

INTERIM RECOVERY PLAN NO. 229

**ROSE MALLEE**  
***(EUCALYPTUS RHODANTHA)***  
**INTERIM RECOVERY PLAN**  
**2006-2011**



July 2006

Department of Environment and Conservation (DEC)  
Kensington



## FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down by the former Department of Conservation and Land Management (CALM), now the Department of Environment and Conservation (DEC) - 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.

DEC 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 and, in the case of Critically Endangered (CR) taxa, always within one year of endorsement of that rank by the Minister.

This IRP will operate from July 2006 to June 2011 but will remain in force until withdrawn or replaced. It is intended that, if the variety 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 5 August 2006 and approved by the Director of Nature Conservation on 19 October 2006. The allocation of staff time and provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate as at July 2006.

## IRP PREPARATION

This IRP was prepared by Kathy Himbeck.

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## ACKNOWLEDGEMENTS

The following people have provided assistance and advice in the preparation of this IRP:

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John Riley	Administrative Officer (Flora), Species and Communities Branch, DEC
Jenny Borger	Three Springs community member and DEC volunteer
Gina Broun	Moora District Conservation Officer, DEC
Craig Douglas	Project Officer, Species and Communities Branch, DEC

Thanks also to DEC's Species and Communities Branch and the private land holders who provided information on altered contact details, new land divisions and assistance in locating new and old locations in the field.

**Cover photographs** by Gina Broun.

## CITATION

This IRP should be cited as:

Department of Environment and Conservation (2006). Rose Mallee (*Eucalyptus rhodantha*) Interim Recovery Plan 2006-2011. Interim Recovery Plan No. 229. Department of Environment and Conservation, Western Australia.

## SUMMARY

<b>Scientific Name:</b>	<i>Eucalyptus rhodantha</i> var. <i>rhodantha</i>	<b>Common Name:</b>	Rose Mallee
<b>Family:</b>	MYRTACEAE	<b>Flowering Period:</b>	March - November
<b>DEC Region:</b>	Midwest	<b>DEC District:</b>	Moora
<b>Shires:</b>	Three Springs (1, 2, 12); Moora (3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14)	<b>Recovery Team:</b>	Moora District Threatened Flora Recovery Team

**Illustrations and/or further information:** Brown, A., Thomson-Dan, C. and Marchant, N (eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management (now DEC), Perth, Western Australia. Sampson, J. F., Hopper, S. D. and Coates, D. J. (1990). *Eucalyptus rhodantha Wildlife Management Program 4*. Department of Conservation and Land Management (now DEC), Perth, Western Australia.,

**Current Status:** *Eucalyptus rhodantha* var. *rhodantha* was declared as Rare Flora in 1980 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked Vulnerable (VU) under World Conservation Union (IUCN 1994) Red List criteria A1c; D1 as there has been an observed reduction in population size over the last three generations based on a decline in the area of occupancy and quality of habitat, the taxon is very restricted and population size is estimated to number fewer than 1000 mature individuals. The variety is also listed as VU under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Description:** *Eucalyptus rhodantha* var. *rhodantha* is a spreading mallee to 3 m high with smooth greyish brown bark and whitish-grey branches. It has distinctive blue-grey, glaucous leaves that are stalkless and usually in opposite pairs, often clasping the stems. The leaves are rounded to heart-shaped, to 8 cm by 8 cm and usually pointed at the tip. The pendulous flower buds are grey, up to 5.5 cm long and 4 cm wide with the pointed cap longer than the base. The flowers are large, to 7.5 cm across, bright red, or rarely creamy yellow, borne on a long thick pedicels and peduncles up to 3.5 cm long and are usually solitary, but may be up to three flowers per inflorescence. The fruits are woody, hemispherical to top-shaped and up to 3 cm long by 5.5 cm wide, with protruding valves. The dark brown seeds are winged.

A second variety, *Eucalyptus rhodantha* var. *petiolaris*, is distinguished by its sometimes alternate, shortly petiolate yellowish green leaves that are cordate to lanceolate in shape. The buds have a rounder, unbeaked budcap and longer calyx tube. *Eucalyptus macrocarpa* is also similar but differs in its more elongated leaves, larger stalkless flowers and fruits and in having buds and fruits that are not pendulous.

**Habitat requirements:** *Eucalyptus rhodantha* var. *rhodantha* is known from fifteen remnant populations in the northern wheatbelt between Watheroo and Three Springs, growing in flat or undulating country on sand or sandy loam soil, often with some gravel. It sometimes grows in association with var. *petiolaris* and is emergent from scrub or heath.

**Habitat critical to the survival of the variety, and important populations:** Habitat critical to the survival of *Eucalyptus rhodantha* var. *rhodantha* includes the area of occupancy of all known populations, similar habitat surrounding populations, remnant vegetation that links populations and similar vegetation on nearby lands that may have contained the variety in the past. Given that the variety is listed as Vulnerable it is considered that it is likely that some populations are more important to the variety's ongoing survival than others. These are populations 1, 2, 7, 8, 9 and 11 and Subpopulation 13A.

**Benefits to other species or ecological communities:** Recovery actions implemented to improve the quality or security of the habitat of *Eucalyptus rhodantha* var. *rhodantha* will also improve the status of other Threatened and Priority Flora such as *Daviesia dielsii* (EN) and *Eucalyptus rhodantha* var. *petiolaris* (P4) at Subpopulation 13A and also *Acacia lirellata* subsp. *lirellata* (P3) and *Daviesia dielsii* (EN) at Population 7.

**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 rhodantha* var. *rhodantha* 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:** According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the variety that is covered by this IRP. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this variety, opportunities may exist through cultural interpretation and awareness of the variety.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

**Affected interests:** Populations occur on private property, Shire road reserve and in a nature reserve.

**Social and economic impact:** There is potential for some social and economic impact during the implementation of this IRP, as most populations of *Eucalyptus rhodantha* var. *rhodantha* occur on private property and road reserves that are not specifically managed for conservation. Where populations are located on private property and Shire managed lands, recovery actions refer to continued liaison between stakeholders with regard to these areas.

**Guide for decision-makers:** Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, and road works) in the immediate vicinity of *Eucalyptus rhodantha* var. *rhodantha* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the variety, or on its habitat or potential habitat.

**Evaluation of the plan's performance:** This IRP will be reviewed within five years and an assessment on the status of the population and its future direction will be made at that time. The performance of the IRP and the progress of Recovery Actions will be evaluated by DEC in conjunction with the Moora District Threatened Flora Recovery Team.

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

1. The Rose Mallee Recovery Team was appointed in 1992 and was amalgamated with the Moora District Threatened Flora Recovery Team in 1997.
2. In October 1995, land supporting the largest pure stand (Subpopulation 13A) of *Eucalyptus rhodantha* var. *rhodantha* was acquired and is now vested with the Conservation Commission as a Class A nature reserve. A rabbit-proof fence and fire break was constructed around its boundary.
3. A stock proof fence was erected around a road reserve population (Population 1) at Three Springs in 2002.
4. The nature reserve (Subpopulation 13A) was baited for rabbits in 1996.
5. The fire break on the nature reserve (Subpopulation 13A) was last upgraded in 1996.
6. Roadside markers are in place for all road reserve populations.
7. Three sites within the nature reserve (Subpopulation 13A) and a gravel pit (Population 2) near Three Springs were planted with *Eucalyptus rhodantha* var. *rhodantha* seedlings in 1995. These were grown from seeds collected in 1994. A second planting session was conducted in the nature reserve in 1997 from seeds collected by Threatened Flora Seed Centre staff and grown by RGC Mineral Sands Ltd Nursery at Eneabba.
8. In 1997/98 *Citrullus lanatus* was hand pulled from the area where seedlings had been planted in the nature reserve (Subpopulation 13A). Weed spraying at this site was conducted in 1997.
9. Seeds of species that are likely to support pollinators were collected and used to revegetate the nature reserve (Subpopulation 13A) in 1994, concentrating on creating a 1.7 km length of buffer vegetation. A similar project was conducted at the gravel pit (Population 2) in Three Springs in 1994 using endemic plant sources.
10. The gravel pit at Population 2 was landscaped prior to the revegetation process.
11. There have been several research projects looking at growth attributes, seed bank dynamics, pollination biology, population genetic structure and mating systems of *Eucalyptus rhodantha* var. *rhodantha*.
12. Seed has been collected from most populations and placed in long term storage at DEC's Threatened Flora Seed Centre. Seed has also been propagated and has been used on farms and in the landscaping around the town of Three Springs.
13. The Shire of Three Springs has adopted *Eucalyptus rhodantha* var. *rhodantha* as their floral emblem as a result of effort put into public liaison and awareness, promoting this important variety.
14. All populations have been surveyed at intervals over the last 25 years. Some individuals have been tagged for cross reference with seed collections and some have been accurately mapped.

**IRP objective:** The objective of this IRP is to identify and abate threats and maintain or enhance viable *in situ* populations to ensure the long-term preservation of the variety in the wild.

#### **Recovery criteria**

**Criteria for success:** The number of populations have increased or individuals within populations have increased by ten percent or more over the five year term of this plan.

**Criteria for failure:** The number of populations have decreased or individuals within populations have decreased by ten percent or more over the five year term of this plan.

**Recovery Actions:** Below are listed those Recovery Actions considered most important to fulfil the criteria for success in this plan. Whilst some actions will be undertaken simultaneously, they are ordered in priority with the more urgent recovery actions at the top of the list. Each is explained in more detail in the following section.

1. Coordinate recovery actions	8. Maintain roadside markers
2. Monitor populations	9. Seek long term protection of habitat
3. Liaise with Land managers	10. Promote awareness
4. Ensure populations on private property are fenced and the fences are adequately maintained	11. Protect from fire
5. Implement weed control	12. Map habitat critical to the survival of <i>Eucalyptus rhodantha</i> var. <i>rhodantha</i>
6. Monitor translocations	13. Conduct further surveys
7. Collect seed for long term storage	14. Review this Plan

## 1. BACKGROUND

### History

*Eucalyptus rhodantha* was described by Blakely & Steedman from material collected near Gunyidi by Henry Steedman in 1934. Prior to European settlement the species was probably distributed in a narrow belt of discontinuous populations of varying sizes between Perth and Geraldton. However, with the extensive clearing of native vegetation for agriculture this distribution has shrunk to a handful of populations between Three Springs and Watheroo. A recovery plan was prepared in 1995 as, at that time, rose mallee was known from just 500 plants and its distribution in areas that have been largely cleared for agriculture deemed that its long-term survival was uncertain. It was further threatened by poor seed set and lack of natural recruitment in the isolated, mostly small stands. Since the implementation of the Recovery Plan the conservation of the species has improved due to the discovery of five new populations, including one that is large and relatively secure (70% increase in plant numbers), acquisition and reservation of land containing two large relatively undisturbed populations, rabbit-proof fencing and active habitat rehabilitation. In 1941 *Eucalyptus rhodantha* was split into two varieties – *Eucalyptus rhodantha* var. *rhodantha* and *Eucalyptus rhodantha* var. *petiolaris*. The variety *petiolaris* was listed as Declared Rare Flora until 2002 when it was confirmed to be a hybrid between *E. rhodantha* var. *rhodantha* and *E. pyriformis*. As its progeny were not consistent with the parent plant, it was deemed to not meet the guidelines for the listing of hybrids, and was consequently removed from the list. It is currently listed as P4.

### Description

*Eucalyptus rhodantha* var. *rhodantha* is a low spreading mallee to 3 m high with smooth greyish brown bark and whitish-grey branches. It has distinctive blue-grey, glaucous leaves that are stalkless and usually in opposite pairs, often clasping the stems. The leaves are rounded to heart-shaped, to 8 cm by 8 cm, and usually pointed at the tip. The pendulous flower buds are grey, to 5.5 cm long by 4 cm wide with the pointed cap longer than the base. The flowers are large, to 7.5 cm across, bright red, or rarely creamy yellow, borne on long thick peduncles to 3.5 cm long and are usually solitary but may have up to three flowers per inflorescence. The fruits are woody, hemispherical to top-shaped, to 3 cm long by 5.5 cm wide, with protruding valves. The dark brown seeds are winged.

*Eucalyptus rhodantha* var. *petiolaris* is distinguished from *E. rhodantha* var. *rhodantha* by its sometimes alternate, shortly petiolate yellowish green leaves and cordate to lanceolate in shape. The buds have a more orbicular, unbeaked budcap and longer calyx tube.

Although not associated in the field, *Eucalyptus rhodantha* var. *rhodantha* is related to and closely resembles *Eucalyptus macrocarpa*, differing in its smaller, pendulous buds and fruits, more compact habit and less elongated leaves.

### Distribution and habitat

*Eucalyptus rhodantha* var. *rhodantha* is endemic to the Moora District where it is known from a few remnant populations between Watheroo and Three Springs. The four most northern populations are scattered over 11 kilometres west and south-west of Three Springs, while the eleven southern populations are distributed over several kilometres near Watheroo (85 kilometres south of Three Springs). Locations and estimated sizes of *Eucalyptus rhodantha* populations are shown in Table 2. *Eucalyptus rhodantha* var. *rhodantha* and *Eucalyptus rhodantha* var. *petiolaris* occur in association at some of these localities.

*Eucalyptus rhodantha* var. *rhodantha* grows on grey sandy soils, often with some gravel content, in flat or slightly undulating country. Most populations are found in remnant bushland on private land, with some plants also occurring as scattered individuals in otherwise cleared and cropped paddocks and narrow degraded road reserves. The larger populations in remnant bushland occur in relatively undisturbed heath communities that are dominated by a range of shrubs including *Dryandra ashbyi*, *Calothamnus quadrifidus*, *Gastrolobium spinosum*, *Hakea trifurcata*, *Hakea sulcata*, *Grevillea eriostachya* and *Acacia* spp.

As described in Kelly & Coates (1995) the climate of the area is 'extra-dry Mediterranean' (Beard 1984), with the majority of rainfall during the winter months between May and August. According to the Western Australian Bureau of Meteorology the average rainfall is 388 mm at Three Springs and 425 mm at Watheroo.

**Table 1. Summary of population land vesting, purpose and tenure**

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
<b>1. SW of Three Springs</b>	Moora	Three Springs	Unvested Reserve	Road Reserve	Shire of Three Springs
<b>2. SW of Three Springs</b>	Moora	Three Springs	Unvested Reserve	Road reserve	Shire of Three Springs
3A. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
3B. NE of Watheroo	Moora	Watheroo	Unvested Reserve	Road Reserve	Shire of Watheroo
3C. NE of Watheroo	Moora	Watheroo	Unvested Reserve	Road reserve	Shire of Watheroo
3D. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
4. NE of Watheroo	Moora	Watheroo	Unvested Reserve	Road Reserve	Shire of Watheroo
5. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
6. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
<b>7. NE of Watheroo</b>	Moora	Watheroo	Freehold	Private Property	Landowners
<b>8. NE of Watheroo</b>	Moora	Watheroo	Freehold	Private Property	Landowners
<b>9. NE of Watheroo</b>	Moora	Watheroo	Freehold	Private Property	Landowners
10. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
<b>11. NE of Watheroo</b>	Moora	Watheroo	Freehold	Private Property	Landowners
12.W of Three Springs	Moora	Three Springs	Unvested Reserve	Road Reserve	Shire of Three Springs
<b>13A. NE of Watheroo</b>	Moora	Watheroo	Conservation Commission of Western Australia	Conservation of flora and fauna	DEC
13B. NE of Watheroo	Moora	Watheroo	Unvested Reserve	Road Reserve	Shire of Watheroo
13C. NE of Watheroo	Moora	Watheroo	Freehold	Private Property	Landowners
14. NE of Watheroo	Moora	Watheroo	Unvested Reserve	Road Reserve	Shire of Watheroo
15. W of Three Springs	Moora	Three Springs	Freehold	Private Property	Landowners

Populations in **bold text** are considered to be Important Populations.

## Biology and ecology

*Eucalyptus rhodantha* var. *rhodantha* is one of a group of endemic Western Australian eucalypts that have large, showy flowers, smooth bark and large fruits. The flowering season is from March to November with the peak flowering time between June and August. The variety has a relatively short period of bud development which means that only one season's buds are carried by a plant at any one time. This strategy may explain why the variety is able to occur on sandy soils in areas where there is limited water availability during the dry season (McNee, 1995). The number of flowers produced per plant varies between one year and the next and is unusually low for a eucalypt (1-56). The long-lived flowers last between 20 and 30 days and birds, *Lichenostomus virescens* (Singing Honeyeater) and *Manorina flavigula* (Yellow-throated Miner) are thought to be the main pollinators. McNee (1995) noted that the *Eucalyptus rhodantha* var. *rhodantha* flowers appeared to be most suited to larger honeyeaters due to the ease of collecting nectar and efficiency in depositing pollen on stigmas. The evolution of bird pollination in this variety may represent evolution of a system that promotes outcrossing and reduces the effects of inbreeding in small, scattered populations (Sampson *et al.* 1990).

Although the fruit of *Eucalyptus rhodantha* var. *rhodantha* can release some seed in the absence of fire, fire stimulates the release of much larger amounts of seed. The seed is winged and is easily blown through the associated patchy vegetation in strong prevailing winds. However, little seedling recruitment has been recorded following fire and no resulting seedlings have survived to adulthood. It has been suggested that insects such as ants can lead to a rapid depletion of soil-stored seed following fire if the amount of seed dropped is too low (Sampson *et al.*, 1990). Plants have the ability to regenerate from a lignotuber after fire or from epicormic buds in response to drought or physical damage.

Sampson *et al.* 1990 found through electrophoretic studies that the average levels of genetic diversity in remnant stands of *Eucalyptus rhodantha* var. *rhodantha* were high. Despite this, and other characteristics that promote the plants diversity, it seems it may not be enough to overcome the impact of inbreeding and reduced gene flow in the smaller remnants. Based on this study, it has been recommended that 25 individuals is the minimum population size and that the minimum reserve area is 35 hectares.

## Threatening processes

*Eucalyptus rhodantha* var. *rhodantha* was declared as Rare Flora in 1980 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked Vulnerable (VU) under World Conservation Union (IUCN 1994) Red List criteria A1c; D1 as there has been an observed reduction in population size over the last three generations based on a decline in the area of occupancy and quality of habitat, the taxon is very restricted and population size is estimated to number fewer than 1000 mature individuals. The variety is also listed as VU under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

*Eucalyptus rhodantha* var. *rhodantha* is a rare taxon with less than 750 plants known, a very limited distribution and severely fragmented populations, with a continuing decline in the quality of habitat and the number of mature individuals. The main ongoing threat is further habitat degradation through weed infestation. Other threats include poor recruitment, road maintenance, inappropriate fire regimes and recreational impacts.

- **Degraded habitat** is a threat to most populations as they occur in remnant vegetation either on road reserves or along the edges of farmland where much of the surrounding habitat has been cleared. The lack of associated native vegetation means that pollinators are likely to be infrequent or absent. Populations adjoining cleared farmland may be subject to drift from herbicide and pesticide spraying.
- **Weed invasion** is a potential threat to populations that occur on road reserves or abut cleared farmland. Annual weeds have encroached into the habitat of *Eucalyptus rhodantha* var. *rhodantha* and edge effects are most noticeable in narrow remnants. Weeds suppress plant growth and recruitment by competing for soil moisture, nutrients and light. They also increase the fire hazard due to the easy ignition of high fuel loads that are produced annually by many grass weed species.
- **Gene flow** is limited between most populations as they are small, scattered and isolated with much of the surrounding habitat cleared and replaced with crops or grazing land that has altered the availability and behaviour of pollinators (mainly birds).
- **Road, track and firebreak maintenance** has the potential to cause damage to populations through mechanical damage to roots, stems and branches as well as retarding growth of individual plants due to increased soil compaction. The locations of populations need to be considered by land managers prior to undertaking the movement of farm machinery and during management activities in reserves, road reserves and access tracks.
- **Salination and fungal pathogens** have the potential to impact on populations of *Eucalyptus rhodantha* var. *rhodantha*. The variety is not thought to be susceptible to dieback (*Phytophthora* spp.) but dieback may kill associated species that support pollinators essential to its survival (Brown *et al.* 1998).
- **Poor recruitment** is a threat to all populations. Little seedling recruitment has been recorded following fire and no resulting seedlings have survived to adulthood.

**Table 2. Summary of population information and threats**

Pop. No. & Location	Land Status	Year/No plants	Condition	Threats
<b>1. SW of Three Springs</b>	Road Reserve	1992 13 1993 13 2001 10 2003 10 2006 12	Healthy	Spray drift, weeds (grasses), poor genetic variability
<b>2. SW of Three Springs</b>	Road Reserve	1992 8 1993 10 2001 3 2006 11	Healthy	Road maintenance, poor genetic variability, weeds (grasses), Road markers need replacing
3A. NE of Watheroo	Private property	1992 29 1994 22 2006 12	Moderate	Intense weeds (grasses), grazing, lack of pollinators
3B. NE of Watheroo	Road Reserve	1994 2 2006 1	Moderate	Road maintenance, weeds
3C. NE of Watheroo	Private property	1994 1 2006 ?	Not found	
3D. NE of Watheroo	Private property	2006 2	Moderate	Salinity?, soil disturbance, grazing, weeds (grasses), spray drift
4. NE of Watheroo	Road Reserve	1992 10 1993 9 2006 6	Moderate	Road maintenance, spray drift, weeds, lack of pollinators
5. NE of Watheroo	Private property	1991 6 2005 ?	Not found	
6. NE of Watheroo	Private property	1991 1 1992 1 2005 1	Poor	Grazing, intense weeds, spray drift, poor genetic variability (one plant), lack of pollinators
<b>7. NE of Watheroo</b>	Private property	1993 29 2005 29	Healthy	Weeds (grasses), spray drift
<b>8. NE of Watheroo</b>	Private property	1993 26 2005 25+	Healthy	Weeds (grasses), spray drift, grazing
<b>9. NE of Watheroo</b>	Private property	1993 56 2005 50+	Healthy	Weeds (grasses), spray drift, grazing
10. NE of Watheroo	Private property	1993 5		Not surveyed in 2005/6
<b>11. NE of Watheroo</b>	Private property	1993 200+ 2005 200+	Healthy	Spray drift
12. W of Three Springs	Road Reserve	1979 4 2006 ?	Not found	
<b>13A. E of Railway Rd</b>	Nature Reserve	1993 330 2006 470+	Healthy	Weeds, spray drift
13B. E of Watheroo Rd	Road Reserve	1994 3 2005 2	Moderate	Road maintenance, spray drift, weeds
13C. E of Railway Rd	Private property	1981 ? 2005 ?	Not found	
14. Carot Well Rd	Road Reserve	1994 1 2000 1 2006 1	Healthy	Soil disturbance (new fence line), road maintenance, spray drift, weeds, lack of pollinators
15. Arrino Rd, Three Springs	Private property	2006 4	Healthy	Grazing, weeds, poor genetic variability, spray drift, isolated population

Populations in **bold text** are considered to be Important Populations; \* NB: Due to the growth habit of mallees, it was difficult to distinguish individuals, therefore, in dense populations a stem 2 m or more away from a clump or another stem was counted as a separate plant.

### **Habitat critical to the survival *Eucalyptus rhodantha* var. *rhodantha* and important populations**

Habitat critical to the survival of *Eucalyptus rhodantha* var. *rhodantha* comprises the area of occupancy of known populations; areas of similar habitat surrounding populations, i.e. sand or sandy loam soil, often with some gravel, emergent from scrub or heath (this provides potential habitat for natural range extensions); 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 variety but may have done so in the past (these represent possible translocation sites).

Given that *Eucalyptus rhodantha* var. *rhodantha* is listed as Vulnerable it is considered that it is likely that some populations are more important to its ongoing survival than others. These are populations 1, 2, 7, 8, 9 and 11 and Subpopulation 13A.

### **Benefits to other species or ecological communities**

Recovery actions implemented to improve the quality or security of the habitat of *Eucalyptus rhodantha* var. *rhodantha* will also improve the status of other Declared Rare and Priority Flora including *Daviesia dielsii* (Endangered) and *Eucalyptus rhodantha* var. *petiolaris* (P4) at Subpopulation 13A and *Acacia lirellata* subsp. *lirellata* (P3) and *Daviesia dielsii* at Population 7.

### **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. As *Eucalyptus rhodantha* var. *rhodantha* is not specifically listed under any international agreement, the implementation of other international environmental responsibilities are not affected by this plan.

### **Role and interests of indigenous people**

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the variety that is covered by this IRP. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this variety, opportunities may exist through cultural interpretation and awareness of the variety.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

### **Social and economic impacts**

As most populations of *Eucalyptus rhodantha* var. *rhodantha* occur on private property and road reserves that are not specifically managed for conservation there is potential for some social and economic impact during the implementation of this IRP. Where populations are located on private property and Shire managed lands, recovery actions will refer to continued liaison between stakeholders.

### **Evaluation of the plan's performance**

DEC 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 of its implementation.

## **2. RECOVERY OBJECTIVE AND CRITERIA**

### **Objectives**

The objective of this IRP is to continue to abate or identify any new threats and maintain or enhance viable in situ populations to ensure the long-term preservation of the variety in the wild.

**Criteria for success:** The number of populations have increased or individuals within populations have increased by ten percent or more over the five year term of the plan.

**Criteria for failure:** The number of populations have decreased or individuals within populations have decreased by ten percent or more over the five year term of the plan.

### 3. RECOVERY ACTIONS

#### Existing recovery actions

The Rose Mallee Recovery Team was appointed in 1992 and met annually until 1997 when it was amalgamated with the Moora District Threatened Flora Recovery Team (MDTFRT). The enlarged team comprises representatives from CALM, now the Department of Environment and Conservation (DEC), the regional herbarium, local shires (Carnamah, Coorow, Dandaragan, Irwin, Moora, Three Springs and Victoria Plains), Main Roads, WestNet Rail, local community, conservation groups, private land owners and several former members of the Rose Mallee Recovery Team. Meetings are held twice per year and a report is produced annually.

Land supporting Subpopulation 13A (previously referred to as stands 4 & 5) of *Eucalyptus rhodantha* var. *rhodantha* was acquired as a nature reserve in October 1995. Following acquisition, the boundary (>4km) had a fire break and rabbit-proof fence constructed under contract. The fire break was upgraded in February 1996. In March 1996 the reserve was baited for rabbits and, at that time, it was recommended by the Agriculture Protection Board that baiting should be conducted annually.

In February 2002 a stock proof fence was erected to protect a population of *Eucalyptus rhodantha* var. *rhodantha* on a paddock boundary along Sweetman Rd near Three Springs. The protective fenceline is 5 m inside the private property boundary.

Roadside markers are in place and maintained for all populations on road verges.

Strict dieback hygiene conditions are conducted when working in the vicinity of *Eucalyptus rhodantha* var. *rhodantha* populations, and this will continue.

Many *Eucalyptus rhodantha* var. *rhodantha* populations are in the Buntine-Marchagee Natural Diversity Recovery Catchment (BMRC) which was established to conserve important biodiversity areas from the risk of salinity. A recovery plan has been drawn up with actions that will complement the existing and future recovery actions for the variety.

A sub-committee of the recovery team selected three sites within the nature reserve (Subpopulation 13A) that were either old farmland areas within the boundary or badly degraded natural vegetation. These sites were rehabilitated with seedlings propagated from plants in the immediate vicinity of each site. The gravel pit in stand 2 (Population 2) at Three Springs was also selected to be rehabilitated using seedlings from populations 1 and 2. The seeds were propagated at the RGC Mineral Sands Ltd Nursery at Eneabba which produced 1600 seedlings in 1994. In 1995, 30 seedlings were planted into the banks of the landscaped gravel pit at Population 2. Seedling planting in Subpopulation 13A commenced in 1994 with 190 seedlings planted by machine and a further 400 seedlings planted by hand in 1995. Some direct seeding of *Eucalyptus rhodantha* var. *rhodantha* was undertaken in conjunction with the seeding of associated species in 1994.

Prior to the full introduction of seedlings in 1994, a trial was conducted where seedlings were planted, trialling different treatments of fertilisers and ground preparation. Results showed that seedling vigour was determined by the condition of the original seedling and not by fertilisers or herbicides. It was shown that good ground preparation was essential and it was recommended that quarterly monitoring was adequate.

In February 1997, seed taken from the Threatened Flora Seed Centre was sown at the RGC Mineral Sands Ltd Nursery. In August 1997, 320 seedlings were planted at site 3 (Subpopulation 13A) and 160 seedlings were planted at site 2 (Subpopulation 13A), both sites are located on Carot Well Rd. The seedlings were checked in February 1998 with 79 surviving in site 3 and 25 in site 2.

Weed control was carried out in the area of Subpopulation 13A in 1996 and further weed control carried out at the seedling translocation site and along the firebreaks in 1997. *Citrullus lanatus* was hand pulled in 1997 and 1998.

Seeds from species that are likely to support pollinators (*Banksia*, *Calothamnus* and *Hakea*) were collected from the area of Subpopulation 13A and propagated by CALM's (now DEC's) Narrogin Nursery. Seedlings and broadcast seed were used to revegetate the area in 1994. Seed was also collected from a range of associated species from the area of Population 2 and direct seeded into the landscaped gravel pit at that site in 1994. Good vegetation cover has been achieved and both revegetation techniques are being monitored. Landscaping of the gravel pit in preparation for revegetation was completed in 1994.

Approximately 1.7 km of buffer vegetation was installed along the boundaries of the reserve containing Subpopulation 13A in 1994. Locally collected *Acacia*, *Allocasuarina*, *Banksia*, *Calothamnus* and *Hakea* species were used. Some of the seeds were propagated by the DEC's Narrogin nursery and the resulting seedlings were machine planted, with the remaining seeds direct seeded. The buffers were planted inside the reserve boundary with a good resulting cover.

Research on the growth attributes and seed bank dynamics of *Eucalyptus rhodantha* (both varieties) was conducted by a Curtin University Honours student in 1992. Other research conducted is listed below:

- S. McNee, (1995) 'The pollination biology of a rare eucalypt species, *Eucalyptus rhodantha*'. Master's thesis, Curtin University, WA.
- J. Sampson, (1988) 'The population genetic structure of *Eucalyptus rhodantha* Blakey & Steedman and its allies *Eucalyptus crucis* Maiden and *Eucalyptus lane-poolei* Maiden'. PhD thesis, University of Western Australia.
- J. F. Sampson, D. J. Coates and S. J. van Leeuwen (1996). 'Mating system variation in animal-pollinated rare and endangered plant populations in Western Australia' in Gondwanan Heritage: past, present and future of the Western Australian biota, ed by S. D. Hopper et al, Surrey Beatty & Sons, Chipping Norton, pg 187-195.

Seed collected from *Eucalyptus rhodantha* var. *rhodantha* populations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11 & 15 is placed in long term storage at DEC's Threatened Flora Seed Centre. Research indicates that this sample will more than adequately represent the genetic variability present within those populations. Viability of the seed has been tested and will be monitored over time to assess longevity and response to storage.

In 1995, seed was forwarded to a local farm tree nursery in Three Springs to replace seedling stocks that originated from plants near Watheroo. Seedlings from local provenances were made available for planting on farms through the Watheroo Progress Committee and local schools. The Three Springs Shire has used plants in landscape works around the town and the Three Springs Talc Mine has planted seedlings in rehabilitation areas.

*Eucalyptus rhodantha* var. *rhodantha* is currently in nursery cultivation and assists with educational/appreciative values.

The profile of *Eucalyptus rhodantha* var. *rhodantha* has been raised through past efforts of public liaison and education. New populations have been found and, with the help of the RGC Mineral Sands Ltd nursery, seedlings have been propagated and these have been used to rehabilitate the nature reserve containing Subpopulation 13A. The Shire of Three Springs has adopted the variety as their floral emblem as a result of a public awareness program that arose from the previous recovery plan.

There has been a great deal of cooperation with land owners in modifying farming practices, such as the use of herbicides and fertilisers, in the vicinity of *Eucalyptus rhodantha* var. *rhodantha* populations.

All populations of *Eucalyptus rhodantha* var. *rhodantha* have been surveyed at intervals over the last 25 years. Subpopulation 3A showed a decline with 29 plants found in 1992, 22 plants in 1994 and 12 plants in 2006.

All individuals in populations 1 to 6 have been tagged with brass plates for cross reference to seed collections. The distribution of individuals in stands 4 and 5 (Subpopulation 13A) were accurately mapped to facilitate a re-introduction program and photo points have been installed at two of the rehabilitation sites to monitor health and habitat enhancement over time.

### **Future recovery actions**

Where populations occur on lands other than those managed by DEC, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are generally in order of descending priority, influenced by their timing over the life of the Plan. However this should not constrain addressing any of the actions if funding is available and other opportunities arise.

#### **1. Coordinate recovery actions**

The Moora District Threatened Flora Recovery Team (MDTFRT) will coordinate recovery actions for *Eucalyptus rhodantha* var. *rhodantha* and other Declared Rare Flora in the Moora District. They will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$9 200 per year

#### **2. Monitor populations**

Staff from DEC's Moora District will continue to monitor known populations of *Eucalyptus rhodantha* var. *rhodantha* on a regular basis, with assistance from DEC's Science Division where research includes this variety. Regular monitoring of factors such as habitat degradation (including weed invasion, plant diseases such as *Phytophthora cinnamomi*, and salinity), population stability (expansion or decline), and recruitment is essential. Where possible, the position of each individual plant will be mapped using a GPS.

**Action:** Monitor populations  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$2 000 per year in years 1 & 5

#### **3. Liaise with land managers**

Staff from DEC's Moora District will continue to liaise with land managers and landowners to ensure that populations are not accidentally damaged or destroyed. Input and involvement will also be sought from any indigenous groups that have an active interest in areas that are habitat for *Eucalyptus rhodantha* var. *rhodantha*.

**Action:** Liaise with land managers  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$1 200 per year

#### **4. Ensure populations on private properties are fenced and the fences are adequately maintained**

Most populations on private property remain unfenced and are at risk from damage by stock. Sheep have been known to strip *Eucalyptus rhodantha* var. *rhodantha* of new growth and are likely to graze young plants. Although it appears that rabbits and kangaroos do not have a significant effect on the mortality of seedlings of *Eucalyptus rhodantha* var. *rhodantha* they may damage seedlings of species that support pollinators (Sampson *et al* 1990). It may therefore be necessary for landowners to fence populations at risk of stock damage, preferably with financial assistance or provision of fencing materials. These fences will need to be assessed for renewal in 10 years time.

**Action:** Fence populations on private properties  
**Responsibility:** Property owners with assistance from DEC (Moora District) through the MDTFRT  
**Cost:** \$5 800 in the first year and \$3 500 in year 5.

## 5. Continue weed control

Weed control was conducted during the translocation and rehabilitation process in the nature reserve and gravel pit and these areas should be continued to be managed for weeds. Most other populations are in agricultural land or along road reserves and therefore surrounded by weeds. Weed control is essential to reduce competition with young seedlings of *Eucalyptus rhodantha* var. *rhodantha* and associated pollinator species. Weed control should be prioritised for those areas that are highly infested using a combination of hand pulling with minimal disturbance and a contact, non-residual herbicide to eliminate both grass and broad-leaved weeds.

**Action:** Implement weed control  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$2 300 per year

## 6. Monitor translocations

There have been several translocations undertaken in a nature reserve (Subpopulation 13A) and gravel pit (Population 2). The status of these translocations should be evaluated to determine if it is a viable option for recovery in the long term. Individual plants need to be mapped, measured, a record made of any flowering activity and a survival rate determined.

**Action:** Monitor translocations  
**Responsibility:** DEC (Moora District, SCB) through the MDTFRT  
**Cost:** \$2 000 per year in years 2 & 5

## 7. Collect seed for long term storage

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for translocations. Seed has been collected from most populations but further collections are required from certain populations and from all new populations.

**Action:** Collect seed for long term storage  
**Responsibility:** DEC (Moora District, Threatened Flora Seed Centre) through the MDTFRT  
**Cost:** \$2 500 per year in years 1 & 5

## 8. Maintain roadside markers

Some populations occur along road reserves where they are vulnerable to damage or destruction from road maintenance operations. Roadside markers have been installed where required and these need to be maintained.

**Action:** Maintain roadside markers  
**Responsibility:** Shire (Moora and Three Springs) with assistance from DEC (Moora District) through the MDTFRT  
**Cost:** \$1 150 per year in years 1 & 5

## 9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of *Eucalyptus rhodantha* var. *rhodantha* should be promoted to the community either through poster displays, the local print or electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged.

**Action:** Promote awareness  
**Responsibility:** DEC (Moora District, SCB) through the MDTFRT  
**Cost:** \$1 600 per year in years 1 & 3

**10. Seek long term protection of habitat**

Ways and means of improving the security of populations and their habitat should be investigated. On private land this may include conservation covenants with a range of agencies or registration through the Land for Wildlife scheme. Only one subpopulation (13A) is on conservation estate with the remaining populations either on private property or road reserves. The reservation status of the land parcels that support populations 1, 2, 7, 8, 9, 11 and 15 should be reviewed, and the possibility of additional protection through the reserve system investigated.

**Action:** Seek long term protection of habitat  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$1 400 per year

**11. Protect from fire**

The use of fire as a management tool to promote seedling recruitment in *Eucalyptus rhodantha* var. *rhodantha* is not recommended. Prescribed burns should be excluded and plants protected from uncontrolled fires through the construction of firebreaks or fuel reduction in surrounding areas. Firebreaks were installed when land was acquired (Subpopulation 13A) and need to be maintained.

**Action:** Protect from fire  
**Responsibility:** DEC (Moora District, SCB) through the MDTFRT  
**Cost:** \$2 300 per year in years 1 & 5

**12. Map habitat critical to the survival of *Eucalyptus rhodantha* var. *rhodantha***

It is a requirement of the EPBC Act that spatial data relating to habitat critical to the survival of *Eucalyptus rhodantha* var. *rhodantha* be determined. Although this habitat is alluded to in Section 1, the areas as described have not yet been mapped and that will be redressed under this action. If additional populations are located, habitat critical to the survival of those populations will also be determined and mapped.

**Action:** Map habitat critical to the survival of *Eucalyptus rhodantha* var. *rhodantha*  
**Responsibility:** DEC (Moora District, SCB) through the MDTFRT  
**Cost:** \$2 200 in the second year only

**13. Conduct field surveys**

Community volunteers will be encouraged to participate in surveys supervised by DEC staff during the flowering period of *Eucalyptus rhodantha* var. *rhodantha*.

**Action:** Conduct field surveys  
**Responsibility:** DEC (Moora District) through the MDTFRT  
**Cost:** \$3 200 per year in years 2 & 3

**14. Review this Plan**

If *Eucalyptus rhodantha* var. *rhodantha* is still ranked Vulnerable at the end of the fourth year or the five-year term of this IRP, the need for further recovery actions, or a review of this IRP will be assessed and a revised plan prepared if necessary.

**Action:** Review this Plan  
**Responsibility:** DEC (SCB, Moora District) through the MDTFRT  
**Cost:** \$16 000 in year 5 only

#### 4. TERM OF PLAN

This IRP will operate from July 2006 to June 2011 but will remain in force until withdrawn or replaced. If *Eucalyptus rhodantha* var. *rhodantha* is still ranked VU after five years, this IRP will be reviewed and, if necessary, further recovery actions put in place.

#### 5. REFERENCES

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- Sampson, J. F. (1988). *The population genetic structure of Eucalyptus rhodantha Blakely & Steedman and its allies Eucalyptus crucis Maiden and Eucalyptus lane-poolei Maiden*. Thesis (Ph.D.) University of WA. Pp. 1-206.
- Sampson, J. F., Hopper, S. D. and Coates, D. J. (1990). *Eucalyptus rhodantha, Wildlife Management Program 4*. Department of Conservation and Land Management (now DEC), Perth, Western Australia.

#### 6. TAXONOMIC DESCRIPTION

Extracted from: Chippendale, G. M. (1988)

Mallee to 3 m, spreading. Bark smooth throughout, grey-brown. Juvenile leaves opposite, sessile, ovate to orbicular, grey-green. Adult leaves opposite, sessile, orbicular, cordate, acuminate; lamina 6-8 cm long and wide, glaucous; lateral veins just visible, at 50° - 65°; intramarginal vein up to 5 mm from margin. Umbels usually 1-flowered, rarely 3-flowered; peduncle terete, thick, glaucous, 10-20 mm long; pedicels glaucous, 5-20 mm long. Buds ovoid to turbinate, glaucous; operculum conical, slightly striate, 20-30 mm long, 20-40 mm wide; hypanthium hemispherical or turbinate, faintly 2-ribbed and striate, 10-25mm long, 20-40 mm side. Fruits hemispherical or turbinate, 20-30mm long, 35 - 55 mm wide, 2-ribbed; disc flat to convex; valves 4 or 5, exerted up to 10mm. Seeds orbicular or irregularly pyramidal, narrowly winged, ribbed on ventral side, brown.

Occurs from SW of Three Springs to N of Bolgart, W.A., often in small pure communities in flat and gently undulating country.

Distinguished from *Eucalyptus macrocarpa* by the long peduncle and pedicels and slightly smaller buds and fruits. The red filaments and silvery leaves make this a desirable shrub in gardens, particularly in drier areas.

