SURVEY OF RARE AND POORLY KNOWN EUCALYPTS OF WESTERN AUSTRALIA

FIELD GUIDE NO. 3

GREENOUGH REGION

BY

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LINE DRAWINGS
BY
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WESTERN AUSTRALIAN DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

1988

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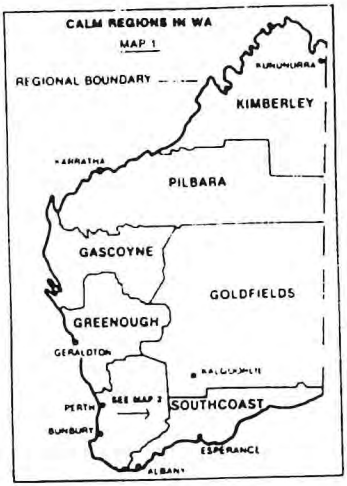
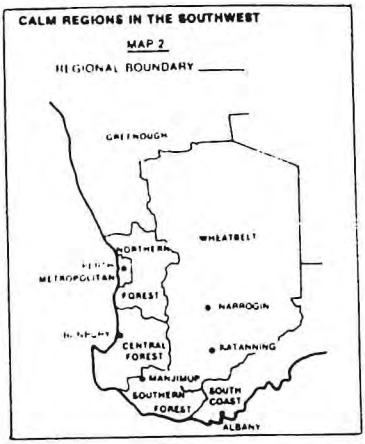
INTRODUCTION

This interim field guide has been produced to assist contributors to the "Survey of Rare and Poorly Known Eucalypts of W.A." to identify the species of interest. As the list of such species is large, it has been subdivided into different State regions. This booklet covers the Greenough Region, as defined by the Western Australian Department of Conservation and Land Management (see Fig. 1). Other booklets cover other C.A.L.M. regions.

Figure 1





Eucalypts have been the subject of recent name changes and taxonomic research. This field guide is the most up-to-date reference available for rare and poorly known eucalypts of the Region, including new species and subspecies whose names have not yet been published. For information on such taxa, we have relied heavily on the unpublished "Field Guide to Eucalypts Vol. 2" by M.I.H. Brooker and D. Kleinig. We are indebted to the authors for allowing access to their manuscript. We have also drawn heavily on the unpublished research results of Ian Brooker, Lawrie Johnson, Ken Hill, Don Blaxell and Stephen Hopper to whom we are grateful for assistance. Because of the active phase of research occurring on eucalypts, this field guide is very much an

interim report. Undoubtedly, new taxa warranting inclusion in the study will be discovered during the course of the survey.

Common eucalypts of the Region can best be identified using Chippendale's "Eucalypts of the Western Australian Goldfields (and the Adjacent Wheatbelt)" and Blackall and Grieve's "How to Know Western Australian Wildflowers, Part IIIA".

Funding for this field guide and the Rare and Poorly Known Eucalypt Survey has been provided by the Australian National Parks and Wildlife Service and the Western Australian Department of Conservation and Land Management. We are grateful to the Curator, Western Australian Herbarium, for providing access to specimens and to Paul Gioia of the Western Australian Wildlife Research Centre for FLORAPLOT computer mapping.

Species' Description and Illustrations

The species are listed in alphabetical order. Unpublished taxa of L. Johnson, D. Blaxell and K. Hill are given a three letter code and referred to as aff. (with affinity to their nearest named relative). Unpublished taxa of Brooker and Hopper are given as manuscript names enclosed in parentheses. For each species (or subspecies), the main identifying features of the plant are indicated on the drawings. Other features, including those which can only be seen in the field are included under "Additional Field Characteristics". If there are similar eucalypts with which the species in question can be confused, these are indicated and their distinguishing features highlighted. In cases where a similar species is common and is thus not included in the field guide, full details of the comparison are given. If a similar species is rare, and is included in the field guide, only a brief comparison is provided. Further details can be found on the relevant page for that species.

All illustrations have been drawn using material from the W.A. Herbarium or from other collections. As it is not possible to show the slight variations of ornamentation which may occur within a species, the most representative specimens have been drawn.

Location Maps

The location maps have been produced from records of specimens lodged at the Western Australian Herbarium, from personal records of M.I.H. Brooker and S.D. Hopper and from information supplied by various wildlife officers and individuals as recorded on the Department of Conservation and Land Management species files. The maps have been compiled on the FLORAPLOT Computer System at the W.A. Wildlife Research Centre.

The maps of species' location are given as a general guide and should not be regarded as covering the entire range of the species.It is hoped that the present survey will either extend the known range or verify the restricted occurrence of certain species. It is also possible that some previously recorded populations or individuals may have disappeared as a result of agricultural clearing, or road widening, or other factors.

Collecting Specimens

Since eucalypts can be difficult to identify and also since we are only looking at rare and poorly known taxa for which confirmed identification is essential, we will be relying greatly on voucher specimens to confirm certain records.

A properly collected, well pressed and labelled specimen will be required in each of the following circumstances:

- For each 'new' species or subspecies recorded by a person e.g. when John Smith records *E. beardiana* for the first time, a voucher specimen is needed.

- For any species or subspecies located a significant distance from its nearest known location (consult the map scale each time as most maps are at different scales). "Significant" may be a few kilometres for an extremely localised species (e.g. *E. 'absita'*), further for more widespread species.

- Whenever you are unsure of an identification.

The following guidelines suggest techniques for collecting and processing specimens so that they remain in a well preserved, identifiable state.

1. Do you have a collectors permit? This is needed before collecting specimens from publicly owned land. It can be obtained from the Senior Clerk Flora, Department of Conservation and Land Management, 50 Hayman Road, Como. On privately owned land, you should always seek the owners permission. Special Ministerial permits are required to collect Declared rare flora (see Table 1). These may also be applied for from the Senior Clerk Flora, Dept. of Conservation and Land Management, 50 Hayman Rd, Como, W.A.

E. beardiana	*E. steedmanii*
E. bennettiae	*E. suberea*
E. brevipes	*E. synandra* subsp. (wheatbelt)
E. burdettiana	*E.* sp. 'olivacea'
E. ceracea	*E.* sp. 'latens'
E. cerasiformis	*E.* sp. 'pruiniramis'
E. coronata	*E.* sp. 'bla'
E. crucis subsp. *crucis*	*E.* sp. 'crispata'
E. erectifolia	*E.* sp. 'phy'
E. insularis	*E.* sp. 'pla'
E. johnsoniana	*E.* sp. 'balanites'
E. lateritica	*E.* sp. 'absita'
E. merrickiae	*E.* sp. 'cuprea'
E. mooreana	*E.* sp. 'argutifolia'
E. rhodantha	*E.* sp. 'leprophloia'

Table 1. Declared Rare Eucalypts of W.A.

2. Collecting and Pressing

We recommend that you label each specimen collected with a unique number and your initials. For example, John D. Smith's collection of two eucalypt species at the first site he collects would be labelled JDS1 and JDS2. The same number should also be written in your field note book and on the relevant Sight Record Sheet, thus allowing future matching of specimens with recorded information. We also recommend that you collect in duplicate for each of your unique numbers. That is, enough material of each species to enable you to keep an adequate sample and to forward to the Survey Coordinators a duplicate (destined for the W.A. Herbarium) (see Fig. 2).

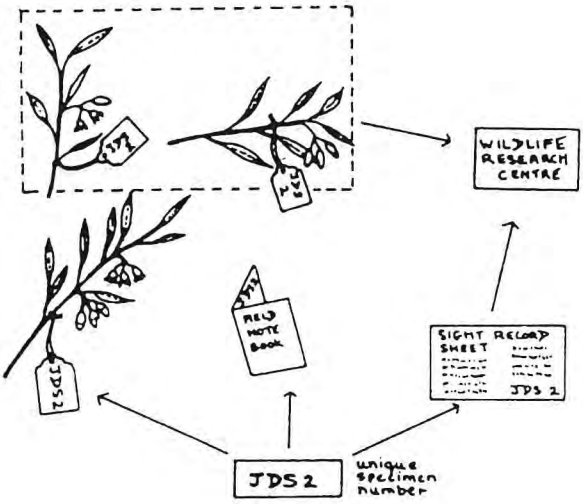


Figure 2. Labelling Plant Specimens

Collections should include leaves, buds and fruits and a small packet of fruits with the seeds enclosed. Where available, juvenile leaves from suckers near the base of the trunk should also be collected. If buds

are not available, a search on the ground may produce shed bud caps which are often an important aid in identification. Bark may be included if it is unusual.

As soon as possible after collection, plant parts should be put between sheets of newspaper, spread out so that they are clearly seen, and pressed. A simple press can be made from two sheets of any non-bending material, strapped together. Some sheets of cardboard, preferable smooth-sided corrugated cardboard, placed between the newspaper sheets will assist air circulation through the press. Drying of plant material occurs within the press and can be facilitated by keeping it in a warm room or in front of a heater and by changing the newspaper daily for the first few days, and then as conditions dictate. Most plants should dry in about a fortnight. Once dried, the plants should be placed between clean, dry sheets of newspaper and suitable measures taken to protect the specimens whilst they are in transit.

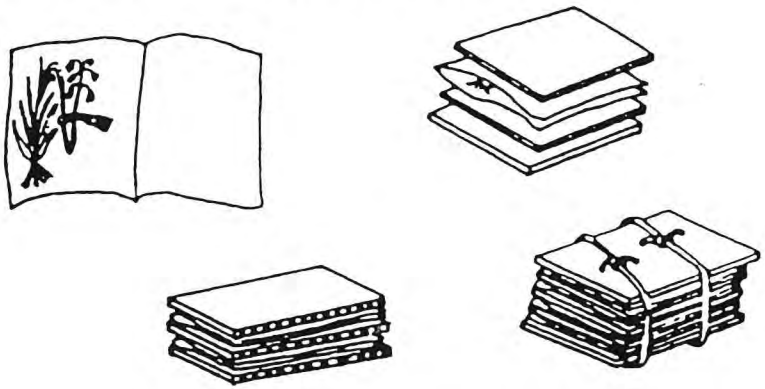


Figure 3. Pressing Plant Specimens

3. Specimen Label Slips

These are standardised recording slips which must accompany any specimen when it is submitted to a

herbarium. These can be filled in by either yourself or the Survey Coordinators (based on information contained on Sight Record Sheets). If you would like to fill in your own Specimen Label Slips, please contact Rare Eucalypt Survey Coordinators, W.A. Wildlife Research Centre, P.O. Box 51, Wanneroo, 6065.

4. Field Notebooks

We recommend the use of field notebooks when recording in the field, with all relevant data being later transferred to Sight Record Sheets. It is important that you make notes on most features illustrated in Fig. 4. when in the field, especially those difficult or impossible to observe on herbarium specimens (e.g. tree or mallee, habit, height, shape, bark features, leaf glossiness, leaf venation and oil gland pattern, presence of pith glands in branchlets, flower colour etc. Such information should be included on the Sight Record Sheets under "Additional Remarks". If there is insufficient space, please attach an additional sheet of paper. If you have collected a specimen, remember to include its unique number in your field note book for future reference.

5. Where to Send Duplicate Specimens for Identification

Please forward your duplicate specimens with relevant sight record sheets to:

Eucalypt Survey Coordinators
Wildlife Research Centre, C.A.L.M.
P.O. Box 51
Wanneroo W.A. 6065

The coordinators will ensure that your specimens are correctly identified, with the able assistance of botanists Ian Brooker and Stephen Hopper. As mentioned

above, the duplicate you send will be deposited in the Western Australian Herbarium.

6. Confidentiality

We urge contributors to be circumspect in divulging precise locations of the rarest of the eucalypts. Many of these are of considerable horticultural value, and some have been stripped entirely of mature fruits at particular sites by unscrupulous seed collectors in the past. If you consider that a given species might be at risk from such activities, please use general locations (e.g. Ravensthorpe district) when discussing or writing about your survey work. While we require very precise locations on computer sheets to ensure we can determine land status and ownership accurately, publications arising from this survey will not provide accurate details or maps for the rarest species.

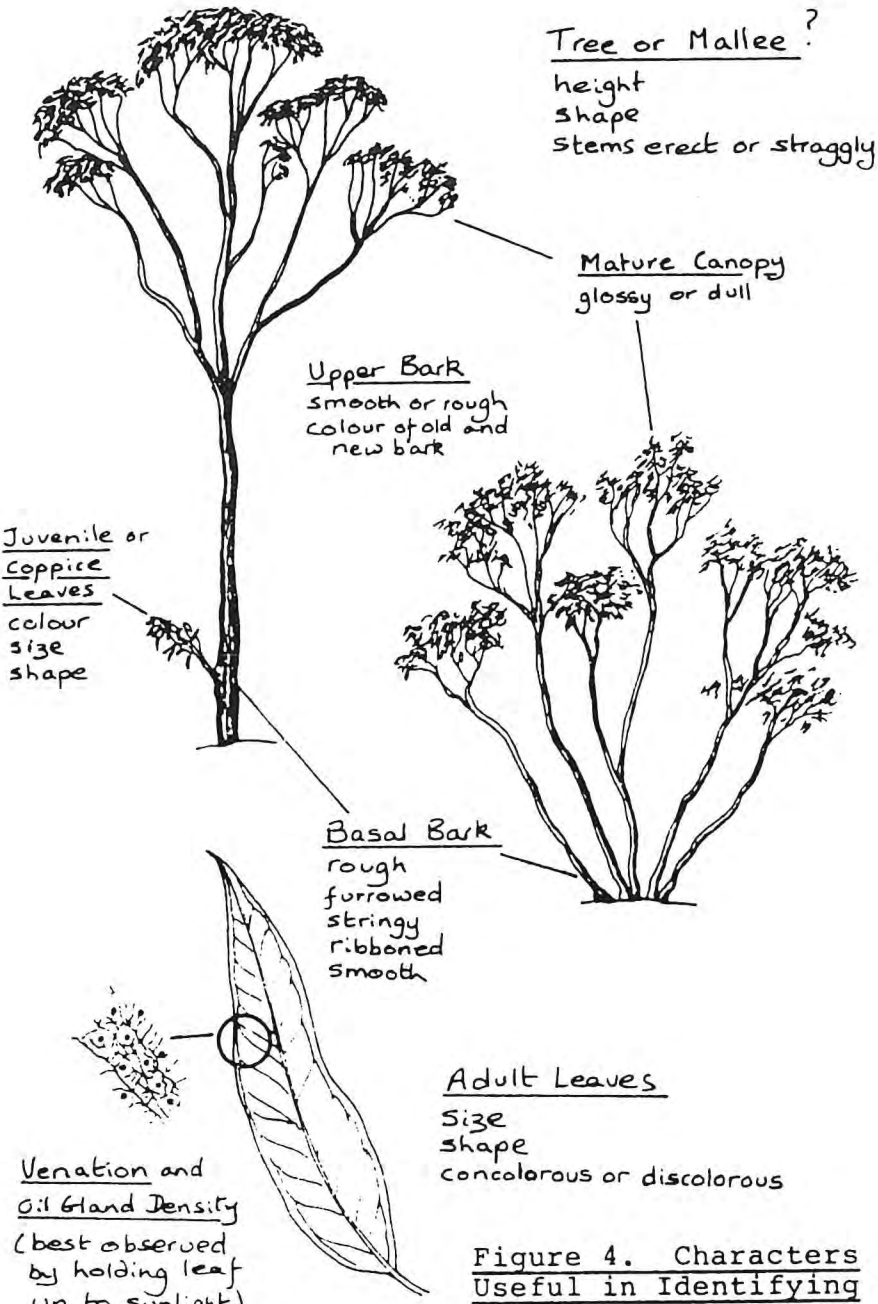
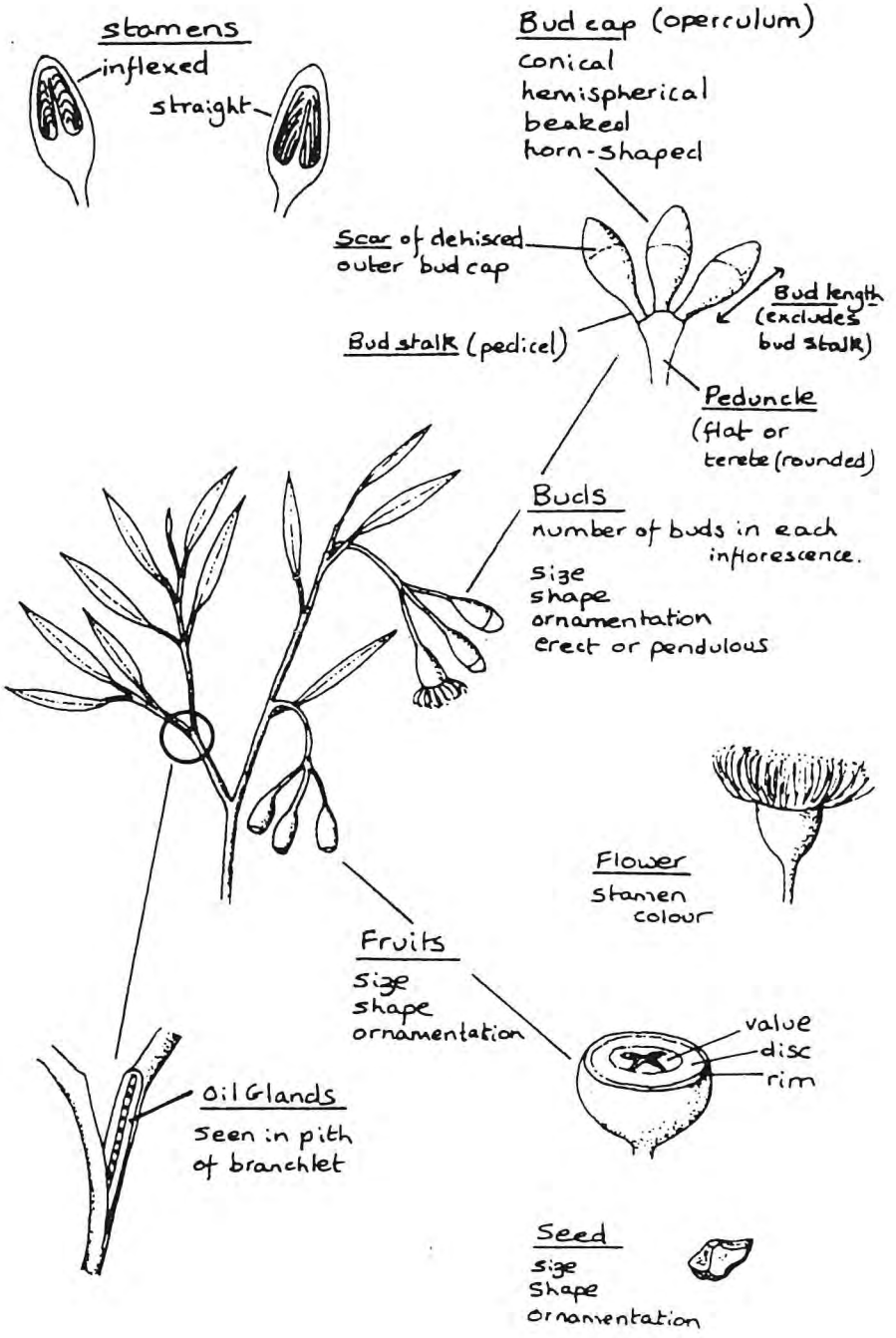


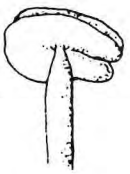
Figure 4. Characters Useful in Identifying Eucalypts


Stamens
inflexed
straight
Bud cap (operculum)
conical
hemispherical
beaked
horn-shaped
Scar of dehisced outer bud cap
Bud length (excludes bud stalk)
Bud stalk (pedicel)
Peduncle
(flat or terete (rounded)
Buds
number of buds in each inflorescence.
size
shape
ornamentation
erect or pendulous
Flower
stamen
colour
Fruits
size
shape
ornamentation
value
disc
rim
Oil Glands
seen in pith of branchlet
Seed
size
shape
ornamentation

GLOSSARY OF TERMS USED

acute	ending in a sharp point
adnate	(of anthers) rigidly fixed at the base (see diagram below)
anthesis	the process of flowering
axillary	in the leaf axil; from where the leaf joins the branchlet
concolorous	leaf with upper and lower sides the same colour
cuboid	resembling a cube
discolorous	leaf with upper and lower sides a different colour
exserted	protruding from the top or opening of the fruit
fertile	(of stamens) having an anther
flanged	a projecting flat rim, collar or rib
glaucous	with a waxy coating giving a white, grey or blue-grey appearance
globoid	of the anthers, somewhat globular in form
hypanthium	the flower receptacle or lower part of the bud
inflorescence	cluster of flowers
mallee	shrub-mallee - has more than one trunk and each trunk is less than 10 cm in diameter
	tree-mallee - has more than one trunk and each trunk is more than 10 cm in diameter
mallet	small to medium sized tree, usually of steep-branching habit, sometimes fluted at the base of the trunk, and often with a conspicuously dense, terminal crown
obtuse	blunt or rounded at the apex
oil glands	minute oil containing structures seen near the surface of young stems, leaves, buds and fruits
operculum	the bud cap, the upper part of the bud which joins the hypanthium and covers the stamens

panicle	a much-branched inflorescence with flowers on stalks
peduncle	the stalk which holds the cluster of buds; may be terete, stout or flattened
pendulous	weeping habit or downturned
petiole	the leaf stalk which joins it to the branchlet
pith	the inner core of tissue of a plant stem
reticulation	the pattern of leaf veins
scar	the marking left on the bud when the first operculum is shed. If only one operculum is present no true scar is formed although a line of dying tissue which resembles a scar may appear near to flowering
sessile	without a stalk
staminode	a sterile stamen, one without an anther or with a reduced, non-functional anther
striated	marked with almost parallel longitudinal ridges
terete	rounded; used when descirbing stems, peduncles and petioles and referring to a cross-section
truncate	slightly cut off
venation	refers to the pattern of veins in the leaf
versatile	(of anthers) fixed at a central point and able to pivot (see below)



versatile

adnate

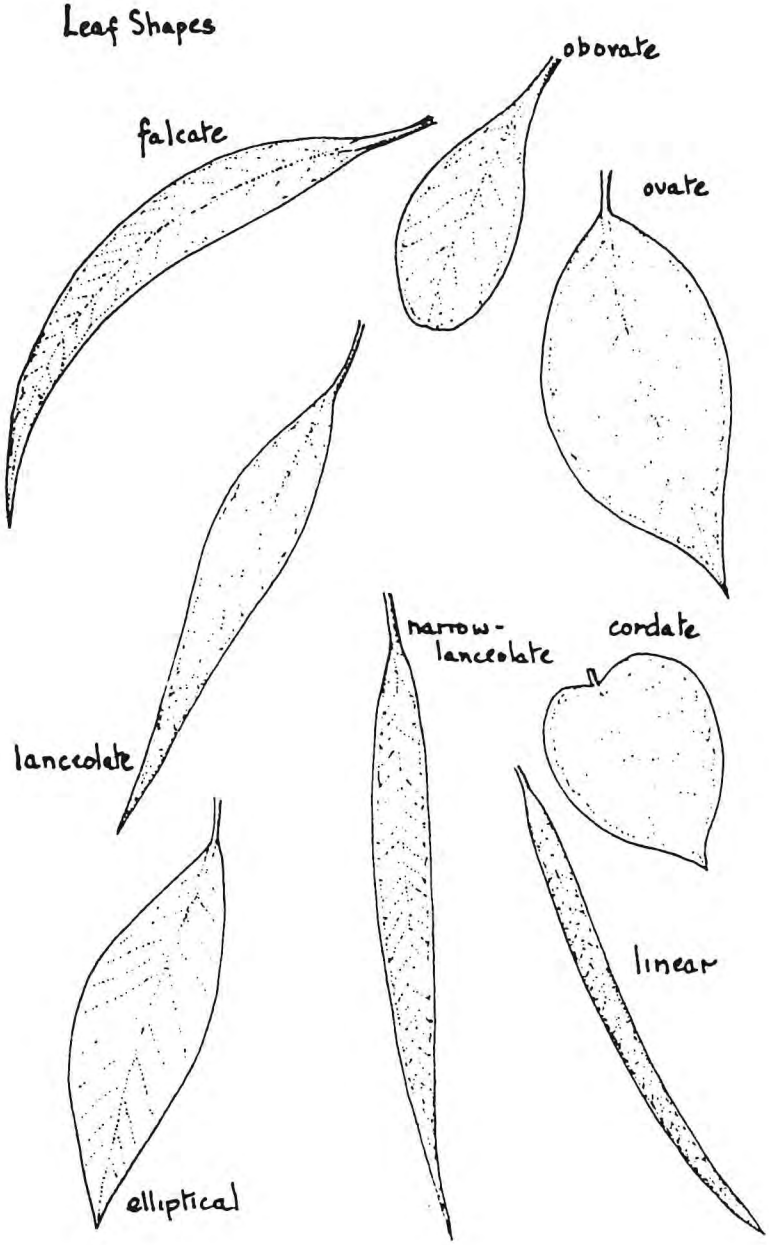
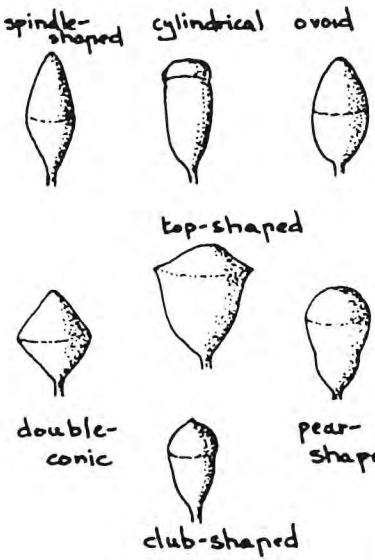
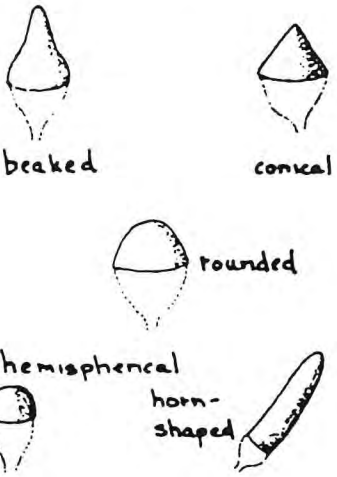


Figure 5. Leaf, bud and fruit shapes

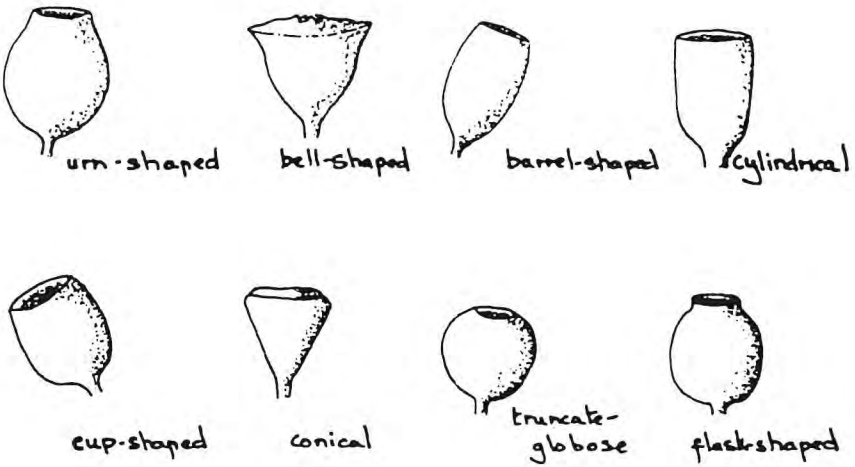
Bud Shapes



Bud Caps (opercula)



Fruits



EUCALYPTUS 'ABSITA' Grayling and Brooker ined.

Badgingarra box

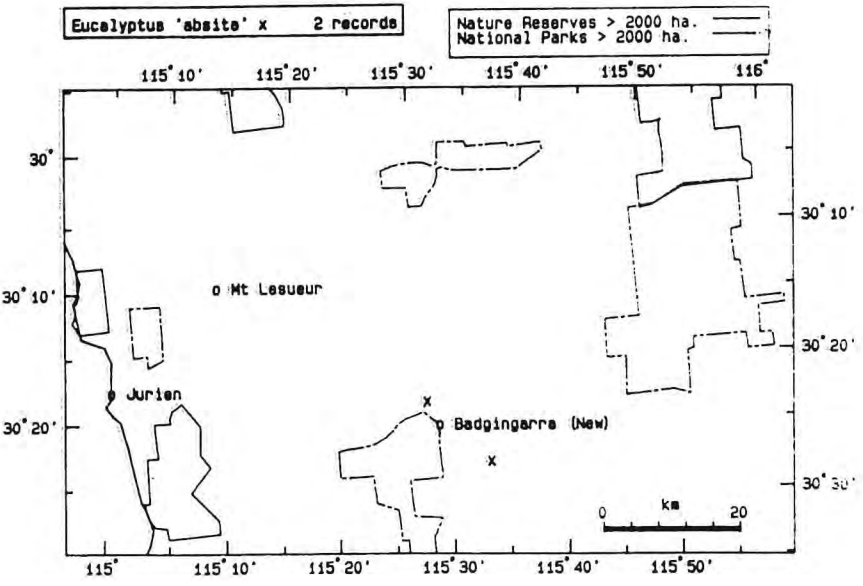
Distribution and Habitat: Known from only two small stands in the Badgingarra area where it occurs on flat sandplain as an emergent mallee amongst dense heath.

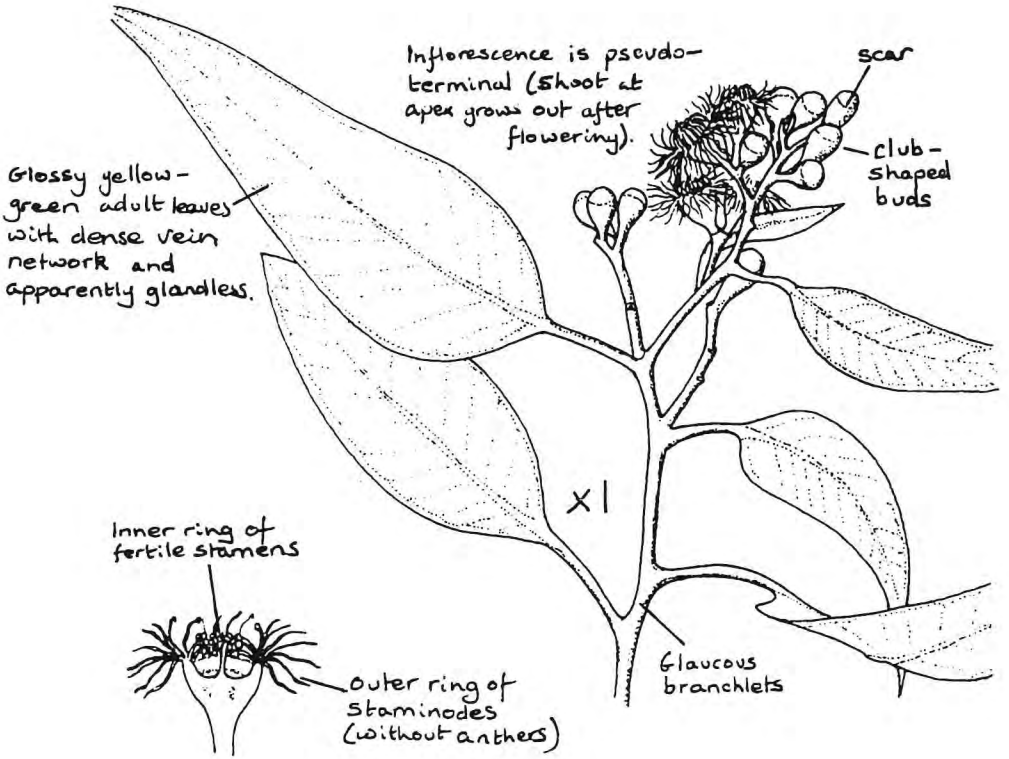
Flowering Period: April to July.

Additional Field Characteristics: Of the two populations known both are mallees. One is up to 2.5 m tall with smooth bark, grey over orange, the other up to 5 m, rough barked at base, smooth above.

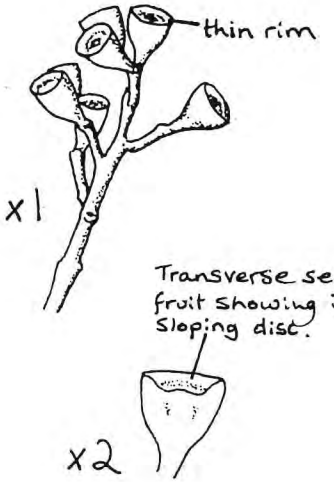
The species is related to *E.* '*cuprea*' and *E. petraea* differing in its glaucous juvenile leaves and the prominent inward-sloping disc of the thin-rimmed fruit (*petraea* has a level disc). All 3 species have pseudo-terminal inflorescences. *E.* '*cuprea*' is only known from the Moresby Range and north of the Murchison River whilst *E. petraea* is usually associated with granite rocks. The fruit of the latter is also distinct as the capsule dehisces by a 5-sided disc which often remains attached at the side of the orifice. *E. 'absita'* may also be confused with *E. loxophleba* subsp. *'lis'* but the latter has adult leaves with numerous, round, island, green and yellow oil glands.

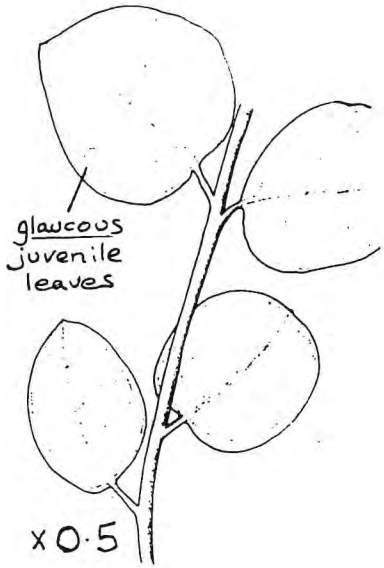
References: Brooker and Kleinig (ms), Hopper (field notes), Roberts, (pers. comm.).




Inflorescence is pseudo-terminal (shoot at apex grows out after flowering).
scar
club-shaped buds
Glossy yellow-green adult leaves with dense vein network and apparently glandless.
x1
Glaucous branchlets

Inner ring of fertile stamens
Outer ring of staminodes (without anthers)


thin rim
x1
Transverse section of fruit showing inward sloping disc.
x2


glaucous juvenile leaves
x0·5

EUCALYPTUS 'ANNULIFORMIS' Grayling and Brooker ined.

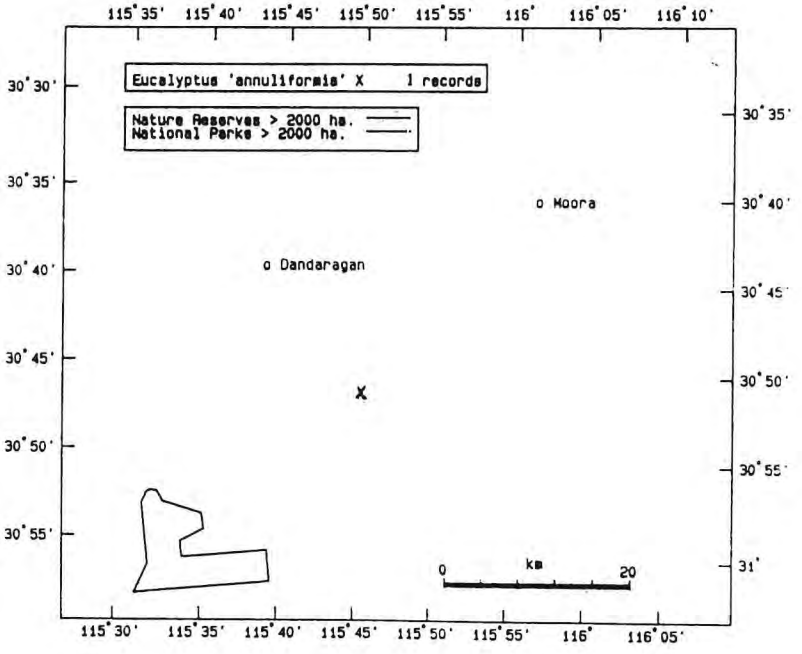
Distribution and Habitat: Only a single small stand is known to the south-east of Dandaragan.

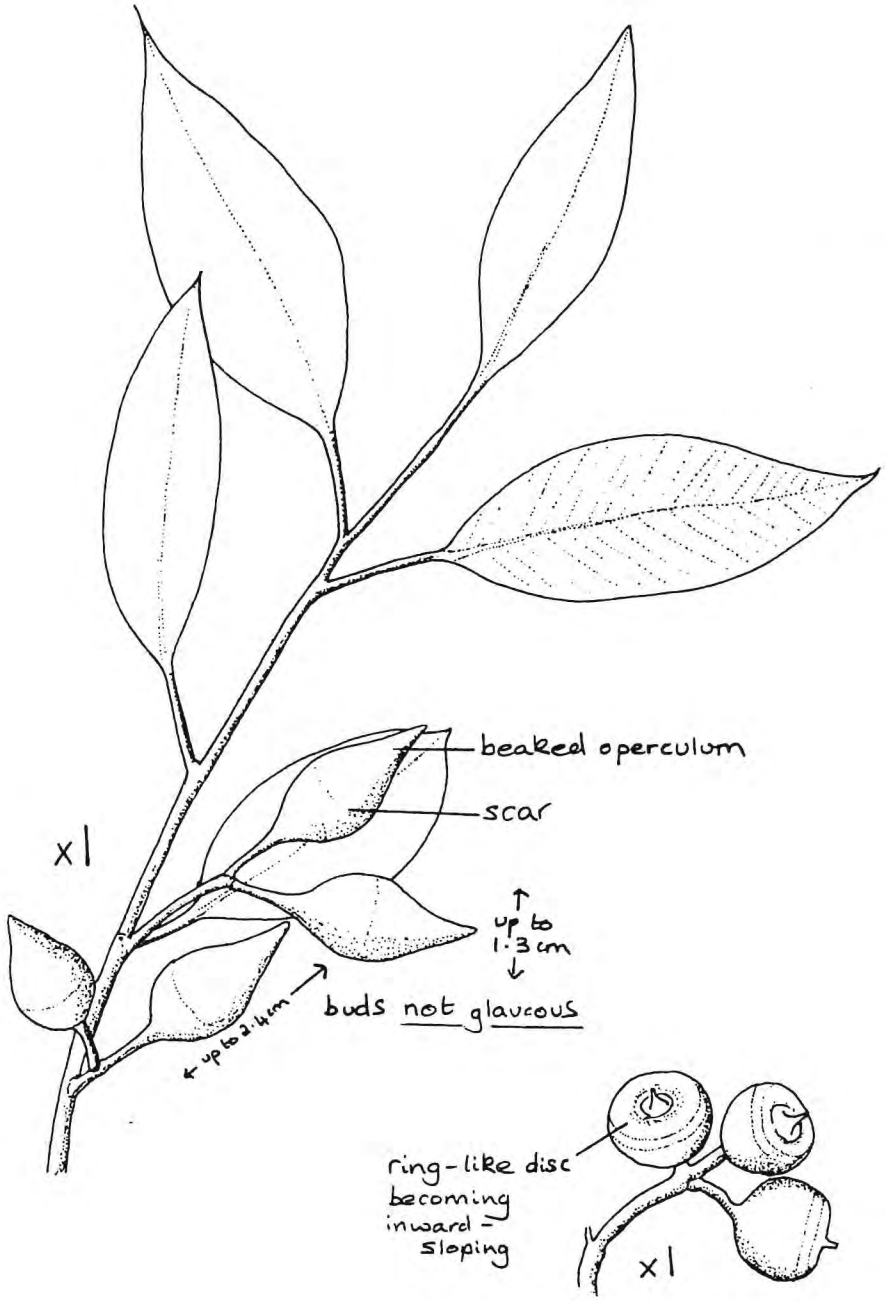
Flowering Period: July - September.

Additional Field Characteristics: A mallee with smooth bark, deciduous in small greyish flakes. The branchlets are reddish when young. Adult leaves measure 5-8 x 0.6-0.8 cm and are dull grey-green. Fruits are almost globular and have exserted valves. The seed is brown and usually smaller than the red-brown chaff.

E. 'annuliformis' is related to *E. drummondii* differing in its larger, non-glaucous buds (*drummondii* buds up to 1.5 x 1 cm), with a beaked operculum (*drummondii* - conical operculum) and greyish bark (*drummondii* - white). The ring-like disc of the *'annuliformis'* fruits which eventually becomes inward sloping, is also distinct.

References: Brooker and Kleinig (ms).




beaked operculum
scar
x1
up to 1·3 cm
buds not glaucous
up to 2·4 cm
ring-like disc becoming inward-sloping
x1

EUCALYPTUS 'BALANITES' Grayling and Brooker

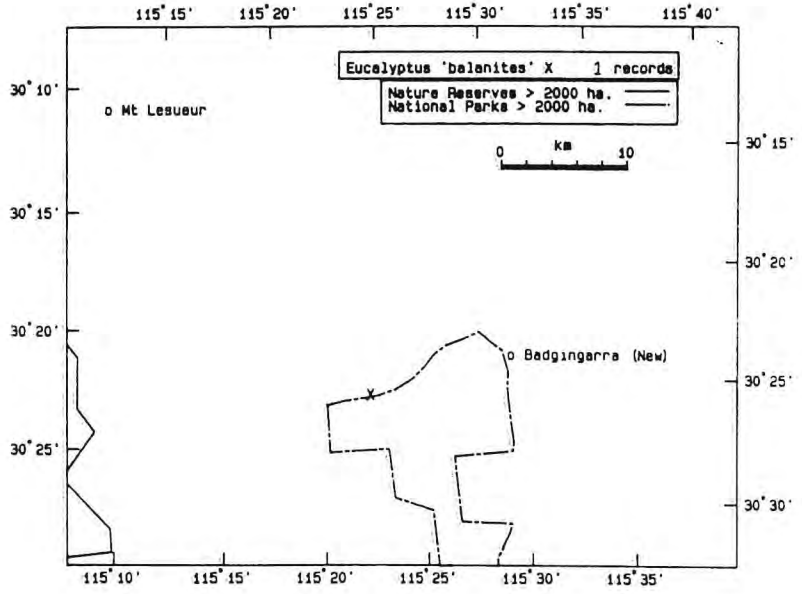
Cadda Road mallee

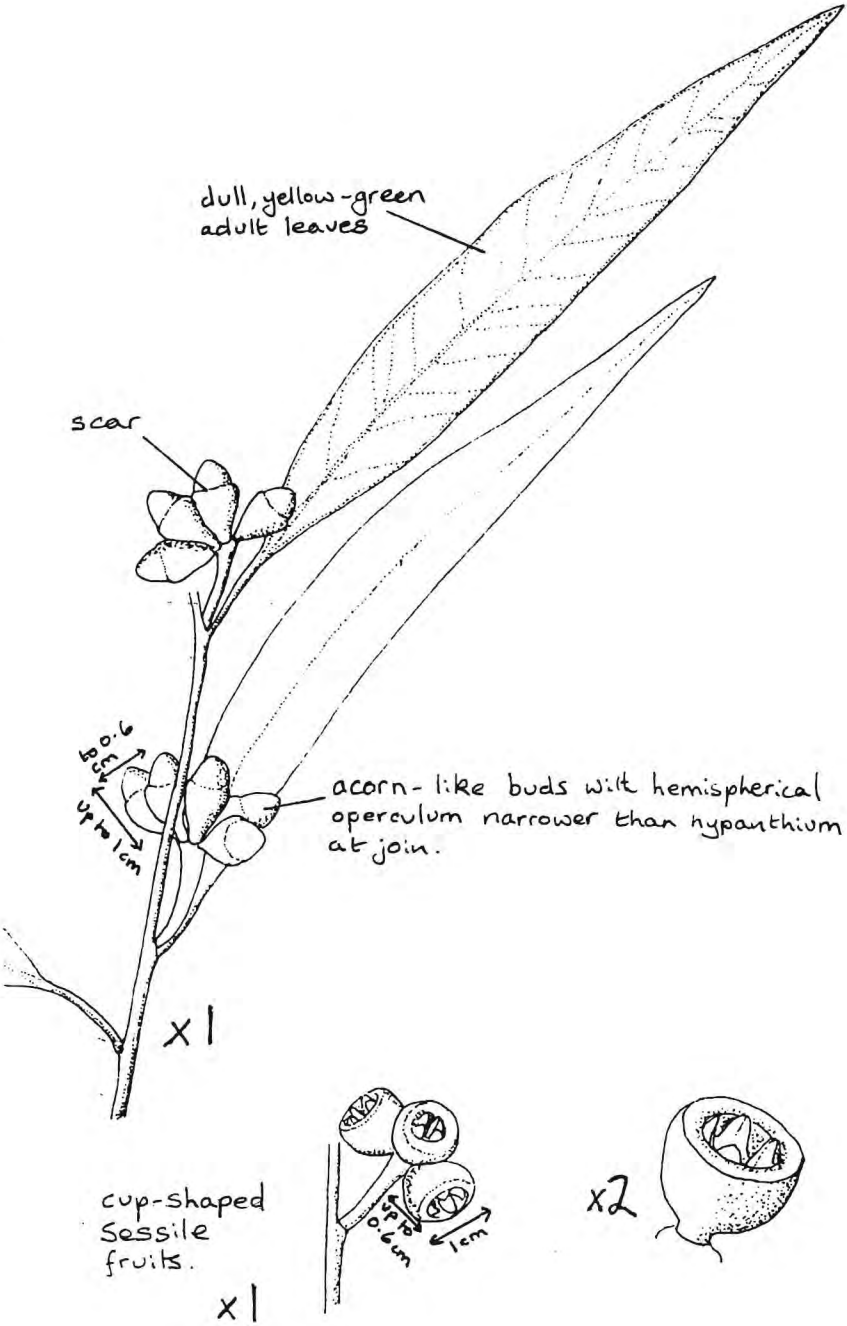
Distribution and Habitat: Known only from a single population on the northern edge of Badgingarra National Park where it is emergent above dense heath. Associated species include *E. todtiana, E. lanepoolei, Nuytsia floribunda.*

Flowering Period: October to January.

Additional Field Characteristics: A mallee to 5 m with rough, corky bark at the base. Juvenile leaves are elliptical and dull blue-green. *E. 'balanites'* is related to *E. decipiens* differing mainly in its buds (*decipiens* buds - fusiform, 0.8-1.1 x 0.5-0.8, operculum acute, conical or beaked, rarely hemispherical). The juvenile leaves also differ, those of *decipiens* being heart-shaped and *decipiens* has rough bark over part or all of the trunk.

References: Brooker and Kleinig (ms), Hopper (field notes).




dull, yellow-green adult leaves
scar
0.6 cm
up to 1cm
acorn-like buds with hemispherical operculum narrower than hypanthium at join.
x1
cup-shaped sessile fruits.
x1
0.6 cm
1cm
x2

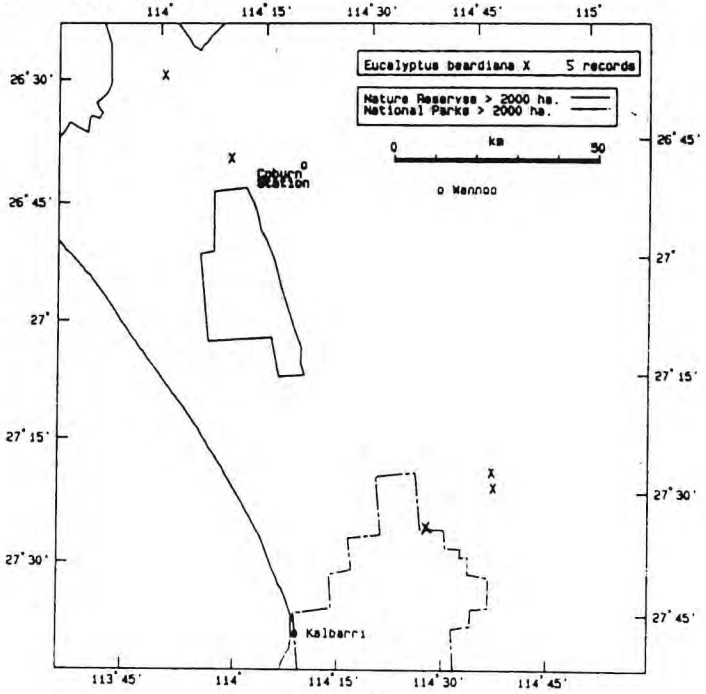
EUCALYPTUS BEARDIANA Brooker and Blaxell

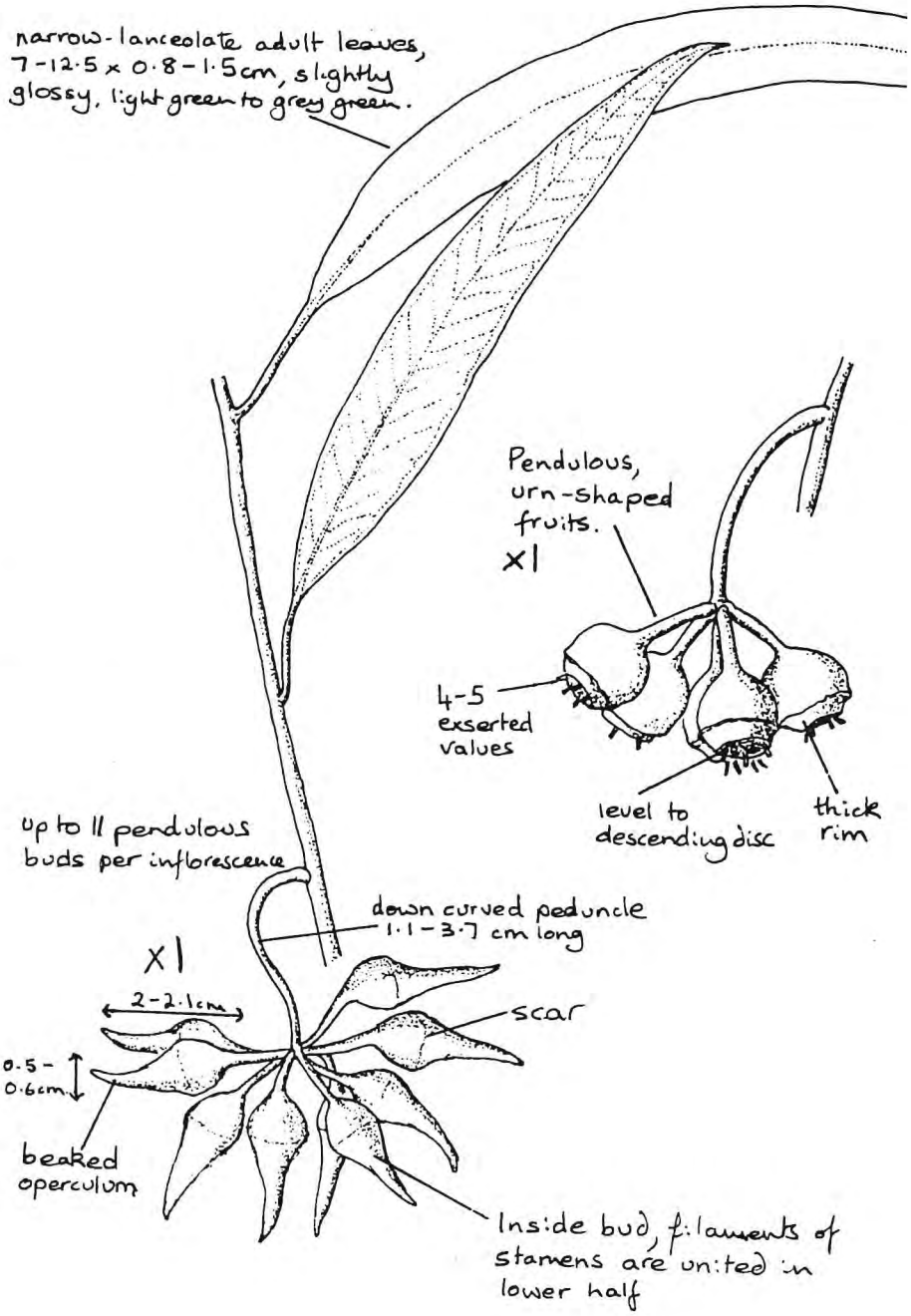
Distribution and Habitat: Occurs north of the Murchison River and towards Shark Bay where it is found on deep yellow sands. Associated species include *Banksia sceptrum, E. gittinsii, E. jucunda.*

Flowering Period: September.

Additional Field Characteristics: A tall, spreading mallee up to 5 m in height with smooth pinkish-grey or cream bark. Juvenile leaves are broad-lanceolate, 2-9 x 0.5-3.5 cm. The buds measure 2-2.1 x 0.5-0.6 cm and the fruits 0.9-1.1 x 1.1-1.2 cm. The seed is brown, flattish to compressed ovoid and with some longitudinal grooves. *E. beardiana* is similar to *E. synandra* but differs in its urn-shaped fruits with a level to descending disc (*synandra* - fruits have broad, steeply ascending disc). *E. synandra* has smaller buds (1.1-1.6 x 0.5-0.8 cm) with up to 7 per inflorescence. The peduncle of *E. synandra* is also smaller (up to 1.8 cm long). *E. beardiana* is also similar to *E. leptopoda* but the latter has narrower leaves (5-14 x 0.5-1.4 cm), shorter buds (0.7-1.2 x 0.4-0.6 cm) with 7 or rarely 9 per inflorescence. *E. leptopoda* also lacks the partly fused filaments to the flowers.

References: Brooker and Kleinig (ms), Elliott and Jones (1986), Brooker and Blaxell (1978), Leigh, Boden and Briggs (1984), Keighery (1983).




narrow-lanceolate adult leaves, 7-12.5 x 0.8-1.5cm, slightly glossy, light green to grey green.
Pendulous, urn-shaped fruits.
x1
4-5 exserted values
level to descending disc
thick rim
up to 11 pendulous buds per inflorescence
down curved peduncle 1.1-3.7 cm long
x1
2-2.1cm
scar
0.5-0.6cm
beaked operculum
Inside bud, filaments of stamens are united in lower half

EUCALYPTUS 'BLA' aff. LOXOPHLEBA

Howatharra mallee

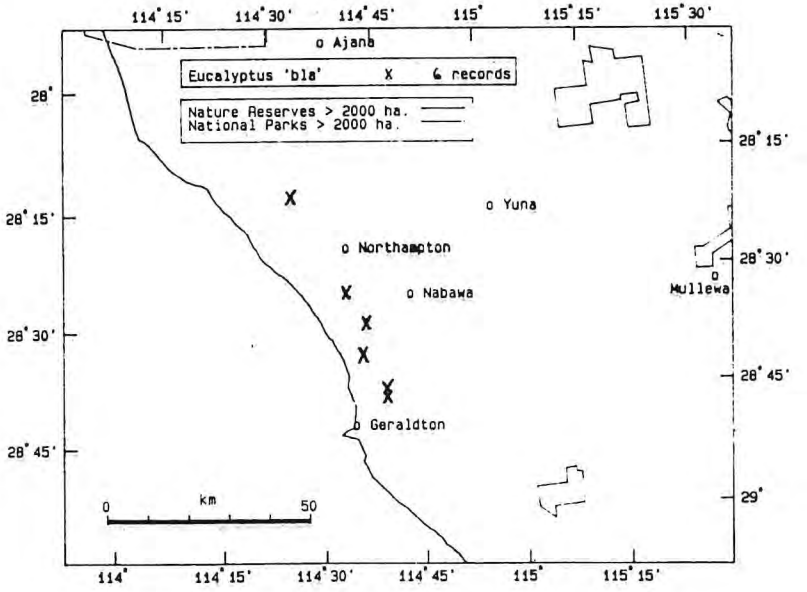
Distribution and Habitat: Known from only 5 small populations in the Moresby Range north-east of Geraldton with a total range of c. 50 km. It occurs as an emergent mallee over heath on stony rises or creek flats. Associated species include *E. loxophleba, E. stowardii, E. 'arachnaea'*.

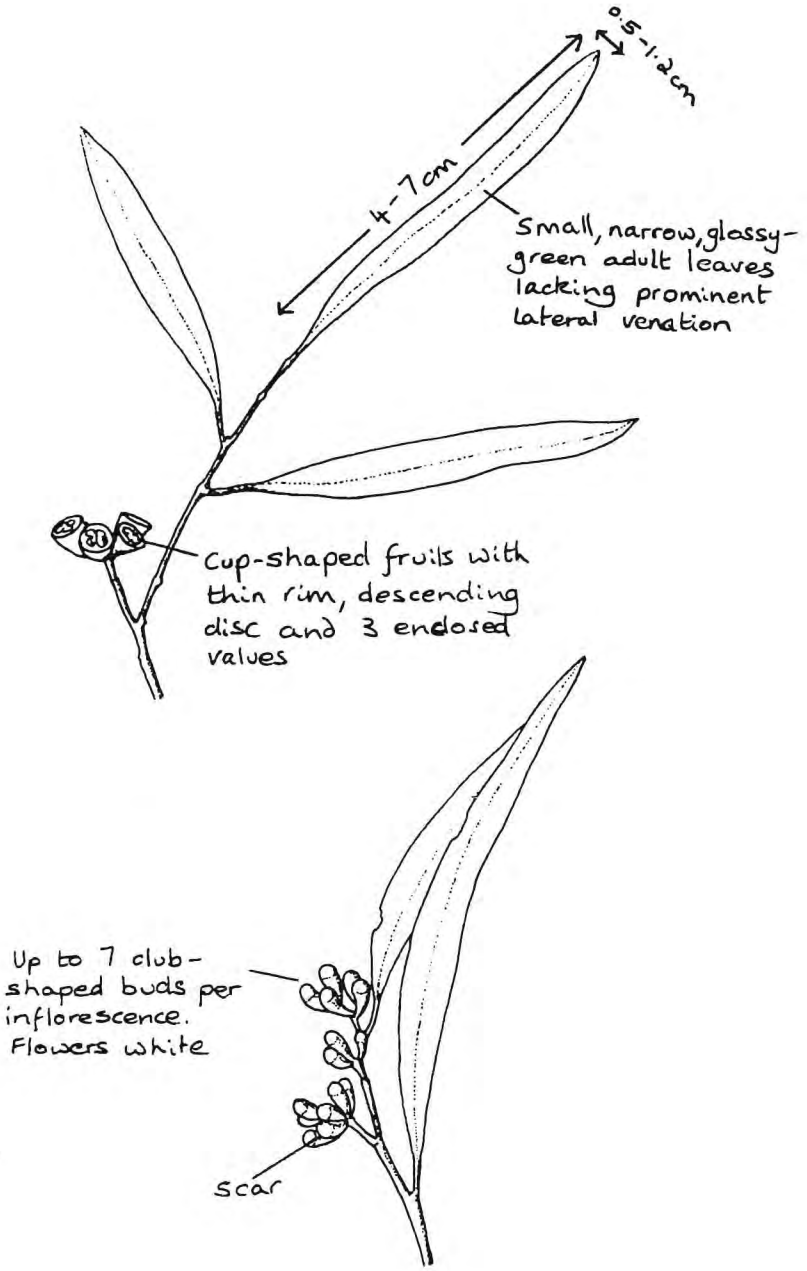
Flowering Period: August - November.

Additional Field Characteristics: A low mallee with smooth bark, pale pinkish brown over grey. Juvenile leaves are at first green to blue-green and ovate to lanceolate, becoming narrow-lanceolate and glossy green. The buds are up to 0.6 x 0.3 cm and the fruits to 0.4 x 0.3 cm. The seed is dark red-brown with a shallow distinct reticulum.

E. 'bla' is related to *E. loxophleba* subsp. *'lis'* (smooth barked *loxophleba*). It differs in its smaller adult leaves (ssp. *'lis'* 7-13 x 1-2 cm) which lack prominent lateral venation, its generally smaller buds and fruits (ssp. *'lis'* - buds 0.6-0.9 x 0.3-0.4 cm, fruits 0.4-0.9 x 0.4-0.6 cm) and its juvenile leaves (ssp. *'lis'* juvenile leaves cordate to ovate, to 12 x 9 cm, usually mealy white). From *E. loxophleba* subsp. *loxophleba* it is distinguished by its smooth bark.

References: Brooker and Kleinig (ms), Hopper (field notes).




0.5-1.2cm
4-7cm
Small, narrow, glossy-green adult leaves lacking prominent lateral venation
Cup-shaped fruits with thin rim, descending disc and 3 enclosed valves
Up to 7 club-shaped buds per inflorescence. Flowers white
scar

EUCALYPTUS CARNABYI Blakely and Steedman

Carnaby's mallee

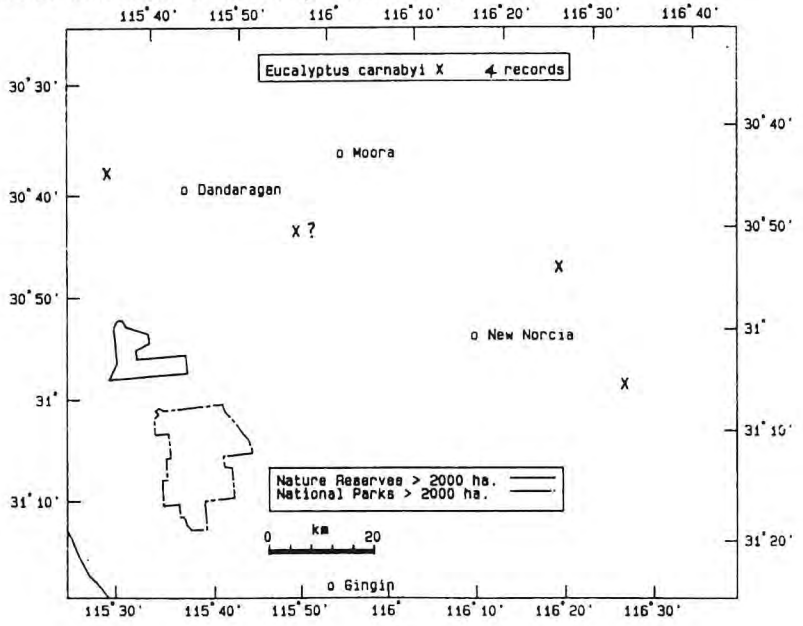
Distribution and Habitat: Known from only a few small stands in the northern wheatbelt, between Calingiri and Dandaragan where it occurs on sandy or gravelly-sand soils. In most cases the species exists in cleared paddocks, but remnant vegetation may include *E. macrocarpa*, *E. drummondii*, *E. falcata*, *E. rigidula*, *E. loxophleba* and *E. wandoo*.

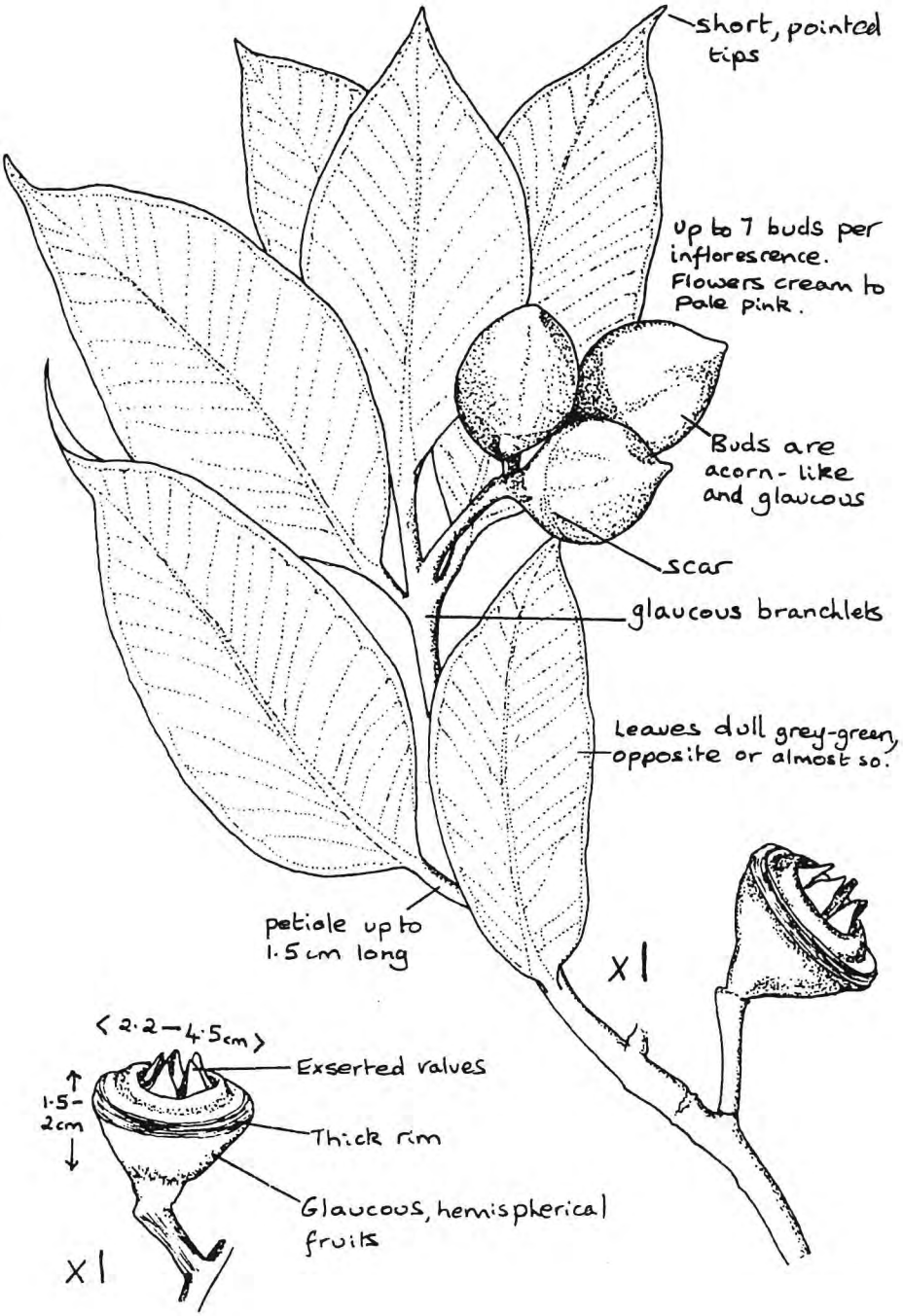
Flowering Period: October - November.

Additional Field Characteristics: A spreading mallee up to 3 m in height which may be a hybrid between *E. macrocarpa* and *E. drummondii*. Bark is smooth grey over cream. Juvenile leaves are ovate, 6-11 x 3-6 cm. There are no distinct adult leaves, the plant being mature in the juvenile phase. The buds measure 1.5-4.5 x 0.3-3 cm, with cream or pink stamens and the fruits are up to 2 x 4.5 cm.

E. carnabyi differs from *E. macrocarpa* in its pointed, petiolate leaves and smaller buds and fruits (*macrocarpa* - buds up to 6 x 4-5 cm, fruits up to 5 x 7 cm). With *E. macrocarpa* there is only one bud per inflorescence. *E. drummondii* differs from *E. carnabyi* in its elliptic to lanceolate mature leaves, 5-8 x 1.5-2 cm, and in its smaller buds and fruits, the latter being globular in shape.

References: Brooker and Kleinig (ms), Chippendale (1973), Elliott and Jones (1986), Gardner (1979).




short, pointed tips
up to 7 buds per inflorescence. Flowers cream to pale pink.
Buds are acorn-like and glaucous
scar
glaucous branchlets
Leaves dull grey-green, opposite or almost so.
petiole up to 1.5 cm long
x1
<2.2–4.5cm>
Exserted valves
1.5–2cm
Thick rim
Glaucous, hemispherical fruits
x1

EUCALYPTUS 'CRISPATA' Brooker and Hopper ined.

Yandanooka mallee

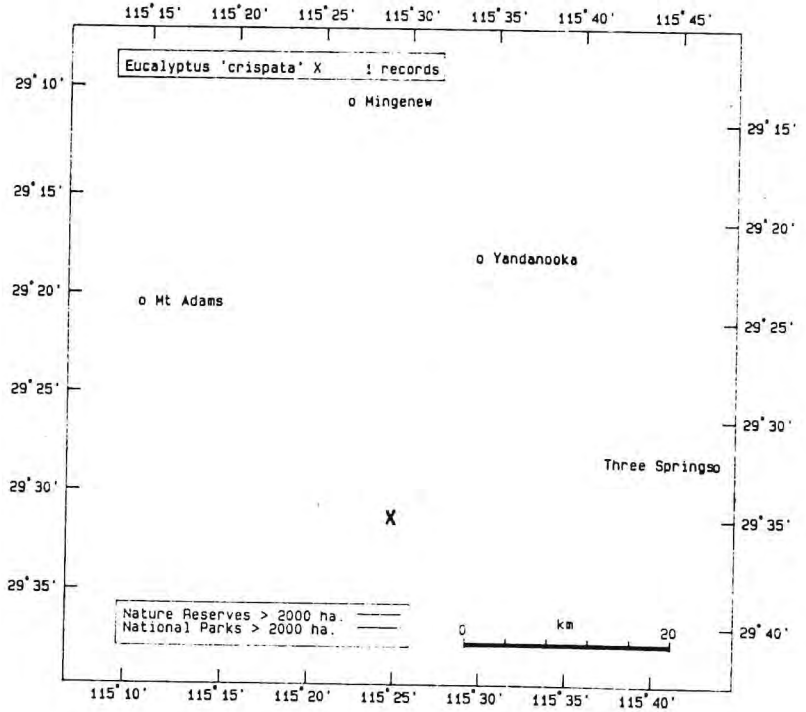
Distribution and Habitat: Known only from the Yandanooka Nature Reserve south of Mingenew.

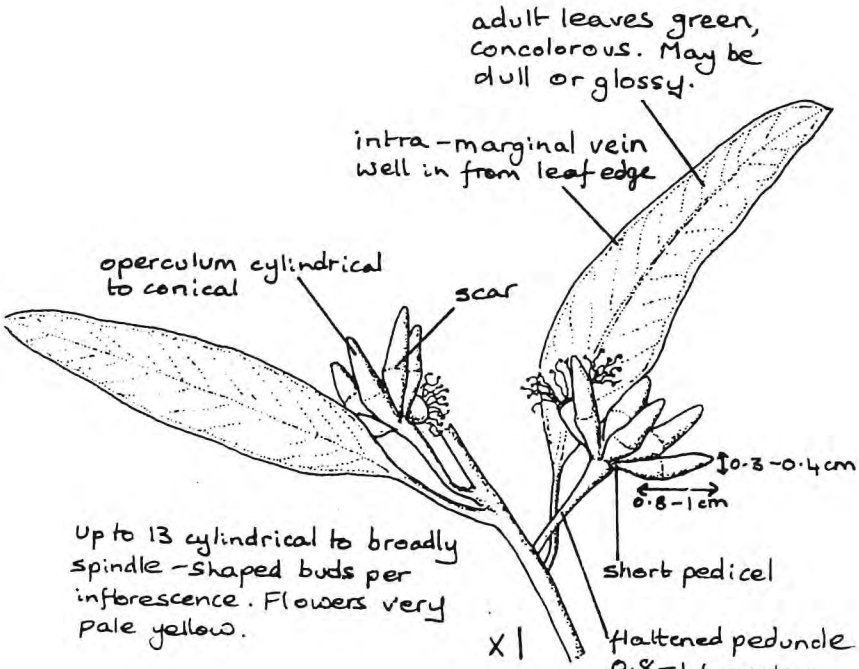
Flowering Period: April -?

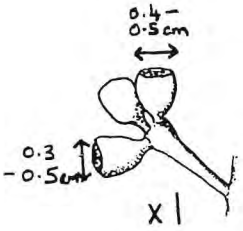
Additional Field Characteristics: A mallee with smooth grey bark above but imperfectly shed towards the base and remaining in dark curled flakes. The pith of the branchlets is glandular. Juvenile leaves are opposite for about 2 pairs, then alternating, dull blue green and up to 6 x 4 cm. Adult leaves are lanceolate or falcate 7-9 x 1-1.5 cm. They have a dense vein network and numerous oil glands. The fruits have a thin rim, descending disc and 3 or 4 valves below rim level. The seed is pale whitish grey and almost spherical or cuboid in shape.

E. 'crispata' is similar to *E. 'arachnaea'* but the latter has longer, narrower buds (1-1.8 x 0.2-0.3 cm) with a conical to horn-shaped operculum, narrower than the hypanthium. *E. 'crispata' is also related to E. accedens* but the latter is always a tree with smooth powdery bark throughout.

References: Brooker and Kleinig (ms), Hopper (field notes).







cone-shaped to cup-shaped fruits

EUCALYPTUS CRUCIS Maiden subsp. LANCEOLATA Brooker & Hopper

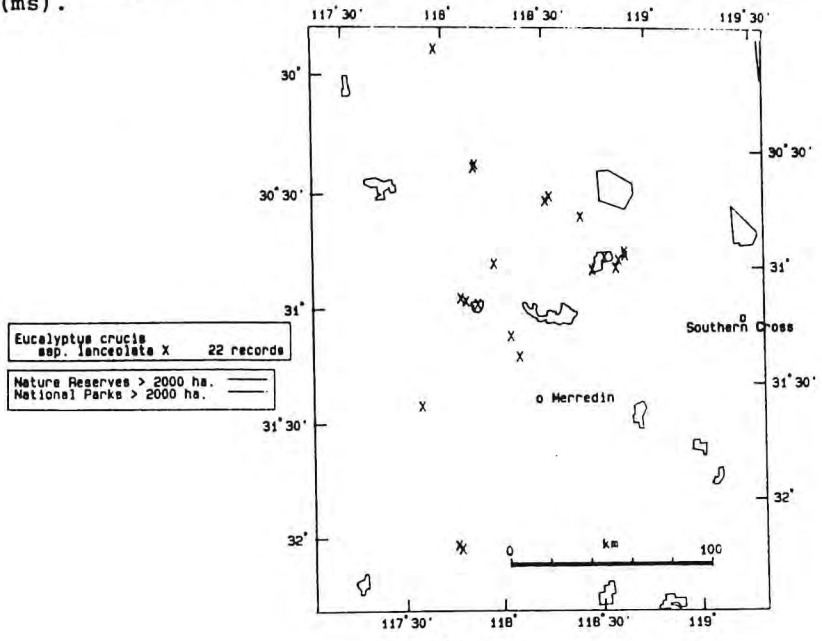
Distribution and Habitat: Restricted to a number of granitic rocks between Corrigin, Mt. Churchman and Bullfinch. It sometimes occurs with *E. caesia* subsp. *magna* or *E. orbifolia*.

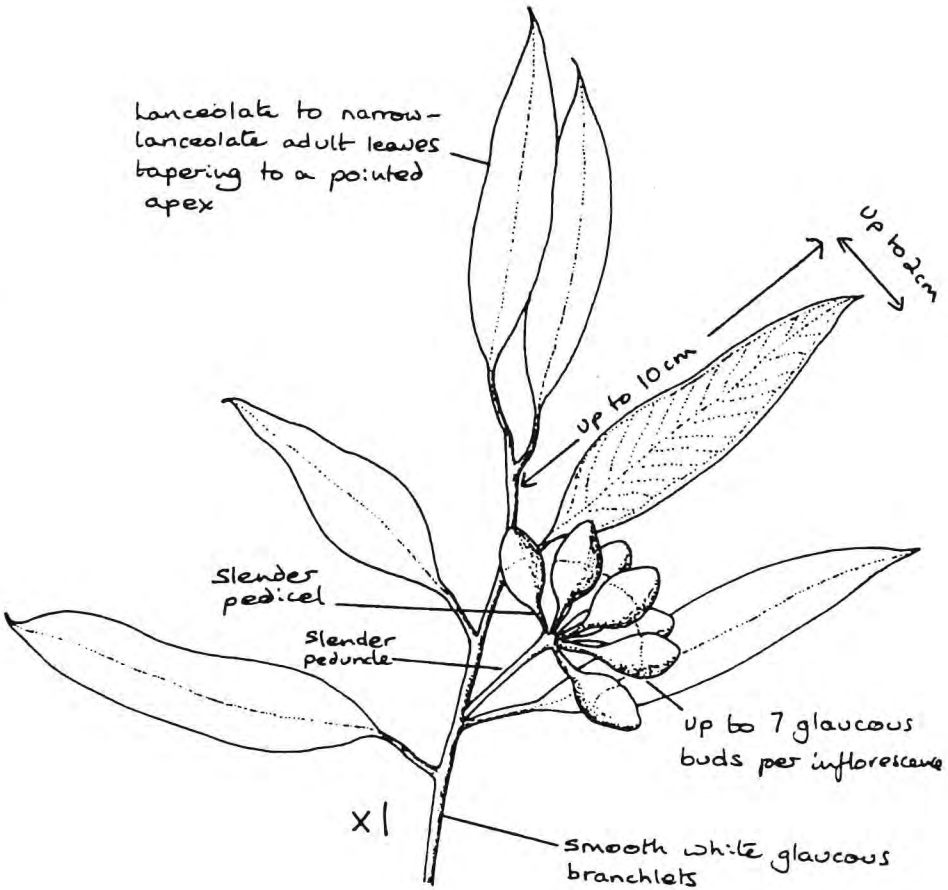
Flowering Period: January to March.

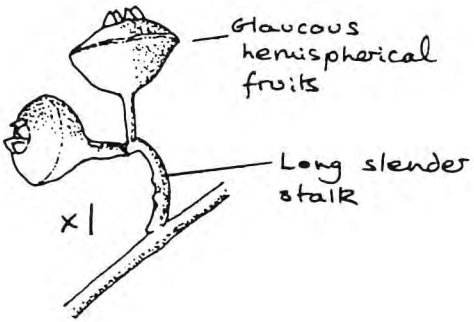
Additional Field Characteristics: A sprawling tall mallee or small tree up to 15 m in height. Basal bark is grey-black to dark red-brown, loose and flaky. Upper bark is reddish-brown and peeling in longitudinal strips. Branchlets are smooth, white and glaucous. Juvenile leaves are rounded to ovate, opposite, and generally sessile. They are similar to the leaves of subsp. *crucis*. However, subsp. *lanceolata* has adult leaves which are lanceolate and taper to a pointed apex. Both buds and fruits are on long slender peduncles. The buds measure up to 0.6 x 0.4 cm and the fruits to 1.6 x 1 cm.

E. crucis subsp. *lanceolata* differs from subsp. *crucis* in its larger habit and in its lanceolate to narrow-lanceolate adult leaves. From the similar *E. ewartiana* it can be distinguished by the latter having petiolate juvenile leaves, thick 4-sided pedicels and smaller buds. Its adult leaves are dull yellow-green and the plant lacks the overall glaucous appearance of *E. crucis*.

References: Brooker and Hopper (1982); Brooker and Kleinig (ms).




Lanceolate to narrow-lanceolate adult leaves tapering to a pointed apex
up to 2cm
up to 10cm
slender pedicel
slender peduncle
up to 7 glaucous buds per inflorescence
x1
smooth white glaucous branchlets


Glaucous hemispherical fruits
Long slender stalk
x1

EUCALYPTUS 'CUPREA'Brooker and Hopper ined.

Mallee box

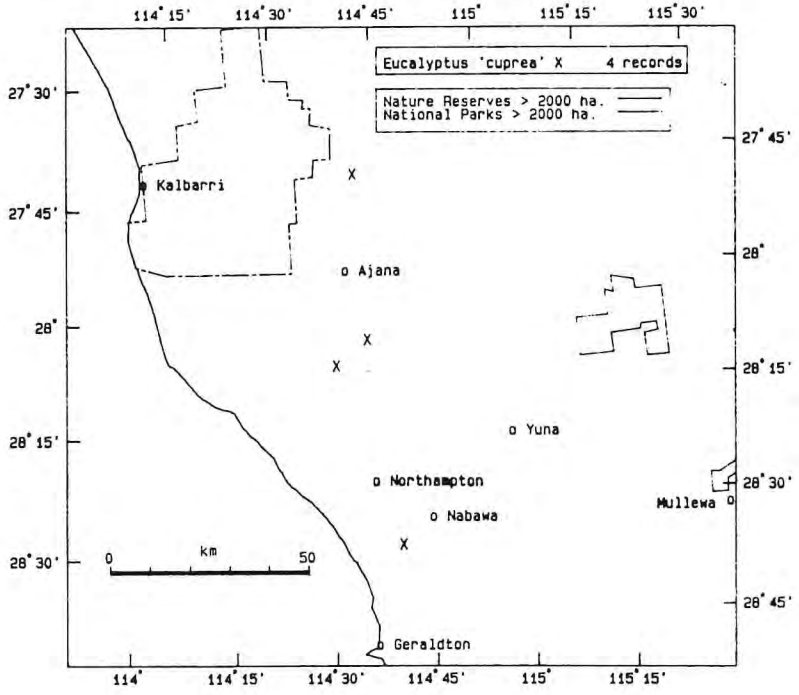
Distribution and Habitat: Restricted to the Moresby Range (north east of Geraldton) and north of the Murchison River, where it occurs on shallow sand over granite.

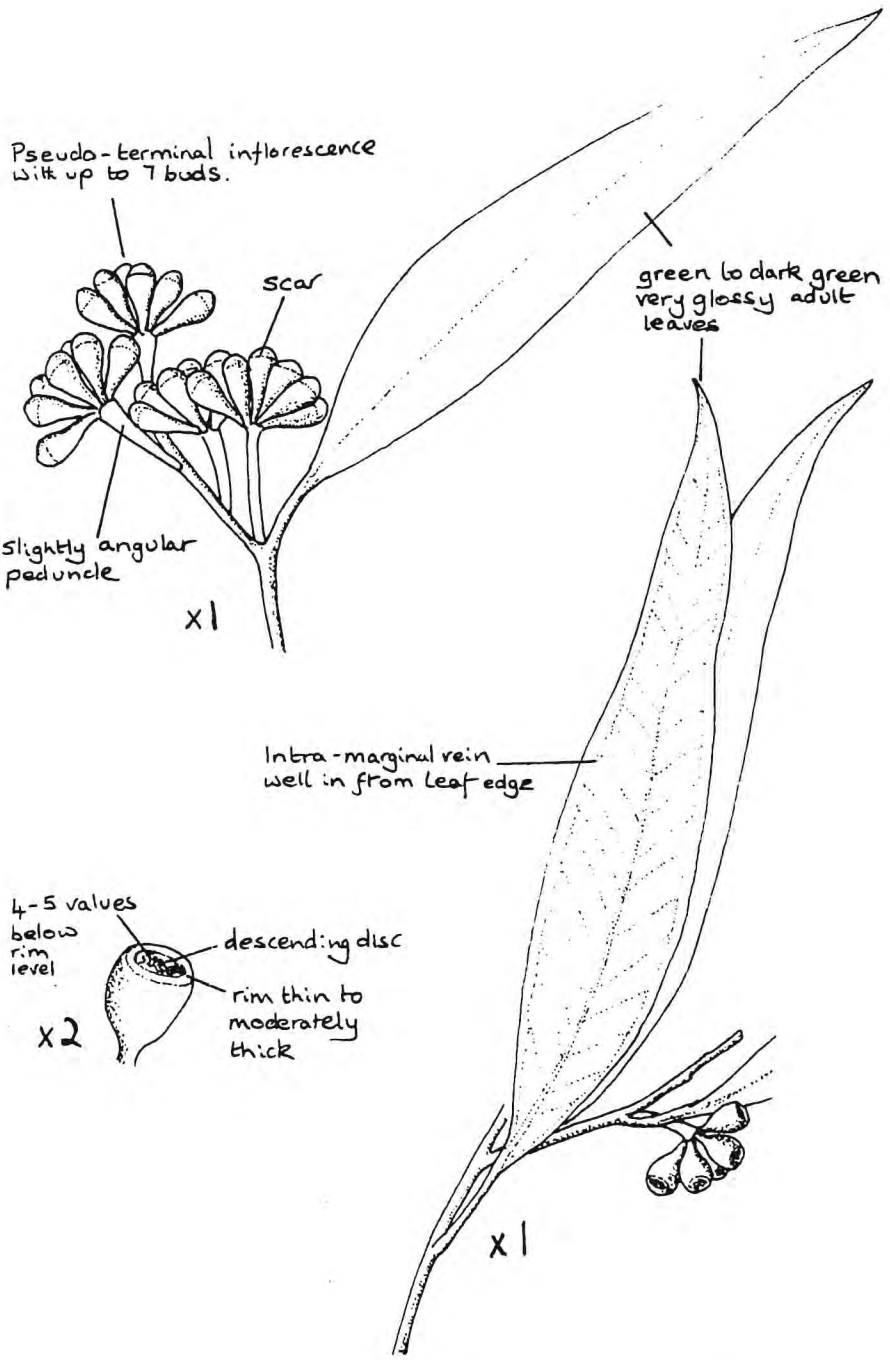
Flowering Period: August - November.

Additional Field Characteristics: A mallee with rough light grey lower bark over smooth dark grey, whitish or greenish grey upper bark. Juvenile leaves are light green, ovate, to 10 x 6 cm. Adult leaves are lanceolate, 8-11 x 1.3-2.3 cm. The club-shaped buds contain inflexed stamens, the outer ones without anthers (staminodes). The seed is dark grey-brown.

E. cuprea is related to *E. 'absita'* and *E. petraea*, differing from the former in its light green, ovate juvenile leaves and in the less prominent disc. From *E. petraea* it differs in its smaller buds and fruits (*petraea* - buds, 0.6-1.1 x 0.4-0.7 cm, fruits, 0.6-1.1 x 0.5-1 cm). The fruits of *E. petraea* split open by a 5-sided disc which often remains attached at the side of the opening.

References: Brooker and Kleinig (ms).




Pseudo-terminal inflorescence with up to 7 buds.
scar
green to dark green very glossy adult leaves
slightly angular peduncle
x1
Intra-marginal vein well in from leaf edge
4-5 valves below rim level
descending disc
rim thin to moderately thick
x2
x1

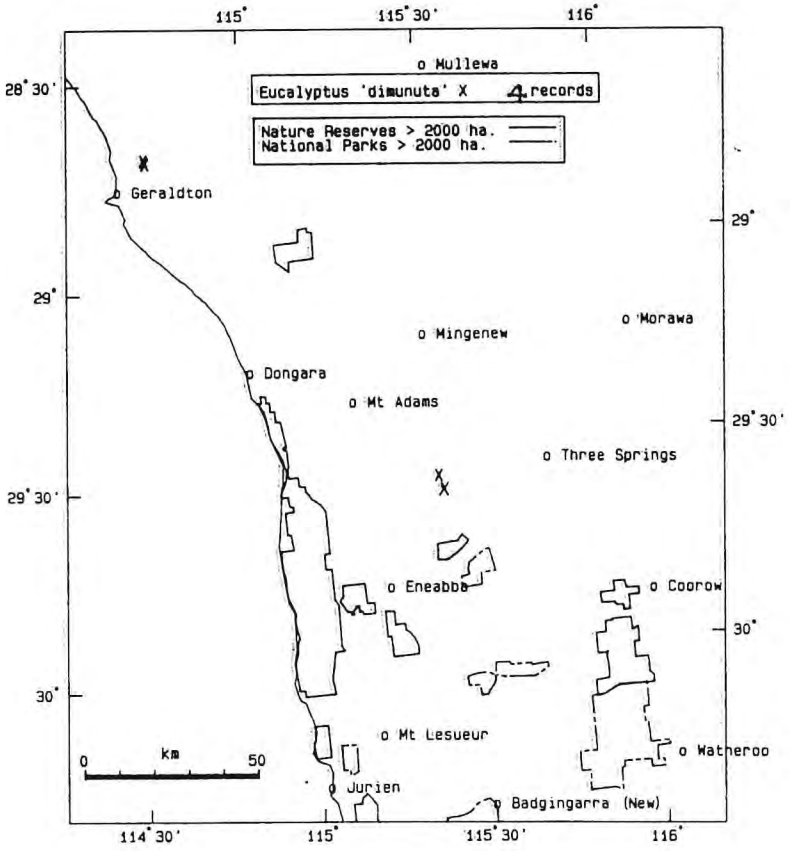
EUCALYPTUS 'DIMINUTA' Brooker and Hopper, ined.

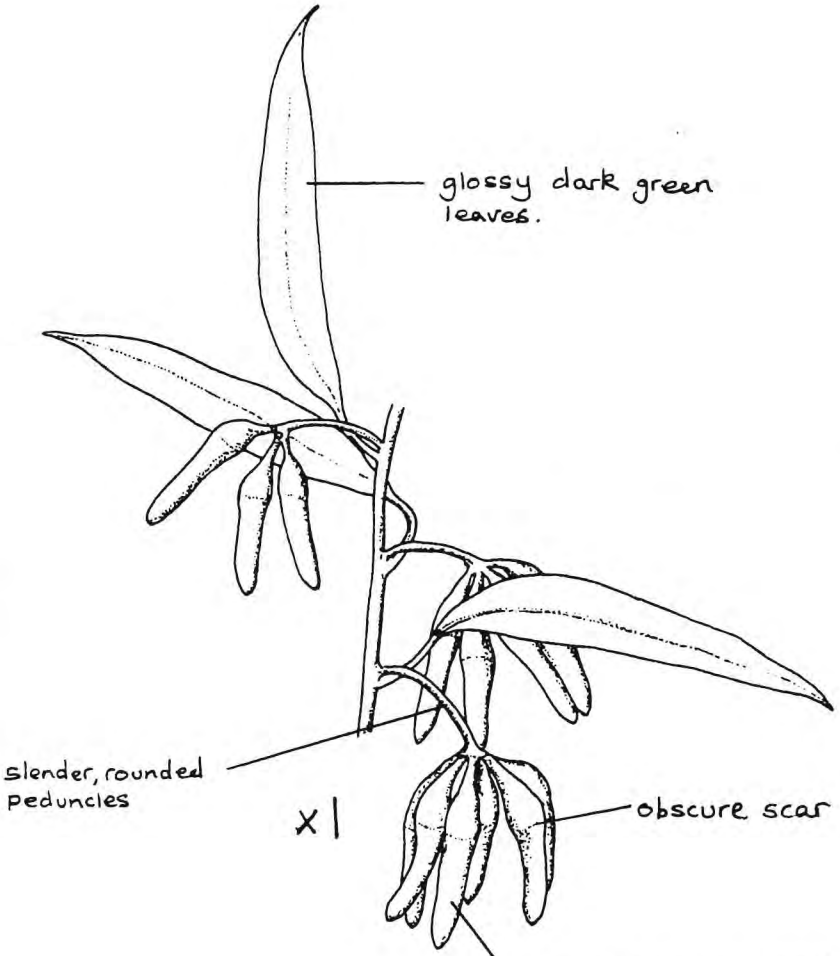
Distribution and Habitat: Known only from two areas - the low stony hills north-east of Geraldton, and at the base of breakaways near Mindaloo Beacon and on the Yandanooka Nature Reserve.

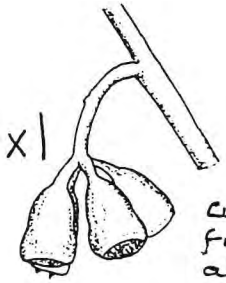
Flowering Period: October - December.

Additional Field Characteristics: A mallee to 3.5 m resembling *E. stowardii* but differing in its smaller, less glossy leaves, buds and fruits. Also there is little or no ribbing on the buds and fruits. The bark is at times coppery.

References: Brooker and Kleinig (ms), Hopper (field notes).







cup-shaped to cylindrical fruits with only slight or absent ribbing.

EUCALYPTUS EFFUSA Brooker

Rough-barked gimlet

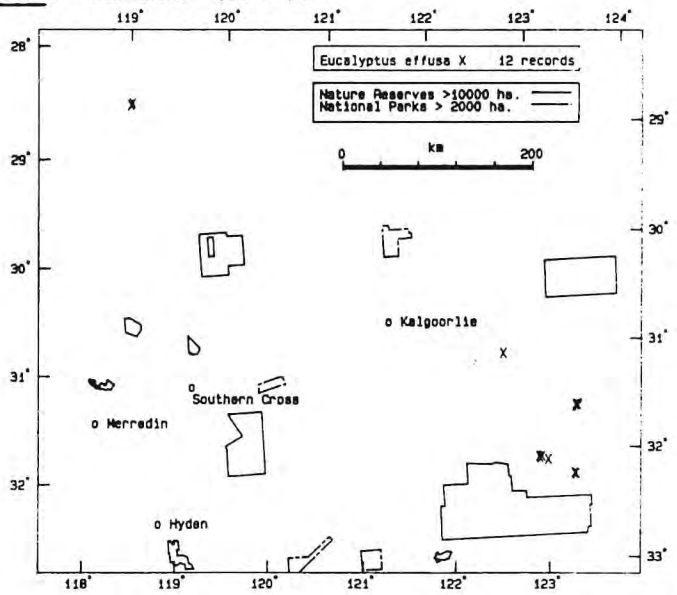
Distribution and Habitat: Has a restricted distribution from the Fraser Range eastwards towards Balladonia, and with an outlying population to the S.W. of Sandstone. Grows in flat country or on low hilly terrain, on sandy or clayey red loams. Often common in open shrub mallee with heath and associated species include *E. leptophylla* and *E. grossa*.

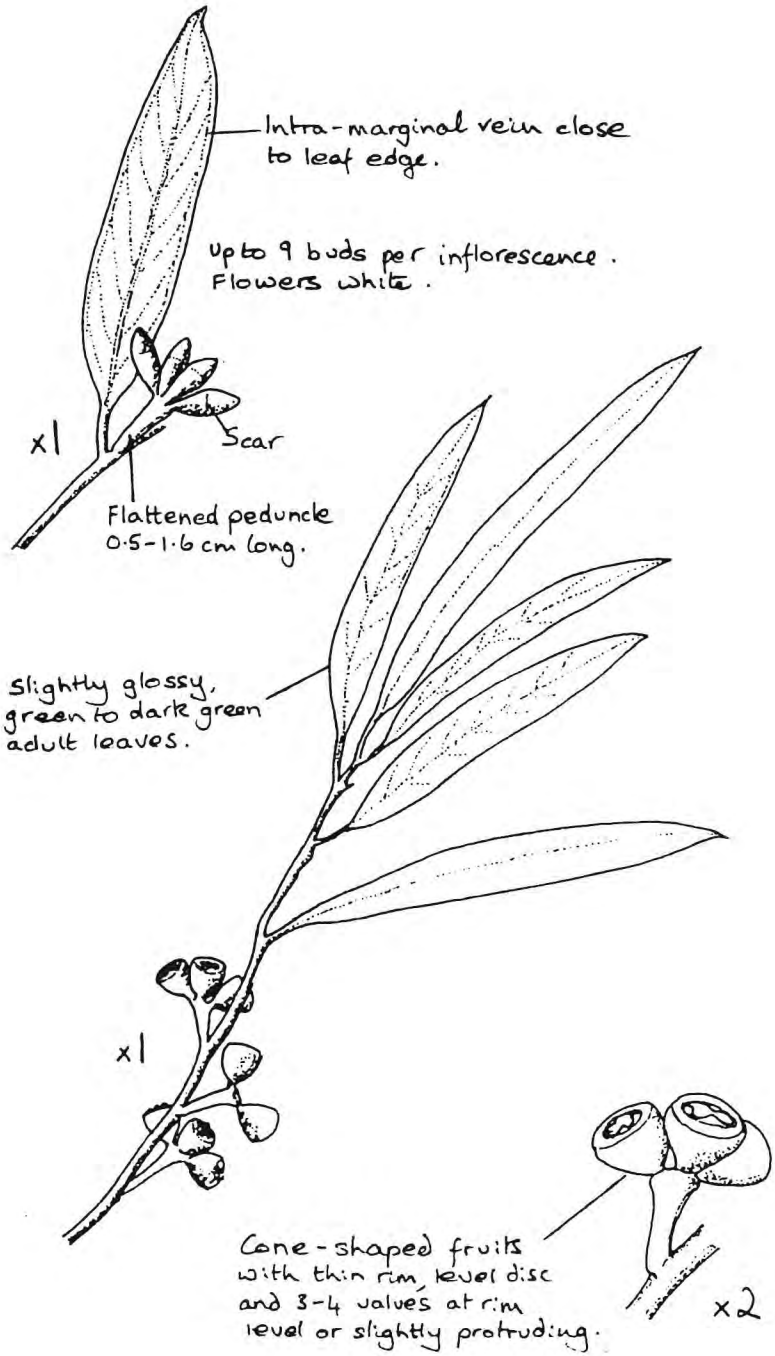
Flowering Period: January - March.

Additional Field Characteristics: Usually a small straggling mallee but may be up to 6 m tall. The small mallees have rough flaky or ribbon bark at the base, the upper parts are smooth and grey to coppery. Taller plants are rough barked over most of the stem. Juvenile leaves are lanceolate-ovate, 10 x 3 cm and green in colour. Adult leaves have a sparse vein network with scattered oil glands and are 5.5-10 x 0.6-1.3 cm. Buds are broadly spindle-shaped, 0.6-0.9 x 0.3-0.4 cm. The stamens are inflexed in the bud. Fruits measure 0.4-0.7 x 0.4-0.6 cm. The seed is yellow brown, cuboid in shape and pitted like honeycomb.

The species is similar to *E. salubris* and *E. campaspe* but differs in its rough bark at the base, its straggly habit and its lack of a fluted trunk.

References: Brooker (1976).




Intra-marginal vein close to leaf edge.
Up to 9 buds per inflorescence. Flowers white.
x1
Scar
Flattened peduncle 0.5-1.6 cm long.
Slightly glossy, green to dark green adult leaves.
x1
Cone-shaped fruits with thin rim, level disc and 3-4 valves at rim level or slightly protruding.
x2

EUCALYPTUS EBBANOENSIS subsp. 'Shiny' Brooker and Hopper ined.

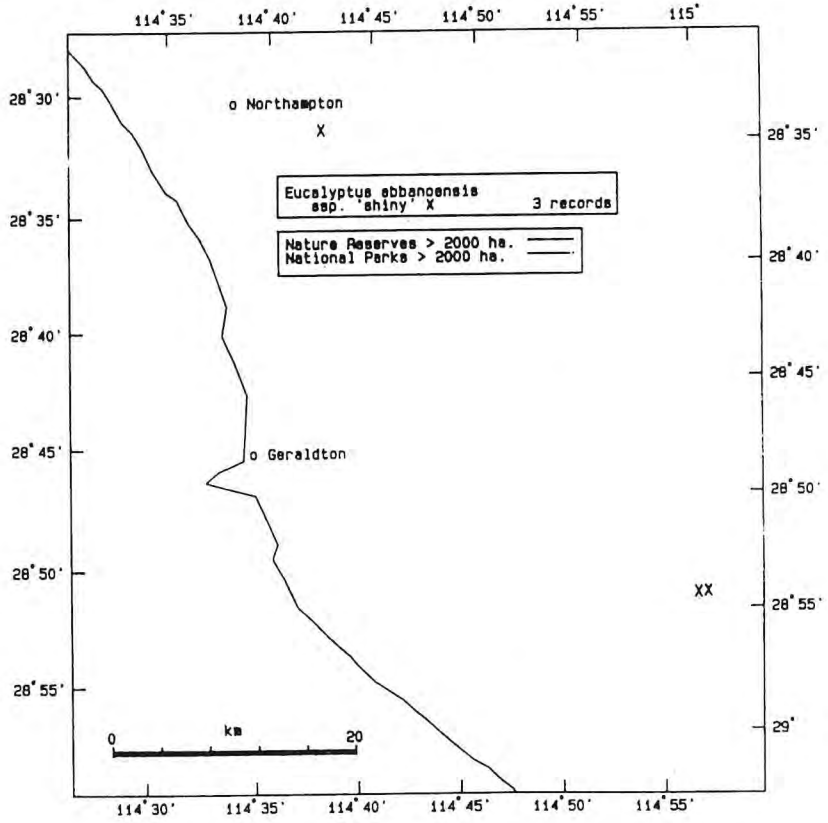
Distribution and Habitat: Known from only two populations in the Nanson to Walkaway area over a distance of approximately 40 km. It occurs on steep rocky breakaway slopes with *E. 'blaxellii'*, *E. eudesmioides* and *E. obtusiflora*.

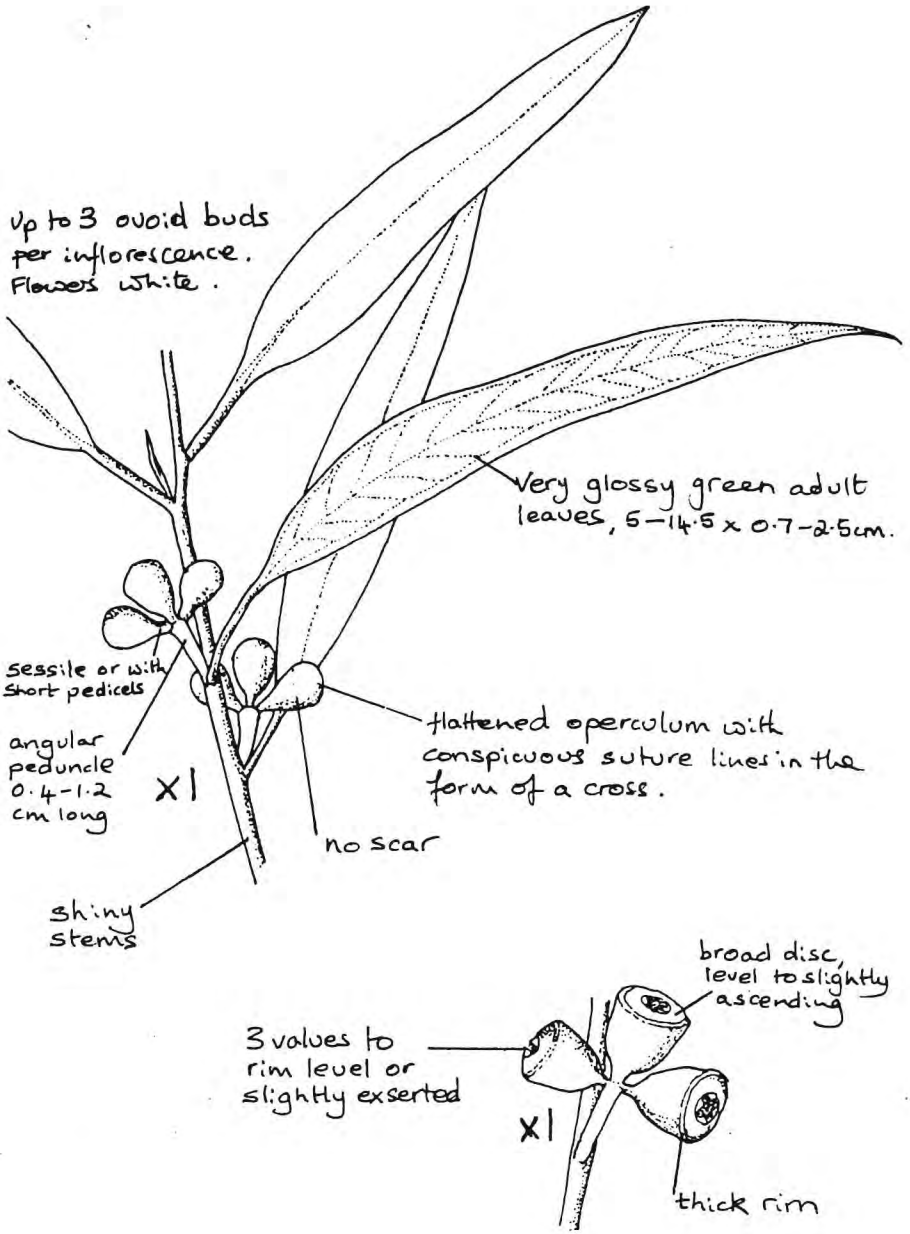
Flowering Period: Unknown.

Additional Field Characteristics: A mallee up to 2 m in height with rough, flaky bark at base or smooth throughout. The branchlets have glandular pith and the adult leaves are covered with numerous, large round island oil glands.

This subspecies is similar to *E. ebbanoensis* but differs in having shiny stems and very glossy leaves (*ebbanoensis* dull leaves).

References: Brooker (field notes).





Cup-shaped fruits.

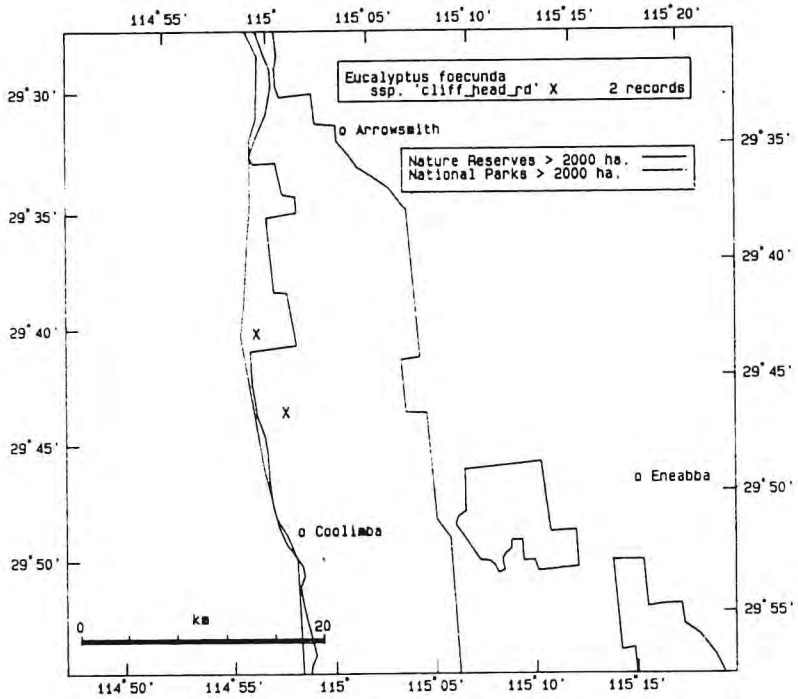
EUCALYPTUS FOECUNDA subsp. "Cliff Head"

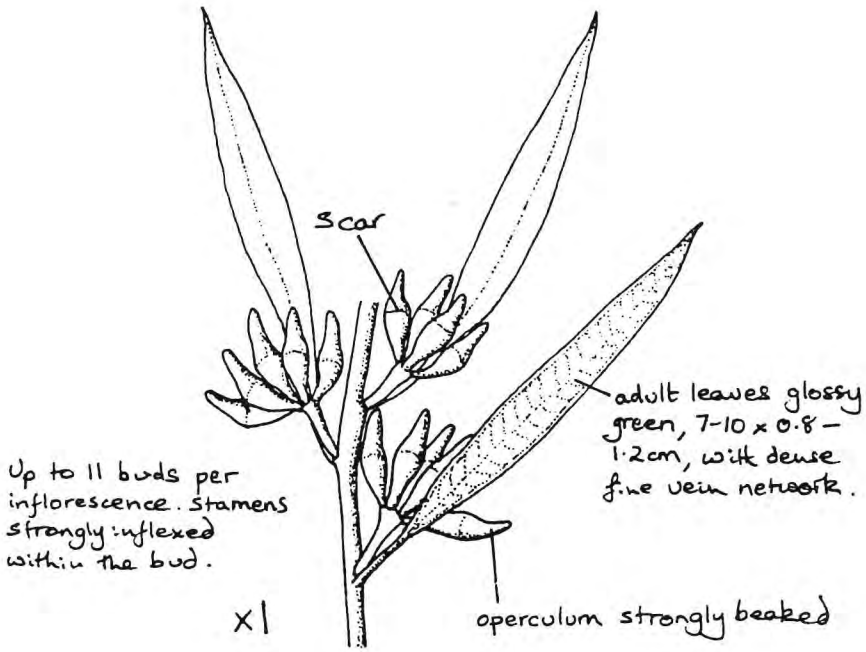
Distribution and Habitat: Restricted to two known populations north of Coolimba on white sand with limestone near the surface.

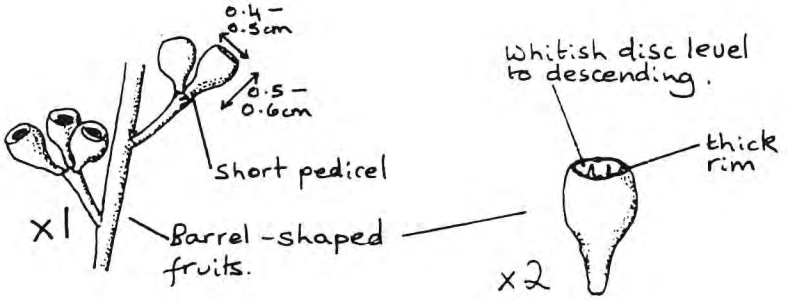
Flowering Period: Unknown.

Additional Field Characteristics: This species is similar to *E. foecunda* but differs in its smooth grey bark with ribboning. It is a mallee up to 4 m. It also has strikingly beaked opercula, unlike those of *E. foecunda* which are conical to slightly beaked.

References: Brooker (field notes).




scar
adult leaves glossy green, 7-10 x 0·8 – 1·2cm, with dense fine vein network.
Up to 11 buds per inflorescence. Stamens strongly inflexed within the bud.
x1
operculum strongly beaked


0.4 – 0.5cm
0.5 – 0.6cm
Short pedicel
x1
Barrel-shaped fruits.
Whitish disc level to descending.
thick rim
x2

EUCALYPTUS JOHNSONIANA Brooker and Blaxell

Johnson's mallee

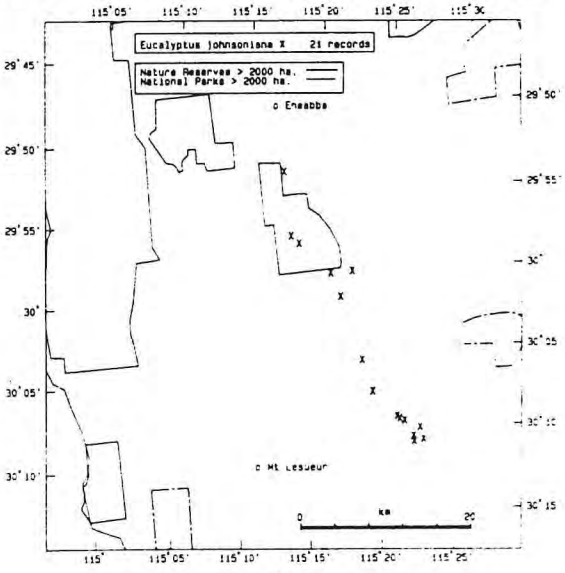
Distribution and Habitat: Restricted to an area between Badgingarra and Eneabba where it occurs on both lateritic mesas and sandplain amongst closed heath. Associated species include *E. todtiana, E. drummondii, E. pendens, Banksia tricuspis.*

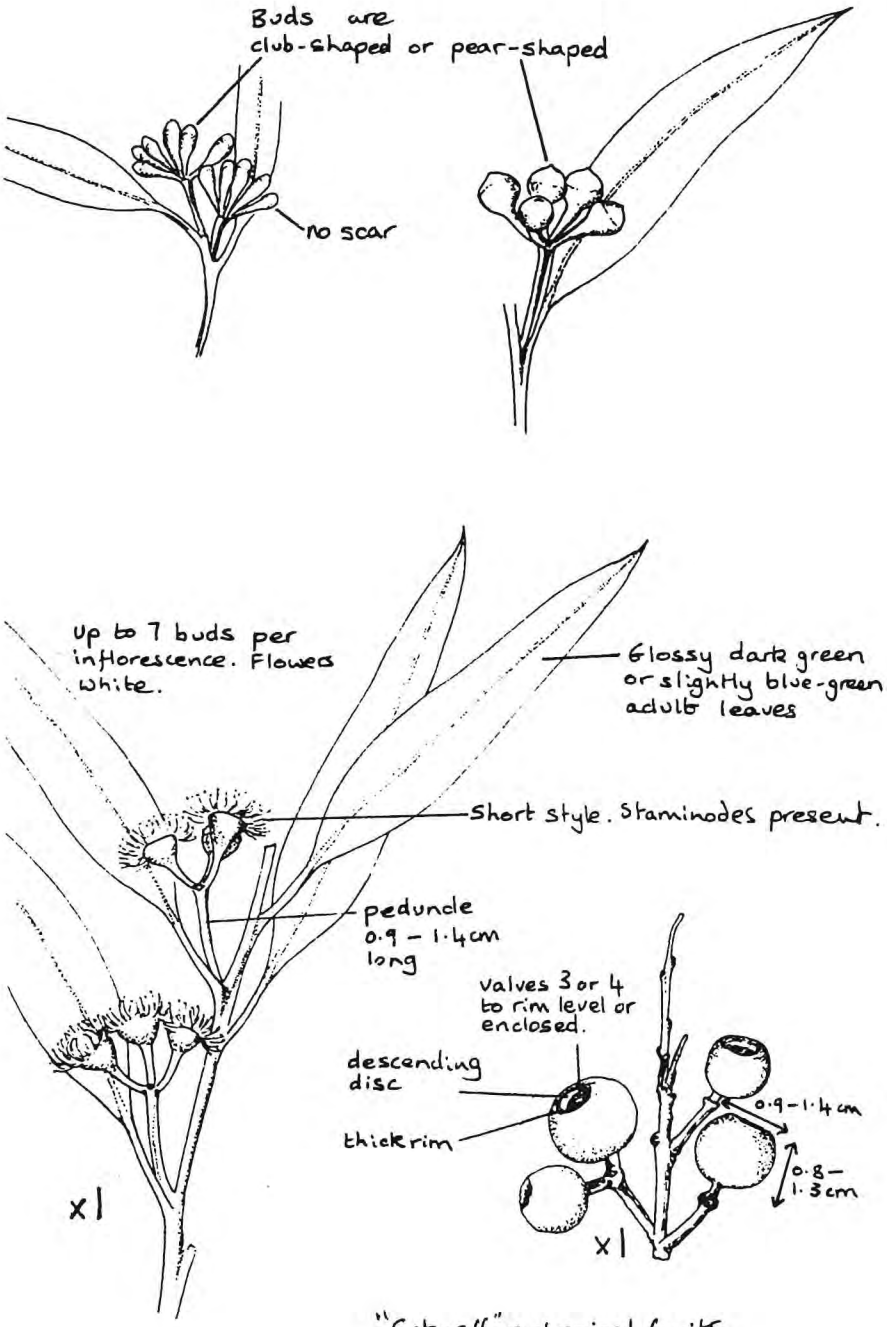
Flowering Period: December - May.

Additional Field Characteristics: A mallee up to 2m, with grey-brown slightly rough basal bark peeling in flakes from the stems. Above, the bark may be smooth and grey brown to creamy white. The crown is dense, often right to the ground. Adult leaves measure 5.5-12 x 0.8-1.5 cm and have numerous oil glands. The buds are club-shaped to pear-shaped, 0.5-1 x 0.3-0.5 cm. The stamens are inflexed in the bud, and the outer ones without anthers. The seed is brown, pyramidal and with lateral wings.

E. johnsoniana may be confused with *E. todtiana, E. lateritica* and *E. suberea*. From the former it differs in its bark and adult leaves (*todtiana* - bark rough throughout, fibrous and prickly; leaves glandless). Both *E. lateritica* and *E. suberea* have double-conic buds with conical opercula. The fruits of *lateritica* are cup-shaped. The adult leaves of *E. suberea* are usually falcate and it may have up to 20 buds per inflorescence. Its seed is brown and shiny.

References: Brooker and Kleinig (ms), Elliott and Jones (1986), Brooker and Blaxell (1978), Leigh, Boden and Briggs (1984).





"Cut-off" spherical fruits

EUCALYPTUS LATERITICA Brooker and Hopper

Laterite mallee/Mt Michaud mallee

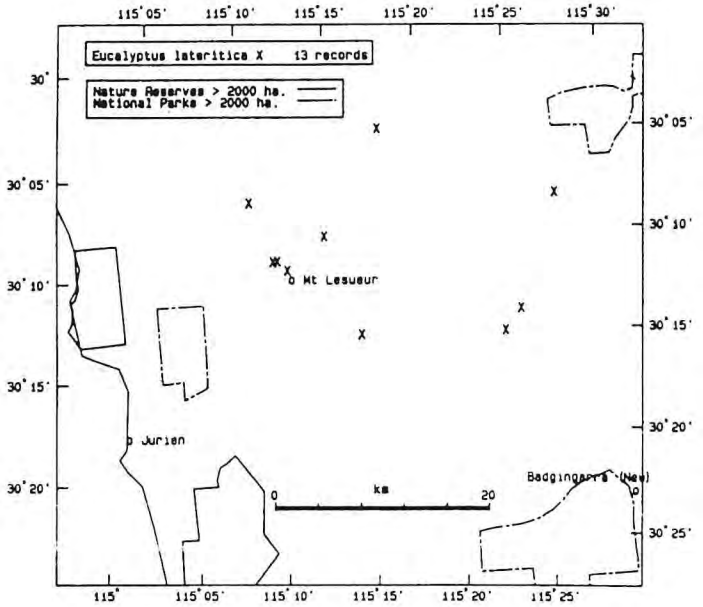
Distribution and Habitat: Known only from the Mt. Lesueur area where it occurs on the edges and upper breakaway slopes of dissected lateritic uplands. Associated species include *E. suberea, E. gittinsii, E. accedens, E. drummondii, E. marginata* and *E. gardneri*.

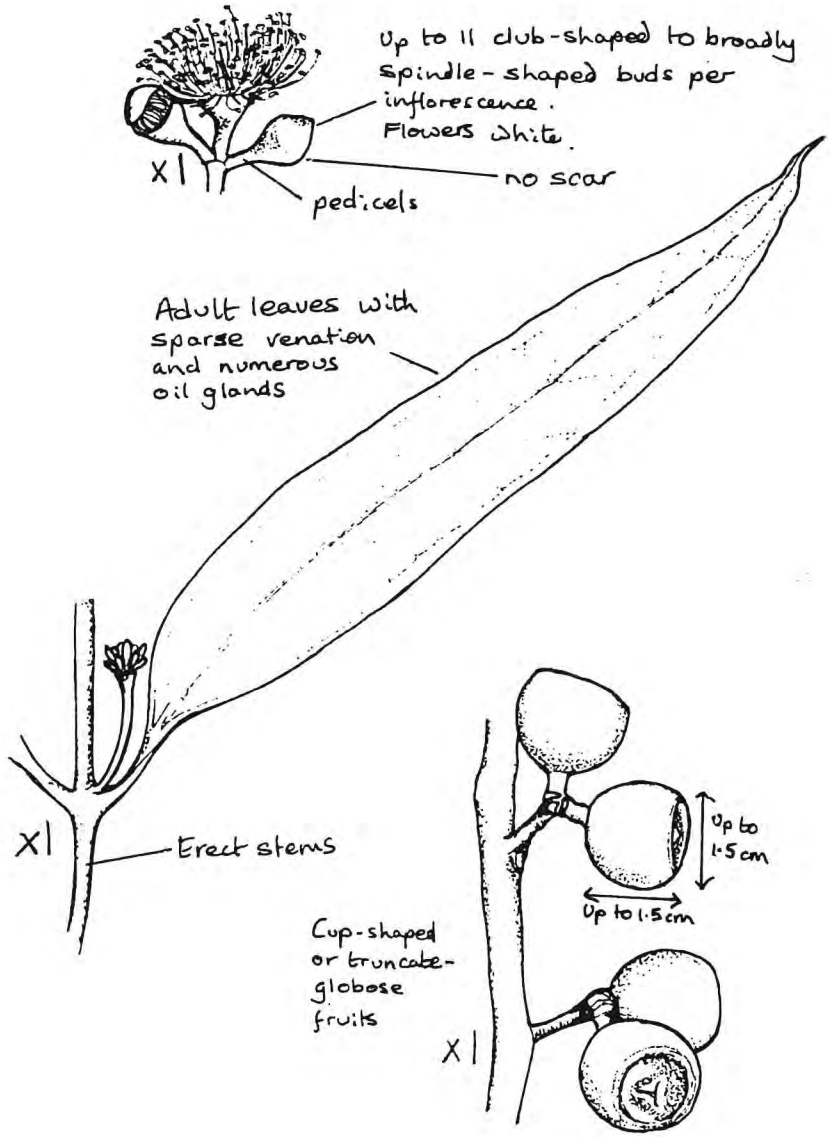
Flowering Period: April to September, peaking in May.

Additional Field Characteristics: An erect mallee to 3m either with a rough, grey-brown basal stocking or mostly smooth. Juvenile leaves are lanceolate, up to 18 x 3.5 cm, slightly glossy and held horizontally. Adult leaves are up to 10 x 1.5 cm and slightly glossy. Buds measure up to 1 x 0.7 cm and are slightly rough surfaced. The fruits have a thick rim and a ring-like or obliquely descending disc. The seed is brown and narrowly pyramidal with lateral wings.

E. lateritica is similar to *E. todtiana* but differs in its glandular leaves and sparse venation (*todtiana* - glandless, venation moderate to dense). It also differs in its bark (*todtiana* - bark rough, fibrous and prickly throughout) and erect branches (*todtiana* - sprawling). The winter flowering season of *E. lateritica* differs from the predominantly summer (January - April) flowering period of *E. todtiana*.

References: Brooker and Hopper (1986).




Up to 11 club-shaped to broadly spindle-shaped buds per inflorescence.
Flowers white.
X1
no scar
pedicels
Adult leaves with sparse venation and numerous oil glands
X1
Erect stems
Up to 1.5cm
Up to 1.5cm
Cup-shaped or truncate-globose fruits
X1

EUCALYPTUS 'LEPROPHLOIA' Brooker & Hopper ined.

Scaly butt mallee

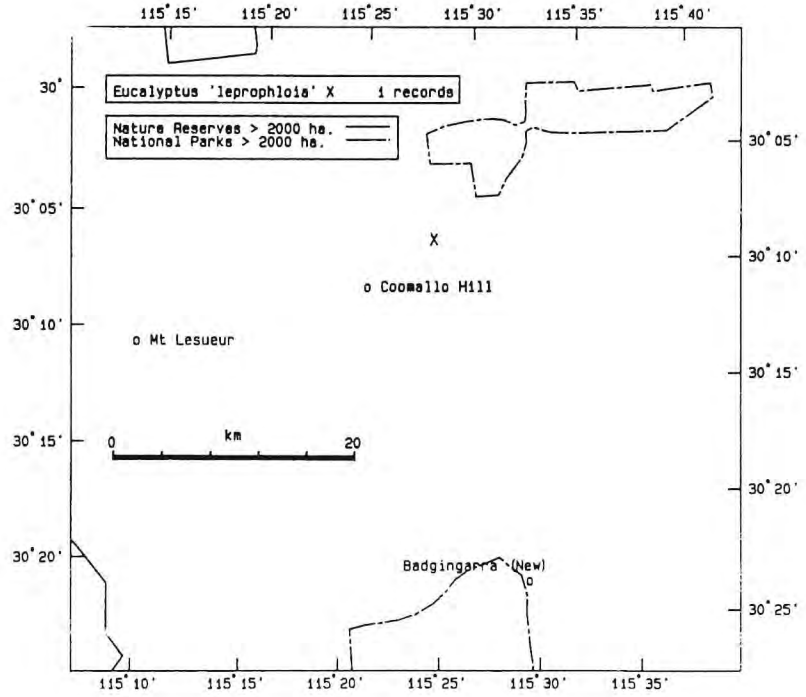
Distribution and Habitat: Known only from a single location north of Badgingarra.

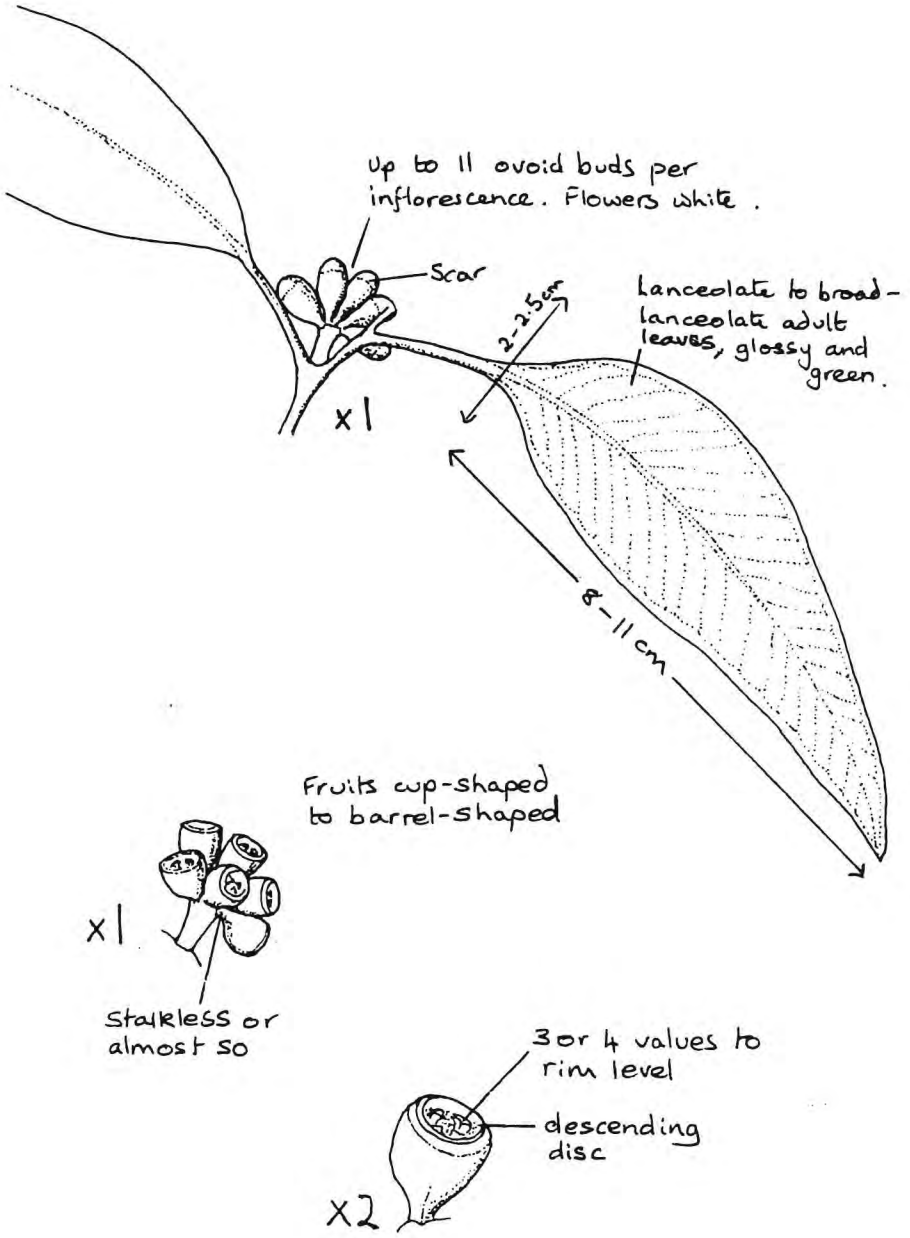
Flowering Period: Not known.

Additional Field Characteristics: An erect mallee with light grey-brown, loose, flaky bark for the lowest 1 m, smooth grey and pinkish-grey above. Juvenile leaves are dull, blue-green to glaucous, ovate or cordate, to 8 x 5 cm. The buds measure 0.6-0.9 x 0.4-0.5 cm and the fruits, 0.6-0.7 x 0.5-0.6 cm. The seed is grey-black and almost smooth.

E. 'leprophloia' is related to *E. accedens* and *E. 'sopherophloia'*. However, *E. accedens* is always a tree and has smooth, pinkish white, powdery bark. Its adult leaves are dull and blue-green. *E. 'sopherophloia'* is a blackbutt, with dark, tightly held, fibrous bark on the lower half of its stems. Its juvenile and adult leaves are narrower (adult leaves 6-10 x 0.8-1.3 cm) than those of *E. 'leprophloia'*.

References: Brooker and Kleinig (ms).




Up to 11 ovoid buds per inflorescence. Flowers white.
Scar
2-2.5cm
Lanceolate to broad-lanceolate adult leaves, glossy and green.
x1
8-11cm
Fruits cup-shaped to barrel-shaped
x1
Stalkless or almost so
3 or 4 values to rim level
descending disc
x2

EUCALYPTUS MACROCARPA subsp. 'ELACANTHA' Brooker and Hopper ined.

Small leaved mottlecah

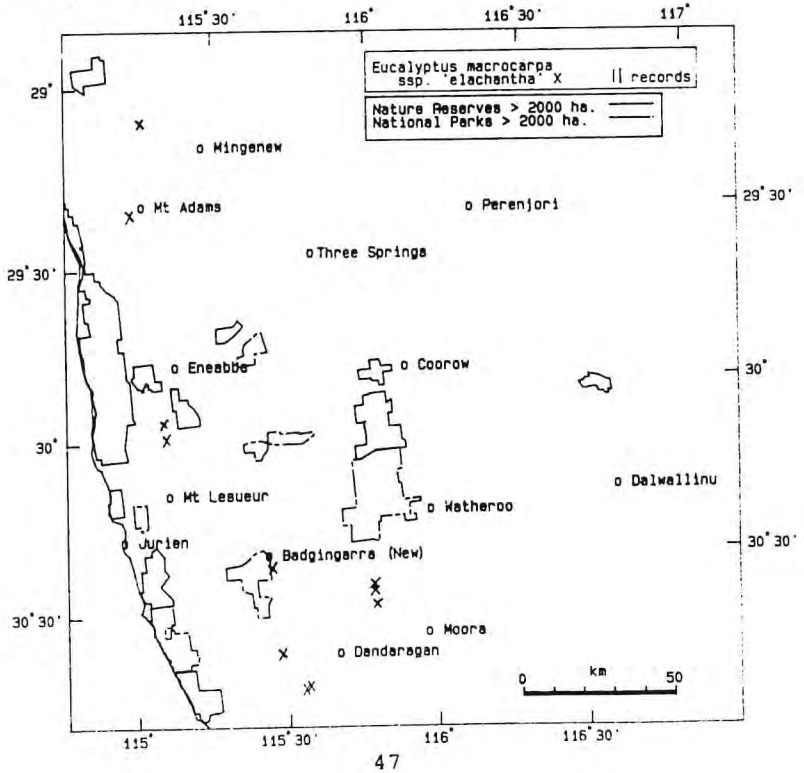
Distribution and Habitat: Has a restricted distribution from south east of Geraldton to Walyering Hill.

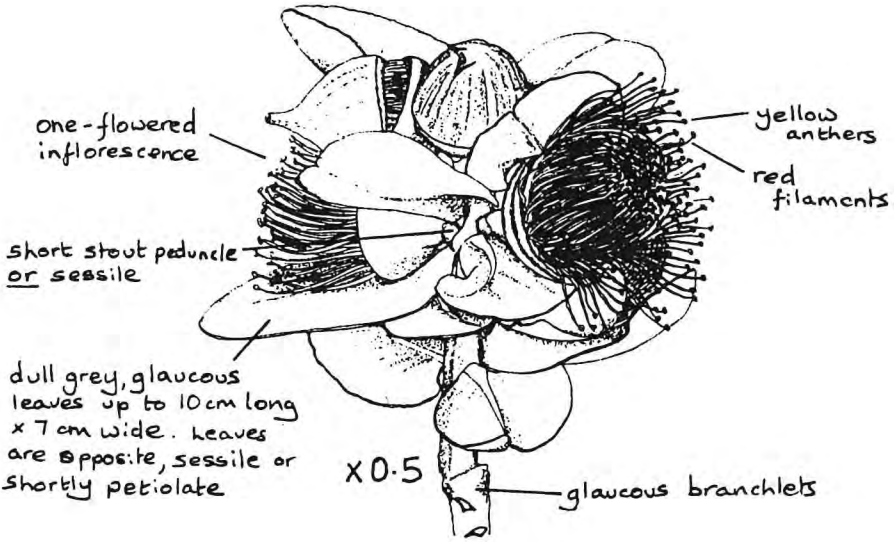
Flowering Period: August - September.

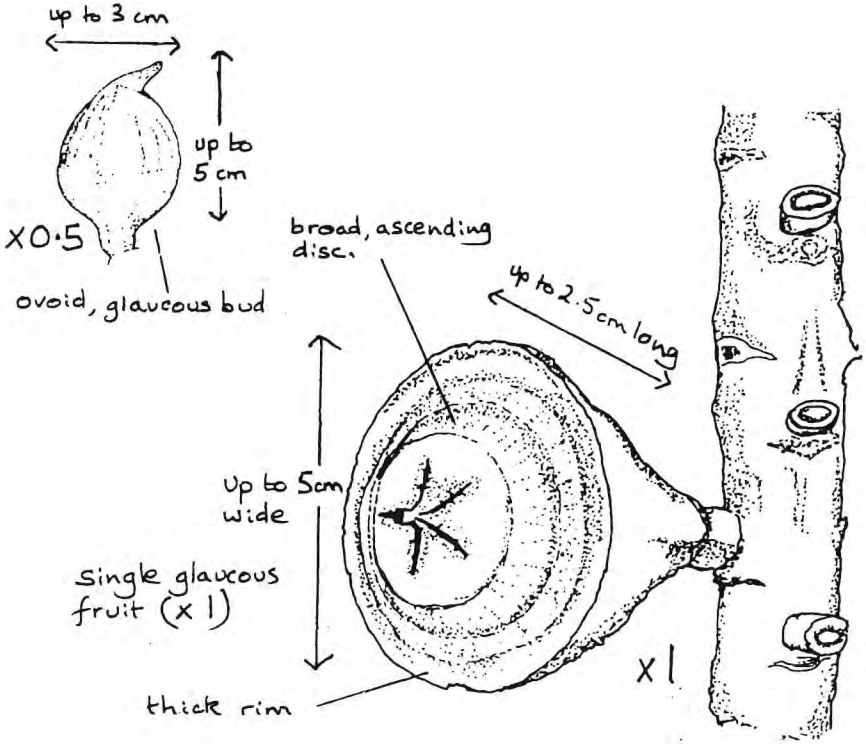
Additional Field Characteristics: A sprawling mallee up to 2 m in height with smooth grey over salmon-pink bark. The large, leathery, dull grey, glaucous leaves are juvenile. There are no distinct adult leaves, the plant being mature in its juvenile leaf phase.

Subsp. *elacantha* may be distinguished from subsp. *macrocarpa* by its generally smaller stature, smaller leaves and smaller buds and fruits. Measurements for subsp. *macrocarpa* are as follows (leaves - to 24 x 11 cm, buds - to 6 x 4.5 cm, fruits - to 5 x 8 cm). The species *E. macrocarpa* is readily distinguished from *E. rhodantha* by the long peduncles and pedicels of the latter.

References: Brooker and Kleinig (ms), Hopper (field notes and pers. comm.).




one-flowered inflorescence
yellow anthers
red filaments
short stout peduncle or sessile
dull grey, glaucous leaves up to 10 cm long x 7 cm wide. Leaves are opposite, sessile or shortly petiolate
x0·5
glaucous branchlets


up to 3 cm
up to 5 cm
x0·5
ovoid, glaucous bud
broad, ascending disc.
up to 2·5 cm long
up to 5cm wide
single glaucous fruit (x 1)
x1
thick rim

EUCALYPTUS PENDENS Brooker

Badgingarra weeping mallee

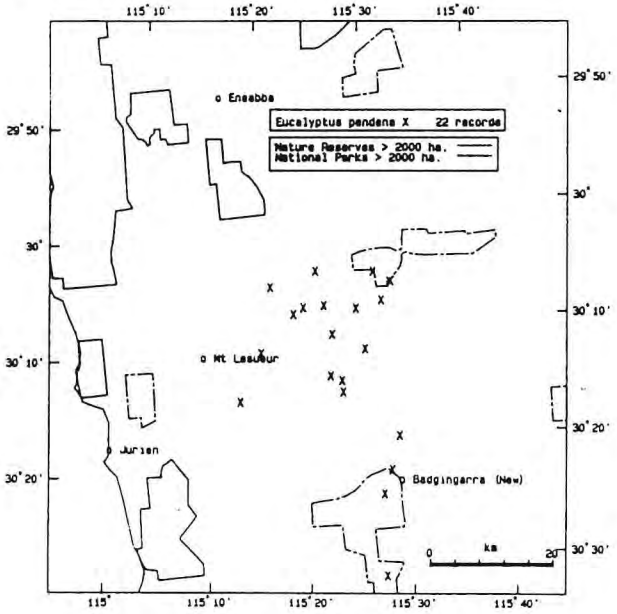
Distribution and Habitat: Confined to an area between Badgingarra and northwards towards Eneabba. It grows on upper slopes and hilltops in shallow sand over laterite, conspicuously emergent amongst an otherwise low heath vegetation.

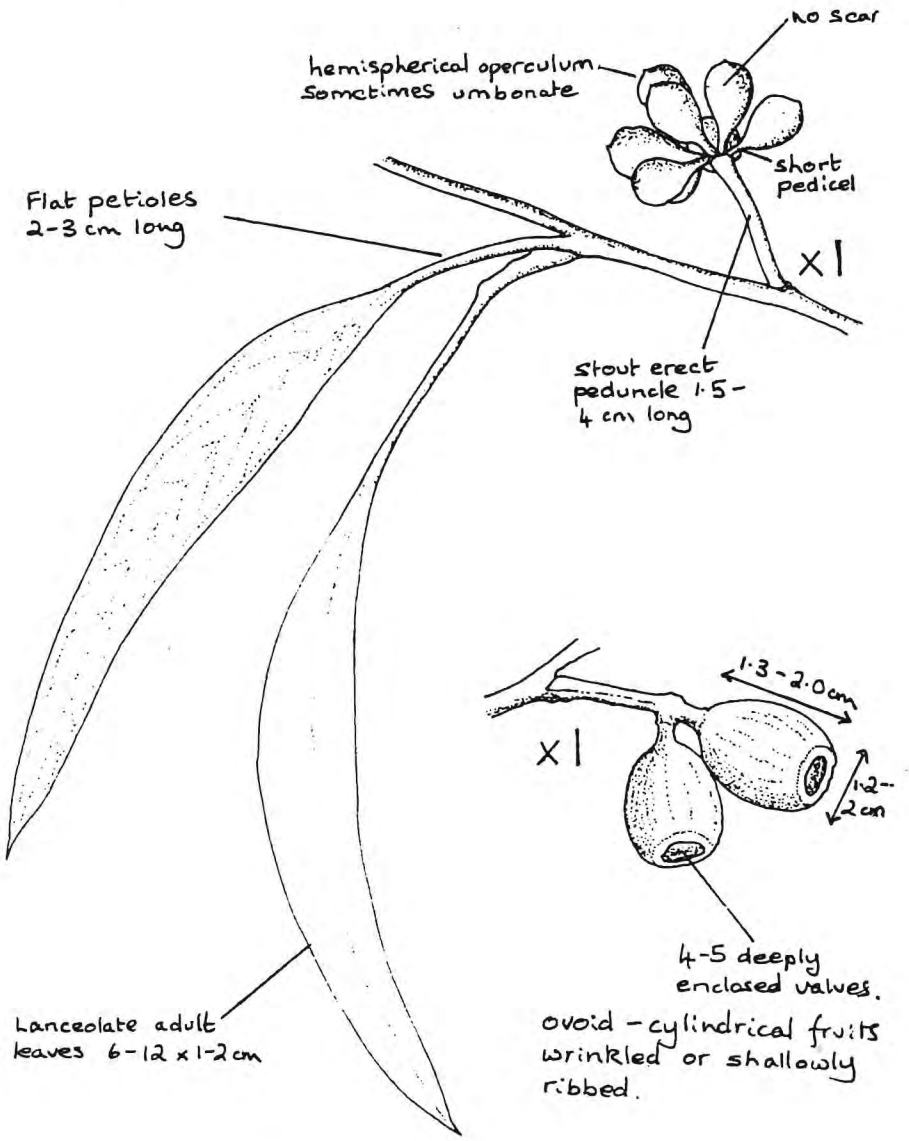
Flowering Period: July - August.

Additional Field Characteristics: A "whipstick" mallee to 5 m with erect or leaning stems and thin pendulous branchlets with sparse foliage. Bark is smooth, dark red, shining and glaucous. Older branchlets and the main stems have pinkish-grey smooth bark. Juvenile leaves are sessile, elliptical, becoming undulate, 2-5 x 1-4 cm. The buds measure 0.9-1.1 x 0.6-0.8 cm.

E. pendens is related to *E. sepulcralis* but differs in its greater number of flowers per inflorescence (*sepulcralis* - up to 7) and smaller fruits (*sepulcralis* fruits 3-3.5 x 2.3-2.4 cm). *E. sepulcralis* is currently only known from the south coast of Western Australia. *E. pendens* is also related to *E. exilis* but the latter has an upright habit and smaller leaves, buds and fruits.

References: Elliott and Jones (1986), Kelly (1978), Brooker (1972), Rye and Hopper (1981).




Up to 13 club-shaped buds per inflorescence
no scar
hemispherical operculum sometimes umbonate
short pedicel
Flat petioles 2-3 cm long
x1
stout erect peduncle 1·5-4 cm long
1·3-2·0cm
x1
1·2-2 cm
4-5 deeply enclosed valves.
Lanceolate adult leaves 6-12 x 1-2 cm
ovoid - cylindrical fruits wrinkled or shallowly ribbed.

EUCALYPTUS 'PRU' aff. ACCEDENS

Jingymia gum

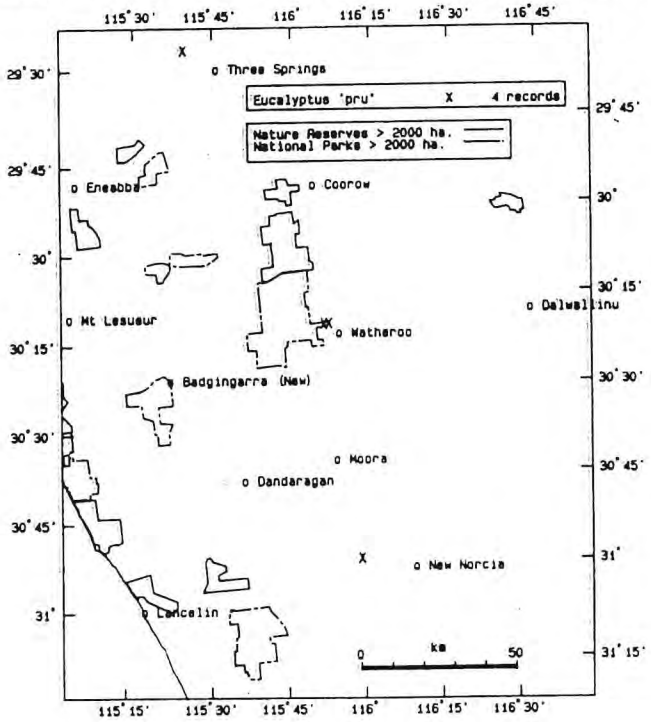
Distribution and Habitat: Known from only three populations c. 160 km apart from Mogumber north to Watheroo and Three Springs where it occurs on loams and stoney gravels as an emergent above low heath. Associated eucalypts may include *E. accedens* and *E. eudesmioides*.

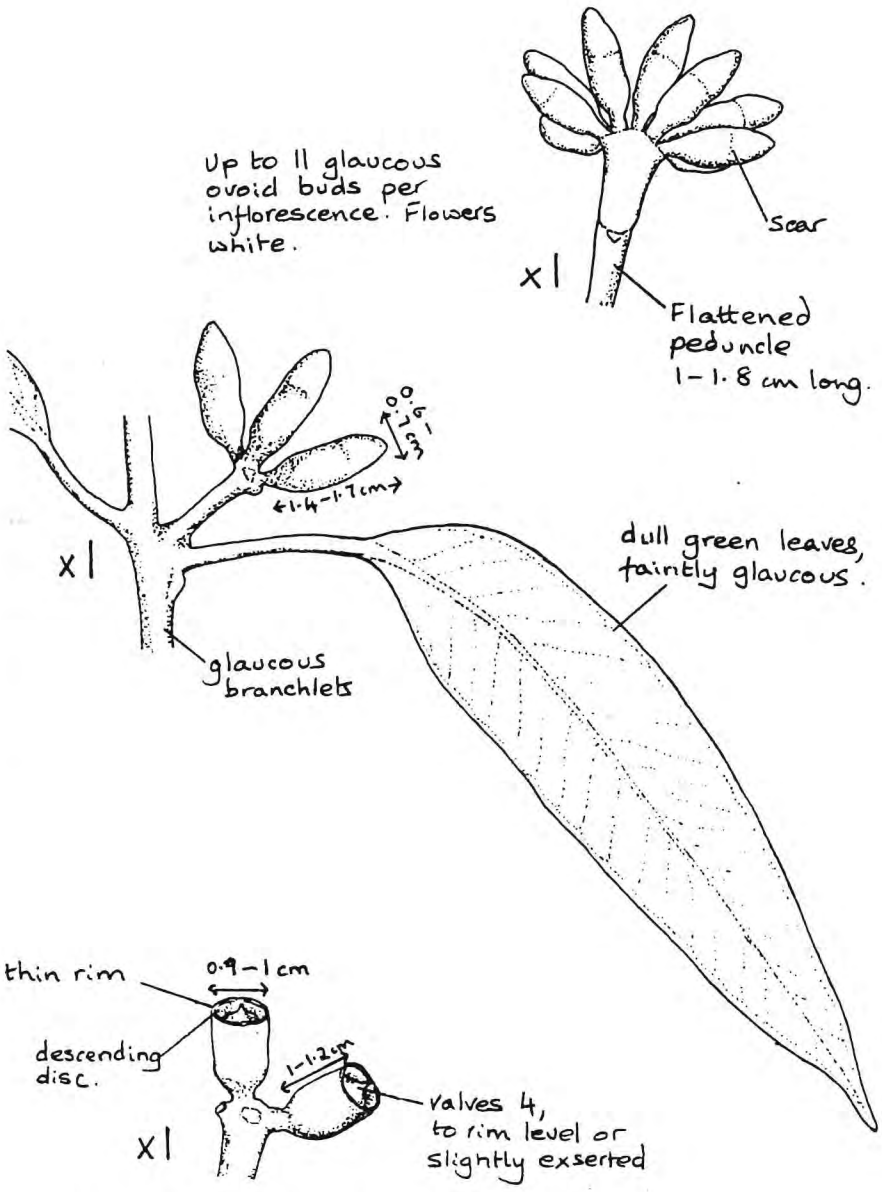
Flowering Period: Unknown.

Additional Field Characteristics: A straggly tree-mallee to 5m with a basal rough grey stocking over smooth grey and pale yellow-brown bark above. It may also occur as a smooth barked mallee. Juvenile leaves are ovate to triangular, to 6 x 6 cm and glaucous. Adult leaves are dull, green to grey-green, 8-12 x 1.1-2.5 cm. The seed is grey-brown to reddish brown, flanged and almost smooth.

E. 'pru' is related to *E. accedens* differing in its larger buds (*accedens* - buds 0.8-1.4 x 0.4-0.7 cm), its rough basal stocking and its glaucous buds, fruits and branchlets.

References: Brooker and Kleinig (ms), Hopper (field notes).




Up to 11 glaucous ovoid buds per inflorescence. Flowers white.
x1
scar
Flattened peduncle 1–1.8 cm long.
0.9–1.3 cm
←1.4–1.7cm→
x1
dull green leaves, faintly glaucous.
glaucous branchlets
thin rim
0.9–1 cm
descending disc.
1–1.2cm
valves 4, to rim level or slightly exserted
x1
glaucous, cup-shaped to cylindrical fruits

EUCALYPTUS RHODANTHA var. RHODANTHA Blakely and Steedman

Rose mallee, rose gum.

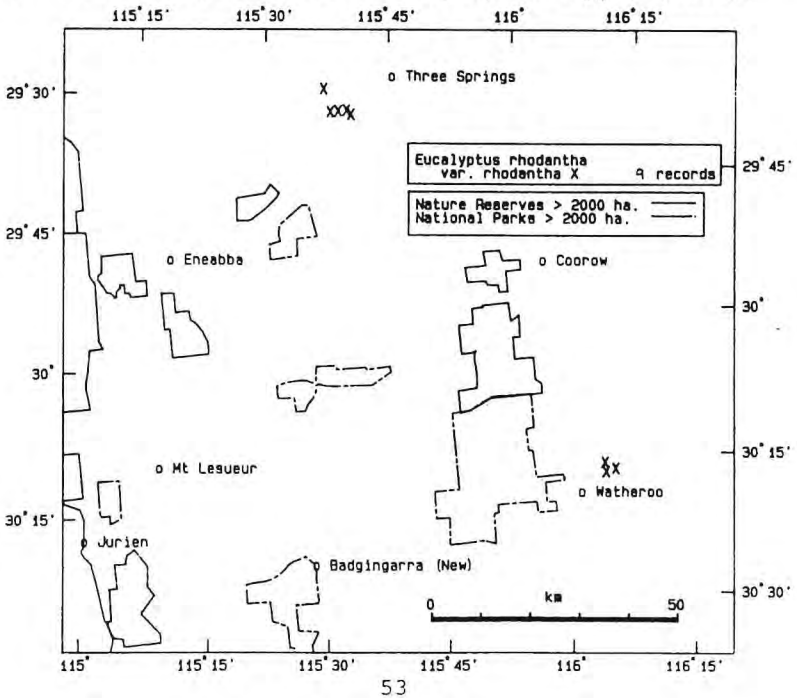
Distribution and Habitat: Restricted to an area between Three Springs and Watheroo where it grows in sandy soil in flat or slightly undulating country usually in small, almost pure communities, with some lower heath-like vegetation eg. *Allocasuarina campestris*, *Acacia* sp. *Hakea* sp.

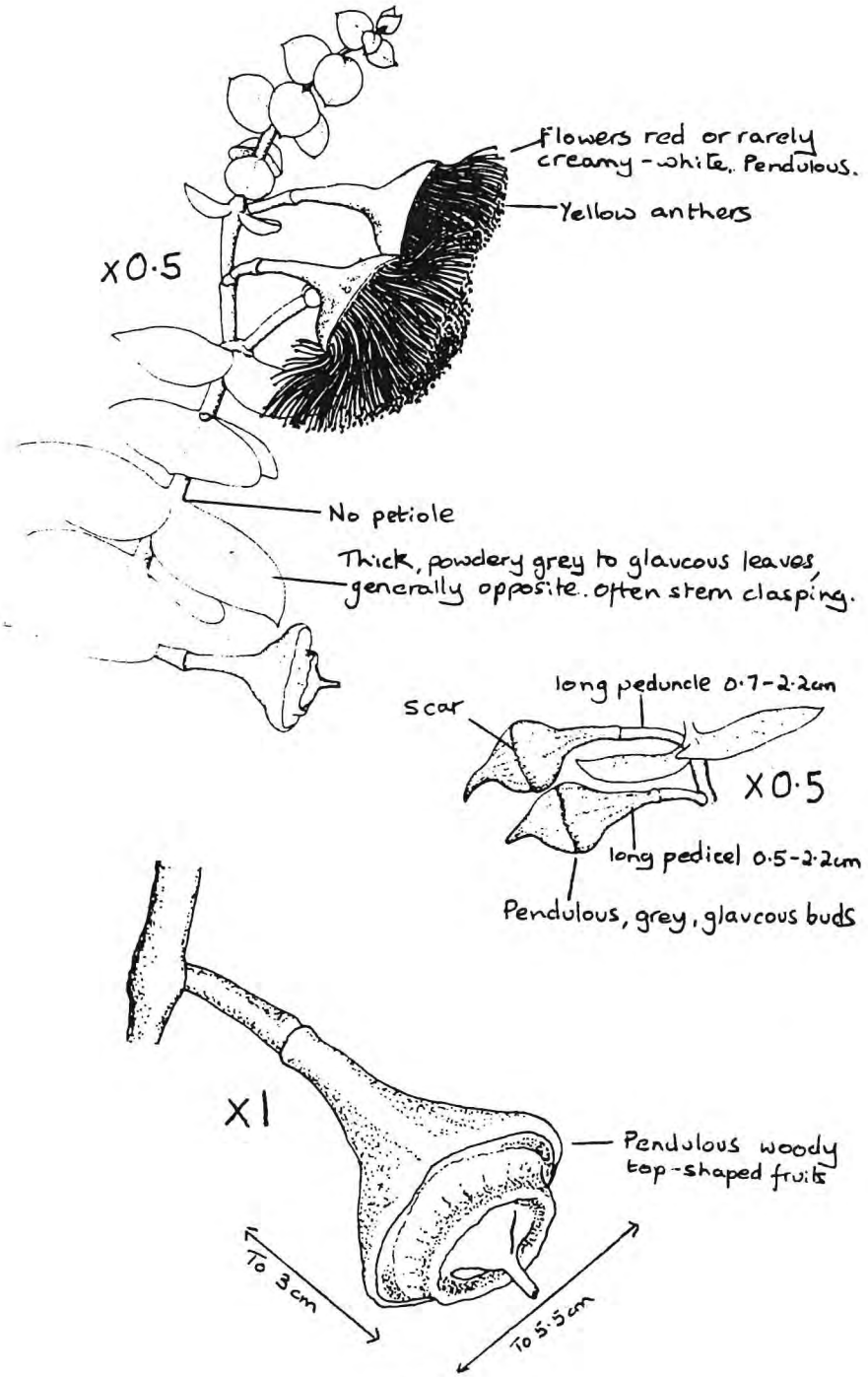
Flowering Period: October - January.

Additional Field Characteristics: A spreading mallee to 4.5m high with smooth greyish-brown bark and white-grey branchlets. The leaves are circular to heart-shaped, 6-8 x 6-8 cm. The plant is mature in its juvenile leaf phase. The buds are usually solitary, though rarely up to 3 per inflorescence. The seed is dark brown and winged.

E. rhodantha var. *rhodantha* is similar to *E. macrocarpa* but differs in its pendulous buds and fruits and its long peduncles and pedicels. From *E. rhodantha* var. *petiolaris* it is distinguished by its sessile (stalkless) leaves which often clasp the stem. The leaf shape of var. *rhodantha* is also more rounded. The two varieties of *E. rhodantha* have been recorded from the same area.

References: Kelly (1977), Elliott and Jones (1986), Chippendale (1973), Gardner (1961), Rye & Hopper (1981).




Flowers red or rarely creamy-white. Pendulous.
Yellow anthers
x0·5
No petiole
Thick, powdery grey to glaucous leaves, generally opposite. often stem clasping.
long peduncle 0·7-2·2cm
scar
x0·5
long pedicel 0·5-2·2cm
Pendulous, grey, glaucous buds
x1
Pendulous woody top-shaped fruit
To 3cm
To 5·5cm

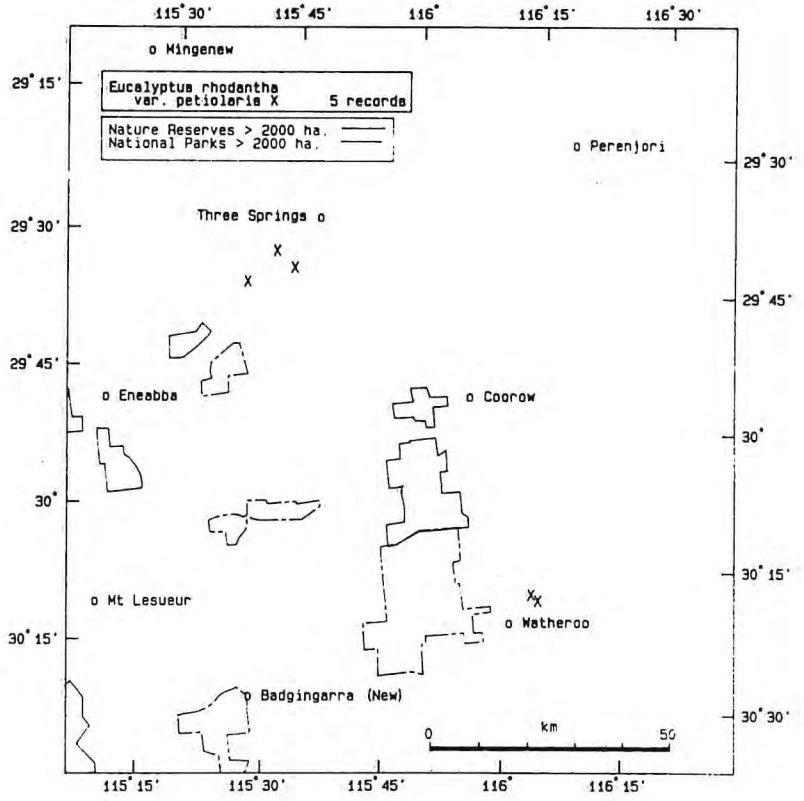
EUCALYPTUS RHODANTHA var. PETIOLARIS Blakely and Steedman

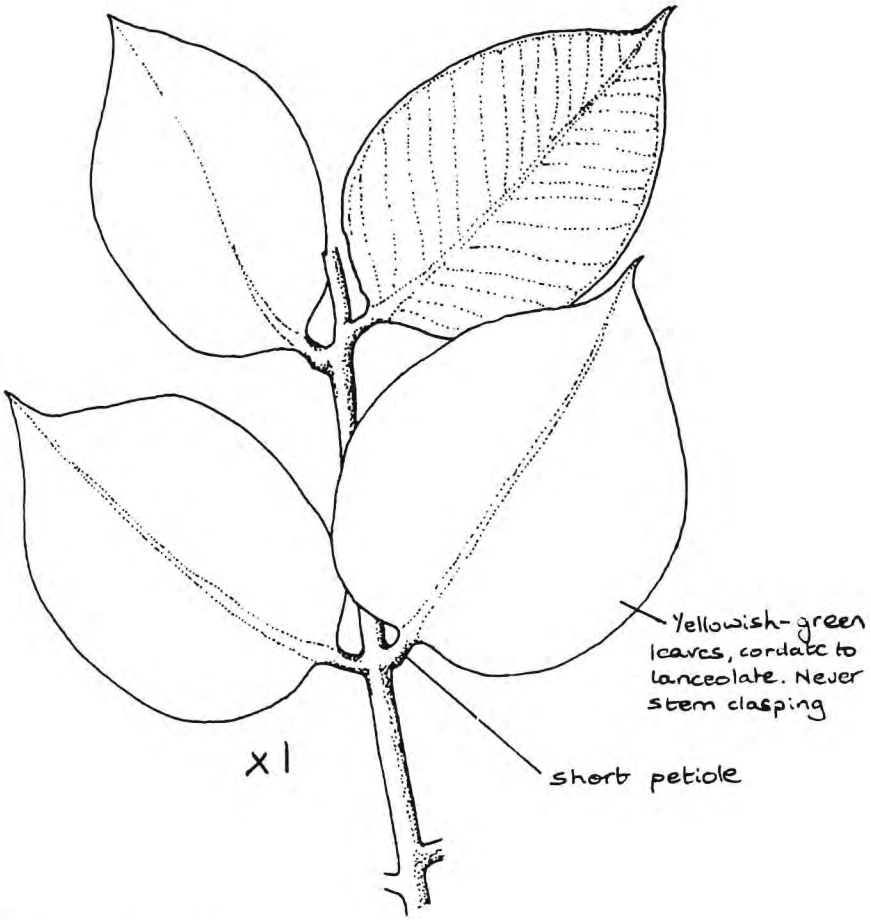
Distribution and Habitat: Known from only two areas, one near Watheroo and the other near Three Springs. It occurs on flat or slightly undulating country in sandy soil, sometimes in association with *E. rhodantha* var. *rhodantha*.

Flowering Period:

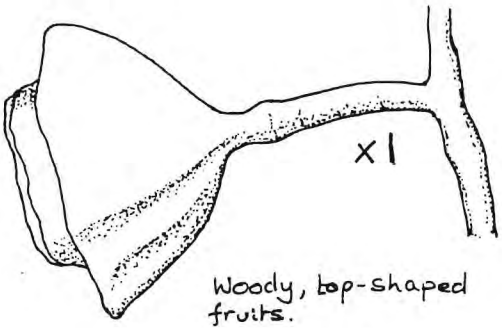
Additional Field Characteristics: *E. rhodantha* var. *petiolaris* may be distinguished from *E. rhodantha* var. *rhodantha* by its shortly petiolate leaves, which tend to be yellowish-green and cordate to lanceolate in shape. They are never stem-clasping as with var. *rhodantha*.

References: Blakely (1941), Hopper (field notes).





Flowers the same as rhodantha var. rhodantha



EUCALYPTUS STOWARDII Maiden

Fluted horn mallee

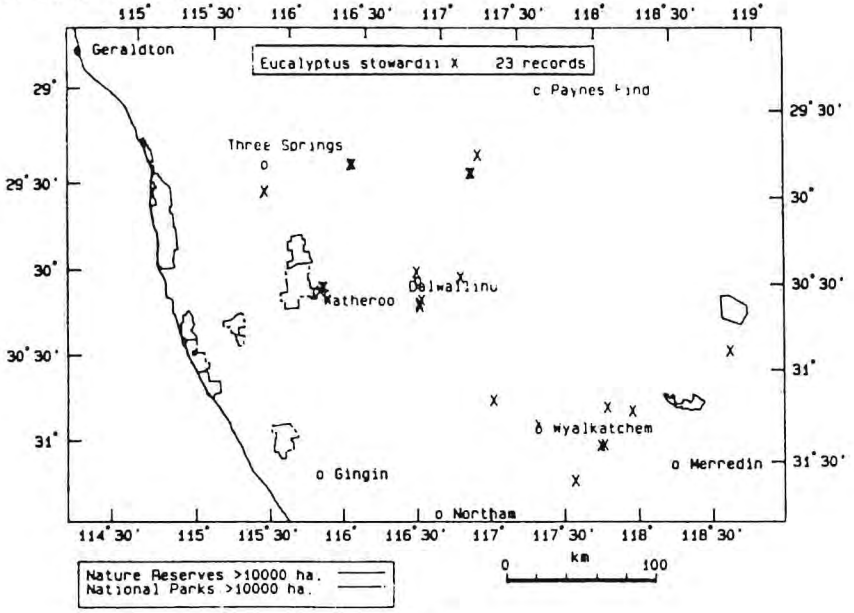
Distribution and Habitat: Has a scattered distribution in the northern wheatbelt from the Dalwallinu-Pithara area to Dowerin, Wyalkatchem, Kununoppin, Westonia and Kellerberrin. It is usually in granitic soil.

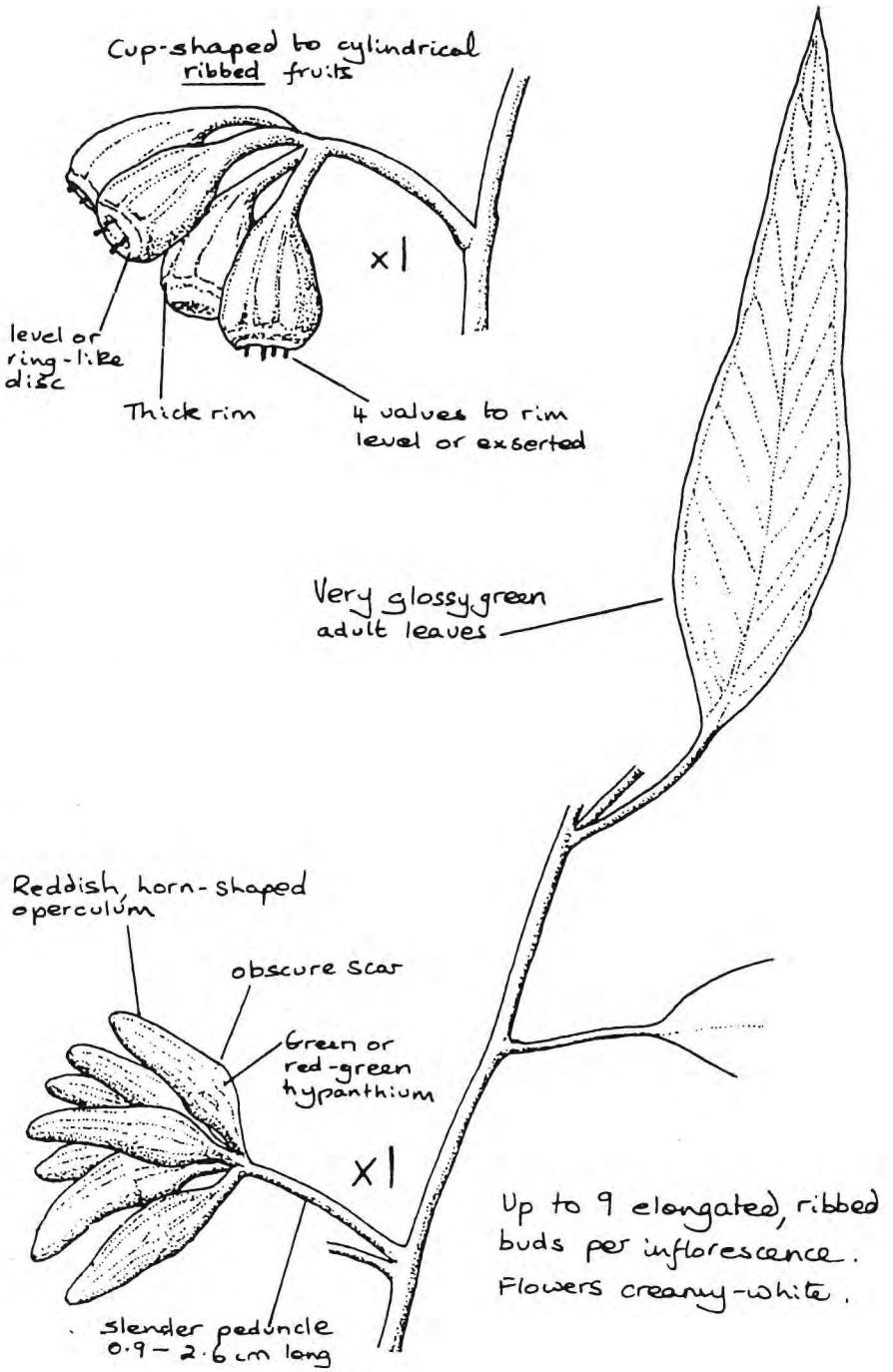
Flowering Period: August-November.

Additional Field Characteristics: A tall mallee, rarely a small tree, up to 8 m in height with smooth greyish bark over salmon-pink. Juvenile leaves are ovate to triangular, to 12 x 7 cm and blue-green. Adult leaves are lanceolate to broad-lanceolate, 6-12 x 1-2.5 cm. The ribbed buds measure 2-3.8 x 0.7-1 cm. Fruits are also ribbed and are 1.1-2.1 x 1-1.4 cm. The seed is grey-black.

E. stowardii resembles *E. eremophila* which is also a smooth barked mallee or mallet with glossy green leaves and similar shaped buds and fruits. However, the ribbing seen on buds and fruits of *E. stowardii* is lacking. Also, the leaf venation of *stowardii* is of moderate density and is visible whereas that of *eremophila* is very sparse and is obscured by the numerous oil glands. *E. stowardii* is also similar to *E. 'diminuta'* but the latter has smaller, less glossy leaves and smaller, less ribbed buds and fruit.

References: Elliott and Jones (1986); Chippendale (1973); Gardner (1979).




Cup-shaped to cylindrical ribbed fruits
x1
level or ring-like disc
Thick rim
4 valves to rim level or exserted
Very glossy green adult leaves
Reddish, horn-shaped operculum
obscure scar
Green or red-green hypanthium
x1
slender peduncle 0·9 – 2·6 cm long
Up to 9 elongated, ribbed buds per inflorescence. Flowers creamy-white.

EUCALYPTUS SUBEREA Brooker and Hopper

Mt. Lesueur Mallee

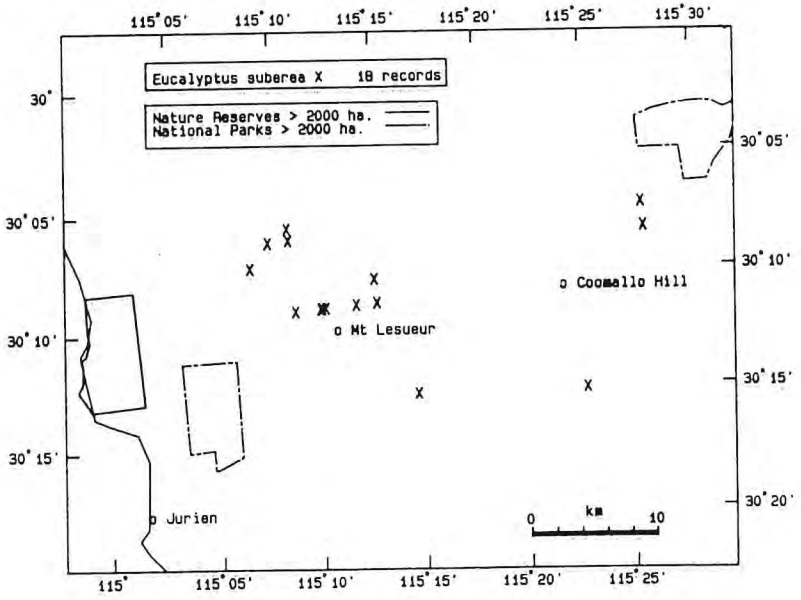
Distribution and Habitat: Known only from the Mt. Lesueur-Coomallo Creek area where it occurs in eleven small populations over a range of c. 30 km on the edges and scree slopes of lateritic uplands. It grows in open mallee communities over dense low heath with *E. lateritica*, *E. gittinsii*, *E. marginata*, *E. calophylla*, *E. accedens*, *E. drummondii*, *E. exilis*, *E. pendens* and *E. 'pluricaulis'*.

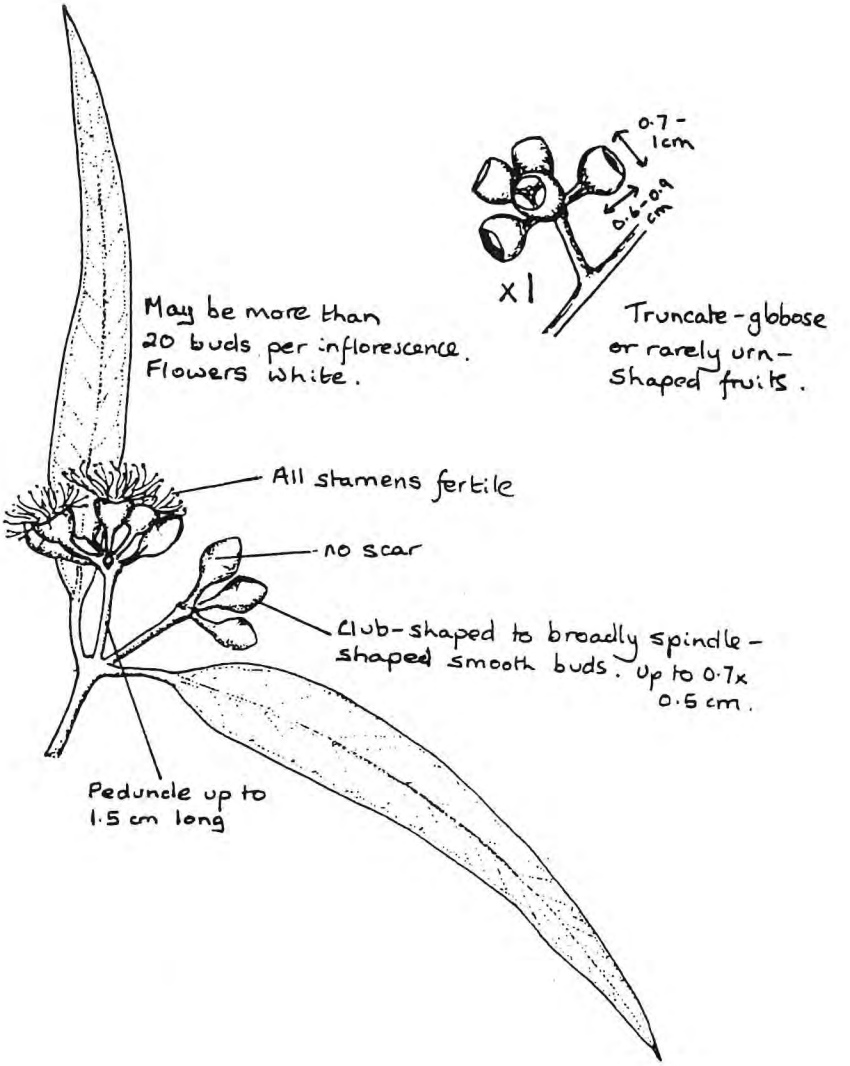
Flowering Period: December - March.

Additional Field Characteristics: A mallee to 3m tall with grey corky rough bark at the base or in larger specimens, thicker, yellowish flaky bark. Juvenile leaves are lanceolate, up to 18 x 5.5 cm, light green and slightly glossy. Adult leaves are falcate to lanceolate, dark green, slightly glossy and up to 9 x 1.5 cm. The operculum may be conical to hemispherical. The fruits are generally truncate-globose, rarely urn-shaped. The rim is thick or thin, the disc descending vertically. The seed is 'D'-shaped shining and brown.

E. suberea has no close relatives and is easily distinguished by its small truncate-globose fruit, its grey-yellow corky bark and its many-flowered inflorescences.

References: Brooker and Hopper (1986).




0.7 - 1cm
0.6 - 0.9 cm
x1
May be more than 20 buds per inflorescence. Flowers white.
Truncate-globose or rarely urn-shaped fruits.
All stamens fertile
no scar
Club-shaped to broadly spindle-shaped smooth buds. Up to 0.7x 0.5 cm.
Peduncle up to 1.5 cm long

EUCALYPTUS 'ZOPHEROPHLOIA' Brooker and Hopper ined.

Blackbutt mallee

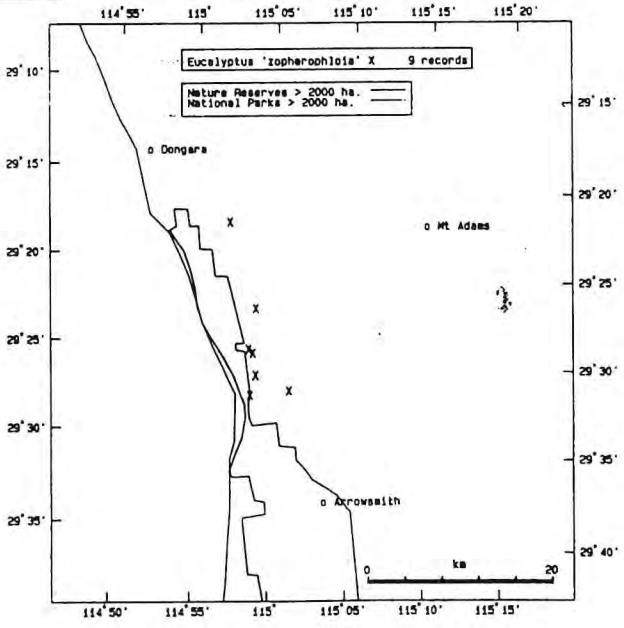
Distribution and Habitat: Restricted to a small area south and south east of Dongara where it grows on calcareous sands.

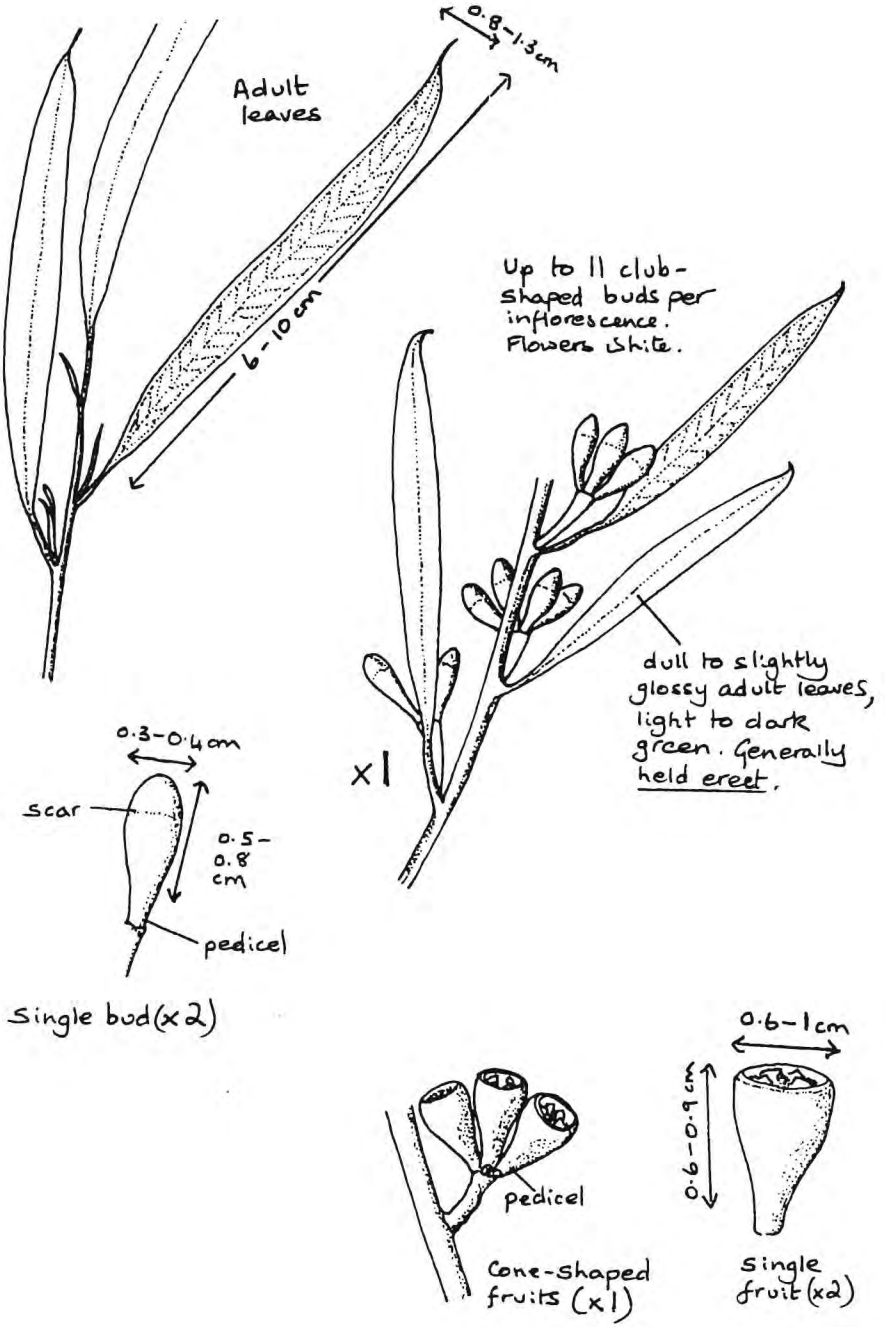
Flowering Period: November - January.

Additional Field Characteristics: A mallee with the basal half of most of its stems covered with dark, rough, fibrous bark. Above, the bark is smooth and greyish. Juvenile leaves are lanceolate to broad lanceolate, to 11 x 3 cm, dull and green. The seed is grey-black and flanged.

E. 'zopherophloia' is related to *E. accedens*, *E. 'leprophloia'* and *E. loxophleba*. From the former it differs in its rough basal bark and narrow, green adult leaves (*accedens* - smooth bark throughout, adult leaves 7-18 x 1.2-3 cm, dull blue-green). Its adult leaves are also narrower than those of *E. 'leprophloia'* (8-11 x 2-2.5 cm) which also lacks the black butt of *'zopherophloia'*. From *E. loxophleba* it may be distinguished by its juvenile leaves (*loxophleba* - ovate or cordate, 8-11 x 5-7 cm, grey-green to glaucous), its narrower, more erect and less glossy adult leaves (*loxophleba* - very glossy, 7-13 x 1-2 cm) and by its grey-black seed (*loxophleba* - brown). The preference of *E. 'zopherophloia'* for limestone habitats is also distinctive.

References: Brooker and Kleinig (ms).




0.8–1.3cm
Adult leaves
6–10cm
Up to 11 club-shaped buds per inflorescence. Flowers white.
dull to slightly glossy adult leaves, light to dark green. Generally held ereet.
x1
0.3–0.4cm
scar
0.5–0.8 cm
pedicel
Single bud (x2)
0.6–1cm
0.6–0.9cm
pedicel
Cone-shaped fruits (x1)
Single fruit (x2)

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GREENOUGH REGION
SPECIES CODES

ABS	E. 'absita'
ANF	E. 'annuliformis'
BAL	E. 'balanites'
BEA	E. beardiana
BLX	E. 'bla' aff. loxophleba
CAR	E. carnabyi
CRI	E. 'crispata'
CRUL	E. crucis ssp. lanceolata
CUP	E. 'cuprea'
DIM	E. 'diminuta'
*DON	E. dongarraensis
EFF	E. effusa
EBBS	E. ebbanoensis ssp. 'shiny'
*ERC	E. erythrocorys
FOEC	E. foecunda ssp. "Cliff Head"
*GIT	E. gittinsii
JOH	E. johnsoniana
LAR	E. lateritica
LEP	E. 'leprophloia'
MACE	E. macrocarpa ssp. 'elacantha'
PEN	E. pendens
PRU	E. 'pru' aff. accedens
RHOR	E. rhodantha var. rhodantha
RHOP	E. rhodantha var. petiolaris
*RIG	E. rigidula
STO	E. stowardii
SUB	E. suberea
ZOP	E. 'zopherophloia'

*Species considered in previously published works to be rare or threatened but which appear to be common on the basis of recent survey. Please record them if observed.