

BENNETT'S MALLEE

(EUCALYPTUS x BENNETTIAE)

INTERIM RECOVERY PLAN

2005-2010

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Photo: Nathan McQuoid

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

CALM is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs and by ensuring that conservation action commences as soon as possible.

This IRP will operate from November 2004 to October 2009 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Endangered, this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was given regional approval on 19 September 2005 and was approved by the Director of Nature Conservation on 17 November 2005. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at November 2004.

ACKNOWLEDGMENTS

Andrew Brown Threatened Flora Coordinator, CALM Species and Communities Branch

Thanks also to staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM Wildlife Branch for their assistance.

SUMMARY

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|-------------------------|--------------------------------|--------------------------|--|
| Scientific Name: | <i>Eucalyptus x bennettiae</i> | Common Name: | Bennett's mallee |
| Family: | Myrtaceae | Flowering Period: | June, August and September |
| CALM Regions: | South Coast | CALM District: | Albany Work Centre |
| Shires: | Ravensthorpe | Recovery Team: | Albany District Threatened Flora Recovery Team |

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Western Australian Herbarium (1998) FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. <http://www.calm.wa.gov.au/science/>.

Current status: *Eucalyptus x bennettiae* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in March 1982 and was delisted in July 2004 due to its hybrid origin. Although currently listed as P4 on the CALM Priority flora list, it is still ranked as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is currently known from four small populations, two consisting of only one plant.

Description: *Eucalyptus x bennettiae* is a small lignotuberous mallee to 2m high. Leaves are 6cm long and 1.5cm wide. The inflorescences are on flat, downward-curving stalks 4cm long and have up to 7 free tubular buds. The filaments are pale yellow. The fruits are free and cup-shaped. Primary stems lack pith glands. Its morphology is intermediate between *E. lehmannii* and *E. sporadica*.

Habitat requirements: *Eucalyptus x bennettiae* is currently known from four locations; two in the 'Bandalup Corridor' in Ravensthorpe and two in the Fitzgerald River National Park, where it grows amongst low mallee-scrub in brown sandy loam on rocky slopes and gullies.

Habitat critical to the survival of the species, and important populations: The habitat critical to the survival of *Eucalyptus x bennettiae* comprises the area of occupancy of the known population; similar habitat within 200 metres of the known population; remnant vegetation that may link future populations; and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so in the past and may be suitable for translocations. Given that this taxon is listed as Endangered it is considered that all populations are important populations.

Benefits to other species/ecological communities: *Eucalyptus x bennettiae* Population 2 occurs in close proximity to the Vulnerable Threatened Ecological Community (TEC) "*Eucalyptus acies* mallee heath". The species also occurs within the 'Bandalup Corridor' and in the vicinity of a number of Declared Rare Flora species. Some recovery actions put in place for *E. x bennettiae* and its parent species will benefit the above threatened species and communities and reciprocally, recovery actions in place for these species and communities will benefit *E. x bennettiae*.

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity and will assist in implementing Australia's responsibilities under that Convention. *Eucalyptus x bennettiae* is not specifically listed under any international treaty and therefore this plan does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, the registered site Dempster Inlet (S02711) occurs in close proximity to *Eucalyptus x bennettiae* Population 2. That Department has welcomed any future consultation that will seek input and involvement from any Indigenous groups that have an active interest in the areas that are habitat for *E. x bennettiae*.

Affected interests: All known populations are on Crown land. One population is in an area that has a pending mining lease.

Social and economic impacts: The implementation of this Interim Recovery Plan (IRP) has the potential to have some minimal social and economic impact, as Population 1 is located on Unvested Crown Reserve, which is under a pending mining lease. However, recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Evaluation of the Plans Performance: The Department of Conservation and Land Management (CALM), in conjunction with the Albany District Threatened Flora Recovery Team (ADTFRT) will evaluate the performance of this IRP.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:

1. All land managers have been notified of the location and threatened status of the taxon.
2. The hybrid status of the taxon has been confirmed.
3. Volunteers and staff from the CALM Albany Work Centre monitor populations.

Objectives

The objective of this Interim Recovery Plan is to protect existing populations of the hybrid and abate threats to adjacent parent populations in order to maximise potential for evolutionary processes.

Recovery criteria

Criteria for success: Existing populations are stable over the period of the plan's adoption.

Criteria for failure: The loss of one or more populations over the period of the plan's adoption.

Recovery actions

- | | |
|--------------------------------|--|
| 1. Coordinate recovery actions | 4. Implement fire management |
| 2. Monitor populations | 5. Map habitat critical to the survival of the species |
| 3. Liaise with stakeholder | 6. Review the IRP and assess the need for further recovery actions |

1. BACKGROUND

History

Eucalyptus x bennettiae was discovered by Eleanor Bennett in the 1970's from an area near Mt Desmond in the Ravensthorpe Range and described by D.J. Carr and S.G.M. Carr in 1980 (Carr and Carr 1980). Three other populations were subsequently found between 1998 and 2000 by ⁴Nathan McQuoid; two in the Fitzgerald River National Park, and the third south-south-east of Ravensthorpe.

Eucalyptus x bennettiae has in the past been considered to be a hybrid between *E. lehmannii* and *E. sporadica* since it co-occurs with these two species and its morphology is intermediate between them (Brooker and Kleinig 1990).

In 2002, a genetic analysis was undertaken by Margaret Byrne and Murdoch University student Esther Walker to confirm the hybrid status of the taxon and to determine if the taxon is self-perpetuating. Plants of *E. x bennettiae* and of the putative parent species were sampled from the type population (Population 1) and Population 4. Plants were assayed with five microsatellite loci. All alleles present in *E. x bennettiae* were present in either *E. lehmannii* or *E. sporadica*, indicating that *E. x bennettiae* does not have any unique genetic identification to differentiate it as a separate species and confirming it as a hybrid of *E. lehmannii* and *E. sporadica* (Walker 2002).

Seed collected from *E. x bennettiae* was also germinated and planted out at an arboretum in South Australia by ⁵Dean Nicolle and it was noted that it did not have the true morphology of *E. x bennettiae* but displayed morphological characters ranging from *E. lehmannii* to *E. sporadica*. This supports the hypothesis that *E. x bennettiae* is an unstable hybrid, i.e. the taxon is not self-perpetuating but relies on the parent species for its perpetuity.

The historical role of hybridisation is recognised as an important, natural evolutionary process, providing the raw material for adaptive evolution. In terms of conserving rare species however hybridisation can have a negative effect by processes such as genetic swamping or replacement or a decrease in fitness (Soltis and Gitzendanner 1999). In the case of *E. x bennettiae*, the hybrid form is very rare and the parent species are common and widespread therefore hybridisation is unlikely to have negative impact on the parent species. However, the question remains should the taxon be conserved as a biological unit in its own right? The Western Australian *Wildlife Conservation Act 1950* allows for any plant organism to be Declared as Rare Flora, including hybrids, unusual colour forms or unique populations if they can be described as an entity. However, for a species to be listed as Rare Flora under CALM Policy No 9 (Conservation of Threatened Flora in the Wild), a taxon of hybrid origin must be:

- a distinct entity, that is, the progeny are consistent within the agreed taxonomic limits for that taxon
- capable of self-perpetuating, that is, not reliant on the parent stock for replacement
- the product of a natural event, that is, both parents are naturally occurring and cross fertilisation was by natural means

Eucalyptus x bennettiae does not meet these criteria as the progeny are not consistent within the agreed taxonomic limits for the taxon group (ie the seedlings separate out to the parental morphology), and it therefore is not accepted as DRF under policy guidelines.

Eucalyptus x bennettiae is now listed as P4 by CALM. This status means the taxon will continue to be monitored. As *Eucalyptus x bennettiae* is a rare hybrid, some monitoring of the taxon is warranted to ensure it persists and maximises the potential for evolutionary processes.

The taxon remains listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, but this is currently being reviewed.

⁴ Nathan McQuoid Greening Australia

⁵ Dean Nicolle Consultant Botanist, South Australia

Description

Eucalyptus x bennettiae belongs to the *Lehmanniae*, a group of seven very closely related *Eucalyptus* species that are endemic to the south coast of Western Australia. All grow in well-drained soils in areas of high rainfall and have flowers with horn-shaped opercula, straight stamens and a ribbed surface to the top of the ovary (Carr and Carr 1980).

Eucalyptus x bennettiae is a small lignotuberous mallee to 2m high. Leaves are 6cm long and 1.5cm wide. The inflorescences are on flat, downward-curving stalks 4cm long and have up to 7 free tubular buds. The filaments are pale yellow. The fruits are free and cup-shaped. Primary stems lack pith glands (Carr and Carr 1980). Its morphology is intermediate between *E. lehmannii* and *E. sporadica*.

Distribution and habitat

Eucalyptus x bennettiae is only known from four locations, two in the 'Bandalup Corridor' in Ravensthorpe and two in the Fitzgerald River National Park. It is found on rocky slopes and in gullies, on brown sandy loam in low mallee over scrub (Brown *et al.* 1998).

The parent species are widespread and common with *Eucalyptus lehmannii* widespread in the southern coastal to sub-coastal areas, including the Stirling Range and *E. sporadica* widespread throughout the wheatbelt, including the Stirling Range and east towards Esperance (Brooker and Kleinig, 2001). *E. x bennettiae* occurs only where the two parent species converge (N. McQuoid, personal communication); however it does not occur in all areas where the parent species converge (⁶M. Grant, personal communication).

Population 3 occurs within an area designated as Wilderness Zone within the Fitzgerald River National Park. As such, only essential management operations are permissible (CALM, 1991). All populations occur within the 'notional Fitzgerald Biosphere Reserve'. This includes the areas around the Fitzgerald River National Park Biosphere Reserve, which was designated under UNESCO Man and the Biosphere (MAB) Programme in 1978.

Biology and ecology

The areas where *Eucalyptus x bennettiae* occurs are not currently affected by any plant diseases such as *Phytophthora cinnamomi* (M. Grant, personal communication). *Eucalyptus x bennettiae* is presumed not susceptible to *Phytophthora cinnamomi*, based on the resistance or low susceptibility to the pathogen of many *Eucalypt* species tested to date (⁷B. Shearer, unpublished data). However, as at least one of the parent species of *E. x bennettiae* is known to be bird pollinated, observed changes in vegetation structure and floristics caused by *P. cinnamomi* may impact on the taxon by decreasing the abundance of such pollinators in the community (Wills 1993; Wilson *et al.* 1994).

Lignotubers are present in the majority of eucalypts and enable regrowth after fire where regeneration by seed frequently fails (House 1997). Mallee eucalypts are sprouters, fire kills the canopy and growth occurs from a large lignotuber partly buried in the soil (Gill 1997). It has been shown that repeated experimental fires, often with augmented fuel quantities, can cause decline in populations of some mallees (Noble 1987 in Gill 1997). Although nothing is known specifically about the fire ecology of *E. x bennettiae*, it is likely to resprout from an underground lignotuber after fire. The time to first flowering after resprouting is unknown.

Eucalyptus lehmannii is pollinated by birds (Keighery 1982) and as *E. x bennettiae* has a similar flower, it is probable that birds pollinate it also.

⁶ Malcolm Grant Senior Operations Officer, CALM Albany Work Centre, Ravensthorpe Office

⁷ Bryan Shearer Principal Research Scientist, CALM Science Division

Threats

Eucalyptus x bennettiae was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in March 1982 and was delisted in July 2004 due to its hybrid origin. Although currently listed as P4 in CALM's Priority flora list, it is still ranked as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is currently known from four small populations, two consisting of a single plant in each.

All areas occupied by *Eucalyptus x bennettiae* are affected or potentially affected by one or more threats identified in this IRP. Threats include:

- **Mining:** The population of *Eucalyptus x bennettiae* in the Ravenshorpe Range occurs within a pending mining lease and mineral survey lines passed within meters of Populations 1A and B in 1991 (⁸L. Anderson, personal communication). Possible future mining impacts include vegetation clearing, introduction of weeds and pathogens such as *Phytophthora cinnamomi*, increased risk of fires and discharge of waste products and hazardous materials.
- **Inappropriate fire regime:** There is limited evidence that mallee populations, which resprout from lignotubers after fire, can be harmed under a regime of too frequent fire (Noble 1987). The optimal fire regime for *Eucalyptus x bennettiae* and its parent species is unknown; however it is considered that intense, extensive and frequent fires will cause adverse affects.
- **Small population size:** One direct threat to all *Eucalyptus x bennettiae* populations is their very small size, rendering them vulnerable to local extinction by either demographic stochasticity (eg. lack of recruitment in one year), or environmental stochasticity (random variation in for example rainfall or fire).

Summary of population land vesting, purpose and tenure

| Population | Vesting | Purpose | Tenure |
|-----------------------|----------------------------|---------------|--------|
| 1A Ravenshorpe Range | Unvested | Common | Crown |
| 1B Ravenshorpe Range | Unvested | Common | Crown |
| 2 Fitzgerald River NP | WA Conservation Commission | National Park | Crown |
| 3 Fitzgerald River NP | WA Conservation Commission | National Park | Crown |
| 4 Road 11 | Unvested | | Crown |

Summary of population information and threats

| Pop. No. & Location | Year / No. Plants* | Condition | Threats |
|---------------------------------|--|-----------|---|
| 1A Unvested Crown Reserve 16119 | 1988 4 1991 4 2000 2 (partial survey only) | Healthy | Mining Small population size Fire |
| 1B Unvested Crown Reserve 16119 | 1988 6 1991 6 | Healthy | |
| 2 National Park | 1989 5 | Healthy | Small population size Fire |
| 3 National Park | 1988 1 2000 0 (unable to locate) | Healthy | Small population size Fire |
| 4 Unvested Crown Reserve | 2000 3 2001 7 sub-clumps (approximately) | | Small population size Fire |

* Genetic analysis has confirmed that the *E. bennettiae* at Population 1 is only one individual and the *E. bennettiae* at Population 4 is only one individual (Walker 2002).

⁸ Lawrie Anderson Policy Project Officer, CALM Albany Work Centre

Habitat critical to the survival of the species, and important populations

Given that this species is listed as Endangered under the Commonwealth EPBC Act, it is considered that all known habitat is habitat critical to the survival of the species. In addition all populations, including any translocated populations, are considered important to the survival of the species. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms, or once occupied (continuously, periodically or occasionally) by an organism or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999*). The area of occupancy of the currently known *Eucalyptus x bennettiae* populations has been mapped. However, other parts of the habitat critical to the survival of *E. x bennettiae* have not been mapped and an action outlined in this Interim Recovery Plan is to map all habitat as defined above.

The habitat critical to the survival of *Eucalyptus x bennettiae* therefore comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations that provide potential habitat for natural recruitment;
- remnant vegetation that surrounds and links populations (this is necessary to allow pollinators to move between populations) and
- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).

Benefits to other species/ecological communities

Eucalyptus x bennettiae Population 2 occurs in close proximity to the Threatened Ecological Community (TEC) “*Eucalyptus acies* mallee heath” (Thumb Peak, Mid Mount Barren and Woolbernup Hill (Central Barren Ranges)). This TEC is listed as Vulnerable in the CALM TEC database. Declared Rare Flora that occur in close proximity to *Eucalyptus x bennettiae* include *Acacia rhamphophylla*, *Daviesia megacalyx* and *Marianthus villosus*. *Eucalyptus x bennettiae* also occurs within the ‘Bandalup Corridor’, a corridor of remnant vegetation linking the flora and fauna of the Fitzgerald River National Park to the eastern Goldfields and forming part of a larger network of corridors throughout the south coast region. Some recovery actions put in place for *E. x bennettiae* and its parent species will benefit the above threatened species and communities and reciprocally, recovery actions in place for these species and communities will benefit *E. x bennettiae*.

International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993 and will assist in implementing Australia’s responsibilities under that Convention. *Eucalyptus x bennettiae* is not specifically listed under any international treaty and therefore this plan does not affect Australia’s obligations under any other international agreements

Role and interests of indigenous people

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, the registered site Dempster Inlet (S02177) occurs in close proximity to *Eucalyptus x bennettiae* Population 2. That Department has welcomed any future consultation that will seek input and involvement from Indigenous groups that have an active interest in the areas that are habitat for *E. x bennettiae* and this is discussed in the recovery actions.

Affected interests

All known populations are on Crown land. One population is in an area that has a pending mining lease.

Social and economic impacts

The implementation of this IRP has the potential to have some minimal social and economic impact, as Population 1 is located in an Unvested Crown Reserve, which is under a pending mining lease. However, recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the population or within the defined critical habitat of *Eucalyptus x bennettiae* require assessment for the potential for a significant level of impact. No developments should be approved unless the proponents can demonstrate that they will not have a detrimental impact on the taxon or its habitat or potential habitat or the local surface and ground water hydrology.

Evaluation of the Plan's Performance

The Department of CALM, in conjunction with the Albany District Threatened Flora Recovery Team will evaluate the performance of this recovery plan. In addition to annual reporting on progress against the criteria for success and failure, the plan is to be reviewed within five years of its implementation. Any changes to management and/or recovery actions made in response to monitoring results will be documented accordingly.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan is to protect existing populations of the hybrid and abate threats to adjacent parent populations in order to maximise potential for evolutionary processes.

Criteria for success: Existing populations are stable over the period of the plan's adoption under the EPBC Act.

Criteria for failure: The loss of one or more populations over the period of the plan's adoption under the EPBC Act.

3. RECOVERY ACTIONS

Existing or completed recovery actions

All land managers have been notified of the location, threatened status and legal responsibility to protect *Eucalyptus x bennettiae*.

In 2002, a genetic analysis was undertaken by Margaret Byrne and Murdoch University student Esther Walker to confirm the hybrid status of the taxon and to determine if the taxon is self-perpetuating. Plants of *E. x bennettiae* and of the putative parent species were sampled from the type population (Population 1) and Population 4. Plants were assayed with five microsatellite loci. All alleles present in *E. x bennettiae* were present in either *E. lehmannii* or *E. sporadica*, indicating that *E. x bennettiae* does not have any unique genetic identification to differentiate it as a separate species and confirming it as a hybrid of *E. lehmannii* and *E. sporadica* (Walker 2002).

Seed collected from *Eucalyptus x bennettiae*, germinated and planted out at an arboretum in South Australia by Dean Nicolle, was found to not have the true morphology of *E. x bennettiae* but displayed morphological characters ranging from *E. lehmannii* and *E. sporadica*. The fact that *E. x bennettiae* occurs only as a few individuals indicates that any seed produced is not readily established in the populations (Walker 2002). Kings Park and Botanic Garden, Perth, have also grown *E. x bennettiae* from seed to maturity and the progeny are variable (N. McQuoid, personal communication).

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate recovery actions

The Albany District Threatened Flora Recovery Team (ADTFRT) is coordinating recovery actions for *Eucalyptus x bennettiae* and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Albany Work Centre) through the ADTFRT
Cost: \$3,000 per year

2. Monitor populations

Continue monitoring of all *Eucalyptus x bennettiae* populations.

Action: Monitor populations
Responsibility: CALM (Albany Work Centre)
Cost: \$1,200 per year

3. Liaise with stakeholders

Staff from CALM Albany District will continue to liaise with future mining leasees to ensure populations on mining tenements are not accidentally damaged or destroyed and that the impacts of identified threats are minimised. Input and involvement will also be sought from Indigenous groups that have an active interest in areas that are habitat for *Eucalyptus x bennettiae*.

Action: Liaise with stakeholders
Responsibility: CALM (Albany Work Centre)
Cost: \$1,200 per year

4. Implement fire management

The optimal fire regime is not well understood for the south coastal mallee heaths and the parent species *Eucalyptus lehmannii* and *E. sporadica*. Therefore, fire management should aim to prevent extensive, intense and frequent wildfires in these communities where possible.

Action: Implement fire management
Responsibility: CALM (Albany Work Centre)
Cost: \$1,000 per year

5. Map habitat critical to the survival of the species

It is a requirement of the EPBC Act (Section 207A) that spatial data relating to critical habitat be determined. Although habitat critical to the survival of the species is alluded to in Section 1, all the areas described have not yet been accurately mapped and will be addressed under this action. If additional populations are located, habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of the species
Responsibility: CALM (Albany Work Centre)
Cost: \$400 in first year

6. Review the IRP and assess the need for further recovery actions

If *Eucalyptus x bennettiae* is still ranked as Endangered under the Commonwealth EPBC Act at the end of the fourth year of the five-year term of this IRP, the plan will be reviewed and the need for further recovery actions assessed.

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|------------------------|---|
| Action: | Review the IRP and assess the need for further recovery actions |
| Responsibility: | CALM (Species and Communities Branch and Albany Work Centre) through the ADTFRT |
| Cost: | \$4,000 in the fifth year (if required) |

4. TERM OF PLAN

This Interim Recovery Plan will operate from November 2005 to October 2010 but will remain in force until withdrawn or replaced. If the taxon is still ranked Endangered under the Commonwealth EPBC Act after five years, this IRP will be reviewed and, if necessary, further recovery actions put in place.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Carr, D.J. and Carr, S.G.M. (1980) The Lehmannianae: a natural group of Western Australian Eucalypts. *Australian Journal of Botany* **28**: 523-550.

Spreading mallee, 2.5-3m tall with several stems arising from the lignotuber; bark pale grey to brown, mottled, shedding in stripes. Young stems triangular in section, becoming rounded with age. The mature leaves are lanceolate to linear-lanceolate, 3-6 x 0.5-1.5 cm, acute; petiole slightly fattened 0.5 – 1cm long. The lateral veins make an angle of about 30° with the midrib and the distant intra-marginal vein is 1-2mm from the leaf edge. The buds are green, 7-11 per inflorescence, free; peduncle narrow, 3-4mm wide not becoming markedly broader at the tip, strap shaped, 3.5-4.1 cm long, erect when young becoming recurved; operculum 2-3 x 0.25-0.5 cm. The filaments are pale yellow. Fruits are free, cup-shaped, valves inserted below orifice, each with a small nodule of former nectary tissue at the centre of its base; 8-11 mm long, 4-7 mm diameter; base of style only slightly ribbed.

