotus gageoides*  
*Verticordia dasystylis* subsp. *dasystylis* ms  
*Verticordia pulchella* ms

### TABLE 3

#### PRIORITY 3 TAXA KNOWN TO OCCUR IN THE KATANNING DISTRICT AS AT DECEMBER 1992

*Acacia brachyphylla* var. *recurvata* ms  
*Acacia moirii* subsp. *dasycarpa*  
*Acacia mutabilis* subsp. *rhynchophylla* ms  
*Acacia newbeyi*  
*Acacia obesa* ms  
*Acacia singula* ms  
*Bossiaea divaricata*  
*Calytrix nematoclada*  
*Dicrastylis glauca*  
*Drosera* sp. (Lake King) K.R. Newbey 5514  
*Dryandra subpinnatifida*  
*Eucalyptus contineus*  
*Eucalyptus depauperata*  
*Frankenia drummondii*  
*Grevillea aneura*  
*Grevillea depauperata*  
*Gyrostemon prostratus*  
*Melaleuca polycephala*  
*Persoonia scabra*  
*Stylidium pseudohirsutum*  
*Thysanotus tenuis*  
*Verticordia lindleyi* subsp. *purpurea* ms  
*Verticordia multiflora* subsp. *multiflora*

### TABLE 4

#### PRIORITY 4 TAXA KNOWN TO OCCUR IN THE KATANNING DISTRICT AS AT DECEMBER 1992

*Acacia grisea*  
*Cyanicula ixioides*  
*Dryandra* sp. 3 (A.S. George 16629) ( var. *blechnifolia*)  
*Dryandra preissii*  
*Eremophila serpens*  
*Eucalyptus aspersa*  
*Eucalyptus deflexa*  
*Gastrolobium glabratum* ms  
*Gastrolobium ovalifolium*  
*Grevillea astericosa*  
*Pomaderris bilocularis*  
*Regelia cymbifolia*  
*Stylidium expeditionis*  
*Tegicornia uniflora*  
*Thysanotus glaucus*  
*Verticordia integra*  
*Verticordia penicillaris*  
*Wurmbea drummondii*  
*Xanthorrhoea brevistyla*



**TABLE 5**  
**DECLARED RARE FLORA IN THE KATANNING DISTRICT AS AT 1992**  
**CONSERVATION STATUS UPDATED TO DECEMBER 1999**

**Declared Rare Flora**

**Extant Taxa** **Conservation Code**

<i>Acacia depressa</i> .....	R
<i>Acacia lanuginophylla</i> ms .....	R
<i>Acacia leptalea</i> ms (now <i>A. leptalea</i> ) .....	R
<i>Adenanthos pungens</i> subsp. <i>effusa</i> .....	R
<i>Adenanthos pungens</i> subsp. <i>pungens</i> .....	R
<i>Adenanthos velutinus</i> .....	R
<i>Allocasuarina tortiramula</i> .....	R
<i>Banksia oligantha</i> .....	R
<i>Bentleya spinescens</i> .....	R
<i>Caladenia dorrienii</i> .....	R
<i>Caladenia hoffmanii</i> ms, now	
<i>C. hoffmanii</i> subsp. <i>granitifolia</i> .....	R
and <i>C. hoffmanii</i> subsp. <i>hoffmanii</i> .....	R
<i>Calectasia arnoldii</i> ms .....	R
<i>Conostylis drummondii</i> .....	R
<i>Conostylis seorsiflora</i> subsp. <i>trichophylla</i> .....	R
<i>Conostylis setigera</i> subsp. <i>dasy</i> .....	R
<i>Drakaea</i> subsp. <i>isolata</i> ms (now <i>D. isolata</i> ms) .....	R
<i>Eremophila subteretifolia</i> ms .....	R
<i>Eremophila veneta</i> ms .....	R
<i>Eremophila verticillata</i> .....	R
<i>Eucalyptus olivacea</i> ms .....	R
<i>Grevillea flexuosa</i> .....	R
<i>Grevillea involucrata</i> .....	R
<i>Lechenaultia loricata</i> .....	R
<i>Lechenaultia pulvinaris</i> .....	R
<i>Roycea pycnophylloides</i> .....	R
<i>Thelymitra psammophila</i> .....	R
<i>Thelymitra stellata</i> .....	R
<i>Tribonanthes purpurea</i> .....	R
<i>Verticordia fimbrilepis</i> subsp. <i>fimbrilepis</i> .....	R
<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>cylindracea</i> .....	R
<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>erecta</i> .....	R

**Presumed Extinct Taxa**

<i>Nemcia lehmanii</i> .....	X
<i>Tetratheca fasciculata</i> .....	X

**Priority Flora**

<i>Caladenia integra</i> .....	P4
<i>Eremophila inflata</i> (now <i>Calamphoreus inflatus</i> ) .....	P4
<i>Grevillea cirsiifolia</i> .....	P4
<i>Grevillea prostrata</i> .....	P4
<i>Myriophyllum petraeum</i> .....	P4

R Declared Rare Flora - Extant Taxa

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

X Declared Rare Flora - Presumed Extinct Taxa

P4 Priority Four - Rare Taxa

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors.

## **PART FOUR THE PLAN FOR MANAGEMENT**

The objective of this Wildlife Management Program is to ensure and enhance, by appropriate management, the continued survival in the wild of populations of Declared Rare Flora.

### **1. Determining Priorities**

Part Two assesses the abundance and conservation status of each Declared Rare Flora within the District and makes recommendations for protection, research and management. On the basis of these recommendations, each taxon was ranked on a scale of 1 to 3 under 19 categories (Table 6) recognised as potential threats or protection and management requirements. Taxa with a low degree of threat or urgency for management and research action were given a score of 1. Those with a high degree of threat were allocated a score of 3. Taxa not threatened or in need of action were not given a score. The criteria used to rank species are given in Table 7. The scores were summed for each of the 36 taxa and for each threat/requirement category. Table 6 summarises the perceived threats, and management and research requirements for each Declared Rare Flora taxon in the Katanning District.

Table 8 lists the 36 Declared Rare Flora in priority order according to the urgency of their requirement for protection and management action. Taxa with a high ranking score are most threatened and/or most in need of action. It is intended that all requirements for each taxon, as outlined in the previous treatments, will be implemented. Work will be conducted, programmed or deferred according to priority, available funds and existing resources and workloads. Attention is directed to Table 8 to determine with which taxa should have priority for management actions. This will enable resources and staff within the Katanning District to be allocated where most urgently required.

Taxa most in need of attention for a particular management or research requirement can be determined from Table 6.

Ranking the categories illustrates which are the most critical threats/requirements in the District. The Table indicates those taxa that are (or may be) threatened by particular activities, in addition to providing for continued research and management once requirements listed for the priority species are fulfilled.

**TABLE 6: DECLARED RARE FLORA (EXTANT) IN THE KATANNING DISTRICT SCORED (1-3) ACCORDING TO THE DEGREE OF THREAT OR URGENCY FOR MANAGEMENT AND RESEARCH ACTION**

	Monitoring or quadrats	Research requirements	Fire exclusion	Liaison with landowner/manag	Germplasm collection and <i>ex situ</i> storage	Location of other populations	Linear Marking	Small population size	Dieback hygiene	Instrumentalities	Weed control	Fencing/grazing control	Recreational damage	Firebreak maint./constructio	Salinity/drainage	Land acquisition	Mining	Re-establishment	TOTAL
<i>Verticordia fimbriopsis ssp. fimbriopsis</i>	3	3	3	3	3	2	3	3	3	1	3	-	-	-	3	1	-	-	3
<i>Acacia lanuginophylla</i>	3	2	3	2	3	2	3	-	2	2	2	3	-	3	3	3	-	-	34
<i>Eremophila veneta ms</i>	3	3	3	3	3	3	3	3	2	2	3	-	-	-	3	-	-	-	34
<i>Eremophila inflata</i>	3	3	3	3	3	3	3	3	2	2	3	-	-	-	-	-	-	-	31
<i>Adenanthos pungens ssp. effusa</i>	3	3	3	3	3	2	3	-	3	2	3	2	-	-	-	-	-	-	30
<i>Eremophila verticillata</i>	3	3	3	3	3	2	3	-	2	-	2	3	-	-	-	-	-	-	30
<i>Benleya spinescens</i>	3	3	3	3	3	2	3	1	2	3	-	-	3	-	-	-	-	-	29
<i>Grevillea circsifolia</i>	3	2	3	3	-	2	3	3	3	-	3	-	-	-	2	-	-	-	27
<i>Conosylius seorsiflora ssp. trichophylla</i>	3	3	2	3	3	3	1	3	-	1	-	-	-	-	-	1	-	-	26
<i>Eremophila suberitfolia ms</i>	3	2	3	-	3	1	3	3	2	2	-	-	3	-	-	-	-	-	25
<i>Lechenanthea pulvinaris</i>	1	3	2	2	3	-	1	3	2	-	2	1	-	3	-	-	-	-	25
<i>Conosylius setrigeria ssp. dasys</i>	3	3	2	3	3	2	2	-	-	3	-	3	-	-	-	-	-	-	24
<i>Grevillea involucreta</i>	3	2	2	2	3	-	3	2	2	2	1	1	-	1	-	-	-	-	24
<i>Grevillea prostrata</i>	3	2	2	2	3	-	3	2	2	-	-	1	-	1	-	-	-	-	24
<i>Acacia leptalia ms</i>	3	2	2	3	3	2	3	1	-	1	-	-	-	2	-	1	-	-	23
<i>Adenanthos pungens ssp. pungens</i>	3	1	3	1	3	3	3	-	2	-	-	-	2	-	-	-	1	-	22
<i>Thelymitra stellata</i>	3	2	2	3	-	3	3	3	-	-	3	-	-	-	-	-	-	-	22
<i>Verticordia staminosa ssp. cylindracea</i>																			
<i>var. erecta</i>	3	2	1	3	3	3	-	2	2	-	-	3	-	-	-	-	-	-	22
<i>Adenanthos velutinus</i>	3	3	3	2	1	3	-	-	3	-	-	3	-	-	-	-	-	-	21
<i>Conosylius drummondii</i>	3	3	3	2	3	-	3	-	-	3	1	-	-	-	-	-	-	-	21
<i>Banksia oligantha</i>	3	2	2	2	2	1	-	-	3	-	-	2	2	-	-	-	-	-	19
<i>Caladenia dorrieni</i>	3	3	2	2	-	2	-	3	-	1	2	1	-	-	-	-	-	-	19
<i>Myriophyllum petraeum</i>	3	2	-	3	-	3	-	3	2	-	-	-	3	-	-	-	-	-	19
<i>Caladenia integra</i>	3	3	2	1	-	-	2	-	-	3	1	-	-	-	-	-	-	-	18
<i>Dracaena confuens ssp. isolata ms</i>	3	3	3	1	-	3	3	-	-	-	-	-	2	-	-	-	-	-	18

TABLE 6: DECLARED RARE FLORA (EXTANT) IN THE KATANNING DISTRICT SCORED (1-3) ACCORDING TO THE DEGREE OF THREAT OR URGENCY FOR MANAGEMENT AND RESEARCH ACTION

	Monitoring or quadrats	Research requirements	Fire exclusion	Liaison with landowner/manag	Germplasm collection and <i>ex situ</i> storage	Location of other populations	Linear Marking	Small population size	Dieback hygiene	Instrumentalities	Weed control	Fencing/grazing control	Recreational damage	Firebreak maint./constructio	Salinity/drainage	Land acquisition	Mining	Re-establishment	TOTAL
<i>Grevillea flexuosa</i>	3	2	3	3	3	-	1	3	-	-	-	-	-	-	-	-	-	-	18
<i>Lechenaultia laricina</i>	3	1	3	3	3	3	-	2	-	-	-	-	-	-	-	-	-	-	18
<i>Eucalyptus olivacea</i>	3	2	2	2	2	1	-	2	2	-	-	-	2	-	-	-	-	-	17
<i>Acacia depressa</i>	3	-	-	2	2	-	3	-	-	3	1	1	-	-	-	1	-	-	16
<i>Thebymitra psammophila</i>	3	3	2	-	-	3	-	3	-	-	-	-	2	-	-	-	-	-	16
<i>Caladenia hoffmannii</i> ms	3	2	3	-	-	2	-	3	-	-	-	-	2	-	-	-	-	-	15
<i>Verticordia staminosa</i> ssp. & var. <i>cylindracea</i>	3	2	1	2	2	1	-	1	2	-	-	1	-	-	-	-	-	-	15
<i>Allocasuarina tortramula</i>	3	2	3	-	1	2	1	-	-	-	-	-	2	-	-	-	-	-	14
<i>Tribonanthes purpurea</i>	3	2	-	2	-	2	-	1	2	-	-	2	-	-	-	-	-	-	14
<i>Calectasia arrolatii</i> ms	3	3	-	-	3	1	-	3	-	-	-	-	-	-	-	-	-	-	13
<i>Roycea pycnophylloides</i>	3	1	-	-	-	3	-	-	2	-	-	-	-	-	-	-	-	-	11
<b>TOTAL</b>	<b>106</b>	<b>83</b>	<b>77</b>	<b>72</b>	<b>69</b>	<b>65</b>	<b>59</b>	<b>56</b>	<b>45</b>	<b>31</b>	<b>30</b>	<b>27</b>	<b>24</b>	<b>15</b>	<b>13</b>	<b>7</b>	<b>7</b>	<b>5</b>	<b>791</b>

**TABLE 7**  
**CRITERIA USED FOR RANKING TAXA IN TABLE 6**

•	<b>MONITORING QUADRATS</b>	
	NO MONITORING QUADRATS ESTABLISHED	3
	LESS THAN 10% POPULATIONS WITH QUADRATS	2
	LESS THAN 50% POPULATIONS WITH QUADRATS	1
	MORE THAN 50% POPULATIONS WITH QUADRATS	0
•	<b>RESEARCH REQUIREMENTS</b>	
	3+ RESEARCH NEEDS IDENTIFIED	3
	2 RESEARCH NEEDS IDENTIFIED	2
	1 RESEARCH NEEDS IDENTIFIED	1
•	<b>FIRE EXCLUSION</b>	
	FIRE SENSITIVE OR UNKNOWN AND AT RISK	3
	FIRE REGIME CRITICAL OR UNKNOWN	2
	FIRE SENSITIVE, NO IMMEDIATE RISK	1
•	<b>LIAISON WITH LANDOWNER/MANAGER</b>	
	NIL POPULATIONS ON CALM LAND	3
	POPULATION/S ON PRIVATE PROPERTY	2
	POPULATION/S ON OTHER CROWN LAND	1
•	<b>SEED COLLECTION</b>	
	NIL COLLECTED, ALTHOUGH PRACTICAL	3
	HELD FROM LESS THAN 50% OF POPULATIONS	2
	HELD FROM 51-80% OF POPULATIONS	1
	HELD FROM MORE THAN 80% OF POPULATIONS	0
•	<b>LOCATION OF OTHER POPULATIONS</b>	
	ONE POPULATION ONLY	3
	2-4 POPULATIONS	2
	5-8 POPULATIONS	1
	MORE THAN 8 POPULATIONS	0
•	<b>LINEAR MARKING</b>	
	SHIRE ROAD OR WESTRAIL	3
	MAIN ROADS DEPARTMENT	2
	CONSERVATION AND LAND MANAGEMENT ROAD OR ACCESS TRACK	1
	<b>SMALL POPULATION SIZE</b>	
	ALL POPULATIONS LESS THAN 50 PLANTS	3
	AT LEAST ONE POPULATION 51-200 PLANTS	2
	AT LEAST ONE POPULATION 201-500 PLANTS	1
	AT LEAST ONE POPULATION 501+ PLANTS	0

•	<b>DIEBACK HYGIENE</b>	
	SUSCEPTIBLE TO PC (OR UNKNOWN), IN HIGH RISK AREA	3
	SUSCEPTIBLE TO PC (OR UNKNOWN), IN LOW RISK AREA	2
•	<b>INSTRUMENTALITIES</b>	
	3+ INSTRUMENTALITIES WITH FACILITIES IN VICINITY	3
	2 INSTRUMENTALITIES WITH FACILITIES IN VICINITY	2
	1 INSTRUMENTALITY WITH FACILITIES IN VICINITY	1
•	<b>WEED CONTROL</b>	
	100% OF POPULATIONS WEED INFESTED	3
	50-99% OF POPULATIONS WEED INFESTED	2
	1-49% OF POPULATIONS WEED INFESTED	1
•	<b>FENCING/GRAZING CONTROL</b>	
	90-100% OF POPULATIONS REQUIRE CONTROL	3
	50-89% OF POPULATIONS REQUIRE CONTROL	2
	5-49% OF POPULATIONS REQUIRE CONTROL	1
	LESS THAN 5% OF POPULATIONS REQUIRE CONTROL	0
•	<b>RECREATIONAL DAMAGE</b>	
	HIGH RISK IDENTIFIED	3
	LOW RISK IDENTIFIED	2
•	<b>FIRE ACCESS TRACK (MAINTENANCE/CONSTRUCTION)</b>	
	90-100% POPULATIONS WHOLLY/PARTLY ON TRACKS	3
	50-89% POPULATIONS WHOLLY/PARTLY ON TRACKS	2
	5-49% POPULATIONS WHOLLY/PARTLY ON TRACKS	1
	1-4% POPULATIONS WHOLLY/PARTLY ON TRACKS	0
•	<b>SALINITY/DRAINAGE</b>	
	SUSCEPTIBLE TO SALINITY AND AT RISK	3
	DRAINAGE RISK IDENTIFIED	2
•	<b>LAND ACQUISITION</b>	
	NEGOTIATIONS CURRENT (EX PRIVATE PROPERTY)	3
	NEGOTIATIONS CURRENT (EX OTHER CROWN LAND)	2
	RESERVE WITH CONSERVATION PURPOSE, NOT VESTED IN NPNCA	1
•	<b>MINING</b>	
	OCCURS AT ACTIVE MINESITE	3
	OCCURS AT INACTIVE MINESITE	2
	OCCURS WITHIN EXPLORATION TENEMENT	1

- **RE-ESTABLISHMENT**

RECOVERY PLAN RECOMMENDED, NOT YET PREPARED	3
RECOVERY PLAN NOT FULLY IMPLEMENTED	2
RECOVERY PLAN IMPLEMENTED	1

TABLE 8

KATANNING DISTRICT DECLARED RARE FLORA (AS AT DECEMBER 1992)  
RANKED IN PRIORITY ORDER FOR  
PROTECTION AND MANAGEMENT ACTION

1	<i>Verticordia fimbrialepis</i> subsp. <i>fimbrialepis</i>
2	<i>Acacia lanuginophylla</i>
3	<i>Eremophila veneta</i> ms
4	<i>Eremophila inflata</i>
5	<i>Adenanthos pungens</i> subsp. <i>effusa</i>
6	<i>Eremophila verticillata</i>
7	<i>Bentleya spinescens</i>
8	<i>Grevillea cirsiifolia</i>
9	<i>Conostylis seorsiflora</i> subsp. <i>trichophylla</i>
10	<i>Eremophila subteretifolia</i> ms
11	<i>Lechenaultia pulvinaris</i>
12	<i>Conostylis setigera</i> subsp. <i>dasys</i>
13	<i>Grevillea involucrata</i>
14	<i>Grevillea prostrata</i>
15	<i>Acacia leptalea</i> ms
16	<i>Grevillea prostrata</i>
17	<i>Adenanthos pungens</i> subsp. <i>pungens</i>
18	<i>Thelymitra stellata</i>
19	<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>erecta</i>
20	<i>Adenanthos velutinus</i>
21	<i>Conostylis drummondii</i>
22	<i>Banksia oligantha</i>
23	<i>Caladenia dorrienii</i>
24	<i>Myriophyllum petraeum</i>
25	<i>Caladenia integra</i>
26	<i>Drakaea</i> subsp. <i>isolata</i> ms
27	<i>Eucalyptus olivacea</i>
28	<i>Acacia depressa</i>
29	<i>Thelymitra psammophila</i>
30	<i>Caladenia hoffmanii</i> ms
31	<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>cylindracea</i>
32	<i>Allocasuarina tortiramula</i>
33	<i>Tribonanthes purpurea</i>
34	<i>Calectasia arnoldii</i> ms
35	<i>Roycea pycnophylloides</i>
36	<i>Grevillea flexuosa</i>
37	<i>Lechenaultia laricina</i>

---



## 2. Management and Research Actions

Confidential Rare Flora files, with precise locality details of known populations, are maintained at State Operations Headquarters at Como and in the Katanning District office. These records are updated regularly as required. All populations within the District should be inspected annually to observe fluctuation in population numbers and to record any changes at each site which may threaten survival.

### 2.1 Monitoring Quadrats

A network of permanent monitoring quadrats is to be established on populations of Declared Rare Flora within the Region. With the exception of *Lechenaultia pulvinaris*, the priority for permanent monitoring is as per the overall priority list given at Table 8.

Monitoring quadrats require annual assessment.

### 2.2 Research Requirements

Few of the Declared Rare Flora taxa within the District have been subject to detailed studies. Research into the taxonomy, genetic systems, population biology and ecology of the species is needed to determine the best means of protecting and managing populations. Response to fire regimes, susceptibility to *Phytophthora* and other introduced pathogens and the impact of increasing soil salinity require special attention. The following species are most urgently in need of research:

*Verticordia fimbrilepis* subsp. *fimbrilepis*  
*Eremophila veneta* ms  
*Eremophila inflata*  
*Adenanthos pungens* subsp. *effusa*  
*Eremophila verticillata*  
*Bentleya spinescens*  
*Conostylis seorsiflora* subsp. *trichophylla*  
*Conostylis drummondii*  
*Lechenaultia pulvinaris*  
*Conostylis setigera* subsp. *dasy*  
*Adenanthos velutinus*  
*Caladenia dorrienii*  
*Caladenia integra*  
*Drakaea* subsp. *isolata* ms  
*Thelymitra psammophila*  
*Calectasia arnoldii* ms

### 2.3 Protection from Fire (Fire Exclusion)

A number of species, particularly those known from only one or a few localities, require exclusion or protection from fire or specially tailored fire regimes. These species should be excluded from prescribed burns on CALM-managed and other lands or only be burnt in accordance with specifically developed fire regimes. Such regimes will need to be developed by both research and regional staff. These species will also need to be protected (by construction of protective breaks or by reduction of fuels in surrounding areas) where possible from potential uncontrolled fires unless such fires fit the conditions determined for the particular fire regime developed for that species. The following species require protection/exclusion from fire until specific fire regimes are developed:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Acacia lanuginophylla*  
*Eremophila inflata*  
*Adenanthos pungens* subsp. *effusa*  
*Bentleya spinescens*  
*Eremophila verticillata*  
*Conostylis drummondii*  
*Eremophila subteretifolia* ms  
*Grevillea cirsiifolia*  
*Adenanthos pungens* subsp. *pungens*  
*Adenanthos velutinus*  
*Drakaea* subsp. *isolata* ms  
*Caladenia hoffmanii* ms  
*Allocasuarina tortiramula*

## 2.4 Liaison with Landowners and Managers

Close association and cooperation with private landowners and other land managers is essential to ensure the continued survival of the majority of Declared Rare Flora species in the District. Survival of some species currently relies entirely on the goodwill of local Shire Councils and private landowners. Departmental staff are required to provide advice and assistance, regarding conservation and management, to landholders and other agencies with Declared Rare Flora populations on land under their control. Land managers are requested to arrange their operations so that the area of Declared Rare Flora will not be destroyed or damaged in any way. Priority species for staff liaison with landowners are:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Eremophila inflata*  
*Adenanthos pungens* subsp. *effusa*  
*Bentleya spinescens*  
*Eremophila verticillata*  
*Conostylis seorsiflora* subsp. *trichophylla*  
*Conostylis setigera* subsp. *dasys*  
*Grevillea cirsiifolia*  
*Acacia leptalea* ms  
*Thelymitra stellata*  
*Verticordia staminosa* subsp. *cylindracea* var. *erecta*  
*Verticordia staminosa* subsp. *cylindracea* var. *cylindracea*  
*Myriophyllum petraeum*

## 2.5 Germplasm Collection and *Ex situ* Storage

Collection and long term storage of seed and other germplasm from wild populations of Declared Rare Flora provides a source of propagation material for future re-establishment, in addition to ensuring protection of populations, or more importantly species, from extinction. Collection should be carried out according to the protocols provided by the Threatened Flora Seed Centre at the Western Australian Herbarium:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Eremophila inflata*  
*Acacia lanuginophylla*  
*Adenanthos pungens* subsp. *effusa*  
*Eremophila verticillata*  
*Bentleya spinescens*

*Conostylis seorsiflora* subsp. *trichophylla*  
*Conostylis drummondii*  
*Lechenaultia pulvinaris*  
*Eremophila subteretifolia* ms  
*Conostylis setigera* subsp. *dasys*  
*Acacia leptalea* ms  
*Grevillea involucrata*  
*Grevillea prostrata*  
*Grevillea flexuosa*  
*Lechenaultia laricina*  
*Verticordia staminosa* subsp. *cylindracea* var. *erecta*  
*Adenanthos pungens* subsp. *pungens*  
*Verticordia staminosa* subsp. *cylindracea* subsp. *cylindracea*  
*Calectasia arnoldii* ms

## 2.6 Location of Other Populations

Further survey of suitable habitats in the wild is a requirement for all of the Declared Rare Flora in the District. Some species are in need of urgent attention, either because of the small number or size of known populations, or their poor representation in conservation reserves. Species most urgently in need of intensive field surveys are:

*Eremophila veneta* ms  
*Eremophila inflata*  
*Conostylis seorsiflora* subsp. *trichophylla*  
*Thelymitra stellata*  
*Grevillea flexuosa*  
*Lechenaultia laricina*  
*Verticordia staminosa* subsp. *cylindracea* var. *erecta*  
*Adenanthos pungens* subsp. *pungens*  
*Adenanthos velutinus*  
*Myriophyllum petraeum*  
*Drakaea* subsp. *isolata* ms  
*Thelymitra psammophila*  
*Roycea pycnophylloides*

## 2.7 Linear Marking

Populations in need of linear marking are located along roads, railway reserves and fire access tracks where they are vulnerable to damage or destruction by maintenance operations. Permanent, but discrete, marker pegs are to be installed at all Declared Rare Flora populations along linear routes. Main Roads WA has developed a field marking system for demarcating environmentally significant areas on road reserves. This system, with minor modifications, has been adopted by CALM's Katanning District for rare flora on CALM-managed land. Westrail and local Shire Councils have been encouraged to adopt a similar system and their response has been excellent. Markers are required for populations of the following species:

*Acacia lanuginophylla*  
*Conostylis drummondii*  
*Lechenaultia pulvinaris*  
*Caladenia integra*  
*Drakaea isolata* ms  
*Allocasuarina tortiramula*

## 2.8 Small Population Size

A number of DRF species have very small population sizes, making them particularly vulnerable to localised disturbance. Species at risk in all of their known populations are:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Eremophila inflata*  
*Conostylis seorsiflora* subsp. *trichophylla*  
*Lechenaultia pulvinaris*  
*Eremophila subteretifolia* ms  
*Grevillea cirsiifolia*  
*Thelymitra stellata*  
*Caladenia dorrienii*  
*Myriophyllum petraeum*  
*Thelymitra psammophila*  
*Caladenia hoffmanii* ms  
*Calectasia arnoldii* ms

## 2.9 Dieback Hygiene

Although insufficient research information is available to assess the full impact of *Phytophthora* dieback on Declared Rare Flora in the District, there are certain genera (eg, Orchidaceae) which are not considered to be at risk. Furthermore, the District can be divided into zones of high or low risk of infection on the basis of the biology of *Phytophthora* species. Operations at sites where the following DRF species are known to occur should be conducted under strict hygiene conditions:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Adenanthos pungens* subsp. *effusa*  
*Grevillea cirsiifolia*  
*Adenanthos velutinus*  
*Banksia oligantha*

## 2.10 Instrumentalities (Protection from Accidental Damage)

In addition to the risk of accidental damage by the actions of landowners/managers populations of some Declared Rare Flora species are situated in very close proximity to facilities managed by various State and Federal instrumentalities eg, Telstra, Western Power, and are therefore at risk of accidental damage by their operations. This risk is compounded where the facilities of more than one organisation are concentrated at the site of a single population and close liaison is needed in respect to the following species:

*Bentleya spinescens*  
*Conostylis drummondii*  
*Conostylis setigera* subsp. *dasy*  
*Caladenia integra*  
*Acacia depressa*

## 2.11 Weed Control

Control of weeds in or near Declared Rare Flora population on CALM-managed land is to be conducted by District staff in close consultation with CALMScience and Wildlife Branch staff. CALM staff should liaise closely with the Agriculture WA, land managers and private landowners if weed control is required near populations on other lands. The following species require weed control or eradication in all of their population localities:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Eremophila inflata*  
*Adenanthos pungens* subsp. *effusa*  
*Grevillea cirsiifolia*  
*Thelymitra stellata*

## 2.12 Fencing/Grazing Control

Declared Rare Flora on private property in the District are generally on farmland where they require protection from grazing by livestock. In some situations landowners themselves have excluded stock, and in others CALM has subsidised the erection and maintenance of fencing as part of formal agreements.

Rabbits are a problem, particularly on deep, sandy soils and granite outcrop areas and District staff should undertake rabbit control where Declared Rare Flora occurs on these CALM-managed lands. Close liaison with Agriculture WA, land managers and private landowners is required in respect to Declared Rare Flora on other lands.

The following taxa require the maintenance of fencing or rabbit control, or both, at more than 90% of their populations:

*Acacia lanuginophylla*  
*Eremophila verticillata*  
*Conostylis setigera* subsp. *dasys*  
*Verticordia staminosa* subsp. *cylindracea* var. *erecta*  
*Adenanthos velutinus*

## 2.13 Recreational Damage

Recreational activities within the District are generally localised and are mainly centred upon picnicking at granite outcrops or water skiing on semi-permanent lakes. These specialised habitats contain a range of unique flora which includes many rare species and significant damage can occur from uncontrolled usage, in particular where vehicle access is not restricted. Recreation should be controlled, or excluded, at sites where the following species occur:

*Bentleya spinescens*  
*Eremophila subteretifolia* ms  
*Myriophyllum petraeum*  
*Caladenia integra*

## 2.14 Fire Access Track Maintenance or Construction

Fire access tracks, or firebreaks, have been constructed along the perimeter of privately owned land and much Crown land to comply with various bushfire control regulations. In addition, larger areas of Crown land, including nature reserves, are sub-divided by fire access tracks. A number of Declared Rare flora species have now been found occurring along these tracks and the continued existence of some populations could be threatened by regular track maintenance. The proposed alignment of additional fire access tracks should be thoroughly searched for Declared Rare Flora prior to construction, with particular emphasis in areas and habitats where Declared Rare Flora species are known to occur.

More than 90% of the known populations of the following species occur wholly or partly on fire access tracks:

*Acacia lanuginophylla*

*Conostylis seorsiflora* subsp. *trichophylla*  
*Lechenaultia pulvinaris*

## 2.15 Salinity/Drainage

Land degradation by salinisation caused by rising water tables as a result of land clearing for agriculture is potentially the biggest single problem faced by land managers in the District. Drainage of farmland to alleviate this problem can result in increased soil salinity and periods of inundation and alterations to run-off patterns in land low in the landscape where threatened flora is known to occur. Close liaison with private landowners, community groups and various government agencies (eg, Agriculture WA) needs to be established and maintained. The following taxa have been identified as being both susceptible to increased soil salinity and at risk locally in most, if not all, of their known populations:

*Verticordia fimbrialepis* subsp. *fimbrialepis*  
*Eremophila veneta* ms  
*Acacia lanuginophylla*

## 2.16 Land Acquisition

The acquisition of land for nature conservation should be a priority for Declared Rare Flora species which are not currently known, or are only poorly represented, on land managed for the conservation of flora and fauna. Currently, negotiations are underway for the acquisition of an area containing more than 95% of the known plants of *Acacia lanuginophylla*.

## 2.17 Mining

Mining within the District generally can be divided into two broad categories, (a) extraction of basic materials for roadworks and building construction, eg, gravel and sand, and (b) extraction of minerals for agricultural use, eg, gypsum and lime. To date the mining of ores for valuable metals such as gold has occurred only sporadically and with little apparent effect upon threatened flora.

Populations of the following species are at risk due to their occurrence at active mine sites:

*Eremophila verticillata*  
*Drakaea isolata* ms  
*Grevillea prostrata*

## 2.18 Re-establishment in the Wild

*Verticordia fimbrialepis* subsp. *fimbrialepis* is not known to occur on land managed for nature conservation and is vulnerable due to small population size and land management practices at every known site. The species should be propagated and re-established in suitable, less vulnerable habitats on land designated for nature conservation under an approved management program.

## 3. Term of The Management Program

A recovery team will be appointed which will oversee the implementation of this Program and will report annually to CALM's Corporate Executive.

This program shall run for a period of 10 years, unless subsequent research or changes to the schedule of Declared Rare Flora cause it to be superseded earlier. During this period, CALM may institute any changes to the provisions outlined in this program as are found, through further research, to be necessary for conservation of the Declared Rare Flora in the District.

## REFERENCES

- Andrews, C. (1905). Two new species of Orchidaceae from Western Australia. *Journal of Western Australian Natural History Society* 2:57.
- Anonymous (1991). The Western Australian Municipal Directory 1991-92 Australian Municipal Publications Pty Ltd, Perth.
- Aplin, T.E.H. (1969). Poison Plants of Western Australia. *Journal of Agriculture, Western Australia* 10:248-257.
- Beard, J.S. (1972). Vegetation Survey of Western Australia, Hyden Area 1:250 000 Series. Vegmap Publications, Sydney.
- Beard, J.S. (1976). Vegetation Survey of Western Australia, Newdegate and Bremer Bay Areas 1:250 000 Series. Vegmap Publications, Sydney.
- Beard, J.S. (1980a). Vegetation Survey of Western Australia, Dumbleyung Area 1:250 000 Series. Vegmap Publications, Sydney.
- Beard, J.S. (1980b). A new phytogeographic map of Western Australia. *Western Australian Herbarium Research Notes* 3:37-58.
- Beard, J.S. (1990). Plant Life of Western Australia. Kangaroo Press Pty Ltd, Sydney.
- Bennett, E.M. (1986). Bentleya, a new genus of Pittosporaceae from southern Western Australia. *Nuytsia* 5(3):401-406.
- Bennett, E.M. (1989). Casuarinaceae. In *Flora of Australia* 3:190.
- Bentham, G. (1863-1879). Flora Australiensis Volumes 1-7. Lovell Reeve and Co, London.
- Blackall, W.E. and Grieve, B.J. (1974, 1980-81). How to Know Western Australian Wildflowers Parts 1-3b. University of Western Australia Press, Perth.
- Blackall, W.E. and Grieve, B.J. (1988). How to Know Western Australian Wildflowers Part 1, 2nd Edition. University of Western Australia Press, Perth.
- Briggs, J. and Leigh, J. (1988). Rare or Threatened Australian Plants. *Australian National Parks and Wildlife Service Special Publication* 14.
- Briggs, J.D. and Leigh J.H. (1996). Rare and Threatened Australian Plants, 1995 revised edition. CSIRO Publishing, Victoria.
- Brittan, N.H. (1960). New Western Australian Species of *Thysanotus* R.Br. (Liliaceae). *Journal and Proceedings of the Royal Society of Western Australia* 43:13.
- Brooker, M.I.H. and Kleinig, D.A. (1990). Field Guide to Eucalypts. Volume 2. South-Western and Southern Australia. Inkata press, Melbourne & Sydney.
- Brown, A., Thomson-Dans, C. and Marchant, N. (eds) (1998). Western Australia's Threatened Flora. Department of Conservation and Land Management. Como, W.A.
- Burgman, M.A. and Sokolowski, R.E.S. (1983). Rare and Geographically Restricted plants of Western Australia. *Department of Fisheries and Wildlife Western Australia Report* 23.

- Chinnock, R.J. (1985). Five endangered new species of Myoporaceae from South-Western Australia. *Nuytsia* 5 (3) : 391-400.
- Coates, A. (1992). Flora and Vegetation Survey of Dragon Rocks Nature Reserve (No A36128). Unpublished report prepared for the Department of Conservation and Land Management.
- Coleman, E. (1933). Description of a new *Caladenia* (Orchid). *Victorian Naturalist* 49:246.
- Craig, G.F., Bell, T.D. and Atkins, C.A., (1990). Response to Salt and Waterlogging Stress of Ten Taxa of ACACIA Selected from Naturally Saline Areas of Western Australia. *Australian Journal of Botany* 38:619-30.
- Crisp, M.D. & Weston, P.H. (1987). Cladistics and Legume Systematics with an Analysis of the Bossiaceae, Brongniartieae and Mirbelieae. In: Stirton, C.H. (Ed), *Legume Systematics*, Part 3. Royal Botanic Gardens, Kew pp 65-130.
- Crook, I.G. and Burbidge, A.A. (1982). Lake Magenta Nature Reserve. *Western Australian Nature Reserve Management Plan* 4. Department of Fisheries and Wildlife, Perth.
- Erickson, R. (1978). *Orchids of the West* 3rd Edition. Paterson Brokensha Pty Ltd, Perth.
- Everist, S.L. (1974). *Poison Plants of Australia*. Angus and Robertson, Sydney.
- Gardner, C.A. (1942). Contributions Flora Australia Occidentales 11 *Journal of the Royal Society of Western Australia* 27:193.
- Gardner, C.A. (1946). Contributions Flora Australia Occidentales 12. *Journal of the Royal Society of Western Australia* 32:75-83.
- Gardner, C.A. (1964). Contributions Flora Australia Occidentales 13. *Journal of the Royal Society of Western Australia* 47:34-64.
- Gardner, C.A. and Bennetts, H.W. (1956). *The Toxic Plants of Western Australia*. Western Australian Newspapers, Perth.
- Gardner, C.A. and George, A.S. (1963). Eight new plants from Western Australia. *Journal of the Royal Society of Western Australia* 46:129-138.
- George, A.S. (1971). A Checklist of the Orchidaceae of Western Australia. *Nuytsia* 1(2):166-196.
- George, A.S. (1974). Seven new species of *Grevillea* (Proteaceae) from Western Australia. *Nuytsia* 1:370-374.
- George, A.S. (1982). Gyrostemonaceae. In *Flora of Australia* 8:372.
- George, A.S. (1991). New taxa, combinations and typifications in *Verticordia* (Myrtaceae : Chamelaucieae). *Nuytsia* 7(3):231-394.
- Green, J.W. (1985). *Census of the Vascular Plants of Western Australia* 2nd Edition. Western Australian Herbarium, Department of Agriculture, Perth.
- Grieve, B.J. and Blackall, W.E. (1975). *How to Know Western Australian Wildflowers* Part IV. University of Western Australia Press, Perth.
- Grieve, B.J. (1975). Botany in Western Australia, A Survey of Progress : 1900-1971. *Journal of the Royal Society of Western Australia* 58(2):33-53.



- Hallam, S.J. (1975). *Fire and Hearth : A Study of Aboriginal Usage and European Usurpation in South-western Australia*. Australian Institute of Aboriginal Studies, Canberra.
- Hoffman, N. and Brown, A. (1984). *Orchids of South West Australia*. University of Western Australia Press, Perth.
- Hopper, S.D. (1979). Biogeographical Aspects of Speciation in the Southwest Australian Flora. *Annual Review of Ecological Systematics* 10:399-422.
- Hopper, S.D. Purdie, R.W. George A.S. and Patrick, S.J. (1987). *Conostylis*. In. *Flora of Australia* 45:57-109.
- Hopper, S.D. van Leeuwen, S. Brown, A. and Patrick, S. (1990). *Western Australia's Endangered Flora*. Department of Conservation and Land Management, Perth.
- Isaacs, J. (1987). *Bush Foods*. Weldon Publishers, Sydney.
- Kelly, A.E. Coates, D.J. Herford, I. Hopper, S.D. O'Donoghue, M. Robson, L. and Sokolowski, R. (1990). Declared Rare Flora and other plants in need of special protection in the Northern Forest Region. *Western Australian Wildlife Management Program* 4. Department of Conservation and Land Management, Perth.
- Kemp, E.M. (1981). Fire and the Australian Biota. In: Gill, A.M. *et al* (Eds), *Pre-Quaternary fire in Australia*. Australian Academy of Science, Canberra. pp 3-21.
- Leaman, E.G. and Graham M.S. (Unpublished). *Monitoring Human Usage of Nature Reserves to assess the Impact of Management Strategies*.
- Leigh, J. Boden, R. and Briggs, J. (1984). *Extinct and Endangered Plants of Australia*. Macmillan Company Pty Ltd, Melbourne.
- Macfarlane, T.D. and Hopper, S.D. (1987). *Flora of Australia* 45:465.
- Maiden, J.H. and Blakely, W.F. (1928). Descriptions of Fifty New Species and Six Varieties of Western and Northern Australian Acacias, and Notes on Four Other Species. *Journal and Proceedings of the Royal Society of Western Australia* 13:19-22.
- Marchant, N.G. and Keighery, G.J. (1979). Poorly Collected and Presumably Rare Vascular Plants in Western Australia. *Kings Park Research Notes* No 5.
- Maslin, B.R. (1975). Studies in the genus *Acacia* (Mimosaceae) 4. A Revision of the Series *Pulchellae*. *Nuytsia* 1(5):422.
- McKenzie, N.L. (1973). Results of a Biological Survey of the Shire of Kent, Western Australia. Report No 13 Department of Fisheries and Fauna, Perth.
- McKenzie, N.L. and Youngson, W.K. (1975). Notes of the Wildlife of a Proposed Nature Reserve around Lake Grace and Lake Chinocup, Western Australia. Report No 6 Department of Fisheries and Wildlife, Perth.
- McKenzie, N.L. Burbidge, A.A. and Marchant, N.G. (1973). Results of a Biological Survey of a Proposed Wildlife Sanctuary at Dragon Rocks near Hyden, Western Australia. Report No 12 Department of Fisheries and Fauna, Perth.
- Miller, K.A.G. (1982). *Rare and Geographically Restricted Plants of Western Australia*. Department of Fisheries and Wildlife, Western Australia Unpublished Report Number 15.

- Mollemans, F.H. Brown, P.H. and Coates, D.J. (1993). Declared Rare Flora and Other Plants in need of Special protection in the Merredin District. *Western Australian Wildlife Management Program 9*, Department of Conservation and Land Management, Perth.
- Morrison, D.A. (1987). The phyto geography, ecology and conservation status of *Lechenaultia* R Br (Goodeniaceae) *Kingia* 1(1):85-133.
- Muir, B.G. (1976). Vegetation : Tarin Rock and North Tarin Rock Reserves. In: Biological survey of the Western Australian Wheatbelt Part 1. *Records of the Western Australian Museum Supplement No 2*.
- Muir, B.G. (1978). Vegetation: Dongolocking Nature Reserve In : Biological survey of the Western Australian Wheatbelt Part 5. *Records of the Western Australian Museum Supplement No 6*.
- Napier, A. Taylor, A. Patrick, S. and Hopper, S. (1987 unpublished). Survey of Rare and Poorly Known Eucalypts of Western Australia. Field Guide No 2 Wheatbelt Region. Western Australian Department of Conservation and Land Management.
- Nelson, E.C. (1978a). A Taxonomic revision of the genus *Adenanthos* (Proteaceae). *Brunonia* 1:303-406.
- Nelson, E.C. (1978b). *Glasra* (Contribu Nat Bot Gard Glasnervin) 2:57-69.
- Newbey, K.R. (1983 unpublished). Some Important Plant Species in Natural Areas North of Agricultural Areas Between Ravensthorpe and Esperance.
- Orchard, A.E. (1990). Haloragaceae. In *Flora of Australia* 18:5-85.
- Patrick, S.J. (1983). Rare and Geographically Restricted Plants of Western Australia. Department of Fisheries and Wildlife Western Australia Unpublished Report Number 22.
- Patrick, S.J. and Hopper, S.D. (1982). A Guide to the Gazetted Rare Flora of Western Australia Supplement 1 to Report No 42 Department of Fisheries and Wildlife Western Australia Report Number 54.
- Pellöe, R.H. (1930). West Australian Orchids. E.H. Pellöe, Perth.
- Rajput, M.T.M. and Carolin, R.C. (1988). The genus *Dampiera* (Goodeniaceae): systematic arrangement, nomenclature notes and new taxa. *Telopea* 3(2):197.
- Rye, B.L. and Hopper, S.D. (1981). A Guide to the Gazetted Rare Flora of Western Australia. Department of Fisheries and Wildlife Western Australia Report Number 42.
- Sampson, J.F. and Hopper, S.D. (1990). Endangered Poison Plants of Western Australia. Final Report World Wildlife Fund Project P105. World Wildlife Fund Australia and the Western Australian Department of Conservation and Land Management.
- Short, P.S. (1989). New Genera and Species of Australian Inuleae (Asteraceae). *Muelleria* 7:111-112.
- Taylor, A. and Hopper, S.D. (1988). The Banksia Atlas. Australian Flora and Fauna Series No 8 Australian Government Publishing Service, Canberra.
- Watson, L. (1962). A taxonomic revision of the genus *Andersonia* (Epacridaceae). *Kew Bulletin* 16:108-109.

White, M.E. (1986). *The Greening of Gondwana*. Reed Books Pty Ltd, Sydney.

White, M.E. (1990). *The Nature of Hidden Worlds*. Reed Books Pty Ltd, Sydney.

## GLOSSARY

<b>acuminate</b>	tapering gradually to a protracted point
<b>acute</b>	terminating in a distinct but not protracted point, the converging edges separated by an angle less than 90 degrees
<b>alternate</b>	of leaves or other lateral organs, borne singly at different heights on the axis; of floral parts, on a different radius, eg describing the position of stamens with respect to petals
<b>annual</b>	a plant whose life span ends within one year after germination
<b>appendage</b>	a structure arising from the surface or extending beyond the tip of another structure
<b>appressed</b>	pressed closely against but not united with
<b>axil</b>	the angle between a leaf or bract and the axis bearing it adj <b>axillary</b>
<b>axis</b>	a stem, (commonly used for the main stem of a whole plant or of an inflorescence)
<b>basal</b>	leaves; placed closest to the ground, at the base of the stem
<b>beak</b>	a prominent terminal projection, especially of a carpel or fruit
<b>bract</b>	a leaf-like structure, different in form from the foliage leaves and without an axillary bud, associated with an inflorescence or flower
<b>bracteole</b>	a small bract-like structure borne singly or in pairs in the pedicel or calyx of a flower
<b>calyx</b>	the sepals of one flower collectively
<b>calyx-tube</b>	a tube formed by fusion or cohesion of sepals cf <b>hypathium</b>
<b>calli</b>	glandular, wart-like structures occurring on the labellum of some orchids
<b>capsule</b>	a dry fruit formed from two or more united carpels and dehiscing at maturity to release the seeds
<b>claw</b>	a narrow, stalk-like basal portion of a petal, sepal or bract
<b>column</b>	a structure formed by fusion of the style, stigma and stamen(s), as in the Orchidaceae
<b>compressed</b>	flattened in one plane, either dorsally (brining the front and back closer together) or laterally (brining the sides closer together)
<b>cupular</b>	cup-shaped
<b>dioecious</b>	having the male and female reproductive structures on separate plants of <b>monoecious</b>
<b>dorsal</b>	the lower or under surface of a leaf or flower

<b>elliptic</b>	oval in outline, widest at the centre
<b>endemic</b>	having a natural distribution confined to a particular geographical region
<b>entire</b>	having a smooth margin, not dissected or toothed
<b>ephemeral</b>	short-lived
<b>erect</b>	upright - as of stem
<b>family</b>	a group of one to many genera believed to be related phylogenetically, usually clearly separable from other such groups
<b>filament</b>	the stalk of a stem; a thread one or more cells thick; in blue-green Algae, a trichome enclosed in a mucilaginous sheath
<b>floral</b>	belonging to or associated with a flower
<b>fruit</b>	the seed-bearing structure in angiosperms formed from the ovary after flowering
<b>genus</b>	a group of species believed to be related phylogenetically and usually clearly separable from other such groups, or a single species without close relatives pl <b>genera</b>
<b>glabrous</b>	without hairs
<b>gland</b>	a structure, without or on the surface of a plant, with a secretory function
<b>glandular</b>	bearing glands; functioning as a gland
<b>glaucous</b>	blue-green in colour, with a whitish bloom (as in the juvenile leaves of many eucalypts)
<b>habit</b>	the growth form of a plant, comprising its size, shape, texture and orientation
<b>habitat</b>	the environment in which a plant lives
<b>herb</b>	any vascular plant that never produces a woody stem, cf <b>forb</b>
<b>hirsute</b>	hairy with hairs longer than in pubescent
<b>hybrid</b>	an offspring of genetically different parents (in a Flora, usually applied where the parents are of different species)
<b>incurved</b>	bent or curved inwards or upwards; of leaf margins, curved towards the adaxial surface
<b>inflorescence</b>	the group or arrangement in which flowers are borne on a plant
<b>juvenile</b>	of leaves, formed on a young plant and different in form from the adult leaves
<b>labellum</b>	a lip; in Orchidaceae, the distinctive median petal that serves as an alighting platform for pollinating insects
<b>lateral</b>	arising from, or at the side of, an axis or structure

<b>lamina</b>	the blade of a leaf
<b>lanceolate</b>	of the leaf, about four times as long as it is broad, broadest in the lower half and tapering towards the tip
<b>leaflet</b>	one of the ultimate segments of a compound leaf
<b>lignotuber</b>	a woody swelling below or just above the ground, containing adventitious buds from which new shoots develop if the top of the plant is cut or burnt (common in the shrubby eucalypts and in many other fire-tolerant Australian shrubs)
<b>limb</b>	the upper free, spreading portion of a corolla or perianth that is connate at the base
<b>linear</b>	very narrow in relation to the length, and with the sides parallel
<b>lobe</b>	partial division of any part
<b>mallee</b>	a growth habit in which several woody stems arise separately from a lignotuber (usually applied to shrubby eucalypts); a plant having the above growth habit
<b>marginal</b>	occurring at or very close to the margin
<b>monoecious</b>	having the male and female reproductive structures in separate flowers but on the same plant cf <b>dioecious</b>
<b>monomorphic</b>	* (see <i>Myriophyllum petraeum</i> ) *
<b>nerve</b>	a vein
<b>oblanceolate</b>	similar in shape to <b>lanceolate</b> but attached at the narrower end
<b>oblong</b>	having the length greater than the width but not many times greater, and the sides parallel
<b>obovate</b>	similar in shape to <b>ovate</b> but attached at the narrower end
<b>obtuse</b>	blunt or rounded at the apex, the converging edges separated by an angle greater than 90 degrees
<b>opposite</b>	of leaves, borne at the same level but on opposite sides of the stem; of floral parts, on the same radius (as) cf <b>alternate</b>
<b>orbicular</b>	circular or nearly so
<b>ovoid</b>	oval in silhouette, but essentially solid, as an egg, usually applied to fruits
<b>papilla</b>	a small, elongated protuberance on the surface of an organ, usually an extension of one epidermal cell adj <b>papillose</b>
<b>pectinate</b>	comb-like, leaf margins with lobes very narrow and close
<b>pedicel</b>	the stalk of a flower adj <b>pedicellate</b>
<b>peduncle</b>	the stalk of an inflorescence; in ferns, the stalk of a sporocarp adj <b>pedunculate</b>

<b>perennial</b>	a plant whose life-span extends over more than two growing seasons
<b>perianth</b>	the calyx and corolla of a flower, especially where the two are similar
<b>persistent</b>	applies to parts of plants which remain after flowering
<b>petal</b>	a member of the inner whorl of non-fertile parts surrounding the fertile organs of a flower, usually soft and coloured conspicuously
<b>petiole</b>	the stalk portion of a leaf
<b>phyllode</b>	a leaf whose blade is much reduced or absent, and whose petiole and rachis have assumed the functions of the whole leaf of <b>cladode</b>
<b>pinnate</b>	divided into pinnae; once-compound cf <b>bipinnate</b>
<b>pollination</b>	the transfer of pollen from the male organ, where it is formed, to the receptive region of a female organ, eg from anther to stigma
<b>propagule</b>	a structure with the capacity to give rise to a new plant, eg a seed, a spore, part of the vegetative body capable of independent growth if detached from the parent
<b>prostrate</b>	lying flat on the ground
<b>pubescent</b>	covered with short, soft, erect hairs
<b>pulvinus</b>	a swelling at the base of the stalk of a leaf or leaflet, often glandular or responsive to touch
<b>pungent</b>	ending in a stiff, sharp point; having an acrid taste or smell
<b>raceme</b>	an indeterminate inflorescence in which a main axis produces a series of flowers on lateral stalks, the oldest at the base and the youngest at the top adj <b>racemose</b>
<b>reflexed</b>	bent sharply downwards or backwards
<b>sepal</b>	a member of the (usually green) outer whorl of non-fertile parts surrounding the fertile organs of a flower
<b>seriate</b>	in rows or whorls
<b>serrate</b>	toothed, with asymmetrical teeth pointing forward
<b>sessile</b>	without a stalk (when applied to a stigma, indicates that the style is absent, the stigma being 'sessile' on the ovary)
<b>shrub</b>	a woody plant less than 5 m high, either without a distinct main axis, or with branches persisting on the main axis almost to its base
<b>simple</b>	undivided; of a leaf, not divided into leaflets; of a hair or an inflorescence, not branched
<b>solitary</b>	of flowers, borne singly, not grouped in an inflorescence

<b>species</b>	a taxon comprising individuals, or populations of individuals, capable of interbreeding to produce fertile offspring; the largest group of individuals between which there are no distinguishable, consistent differences in form or reproductive mechanisms
<b>spike</b>	an unbranched, indeterminate inflorescence in which the flowers are without stalks adj <b>spicate</b>
<b>stamen</b>	a male reproductive organ of a flowering plant, bearing pollen and typically consisting of a (filament) and pollen bearing portion (anther)
<b>staminode</b>	a sterile stamen, or a structure resembling a stamen and borne on the staminal part of the flower
<b>stem</b>	the main axis or a branch of the main axial system of a plant, developed from the plumule of the embryo and typically bearing leaves
<b>stigma</b>	the usually papillate or glandular receptive tip of the style which receives the pollen at pollination
<b>stipule</b>	one of a pair of appendages at the bases of leaves in many dicotyledons
<b>style</b>	the stigma and its stalk, attached to the summit of the ovary
<b>taxon</b>	a group or category, at any level, in a system for classifying plants or animals
<b>terete</b>	cylindrical or nearly so; circular in cross-section
<b>terminal</b>	at the apex or distal end
<b>terrestrial</b>	of or on the ground; of the habitat of a plant, on land as opposed to in water, or on the ground as opposed to on another plant
<b>throat</b>	of a corolla tube, the top, where the tube joins the lobes
<b>trilobed</b>	having three lobes
<b>tuber</b>	storage organ formed by swelling of an underground stem or the distal end of a root
<b>unisexual</b>	bearing only male or only female reproductive organs
<b>vein</b>	a strand of vascular tissue
<b>verticillate</b>	arranged in one or more whorls
<b>whorl</b>	a ring of leaves, bracts or floral parts borne at the same level on an axis
<b>wing</b>	a membranous expansion of a fruit or seed, which aids dispersal; a thin flange of tissue extended beyond the normal outline of a stem or petiole; a lateral petal of a flower in Papilionaceae