INTERIM RECOVERY PLAN NO. 165

ROUGH EMU BUSH

(*EREMOPHILA SCABERULA*)

INTERIM RECOVERY PLAN

2004-2009

Robyn Luu[1] & Val English[2]
[1] Project Officer, WA Threatened Species and Communities Unit, CALM, PO Box 51 Wanneroo, 6946.
[2] Acting Senior Ecologist, Threatened Species and Communities Unit, CALM, PO Box 51 Wanneroo, 6946.

Photograph: Andrew Brown

June 2004

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

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 replaces the previous plan by Stack and English (1999) for *Eremophila scaberula*, which was current from 1999-2002.

This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was given regional approval on 4 June, 2004 and was approved by the Director of Nature Conservation on 22 June, 2004. 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 at May 2004.

ACKNOWLEDGMENTS

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

Gina Broun	Conservation Officer, CALM's Moora District
Rebecca Carter	Nature Conservation Co-ordinator, CALM's Moora District
Robert Chinnock	Adelaide Herbarium
Anne Cochrane	Senior Research Scientist, CALM's Science Division
Andrew Crawford	Technical Officer, CALM's Science Division
Anne Harris	Project Officer, CALM's WA Threatened Species and Communities Unit
Leonie Monks	Research Scientist, CALM's Science Division
Amanda Shade	Horticulturalist, Botanic Gardens and Park Authority

Thanks also to 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:	*Eremophila scaberula* W.Fitzg.	**Common Name:**	Rough Emu Bush
Family:	Myoporaceae	**Flowering Period:**	September to October, opportunistically
CALM Region:	Midwest	**CALM District:**	Moora
Shires:	Shire of Moora	**Recovery Team:**	Moora 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; Fitzgerald, W.V. (1905) Some new species of West Australian plants. *Journal of the West Australian Natural History Society* 2, 29; 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: *Eremophila scaberula* was declared as Rare Flora in October 1996 under the Western Australian *Wildlife Conservation Act 1950* and ranked as Critically Endangered (CR) in November 1998. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). It currently meets World Conservation Union (IUCN 2000) Red List Category Critically Endangered (CR) under criteria B1ab(iii)+2ab(iii) due to the severe fragmentation of populations, and a continuing decline in the quality of habitat. The main threats are road and rail maintenance, weed invasion, inappropriate fire regimes, poor regeneration, rising salinity and waterlogging, lack of associated vegetation and rubbish dumping.

Critical habitat: The critical habitat for *Eremophila scaberula* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; remnant vegetation that surrounds or links populations; additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so in the past and may be suitable for translocations; and the local catchment for the surface and possibly ground waters that provide the habitat of the taxon.

Habitat critical to the survival of the species, and important populations: Given that this taxon is listed as Critically Endangered Rare Flora it is considered that all known habitat is habitat critical, and that all populations, including translocated populations, are important.

Benefits to other species/ecological communities: There are no other known Declared Rare Flora or threatened ecological communities in the habitat of *Eremophila scaberula*, however, recovery actions implemented to improve the quality or security of the habitat of this species will also improve the status of remnant vegetation in which it is 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. The taxon is not listed under any specific international treaty, however, and therefore this IRP 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, no sites have been discovered near the *Eremophila scaberula* populations. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *E. scaberula*, and this is discussed in the recovery actions.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as all populations are located on rail and road reserves.

Evaluation of the Plans Performance: CALM, in conjunction with the Recovery Team will evaluate the performance of this IRP. The plan is to be reviewed within five years.

Habitat requirements: *Eremophila scaberula* is restricted to an area south of Moora over a linear range of less than 20 km. The taxon is found on rich loam or clay flats that support open low *Eucalyptus salmonophloia* woodland over open low scrub of *Scaevola spinescens*.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. Land managers have been notified of the location and threatened status of the taxon.
2. Declared Rare Flora (DRF) markers have been installed at most populations along the road and rail line.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.
4. Control of introduced grasses using Fusilade was undertaken in September 2001 and June 2003 at *Eremophila scaberula* Populations 1 and 3.

5. A translocation was begun for *Eremophila scaberula* in August 2001.
6. Research into the biology of *Eremophila scaberula* was undertaken in 2002/2003.
7. An A4 sized poster, which provides a description of the species and information about threats and recovery actions, has been developed for *Eremophila scaberula,* and distributed.
8. There have been several collections of *Eremophila scaberula* seed.
9. A fire management strategy has been produced for populations of *Eremophila scaberula*.
10. The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP.
11. Staff from CALM's Moora District regularly monitor populations of this taxon.

IRP Objective: 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 taxon in the wild.

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more over the period of the plan's adoption under the EPBC Act.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

Recovery actions

1. Coordinate recovery actions.
2. Map critical habitat.
3. Undertake weed control.
4. Install DRF markers.
5. Stimulate the germination of soil-stored seed.
6. Conduct further surveys.
7. Develop and implement a fire management strategy.
8. Rehabilitate habitat.
9. Remove rubbish.
10. Monitor populations.
11. Continue to implement Translocation Proposal.
12. Liaise with land managers.
13. Promote awareness.
14. Continue to obtain biological and ecological information.
15. Review the need for a full Recovery Plan.

1. BACKGROUND

History

Eremophila scaberula was first collected in 1903 at Moora. Despite further searches, no more plants were located until 1996 when CALM staff discovered a third population of approximately 200 plants. Currently, the species is known from three populations, all in close proximity to one another, consisting of approximately 632 plants.

An Interim Recovery Plan was developed for the species in 1999 (Stack and English 1999). Information accumulated since that plan was completed has been incorporated into this plan and this document now replaces Stack and English (1999).

Description

Eremophila scaberula W.Fitzg. is a low growing shrub with rough, slightly sticky branches and foliage. It has solitary purple flowers that occur on thick stalks that emerge from the leaf axils. The branches have raised lines from each leaf stalk. The leaves, which are 4 to 8 mm long and crowded on the stems, narrow into a short stalk that is flat above with a prominent midrib beneath. The corolla is about 1 to 1.2 cm long (Brown *et al*. 1998).

Eremophila scaberula differs from *E. microtheca* in its rough branches and foliage, hairless calyx segments and less wrinkled fruits. Unlike *E. sargentii*, it is non-aromatic, has star-shaped hairs on the branches and leaves, and a densely hairy corolla tube (Brown *et al*. 1998).

Distribution and habitat

Eremophila scaberula is restricted to an area south of Moora over a linear range of less than 20 km along narrow reserves. Generally the plants are healthy although the surrounding habitat is quite disturbed. The taxon is found on rich loam or clay flats that support open low *Eucalyptus salmonophloia* woodland over open low scrub of *Scaevola spinescens*, several Acacia species, and grasses.

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

Given that this taxon is listed as Critically Endangered Declared Rare Flora it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the taxon. Recovery actions include survey for further populations that may lead to the identification of additional habitat critical.

Benefits to other species/ecological communities

There are no other known Declared Rare Flora or threatened ecological communities in the habitat of *Eremophila scaberula*, however, recovery actions implemented to improve the quality or security of the habitat of *Eremophila scaberula* will also improve the status of remnant vegetation in which it is 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. The taxon is not listed under any specific international treaty, however, and therefore this IRP 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, no sites have been discovered near the *Eremophila scaberula* populations. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *E. scaberula*, and this is discussed in the recovery actions.

Social and economic impacts

The implementation of this interim recovery plan is unlikely to cause significant adverse social or economic impacts as all populations are located on rail and road reserves.

Evaluation of the Plans Performance

CALM, in conjunction with the Moora District Threatened Flora Recovery Team will evaluate the performance of this Interim Recovery Plan. The plan is to be reviewed within five years of its implementation. Any changes to management of the taxon or recovery actions will be documented accordingly.

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 (*Environment Protection and Biodiversity Conservation Act 1999*).

The critical habitat for *Eremophila scaberula* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, ie. rich loam or clay flats that support open low *Eucalyptus salmonophloia* woodland over open low scrub (these provide potential habitat for natural range extension);
- remnant vegetation that surrounds or links populations (this is necessary to allow pollinators to exist in, and move between populations);
- additional occurrences of similar habitat that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites); and
- the local catchment for the surface and possibly ground waters that maintain the habitat of the taxon.

Biology and ecology

R. Chinnock has suggested that *Eremophila scaberula* may be pollinated by small native bees. Although bull ants have been seen on the flowers, R. Chinnock believes ant pollination in Eremophilas is largely accidental. *E. scaberula* appears to be a disturbance opportunist, with germination stimulated by fire or earth movement. *E. scaberula* is in cultivation in South Australia.

CALM staff from WATSCU and Science Division investigated size classes, flowering and fruiting characteristics, and growth habit in *Eremophila scaberula* in 2002/2003 (Harris and Yates 2003). This study noted that there were low numbers of younger plants in the lower class sizes and a predominance in one larger size class. This suggests that recruitment of plants may be associated with episodic events. Although flower and fruit set were found to be prolific, seed production was extremely low. Plants were found not to be lignotuberous and will therefore need to recruit from seed for the population to survive intermittent fire. However, for larger plants where the multiple decumbent stems

came into contact with the soil, adventitious roots formed (Harris and Yates 2003). Fungi were also observed on the roots of the plants (personal observation A. Harris[1]).

CALM Threatened Flora Seed Centre (TFSC) staff noted that there were many aborted and soft fruits on the plants while collecting seed from this species in December 1996.

Threats

Eremophila scaberula was declared as Rare Flora in October 1996 under the Western Australian *Wildlife Conservation Act* 1950 and ranked as Critically Endangered (CR) in November 1998. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). It currently meets World Conservation Union (IUCN 2000) Red List Category Critically Endangered (CR) under criterion B1ab(iii)+2ab(iii) due to the severe fragmentation of populations, and a continuing decline in the quality of habitat. The main threats are road and rail maintenance, weed invasion, inappropriate fire regimes, poor regeneration, rising salinity and waterlogging, lack of associated vegetation and rubbish dumping.

- **Road and rail maintenance activities** threaten all populations. Threats include grading, chemical spraying, construction of drainage channels and mowing or slashing of vegetation. Several of these actions also encourage weed invasion.

- **Weed invasion** is a major threat to all populations. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many weed species.

- **Inappropriate fire regimes** would affect the viability of the populations, as *Eremophila scaberula* appears to be an obligate seeder that germinates following fire. If this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, occasional fires or other disturbances are likely to be required for the taxon to propagate from soil stored seed.

- **Poor regeneration**, presumably due to lack of appropriate disturbance, threatens most populations as very few young plants of *Eremophila scaberula* have been observed.

- **Rising salinity and waterlogging** resulting from broad scale clearing of the catchment for agriculture are impacting on all populations. These threats are leading to degradation of the species' habitat and, if not addressed, are likely to become worse in the medium to long term. Flooding occurred in 2000 and resulted in the deaths of numerous plants at Population 1.

- **Lack of associated vegetation** is a threat to all road reserve populations. As a result, pollinators and any native digging and burrowing animals that may historically have disturbed the soil and thereby stimulated germination, are likely to be infrequent or absent. In addition, with little vegetation present providing a buffer, weeds (in particular grasses) are able to invade from roadsides and nearby farmland.

- **Rubbish dumping** along the road and rail reserves is a minor threat to all populations. Apart from being visually unappealing, rubbish, in particular garden waste, introduces weed seeds into the bushland as well as increasing the fire hazard.

[1] Anne Harris, Project Officer, CALM's WA Threatened Species and Communities Unit

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1A. South of Moora	Main Roads Road Reserve	1995 90* 1996 80 1998 58 (4) 2000 78 (9) 2003 81	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping, lack of associated vegetation
1B &1C. South of Moora	Westrail Rail Reserve & Nature Reserve	1995 * 1996 52 1998 24 (1) 2000 43 (7) 2003 49	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping
2A. South of Moora	Main Roads Road Reserve	1995 80* 1996 90 1998 37 (2) 2000 78 (9) 2003 42	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping, lack of associated vegetation
2B. South of Moora	Westrail Rail Reserve	1995 * 1996 111 1998 90 (12) 2000 43 (7) 2002 266 2003 283	Moderate	Rail and road maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping
3A. South of Moora	Main Roads Road Reserve	1996 62 1998 48 (5) 2000 50 (4) 2003 32	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping, lack of associated vegetation
3B. South of Moora	Westrail Rail Reserve	1996 137 1998 81 (3) 2000 113 (3) 2003 145	Moderate	Rail and road maintenance activities, weed competition, inappropriate fire regimes, poor regeneration, rubbish dumping

Numbers in brackets = number of seedlings.
*= total for subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined critical habitat of *Eremophila scaberula* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the taxon, or its habitat or potential habitat, or the local surface and possibly ground water hydrology.

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 taxon in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more over the period of the plan's adoption under the EPBC Act.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

3. RECOVERY ACTIONS

Existing recovery actions

Land managers have been notified of the location and threatened status of the taxon. The notification details the Declared Rare status of *Eremophila scaberula* and the legal responsibility to protect it.

Declared Rare Flora (DRF) markers have been installed at most populations along the road and rail line. These serve to alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage plants or their habitat. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.

Control of introduced grasses using Fusilade was undertaken in September 2001 and June 2003 at Populations 1 and 3 of *Eremophila scaberula* by experienced contractors under the supervision of CALM District staff. Numbers of plants of *Eremophila scaberula* were recorded in 25 x 25m plots in the treated area, and control plots were installed at Population 2.

In August 2001, a translocation was begun for *Eremophila scaberula* by staff from CALM's Science Division and Moora District. The translocation was done according to an approved Translocation Proposal (Monks and Reaveley 2001) as required under CALM's Policy Statement Number 29. Three replicates were set up with 100 gridpoints in each. Four fruit were then buried at each gridpoint with a total of 1200 fruits planted. Each replicate was divided in half and the area over one half was burnt. To date there has been no germination across either treatment (personal communication L. Monks[2]).

Research into the biology of *Eremophila scaberula* was undertaken in 2002/2003 by staff from CALM's WA Threatened Species and Communities Unit, in conjunction with Science Division (Harris and Yates 2003). The aims of this project were to establish a quantitative monitoring framework and data baseline for detecting changes in population abundance, health, size structure and life stage structure, and reproductive potential. The project included survey and accurate counts of the populations and establishing permanently marked quadrats and photopoints. Within each quadrat all *E. scaberula* plants were tagged, their canopy dimensions, health and life-stage recorded and reproductive potential monitored (Harris and Yates 2003).

An A4 sized poster, which provides a description of the species and information about threats and recovery actions, has been developed for *Eremophila scaberula*. It is hoped that the poster will result in the discovery of new populations.

Fifty seeds were collected by the Botanic Gardens and Parks Authority (BGPA) in August 1996. Cutting material was taken at the same time, from which 335 cuttings were produced from 5 clones. The success of cuttings varied between clones, but was generally limited. In May 1997, BGPA held approximately 80 plants in their Nursery.

There have been several collections of *Eremophila scaberula* seed. Approximately 1113 fruits (~345 seed) were collected from Population 2 in November 1996; 1317 fruits (~760 seed) from Population 1 and 2946 fruits (~1031 seed) from Population 3 in December 1996 and stored in CALM's TFSC at –18°C. The TFSC test the viability of the seed initially and then after one year in storage. The initial germination rate of *E. scaberula* seed ranged from 39 to 70% and after one year in storage from 60 to 67% (unpublished data, A. Cochrane[3]).

A fire management strategy was produced for populations of *Eremophila scaberula* by contract staff from WATSCU in 2003.

[2] Leonie Monks, Research Scientist, CALM's Science Division
[3] Anne Cochrane, Senior Research Scientist, CALM's Threatened Flora Seed Centre

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Staff from CALM's Moora District regularly monitor populations of this taxon.

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 Moora District Threatened Flora Recovery Team (MDTFRT) will continue to coordinate recovery actions for *Eremophila scaberula* and other Declared Rare Flora in their region. 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: $2,200 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 done 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. Undertake weed control

Weed control will be undertaken in consultation with the land managers. Appropriate methods of weed control are found in Brown and Brooks (2002) and may include hand weeding or localised application of herbicide. All applications of weed control will be followed by a report on the method, timing and success of the treatment against weeds, and the effect on *Eremophila scaberula* and associated native plant species. It is anticipated that native species in the habitat will regenerate after weed competition is reduced.

Action: Undertake weed control
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,000 per year.

4. Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are required along the road reserve at Subpopulation 2a. Their purpose is to alert people operating in the area to the presence of DRF and to help prevent habitat disturbance.

Action: Install DRF markers
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $700 in first year.

5. Stimulate the germination of soil-stored seed

Burning, smokewater and soil disturbance may be effective in stimulating the germination of soil-stored seed. These trials will be conducted near existing populations in areas newly cleared of weeds, and/or in areas where *Eremophila scaberula* was known to occur previously. After treatment, annual monitoring will include recording the times when flowering first occurs and seed is produced, and the age at which senescence is reached. This will enable formulation of a recommended interval time between disturbances to maintain populations.

Action: Stimulate the germination of soil-stored seed
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,800 in second, third and fourth years.

6. Conduct further surveys

Further surveys will be conducted for this taxon during its flowering period (September to October) in appropriate habitat, including on private lands wherever possible. Volunteers from the local community, Wildflower Societies and Naturalist Clubs will be encouraged to be involved in surveys supervised by CALM staff. Areas considered suitable for translocation will also be noted.

Action: Conduct further surveys
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,400 per year.

7. Develop and implement a fire management strategy

Eremophila scaberula appears to be an obligate seeder that germinates following disturbances such as fire. Fire will be prevented from occurring in the habitat of populations, except where it is being used experimentally as a recovery tool. A basic fire management strategy has been developed but needs to be expanded to recommend fire frequency, intensity, season, and control measures.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,500 in first year and $1,000 in subsequent years.

8. Rehabilitate habitat

Subpopulations 1a, 2a and 3a of *Eremophila scaberula* that occur along road reserves, will be rehabilitated with plantings of species sourced from the local habitat.

Action: Rehabilitate habitat
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,200 in first, second and third years.

9. Remove rubbish

Rubbish dumped in road reserves populations will be removed and disposed of correctly.

Action: Remove rubbish

Responsibility: CALM (Moora District) through the MDTFRT
Cost: $300 per year.

10. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollinator activity, seed production, recruitment, longevity and predation is essential. All populations will be inspected annually with special attention given to any impacts from altered hydrology. In areas that are possibly under threat from salinisation or waterlogging, soil salinity and pH will be monitored annually during winter.

Action: Monitor populations
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,000 per year.

11. Continue to implement Translocation Proposal

In 2001, a translocation was begun for *Eremophila scaberula*. The translocation was done according to an approved Translocation Proposal (Monks and Reaveley 2001) as required under CALM's Policy Statement Number 29. This translocation will be continued, with translocation of seedlings being trialled if monitoring continues to indicate that direct seeding trials were unsuccessful.

Action: Continue to implement Translocation Proposal
Responsibility: CALM (Science Division, Moora District) and BGPA, through the MDTFRT
Cost: $9,600 in the second and third years; and $2,100 in the remaining years.

12. Liaise with land managers

Staff from the Department's Moora District will continue to liaise with land managers to help 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 *Eremophila scaberula*.

Action: Liaise with land managers
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $900 per year.

13. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this taxon will be promoted to the community through poster displays and through the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet that includes a description of the plant, its habitat, threats, recovery actions and photos has been produced and will be distributed through a postal drop to residents in Shires that contain possible habitat for the taxon.

Action: Promote awareness
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $700 in first and second years; $600 in remaining years.

14. Continue to obtain biological and ecological information

Improved knowledge of the biology and ecology of *Eremophila scaberula* will provide a better scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the taxon, and the requirements of pollinators.
3. The reproductive strategies, phenology and seasonal growth of the taxon.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.
5. The impact of salinity and waterlogging on *Eremophila scaberula* and its habitat.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division, Moora District) through the MDTFRT
Cost: $19,200 for year one and two.

15. Review the need for a full Recovery Plan

At the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for further recovery will be assessed. If the taxon is still ranked Critically Endangered at that time the need for further recovery actions, a full Recovery Plan or to update this IRP will be assessed.

Action: Review the need for a full Recovery Plan
Responsibility: CALM (WATSCU, Moora District) through the MDTFRT
Cost: $23,000 in the fifth year (if required).

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. After five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. REFERENCES

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

Brown, K. and Brooks, K. (2002) *Bushland weeds; a practical guide to their management*. Environmental Weeds Action Network (Inc), Western Australia.

Department of Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.

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

Department of Conservation and Land Management (1995) Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* Department of Conservation and Land Management, Perth.

Fitzgerald, W.V. (1905) Some new species of West Australian plants. *Journal of the West Australian Natural History Society* 2, 29.

Harris, A. and Yates, C. (2003) Population characteristics of *Eremophila scaberula* (Rough Emu Bush), a framework for monitoring change. Unpublished report to the Western Australian Threatened Species and Communities Unit. Department of Conservation and Land Management, Perth.

Monks, L. and Reaveley, A. (2001) Translocation Proposal for *Eremophila scaberula*. Department of Conservation and Land Management, Perth.

Stack, G. and English, V. (1999) *Eremophila scaberula* Interim Recovery Plan No 28, 1999 – 2002. Department of Conservation and Land Management, Perth.

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/

World Conservation Union (2000) *IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 51st meeting of the IUCN Council*. Gland, Switzerland.

6. TAXONOMIC DESCRIPTION

Fitzgerald, W.V. (1905) Some new species of West Australian plants. *Journal of the West Australian Natural History Society* 2, 29.

Eremophila* (*Pholidia*) *scaberula

A low growing, almost procumbent heath-like shrub, the branches with raised decurrent lines from each leaf-stalk and along with the foliage scaberulous and scarcely viscid. Leaves rather crowded, spreading or incurved, linear or almost subulate, obtuse, attenuated into a short petiole, entire, thick, flat above, the midrib prominent beneath, 2-4 lines long. Flowers purple, solitary, on thick axilliary pedicels of 1-2 lines long. Calyx glabrous, about 2 lines long, the segments lanceolate-ovate and terminating in subulate recurved points. Corolla 5-6 lines long, tube not longer than the calyx, the obliquely broad campanulate portion longer; lobes broad and rather short, the upper ones connate high up and recurved, the lower middle one broader and longer than the others, quite glabrous without, slightly woolly within. Stamens included. Ovary glabrous, scarcely rugose, slightly laterally compressed, cylindrico-conical, 2-celled, each cell 2-ovulate. Style slender, glabrous, hooked at the end, exserted. Fruit narrow-ovate, not longer than the calyx, rugose and usually 4-celled.

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	1200	500	500	1200	500	500	1200	500	500	1200	500	500	1200	500	500
Map critical habitat	500		1500												
Undertake weed control	500		500	500		500	500		500	500		500	500		500
Install DRF markers	400		300												
Stimulate the germination of soil-stored seed				500		2300	500		2300	500		2300			
Conduct further surveys	700	800	900	700	800	900	700	800	900	700	800	900	700	800	900
Develop and implement a fire management strategy	1400		1100	200		800	200		800	200		800	200		800
Rehabilitate habitat	500		1700	500		1700	500		1700						
Remove rubbish	100		200	100		200	100		200	100		200	100		200
Monitor populations	500		500	500		500	500		500	500		500	500		500
Continue to implement translocation proposal				2600		7000	2600		7000	1000		1100	1000		1100
Liaise with land managers	900			900			900			900			900		
Promote awareness	600		100	600		100	600			600			600		
Continue to obtain biological and ecological information	10800		8400	10800		8400									
Review the need for a full Recovery Plan													15300		7700
Total	18100	1300	15700	19100	1300	22900	8300	1300	14400	6200	1300	6800	21000	1300	12200
Yearly Total		**35,100**			**43,300**			**24,000**			**14,300**			**34,500**	

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

Total CALM:	$72,700
Total Other:	$6,500
Total External Funding:	$72,000
TOTAL COSTS:	**$151,200**