INTERIM RECOVERY PLAN NO.189

SCALY-BUTT MALLEE

(*EUCALYPTUS LEPROPHLOIA*)

INTERIM RECOVERY PLAN

2004-2009

Gillian Stack and Gina Broun

Photograph: Andrew Crawford

December 2004

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
PO Box 51, Wanneroo, WA 6946

Natural Heritage Trust
Helping Communities Helping Australia

Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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 Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from December 2004 to November 2009 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years.

This IRP was given Regional approval on 20 December 2004 and approved by the Director of Nature Conservation on 2 February 2005. The allocation of staff time and 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 in December 2004.

ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this Interim Recovery Plan:

Andrew Crawford	Technical Officer, CALM's Threatened Flora Seed Centre
Sue Patrick	Senior Research Scientist, CALM’s WA Herbarium
Pat Ryan	Previously Rural Adviser, CALM’s Midwest Region
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Don Williams	Land owner and flora enthusiast, Badgingarra area

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

SUMMARY

Scientific Name:	*Eucalyptus leprophloia*	**Common Name:**	Scaly-Butt Mallee
Family:	Myrtaceae	**Flowering Period:**	August – December
CALM Region:	Midwest	**CALM District:**	Moora
Shires:	Coorow (Population 1), Three Springs (Populations 2, 4) Dandaragan (Populations 3, 5, 6)	**Recovery Team:**	Moora District Threatened Flora Recovery Team

Illustrations and/or further information: Brooker, M.I.H. and Hopper, S.D. (1993) New series, subseries, species and subspecies of *Eucalyptus* (Myrtaceae) from Western Australia and from South Australia. *Nuytsia* 9 (1), 1-68; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds) (1998) *Western Australia's Threatened Flora*, Department of Conservation and Land Management, Western Australia; Patrick, S and Brown, A. (2001) *Declared Rare and Poorly Known Flora in the Moora District*. Department of Conservation and Land Management, Western Australia.

Current status: *Eucalyptus leprophloia* was declared as Rare Flora in September 1987 and is ranked as Endangered under the *Wildlife Conservation Act 1950*. It currently meets World Conservation Union (IUCN) Red List criterion D under Endangered (IUCN 2000), as it is estimated that there is a total of about 50-90 individuals across six populations. *Eucalyptus leprophloia* is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are farming operations, degraded habitat, edge effects, grazing and inappropriate fire regimes.

Description: *Eucalyptus leprophloia* is an erect mallee to 5 m tall, with scaly, curly bark to 1 m and smooth grey over pale copper bark above. The juvenile leaves are up to 8 cm long and 6 cm wide, oval, bluish-green and dull. Adult leaves are up to 14 cm long and 2.5 cm wide and are also dull green. Egg-shaped buds are 7 mm long and 4 mm wide, on very short stalks. Flowers are creamy-white, forming cup-shaped fruits to 7 mm long and 6 mm wide (Brooker and Hopper 1993).

Habitat requirements: *E. leprophloia* is currently known over a range of approximately 90 km, from north of Badgingarra to the Mt Adams area. It is found in a range of habitats, including the slopes of hills in brown loam over laterite as an emergent mallee; in white sand on gentle valley slopes in low *E. accedens* woodland over heath; on grey sand and laterite with *E. todtiana*; in grey sandy clay loam on the slopes of a drainage line between two breakaways; and in grey sand and lateritic gravel with *Corymbia calophylla* and *E. wandoo* over open low scrub (Brown *et al.* 1998).

Critical habitat: The critical habitat for *E. leprophloia* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; corridors of remnant vegetation that link 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.

Habitat critical to the survival of the species, and important populations: Given that this species is listed as Endangered, it is considered that all known habitat for wild and translocated populations is habitat critical to its survival, and that all wild and translocated populations are important populations.

Benefits to other species or ecological communities: *Eucalyptus lateritica* (listed as Endangered under the *Wildlife Conservation Act 1950*; Vulnerable under EPBC Act) and *E. suberea* (Vulnerable under *Wildlife Conservation Act 1950* and EPBC Act) both occur near Population 1 of *E. leprophloia*. A carefully planned and executed fire management strategy at Population 1 will also help to promote regeneration of these Declared Rare Flora species as well as the ecological community in which they occur. Recovery actions such as improving the security of tenure and managing gravel extraction near other *E. leprophloia* populations will also protect the ecological communities in which those populations are located.

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. However, as *E. leprophloia* is not specifically listed under any other international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people: The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of these populations. Implementation of recovery actions under this plan will include consideration of the role and interests of indigenous communities in the region and this is discussed in the recovery actions.

Social and economic impact: Some populations of *E. leprophloia* occur on private land and negotiations will continue with regard to the future management of these populations. The implementation of this recovery plan has the potential to

have some limited social and economic impact, where populations are located on private property. Recovery actions refer to continued liaison between stakeholders with regard to these areas.

Evaluation of the plan's performance: The Department of Conservation and Land Management in conjunction with the Moora District Threatened Flora Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Affected Interests: The landholders that would be affected by the implementation of this plan include the owners of private land that contains Populations 1 and 4, and the Education Department as Population 3 occurs on land under the care, control and management of that department. The Department of Conservation and Land Management manages the Nature Reserve on which Population 5 was recorded, and the Unallocated Crown Land on which Population 2 occurs. Population 6 has not been relocated since 1992, and the status of land on which it may occur is unknown.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. Relevant land managers have been made aware of the location and threatened status of the species.
2. A fence was erected by the landholder at Population 1 before 1991.
3. Seed has been collected from Population 1 twice, in 1994 and 2002.
4. An information sheet that describes and illustrates the species has been prepared and will be printed in the future.
5. Staff from CALM's Moora District monitor populations of the species.
6. The Moora District Threatened Flora Recovery Team is overseeing the implementation of this IRP.

IRP objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance viable *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria
Criteria for success: The number of individuals within populations and/or the number of populations have remained stable or increased by ten percent or more over the five year period of the plan.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the five year period of the plan.

Recovery actions
1. Coordinate recovery actions
2. Map critical habitat
3. Liaise with relevant land managers
4. Monitor populations
5. Seek long-term protection of habitat
6. Collect seed
7. Develop and implement a fire management strategy
8. Conduct further surveys
9. Promote awareness
10. Review the need for further recovery actions

1. BACKGROUND

History

The first collection of *Eucalyptus leprophloia* was made in 1979 from the Badgingarra area by S.D. Hopper. The taxonomic description of *E. leprophloia* was published in 1993, and the species was named for the scaly appearance of the lower bark. There are currently six small populations known, with one cluster of four populations north of Badgingarra, and two populations south east of Dongara. This distribution of a few plants scattered over a wide area seems likely to reflect its natural rarity, as a relatively high proportion of uncleared vegetation remains between those two clusters of populations.

Population 1 was burnt in March 1966. The landholders of this population are extremely knowledgeable about the flora of their region, and *Eucalyptus leprophloia* occurs within 800 hectares of bushland retained on their farm. As it has been approximately 40 years since the last fire, they are interested in developing a fire management strategy with CALM to burn small areas of their bush in a controlled way to stimulate regeneration of species that require fire to germinate, including *E. leprophloia*.

The landholders at Population 4 had been propagating *Eucalyptus leprophloia* in their on-farm nursery for a number of years at the time they were notified of the Declared Rare status of this species (P. Ryan[1] personal communication). These were used in on-farm revegetation. They offered to grow seedlings from all populations on their property to form a seed orchard for this species, under the guidance of CALM. This would allow greater cross-pollination and improve the vigor of this species, allowing greater use of *E. leprophloia* in windbreak and aesthetic plantings in the local area. However, this offer was declined as not enough was known about the genetics of the species, the degree of inbreeding within populations, or about the flowering processes of the species including whether there are differences between populations in flowering times, whether farm chemicals would be used at flowering time, the fertility of pollen, pollinator presence, and other factors affecting flowering, pollination and seedset.

Description

Eucalyptus leprophloia is an erect mallee to 5 m tall, with light grey-brown scaly, curly bark to 1 m and smooth grey over pale copper bark above. Juvenile leaves are up to 8 cm long and 6 cm wide, oval and dull bluish-green. Adult leaves are up to 14 cm long and 2.5 cm wide and are also dull green. Egg-shaped buds are 7 mm long and 4 mm wide, on very short stalks. Flowers are creamy-white, forming cup-shaped fruits to 7 mm long and 6 mm wide (Brooker and Hopper 1993; Patrick and Brown 2001).

Eucalyptus leprophloia is related to *E. zopherophloia*, but the two species do not occur together, occupying lateritic and calcareous soil respectively. They may be distinguished by bark character and the oil gland patterns in the leaves, which are intersectional in *E. leprophloia* and island-like in *E. zopherophloia* (Brooker and Hopper 1993). *E. leprophloia* is also related to *E. accedens*, which can be distinguished by its smooth, pinkish-white, powdery bark (Patrick and Brown 2001; Brown *et al.* 1998).

Distribution and habitat

Eucalyptus leprophloia is currently known over a range of approximately 90 km, from north of Badgingarra to the Mt Adams area. It is known from an estimated total of 50-90 plants in six populations, but numbers of individuals are very difficult to determine, as the species is a multi-stemmed mallee. *E. leprophloia* is found in a range of habitats, including the slopes of hills in brown loam over laterite, as an emergent mallee over scrub with *E. accedens* and *Allocasuarina humilis*; in white sand on gentle valley slopes in low *E. accedens* woodland over heath; on grey sand and laterite with *E. todtiana*; in grey sandy clay loam on the slopes of a drainage line between two breakaways, with *E. falcata* and *E. gittinsii* over heath; and in grey sand and lateritic gravel with *Corymbia calophylla* and *E. wandoo* over open low scrub (Patrick and Brown 2001).

[1] Pat Ryan: Previously Rural Adviser, CALM's Midwest Region

Biology and ecology

Eucalyptus species are typically highly adapted to surviving fires, which are a regular occurrence in many Australian habitats. Seedlings tend to be slow-growing, as much energy is channeled into the production of a lignotuber. After fire has removed or damaged above-ground parts of an established plant, a number of replacement stems are initiated from the lignotuber, producing the mallee form. Fire often also stimulates germination of *Eucalyptus* seed.

Threats

Eucalyptus leprophloia was declared as Rare Flora in September 1987. It is listed as Endangered under the *Wildlife Conservation Act 1950*. It currently meets World Conservation Union (IUCN) Red List criteria Endangered under criterion D (IUCN 2000), as it is known from less than 250 mature individuals. *E. leprophloia* is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are farming operations, degraded habitat, edge effects, grazing, inappropriate fire regimes, poor recruitment, and possibly clearing.

- **Farming operations** threaten Population 4, as the plants occur in a paddock. Ploughing may affect the root mass; spray drift of both fertiliser and herbicide is likely to impact on the health of the plants; and stock may graze seedlings and compress the soil, altering water infiltration. Negotiations will occur between CALM and the landholder to minimise these effects.
- **Degraded habitat** represents a threat to Population 4. The lack of associated native vegetation makes it most likely that pollinators will be infrequent or absent. In addition, the lack of available habitat for recruitment is of concern.
- **Edge effects** are a threat to Populations 5a and 5b, that occur near the edge of a Nature Reserve next to cleared farmland. In addition to the proximity of a weed seed source, effects include increased wind speed, fertiliser and herbicide spray-drift and runoff, modified hydrology and altered disturbance regimes, including fire.
- **Grazing** by rabbits and stock has impacted on the quality of habitat and recruitment at Population 4. Grazing by insects has also resulted in abortion of flower buds at that population.
- **Inappropriate fire regimes** may affect the viability of populations, as *E. leprophloia* is thought to resprout following fire. The lignotubers may be depleted if fires recur before plants can restore rootstock resources. Frequent fire is also likely to degrade the supporting ecological community, changing species composition as well as fostering weed invasion and erosion. This species is likely to require fire for recruitment of new individuals, but the long lifespan of *Eucalyptus* species suggests that there is no urgent need for fire in the short or middle-term (C. Yates[2], pers. comm.).
- **Poor recruitment** is apparent at all populations as only one juvenile plant has been observed, and this was in 1994. As this species is long-lived, this threat is minor unless the health of adult plants declines.
- **Gravel extraction** is a potential threat to Populations 2 and 3. Laterite deposits occur at both sites. *E. leprophloia* typically occurs on sand with gravel at these sites, and not on the deep gravel that would be targeted for gravel extraction, but there is potential for damage through access and habitat degradation. Liaison with potential mining interests will help to minimise the impacts.
- **Clearing** is a potential threat at Population 1. The 800 hectare area of bushland that contains Population 1 is well managed by the current owners, but the land is not subject to a covenant or other means of ensuring its future conservation.

[2] Dr Colin Yates, Senior Research Scientist (Ecology), CALM's Science Division

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1. N of Badgingarra	Private property	1989 60-70 1991 1 clump, 190 stems 1992 c. 50 1994 190 stems (1 juv) (estimated 30-70 plants)	Healthy	Clearing, inappropriate fire
2. SW of Mingenew	Unallocated Crown Land (UCL)	1996 5 (estimated 1-2 plants)	Unknown	Possible gravel extraction, inappropriate fire
3. NE of Jurien Bay	Education reserve	1991 1 clump, ± 20 stems (estimated 5 plants)	Healthy	Possible gravel extraction, inappropriate fire
4. S of Mingenew	Private property	1991 1 clump, 70+ stems (estimated 10 plants)	Healthy	Farming operations, grazing, insect damage, inappropriate fire
5a. N of Badgingarra	Nature reserve	1992 5+ (estimated 1-2 plants)	Healthy	Edge effects, inappropriate fire
5b. N of Badgingarra	Nature reserve	1992 1 clump (estimated 1 plant)	Unknown	Edge effects, inappropriate fire
6. N of Badgingarra	Unknown	1992 'occasional' (number unknown)	Unknown	Unknown

Numbers in brackets = number of juveniles.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Eucalyptus leprophloia* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the species, or on its habitat or potential habitat.

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. 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 (EPBC Act).

It is considered that all known habitat for wild and translocated populations of *Eucalyptus leprophloia* is critical habitat. This includes:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of populations, i.e. yellow sand or brown sand with gravel in low scrub or heath (these provide potential habitat for natural range extension);
- corridors of remnant vegetation that link populations (these are necessary to allow pollinators to move between populations and are usually road and rail verges); 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 or ecological communities

Eucalyptus lateritica (Endangered under *Wildlife Conservation Act 1950*; Vulnerable under EPBC Act) and *E. suberea* (Vulnerable under *Wildlife Conservation Act 1950* and EPBC Act) both occur near Population 1 of *E. leprophloia*. A carefully planned and executed fire management strategy at Population 1 will also promote regeneration of these Declared Rare Flora as well as the ecological community in which they occur. Recovery actions such as improving the security of tenure and managing gravel extraction near other *E. leprophloia* populations will also protect the ecological communities in which those populations are located.

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. However, as *Eucalyptus leprophloia* is not specifically listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of these populations. Implementation of recovery actions under this plan will include consideration of the role and interests of indigenous communities in the region, and this is discussed in the recovery actions.

Social and economic impacts

Some populations of *Eucalyptus leprophloia* occur on private land and negotiations will continue with regard to the future management of these populations. The implementation of this recovery plan has the potential to have some limited social and economic impact, where populations are located on private property, or on other lands (whose purpose is not specifically conservation) such as the Unallocated Crown Land that contains Population 2 and the education reserve that contains Population 3. Recovery actions refer to continued liaison between stakeholders with regard to these areas.

Evaluation of the plan's performance

CALM will evaluate the performance of this IRP in conjunction with the Moora District Threatened Flora Recovery Team. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years.

Affected Interests

The land holders that would be affected by the implementation of this plan include the owners of private land that contains Populations 1 and 4, and the Education Department as Population 3 occurs on land under the care, control and management of that department. The Department of Conservation and Land Management manages the Nature Reserve on which Population 5 was recorded, and the Unallocated Crown Land on which Population 2 occurs. Population 6 has not been relocated since 1992, and the status of land on which it may occur is unknown.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have remained stable or increased by ten percent or more during the five year life of this plan.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more during the five year life of this plan.

3. RECOVERY ACTIONS

Existing recovery actions

All relevant land managers have been notified of the location and threatened status of the species. The notification details the Declared Rare status of *E. leprophloia* and the associated legal obligations.

Population 1 occurs within 800 hectares of remnant vegetation that was fenced by the landowners prior to 1991.

Botanic Garden and Parks Authority hold 3.52g of seed (approximately 1000 seeds), collected in September 1994 from Population 1 (A. Shade[3] pers. comm.). CALM's Threatened Flora Seed Centre also have approximately 1000 seeds in storage, collected from seven plants at Population 1 in December 2002 (A. Cochrane[4] unpublished data).

A double-sided information sheet has been prepared, and includes a description of *E. leprophloia*, its habitat, threats, recovery actions and photos. This will be printed, and then distributed to the community through local libraries, wildflower shows and other avenues. It is hoped that this may result in the discovery of new populations, and raise community awareness of the value of native flora.

Staff from CALM's Moora District monitor all populations of this species.

The Moora District Threatened Flora Recovery Team are overseeing the implementation of this IRP.

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.

1. Coordinate recovery actions

The Moora District Threatened Flora Recovery Team will coordinate recovery actions for *Eucalyptus leprophloia* and other Declared Rare Flora in their district. They will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,000 per year

2. Map critical habitat

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be redressed under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action: Map critical habitat
Responsibility: CALM (Moora District, WATSCU) through the MDTFRT
Cost: $2,000 in the first year

3. Liaise with relevant land managers

Staff from CALM's Moora District will continue to liaise with relevant land managers and landowners to ensure that populations are not accidentally damaged or destroyed.

Action: Liaise with relevant land managers
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,100 per year

4. Monitor populations

Monitoring of factors such as habitat degradation (including weed invasion, salinity and plant diseases such as *Phytophthora cinnamomi*), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential.

[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority
[4] Anne Cochrane, Manager, CALM's Threatened Flora Seed Centre

Action: Monitor populations
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $900 per year

5. Seek long-term protection of habitat

Ways and means of improving the security of populations and their habitat will be investigated. On private land, this may include conservation covenants with a range of agencies or registration through the Land for Wildlife scheme. It is possible that acquisition may also be considered. The reservation status of the land parcels that support Populations 2 and 3 (including Unallocated Crown Land and an education reserve) will be reviewed, and the possibility of seeking additional protection through the reservation system investigated.

Action: Seek long-term protection of habitat
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $600 per year

6. Collect seed

It is necessary to store germplasm as a genetic resource, ready for use in translocations and as an *ex situ* genetic 'blueprint' of the species. Some seed has been collected from Population 1 but additional collections are required from that and other populations to maintain adequate representation of the genetic diversity of this species.

Action: Collect seed
Responsibility: CALM (Threatened Flora Seed Centre, Moora District) and Botanic Garden and Parks Authority, through the MDTFRT
Cost: $2,600 in the first, third and fifth years

7. Develop and implement a fire management strategy

Mallee eucalypt adults typically resprout from lignotubers after fire, producing multiple stems that usually flower more quickly than a juvenile growing from seed. Fire also often stimulates germination in eucalypts. Although eucalypts are well adapted to fire, frequent fires may prevent the accumulation of sufficient soil-stored seed for a new wave of germination, kill fire-stimulated seedlings before they can recruit into the population, and overtax the lignotuber of existing adults. Fire also promotes the introduction and proliferation of weed species. Fire should therefore be prevented from occurring in the habitat of populations, except where it is being used experimentally as a recovery tool. Population 1 was burnt in 1966, but the fire history of other populations is unknown. The carefully controlled burning of small areas of vegetation at Population 1 should be undertaken in cooperation with the landowners to stimulate recruitment. Careful follow-up monitoring will be required to determine impacts to the habitat (such as weed levels), and success in stimulating recruitment. A fire management strategy will be developed at this and other populations in consultation with land managers to determine fire control measures and a recommended fire frequency, timing and intensity.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $3,000 in first and second years, and $1,800 in subsequent years

8. Conduct further surveys

Community volunteers will be encouraged to be involved in further surveys that will be supervised by CALM staff. Surveys will ideally be conducted during the flowering period of the species (August-December). Records of areas surveyed will be sent to Wildlife Branch and retained at the District, even if *Eucalyptus leprophloia* is not located.

Action: Conduct further surveys
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,400 per year in the second and fourth years

9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet will be produced, and will include a description of the plant, its habitat, threats, recovery actions and photos. This will be distributed to the public through CALM's Moora District office and at the offices and libraries of the Shires of Coorow, Three Springs and Dandaragan. Such information distribution may lead to the discovery of new populations.

Action: Promote awareness
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,700 in first year, and $1,100 per year thereafter

10. Review the need for further recovery actions

At the end of the fourth year of its five-year term this Interim Recovery Plan will be reviewed and the need for a full recovery plan or further recovery actions will be assessed.

Action: Review the need for further recovery actions
Responsibility: CALM (WATSCU, Moora District) through the MDTFRT
Cost: $13,000 in the fifth year (if full Recovery Plan required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from December 2004 to November 2009 but will remain in force until withdrawn or replaced. If the taxon is still ranked Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. REFERENCES

Brooker, M.I.H. and Hopper, S.D. (1993) New series, subseries, species and subspecies of *Eucalyptus* (Myrtaceae) from Western Australia and from South Australia. *Nuytsia* 9 (1), 1-68.

Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.

CALM (2003 onwards) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Perth, Western Australia. Accessed 2003. http://www.calm.wa.gov.au/science/

CALM (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Perth, Western Australia.

CALM (1992) Policy Statement No. 44 *Wildlife Management Programs*. Perth, Western Australia.

CALM (1990 onwards) *Threatened Flora Database (DEFL)*. Wildlife Branch, Perth, Western Australia. Accessed 2003.

IUCN (2000) *IUCN Red List Categories prepared by the IUCN Species Survival Commission, as approved by the 51st Meeting of the IUCN Council*. Gland, Switzerland.

Patrick, S. and Brown, A. (2001) *Declared Rare and Poorly Known Flora in the Moora District*. Department of Conservation and Land Management, Western Australia.

7. TAXONOMIC DESCRIPTION

Excerpt from: Brooker, M.I.H. and Hopper, S.D. (1993) New series, subseries, species and subspecies of *Eucalyptus* (Myrtaceae) from Western Australia and from South Australia. *Nuytsia* 9 (1), 1-68.

Eucalyptus leprophloia

Erect *mallee* to 5 m tall with scaly, curly partly decorticated rough but not fibrous bark to 1 m, smooth grey over pale coppery above. Forming *lignotubers*. *Cotyledons* bisected. *Seedling leaves* petiolate, decussate, remaining opposite for 4 or 5 pairs, ovate to deltoid, to 8 x 6 cm, light green to bluish green, dull. *Adult leaves* alternating, petiolate, lanceolate, to 14 x 2.5 cm, concolorous, dull; reticulation dense, incomplete, with numerous, mostly intersectional oil glands. *Inflorescences* axillary, unbranched, to 11-flowered; peduncles flattened, to 1 cm long. *Buds* pedicellate, ovoid, to 0.7 x 0.4 cm, bioperculate; inner operculum hemispherical to obtusely conical, slightly shorter than hypanthium. *Flowers* creamy-white. *Ovules* in 4 vertical rows on placenta. *Fruits* shortly pedicellate, cupular, to 0.7 x 0.6 cm; rim thin to moderately thick; disc descending; valves 3 or 4, to rim level.

Distribution: Known only from three disjunct stands, one (type locality) of approximately 30 individuals in a valley between lateritic breakaways, and the other of a few clumps on subdued valley slopes in a low woodland of *E. accedens*.

Flowering period: August - October.

Etymology: The name refers to the scaly basal bark (Greek *lepros* – scaly and *phloia* - bark).

Notes: While *E. leprophloia* is related to *E. zopherophloia*, the two species do not occur together, occupying lateritic and calcareous soil respectively. They may be distinguished by bark character and the oil gland patterns in the leaves, intersectional in *E. leprophloia* and island in *E. zopherophloia*.

SUMMARY OF RECOVERY ACTIONS AND COSTS

Recovery Action	Year 1			Year 2			Year 3			Year 4			Year 5		
	CALM	**Other**	**Ext.**	**CALM**	**Other**	**Ext.**	**CALM**	**Other**	**Ext.**	**CALM**	**Other**	**Ext.**	**CALM**	**Other**	**Ext.**
Coordinate recovery actions	1,200	800		1,200	800		1,200	800		1,200	800		1,200	800	
Map critical habitat	1,500		500												
Liaise with land managers	400		700	400		700	400		700	400		700	400		700
Monitor populations	500		400	500		400	500		400	500		400	500		400
Achieve long-term protection of habitat	500		100	500		100	500		100	500		100	500		100
Collect seed	1,000		1,600				1,000		1,600				1,000		1,600
Develop and implement a fire management strategy	1,200	1,200	600	1,200	1,200	600	800	400	600	800	400	600	800	400	600
Conduct further surveys				500	500	400				500	500	400			
Promote awareness	1,100		600	1,100			1,100			1,100			1,100		
Review the need for further recovery actions													6,000	1,000	6,000
Total	7,400	2,000	4,500	5,400	2,500	2,200	5,500	1,200	3,400	5,000	1,700	2,200	11,500	2,200	9,400
Yearly Total		**13,900**			**10,100**			**10,100**			**8,900**			**23,100**	

Ext. = External funding (funding to be sought), Other = funds contributed by NHT, in-kind contribution and BGPA.

Total CALM:	$34,800
Total Other:	$9,600
Total External Funding:	$21,700
Total Costs:	**$66,100**