Resinous Eremophila

(*Eremophila resinosa*)

RECOVERY PLAN

Department of Environment and Conservation
Kensington

Australian Government

Government of Western Australia

Department of Environment and Conservation
Our environment, our future

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. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006.

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 the 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This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked CR in Western Australia, this IRP will be reviewed after four years and the need for a full RP assessed.

This IRP was approved by the Director of Nature Conservation on 30 April 2008. This IRP was prepared with financial support from the Australian Government to be adopted as a National Recovery Plan under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This plan was written and endorsed as an IRP in Western Australia and is treated as the National Recovery Plan for this species under the EPBC Act.

Information in this IRP was accurate as of April 2008.

IRP PREPARATION

This IRP was prepared by: Craig Douglas[1], Wendy Johnston[2] and David Jolliffe[3]

[1] Project Officer, Species and Communities Branch, DEC, PO Box 51 Wanneroo, 6946.
[2] Flora Conservation Officer, Yilgarn District, DEC, PO Box 332, Merredin WA 6415.
[3] District Nature Conservation Officer, Yilgarn District, DEC, PO Box 332, Merredin WA 6415.

ACKNOWLEDGEMENTS

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

Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC
Joel Collins	Former Flora Conservation Officer, Yilgarn District, DEC
Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC
Bob Dixon	Manager of Biodiversity and Extensions, Botanic Gardens and Parks Authority
Luke Sweedman	Curator of the Western Australian Seed Technology Centre, Botanic Gardens and Parks Authority

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

Cover photograph by Joff Start.

CITATION

This Recovery Plan should be cited as:

Department of Environment and Conservation (2009). Resinous Eremophila (*Eremophila resinosa*) Recovery Plan, Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	***Eremophila resinosa***	**Common Name:**	Resinous Eremophila
Family:	Myoporaceae	**Flowering Period:**	Periodic: mainly October-November
DEC Region:	Wheatbelt	**DEC District:**	Yilgarn
Shire:	Westonia, Mukinbudin, Nungarin, Koorda, Mt Marshall, Wyalkatchem	**Recovery Team:**	Yilgarn District Threatened Flora Recovery Team

Illustrations and/or further information: Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia.* Department of Environment and Conservation, Western Australia; Brown, A., Thomson-Dans, C. and Marchant N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 86; Hopper, S.D., Leeuwen, S., Brown, A. and Patrick, S. (1990). *Western Australia's Endangered Flora*. Department of Conservation and Land Management, Western Australia. pp 56. DEC (2007a) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Perth, Western Australia. Accessed 2007. http://www.calm.wa.gov.au/science/

Current status: *Eremophila resinosa* was declared as Rare Flora in 1982 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked as Endangered (EN) under World Conservation Union (IUCN 1994) Red List criterion C2a due to population size being less than 2500 mature individuals, with continuing decline observed and no subpopulation estimated to contain more than 250 mature individuals. The main threats are road, rail and firebreak maintenance, farming operations including grazing and fence maintenance, weeds, degradation of habitat through activities such as traffic and rubbish dumping, inappropriate fire regimes, low seed set and poor recruitment. *Eremophila resinosa* is listed as Endangered (EN) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Eremophila resinosa is known from 26 natural populations and 1418 plants in the central eastern Wheatbelt of Western Australia.

Fourteen populations and twelve subpopulations of *Eremophila resinosa* occur on road reserves (Populations 3, 5-12, 15, 18-20 and 22; Subpopulations 1a-c, 2a-c, 4b, 14a-b, 16b, 17a-b), one subpopulation on rail reserve (Subpopulation 4a), one population on private property (Population 21) and three populations and one subpopulation on shire reserves (Population 13, 23 and 24; Subpopulations 16a).

Description: *Eremophila resinosa* is a spreading shrub 40 to 80 cm tall by 60 to 100 cm wide with branches that are densely covered in short white woolly hairs and sprinkled with resinous wart-like projections. The leaves are 4 to 8 mm long by 2 to 3 mm wide, alternate, obovate, obtuse with a minute point, rather thick and flat with a greyish layer of very short, closely interwoven star shaped hairs on both sides. The peduncles are axillary, solitary and exceedingly short. The calyx-segments are linear-lanceolate. The corolla is 15 mm long, funnel-shaped, the tube scarcely exceeding the calyx, the throat is dilated with five free lobes, each 5 mm long, all pointed, the upper ones recurved, the lower ones spreading, all sprinkled outside with short star shaped woolly hairs. The throat is covered in long sparse hairs with a ring of numerous hairs occurring at the base. The flowers are blue or purple with white spots inside. There are four stamens not exceeding the length of the corolla. The ovary is densely covered in short woolly hairs and is four celled with one ovule in each cell (Bentham 1870; Ewart *et al*. 1908; Brown 2005).

Habitat requirements: *Eremophila resinosa* occurs on soil types from sandy loams to loams and clays in open mallee woodland with a mixed *Acacia* scrub understorey.

Habitat critical to the survival of the species, and important populations: Given that *Eremophila resinosa* is ranked as Endangered and is known from only 26 populations, it is considered that only known habitat for extant wild and translocated populations is critical to its survival, and that all extant wild and translocated populations are important populations. Habitat critical to the survival of *E. resinosa* includes the area of occupancy of extant populations, areas of similar habitat (i.e. sandy loams, clays, and loams supporting open mallee woodland with mixed *Acacia* scrub understorey) surrounding important populations (this is necessary to allow access for pollinators and population expansion) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat for *Eremophila resinosa* will also improve the status of associated native vegetation. One other threatened flora species (*Cyphanthera odgersii* subsp. *occidentalis*) is located in the vicinity of *Eremophila resinosa*.

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. *Eremophila resinosa* 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: The Department of Indigenous Affairs Aboriginal Heritage Sites Register records no sites of Aboriginal significance that are known at or near populations of the species 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 species, opportunities may exist through cultural interpretation and awareness of the species.

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 impact: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. However, as some of the populations of *Eremophila resinosa* occur on, or adjacent to, private property their protection may potentially affect farming activities. Populations on road and rail reserves, and mining tenements, will require protection during management activities, and hence the occurrence of *Eremophila resinosa* in those areas may have an impact on those land managers. Actions will involve continued liaison and cooperation with all stakeholders with regard to these areas.

Affected interests: Stakeholders potentially affected by the implementation of this plan include the Shires of Westonia, Mukinbudin, Nungarin, Koorda and Mt Marshall, Main Roads WA, WestNet Rail and owners of private property.

Evaluation of the plan's performance: DEC in conjunction with the Yilgarn District Threatened Flora Recovery Team (YDTFRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

Completed Recovery Actions

1. Land managers including private land owners, Main Roads WA, WestNet Rail and Shires with populations on land under their management have been made aware of the threatened nature of this species, its location and their legal obligations to protect it.
2. Declared Rare Flora (DRF) markers have been installed at Populations 3, 5-7, 9, 11-12, 15, 18-20 and 22 and Subpopulations 1bc, 2c, 4ab, 14b, 16b and 17ab.
3. Six plants have been propagated from part of Population 23 (mining lease), and successfully translocated. Seed was collected from parent plants prior to their taking.
4. Collections of seed from several populations have been stored at the Botanic Gardens and Parks Authority (BGPA) and DEC's Threatened Flora Seed Centre (TFSC).
5. Rubbish dumped in Subpopulation 16a has been removed by the Shire of Westonia and measures taken to restrict vehicle access.

Ongoing and future recovery actions

6. The YDTFRT is overseeing the implementation of this IRP and will include it in their annual report to DEC's Corporate Executive and funding bodies.
7. Staff from DEC's Yilgarn District office are monitoring all known populations.

IRP objective: The objective of this IRP 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 populations have increased and/or the number of mature individuals have increased by ten percent or more over the five year term of the plan.

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

Recovery actions

1. Coordinate recovery actions
2. Conduct further surveys
3. Liaise with land managers
4. Install DRF markers
5. Conduct further translocations
6. Monitor populations
7. Undertake weed control
8. Fencing
9. Obtain biological and ecological information
10. Collect seed
11. Promote awareness
12. Map habitat critical to the survival of *Eremophila resinosa*
13. Review the plan and need for further recovery actions

1. BACKGROUND

History

Eremophila resinosa was described in 1839 as *Pholidia resinosa* based on specimens collected in 1835 (Endlicher and Fenzl 1839). Ferdinand Mueller later moved the species into the genus *Eremophila* (Mueller 1859). In 1908 Alfred Ewart not realizing that it had already been named, invalidly described the species as *Eremophila kochii*, after the collector Max Koch (Ewart *et al*. 1908).

In 2003 Westonia Mining Ltd. conducted a floristic survey during which a population of 441 *Eremophila resinosa* plants were found on land under their lease. The following year the company developed a translocation proposal as five plants were to be taken during mining operations. At this time seed was collected from those plants. 321 plants were subsequently raised by the Botanic Gardens and Parks Authority (BGPA) and planted into the translocation area. In winter 2005 a further 257 plants were raised by BGPA and planted in the same area (B. Dixon pers. comm.). As at 2006 the translocated population numbered 509 individuals.

Eremophila resinosa is known from 26 natural populations and 1418 plants in DEC's Yilgarn District. Populations 7, 19 and 20 are now presumed extinct.

Description

Eremophila resinosa is a spreading shrub 40 to 80 cm tall by 60 to 100 cm wide with branches that are densely covered in short white woolly hairs and sprinkled with resinous wart-like projections. The leaves are 4 to 8 mm long by 2 to 3 mm wide, alternate, obovate, obtuse with a minute point, rather thick and flat with a greyish layer of very short, closely interwoven star shaped hairs on both sides. The peduncles are axillary, solitary and exceedingly short. The calyx-segments are linear-lanceolate. The corolla is 15 mm long, funnel-shaped, the tube scarcely exceeding the calyx, the throat is dilated with five free lobes, each 5 mm long, all pointed, the upper ones recurved, the lower ones spreading, all sprinkled outside with short star shaped woolly hairs. The throat is covered in long sparse hairs with a ring of numerous hairs occurring at the base. The flowers are blue or purple with white spots inside. There are four stamens not exceeding the length of the corolla. The ovary is densely covered in short woolly hairs and is four celled with one ovule in each cell (Bentham 1870; Ewart *et al*. 1908; Brown 2005).

Distribution and habitat

Eremophila resinosa is confined to the central eastern Wheatbelt of Western Australia.

Habitat is sandy loams and clays in open mallee woodland with a mixed *Acacia* scrub understorey. Species associated with *Eremophila resinosa* include *Eucalyptus salubris*, *E. salmonophloia*, *E. longicornis*, *E. transcontinentalis*, *Acacia acuminata*, *A. erinacea*, *A. hemiteles* and *Eremophila oppositifolia*.

Summary of population land vesting, purpose and manager

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a N of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
1b N of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
1c N of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
2a NW of Mukinbudin	Yilgarn	Mukinbudin	Unvested Reserve	Road Reserve	Shire of Mukinbudin
2b NW of Mukinbudin	Yilgarn	Mukinbudin	Unvested Reserve	Road Reserve	Shire of Mukinbudin
2c Cowcowing	Yilgarn	Wyalkatchem	Unvested Reserve	Road Reserve	Shire of Wyalkatchem
3 SW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
4a NW of Nungarin	Yilgarn	Nungarin	Public Transport Authority	Rail Reserve	WestNet Rail
4b NW of Nungarin	Yilgarn	Nungarin	Minister for Transport	Road Reserve	MainRoads WA
5 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
6 SW of Westonia	Yilgarn	Westonia	Minister for Transport	Road Reserve	MainRoads WA
7 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
8 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
9 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
10 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
11 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
12 SW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
13 Westonia	Yilgarn	Westonia	Unvested Reserve	Recreation-Race track	Shire of Westonia
14a S of Koorda	Yilgarn	Koorda	Unvested Reserve	Road Reserve	Shire of Koorda
14b S of Koorda	Yilgarn	Koorda	Unvested Reserve	Road Reserve	Shire of Koorda
15 NW of Westonia	Yilgarn	Nungarin	Unvested Reserve	Road Reserve	Shire of Nungarin
16a Westonia	Yilgarn	Westonia	Unvested Reserve	Shire Reserve – proposed hospital site	Shire of Westonia
16b Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
17a NW of Nungarin	Yilgarn	Nungarin	Unvested Reserve	Road Reserve	Shire of Nungarin
17b NW of Nungarin	Yilgarn	Nungarin	Unvested Reserve	Road Reserve	Shire of Nungarin
18 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
19 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
20 NW of Westonia	Yilgarn	Westonia	Unvested Reserve	Road Reserve	Shire of Westonia
21 NW of Westonia	Yilgarn	Westonia	Freehold	Private property	Landholders
22 E of Kalannie	Yilgarn	Mt Marshall	Minister for Transport	Road Reserve	MainRoads WA
23 NW of Westonia	Yilgarn	Westonia	Shire of Westonia	Common - mining	Westonia Mines
24 N of Westonia	Yilgarn	Westonia	Shire of Westonia	Common - mining	Westonia Mines
25 N of Westonia	Yilgarn	Westonia	Shire of Westonia	Road reserve	Shire of Westonia
26 N of Westonia	Yilgarn	Westonia	Freehold	Private property	Landholders

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

Biology and ecology

Richmond and Coates (1995) concluded that *Eremophila resinosa* is highly flammable but based on the concentration of starch grains within the roots, mature plants are likely to resprout from underground stock post fire. However, they also concluded that young seedlings (1 to 2 years old) are likely to be fire sensitive and may be killed even by low intensity spring fires.

Cochrane *et al.* (2002) conclude that only 31.5% of *Eremophila resinosa* locules contained at least one healthy seed. This low result has several plausible explanations including habitat fragmentation which may be reducing pollination through lack of habitat connectivity and permeability and lack of resources for pollinators. Inbreeding may also be a cause, however many species in the transitional rainfall zone of Western Australia have developed diverse genetic system responses to inbreeding in order to cope with long periods of small population size imposed on them (Hopper *et al*. 1996).

Healthy *Eremophila resinosa* seed was found to have a germination rate of 77% for fresh seed and 67% for seeds kept for one year under standard storage conditions (Cochrane *et al*. 2002). Cochrane *et al.* 2002 found *E. resinosa* had the broadest range of germination times amongst twelve *Eremophila* species with first germination recorded at 10 days and last germination at 74 days for fresh seed. This range is reduced for stored seed with initial germination recorded at 14 days and last germination at 35 days.

Richmond and Coates (1995) recorded a grafting strike rate of 100% for *Eremophila resinosa* and cutting survival rate of 1%.

Flowering of *Eremophila resinosa* appears to occur all year round with the main flowering time being between October-November. Fruits mainly develop between December to January with records of limited fruiting occurring in November and March.

Threats

The main threats are road, rail and firebreak maintenance, farming operations including grazing and fence maintenance, weeds, degradation of habitat through activities such as traffic and rubbish dumping, inappropriate fire regimes, low seed set and poor recruitment.

- **Road, rail and firebreak maintenance.** Ten populations and thirteen subpopulations of *Eremophila resinosa* occur on road (Shire and MainRoads WA) and rail (WestNet Rail) reserves. Relevant authorities have been informed of their location so that appropriate protective actions can be implemented, as part of action 3.
- **Farming operations.** Populations of *Eremophila resinosa* bordering private property are threatened by fence maintenance, spray drift and grazing. Liaison is ongoing and covered by action 3.
- **Weeds** are a significant threat to eight populations and four subpopulations of *Eremophila resinosa*. Weeds complete for resources and reduce germination success. In areas where introduced and native grasses produce large fuel loads intense fires could damage the subterranean stock of *E. resinosa* (Richmond and Coates 1995).
- **Degradation of habitat through recreational activities, traffic and rubbish dumping** threatens one population and one subpopulation of *Eremophila resinosa*. Since 1993 the number of plants in Subpopulation 16a has been substantially reduced following these activities and recruitment has ceased. Land managers have been made aware of the threatened nature of the species, its location and their legal obligations to protect it. Liaison is continuing as part of action 3.
- **Mining activities** has the potential to impact population 23, which is one of the largest populations. A number of plants have been removed, and the potential exists for additional plants to be removed during mine expansion.
- **Inappropriate fire regimes.** Because seedlings of this species are likely to be killed by fire 1 to 2 years following germination, frequent fire has the potential to affect all populations. Liaison with land managers is continuing to prevent this from happening. See action 3.
- **Low seeds set.** *Eremophila resinosa* is recorded as producing low numbers of healthy seeds.
- **Poor recruitment.** No populations have shown signs of recruitment since 1993.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Current Condition	Threats
1a N of Westonia	Shire Road Reserve	1993 37 [1]* 2003 14* 2005 7 2008 7	Moderate	Road maintenance, weeds, farm operations-grazing, fence maintenance
1b N of Westonia	Shire Road Reserve	1993 37 [1]* 2003 14* 2005 4 2008 5	Moderate	Road maintenance, weeds, farm operations-grazing, fence maintenance
1c N of Westonia	Shire Road Reserve	1993 37 [1]* 2003 14*	Moderate	Road maintenance, weeds, farm operations-grazing, fence maintenance

Pop. No. & Location	Land Status	Year/No. plants	Current Condition	Threats
		2005 2 2008 2		
2a NW of Mukinbudin	Shire Road Reserve	2003 9 2005 3 2008 4	Moderate	Road maintenance
2b NW of Mukinbudin	Shire Road Reserve	2003 6 2008 4	Healthy	Road maintenance
2c Cowcowing	Shire Reserve	1991 14 2003 5 2005 3 2006 4	Moderate	Road maintenance
3 SW of Westonia	Shire Road Reserve	1989 44 [2] 2000 30 2008 13	Poor	Road maintenance, weeds
4a NW of Nungarin	WestNet Rail reserve	1991 4* 1994 3 2005 5* 2008 4	Moderate	Rail maintenance, spraying, grazing by 'moving' stock
4b NW of Nungarin	Main Roads WA reserve	1991 4* 1994 1 2005 5* 2008 0	Disturbed	Road maintenance
5 NW of Westonia	Shire Road Reserve	1993 2 2005 2 2008 2	Disturbed	Road maintenance, weeds
6 SW of Westonia	Main Roads WA reserve	1992 15 2005 3 2008 26	Disturbed	Road maintenance
7 NW of Westonia	Shire Road Reserve	1991 4 2003 0 2008 0		Road maintenance
8 NW of Westonia	Shire Road Reserve	2000 0 2008 2	Unknown	Unknown
9 NW of Westonia	Shire Road Reserve	1992 12 2003 7 [5] 2008 5	Poor	Road maintenance, farming operations-soil erosion, grazing
10 NW of Westonia	Shire Road Reserve	1992 9 2005 3 2006 2 [1] 2008 1	Disturbed	Road maintenance, farming operations-soil erosion, wind blown medic seed
11 NW of Westonia	Shire Road Reserve	1992 1 2003 1 2008 1	Moderate	Road maintenance, weeds
12 SW of Westonia	Shire Road Reserve	1993 37 [3] 2005 19 2008 34	Moderate	Road maintenance, farming operations-grazing & fence maintenance, soil erosion, weeds
13 Westonia	Shire Reserve – Race Track	1993 214 (1) 2006 53 2008 53	Moderate	Vehicle traffic, rubbish dumping
14a S of Koorda	Shire Road Reserve	1992 100 (1) 1999 100 2003 82 2008 57	Disturbed	Road maintenance, farming operations-grazing & fence maintenance, weeds, soil erosion and spray drift
14b S of Koorda	Shire Road Reserve	2003 4 2005 10 2008 8	Disturbed	Road maintenance, farming operations-grazing & fence maintenance, weeds, soil erosion and spray drift
15 NW of Westonia	Shire Road Reserve	1995 5 2003 2 2008 1	Moderate	Road maintenance
16a Westonia	Shire Reserve – proposed hospital site	1993 120 (30) 2003 21 [1] 2008 21	Moderate	Recreation

Pop. No. & Location	Land Status	Year/No. plants	Current Condition	Threats
16b Westonia	Shire Road Reserve	2005 6 2008 6	Healthy	Road maintenance, farming operations-grazing & fence maintenance, weeds
17a NW of Nungarin	Shire Road Reserve	1993 1 1995 1 2008 1	Moderate	Road maintenance
17b NW of Nungarin	Shire Road Reserve	1993 1 1995 1 2008 1	Moderate	Road maintenance
18 NW of Westonia	Shire Road Reserve	1994 2 2006 1 2008 1	Poor	Road maintenance – grading and spoon drain maintenance
19 NW of Westonia	Shire Road Reserve	1994 1 1999 0 2008 0	Moderate	Farm maintenance-grazing & fence maintenance, road maintenance, weeds
20 NW of Westonia	Shire Road Reserve	1994 1 2006 0 2008 0	Moderate	Farm maintenance-grazing & fence maintenance, road maintenance, weeds
21 NW of Westonia	Private Property	1996 1 2008 3	Moderate	Farm operations-grazing
22 E of Kalannie	Main Roads WA reserve	2001 13 2008 13	Moderate	Road maintenance, weeds
23 NW of Westonia	Shire Reserve and Mining Lease	2003 441 2004 426 [15 removed] 2008 1133	Healthy	Mining
24 N of Westonia	Shire Reserve	2005 571 2006 509 [62] 2008 ?	Healthy	Weeds and annual grasses
25 N of Westonia	Shire Road Reserve	2008 1	Moderate	Road works, weeds
26 N of Westonia	Private Property	2008 5	Healthy	Weeds

Populations in **bold text** are considered to be Important Populations, Note: * = total for all subpopulations, ( ) = number of seedlings, [ ] = number dead

Guide for decision-makers

The above table provides details of current and possible future threats. Proposed actions in the immediate vicinity of populations or within the defined habitat critical to the survival of *Eremophila resinosa* require assessment for the potential for a significant level of impact.

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

Given that *Eremophila resinosa* is ranked as Endangered, but is known from 24 locations, some of which have few or no recently recorded plants, it is considered that all known habitat for extant wild and translocated populations is critical to the survival of the species, and that extant wild and translocated populations are important populations. Important populations, which also contain habitat critical to the survival of the species, are identified in the above table. Populations not considered important are 7, 8, 19 and 20 which have not recently had any extant plants recorded. Habitat critical to the survival of *E. resinosa* includes the area of occupancy of extant populations, areas of similar habitat (i.e. sandy loams, clays, and loams supporting open mallee woodland with mixed *Acacia* scrub understorey) surrounding important populations (this is necessary to provide habitat for pollinators and future population expansion) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat for *Eremophila resinosa* will also improve the status of associated vegetation. One other threatened flora species is located in the area of

Eremophila resinosa (see table below).

Conservation-listed flora species occurring in habitat of *Eremophila resinosa*

Species name	Conservation Status (Western Australia)	Conservation Status (EPBC Act)
Cyphanthera odgersii subsp. *occidentalis*	DRF, Critically Endangered	Endangered

DRF – Declared Rare Flora.

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. *Eremophila resinosa* is not listed under any specific international treaty however, and therefore this Interim Recovery Plan does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

The Department of Indigenous Affairs Aboriginal Heritage Sites Register lists no sites of Aboriginal significance at or near populations of the species 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 species, opportunities may exist through cultural interpretation and awareness of the species.

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 impact

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as some populations of *Eremophila resinosa* occur on, or adjacent to, private property the protection of them may potentially affect farming activities. Populations on road and rail reserves, and mining tenements, will require protection during management activities, and hence the occurrence of *Eremophila resinosa* in those areas may have an impact on those land managers. Actions will involve continued liaison and cooperation with all stakeholders with regard to these areas.

Affected interests

Stakeholders potentially affected by the implementation of this plan include the Shires of Westonia, Mukinbudin, Nungarin, Koorda and Mt Marshall, Main Roads WA, WestNet Rail and owners of private property.

Evaluation of the plan's performance

The Department of Environment and Conservation (DEC), in conjunction with the Yilgarn District Threatened Flora Recovery Team (YDTFRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed within five years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this IRP 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.

Criteria for success: The number of populations have increased and/or the number of mature individuals have increased by ten percent or more over the five year term of the plan.
Criteria for failure: The number of populations have decreased and/or the number of mature individuals have decreased by ten percent or more over the five year term of the plan.

3. RECOVERY ACTIONS

Completed recovery actions

Land managers, including private landowners, the Shires of Westonia, Wyalkatchem, Mukinbudin, Nungarin and Koorda, Main Roads WA and WestNet Rail have been made aware of the threatened nature of the species, its location and their legal obligations to protect it.

Declared Rare Flora (DRF) markers have been placed at most road verge populations.

In 2004 expanded operations at Westonia Mines necessitated the taking of five *Eremophila resinosa*. Cuttings and seed collected were used to establish a translocated population.

In January 1997 and 2004 the BGPA collected seed from six populations of *Eremophila resinosa* and currently hold 275.5g of seed in their seed store. DEC's TFSC have 2774 seeds collected from Populations 3, 12, 14, 23 and Subpopulation 16a.

Car bodies dumped on a Shire Reserve occupied by Subpopulation 16a have been removed and measures taken to restrict vehicle access.

Ongoing and future recovery actions

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

Staff from DEC's Yilgarn District office monitor all populations.

Where recovery actions are implemented on lands other than those managed by DEC, permission has been or will be sought from the appropriate land managers prior to actions being undertaken. The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the plan. 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 YDTFRT is coordinating the implementation of recovery actions for *Eremophila resinosa* and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: The YDTFRT

Cost: $1,600 per year

2. Conduct further surveys

Expanded surveys of remnant bushland in the area of existing populations is recommended. It is suggested that surveys be conducted with the help of volunteers from the local community, wildflower societies and naturalist clubs during the species' flowering period between October and November.

Action: Conduct further surveys
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $1,900 in year 2 and 3

3. Liaise with land managers

Staff from DEC's Yilgarn District will continue to liaise with appropriate land owners and managers to ensure that populations are not accidentaly damaged or destroyed. Input and involvement will also be sought from Aboriginal groups that have an active interest in areas that are habitat for *Eremophila resinosa*.

Action: Liaise with land managers
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $1,200 per year

4. Install DRF markers

Declared Rare Flora (DRF) markers are required at Populations 6 and 7 and at Subpopulations 1a, 2a-c, 4ab and 14a .

Action: Install DRF Markers
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $3,300 in the first year

5. Conduct further translocations

Translocation has been deemed desirable for the conservation of this species as surveys have failed to locate any substantial new populations and many existing populations are small and on narrow road reserves or in areas subject to mining. In 2004 Westonia Mining Ltd. developed a translocation proposal and 321 plants were subsequently raised by the Botanic Gardens and Parks Authority (BGPA) and planted into the translocation area. In winter 2005 a further 257 plants were raised by BGPA and planted in the same area. As at 2006 the translocated population numbered 509 individuals. Further supplementary translocation will be conducted during the timeframe of this plan.

Information on the translocation of threatened plants and animals in the wild is provided in DEC's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995), and follow the national translocation protocols (Vallee et al., 2004). All translocation proposals require endorsement by DEC's Director of Nature Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action: Conduct further translocations
Responsibility: DEC (Yilgarn District) and BGPA through the YDTFRT
Cost: $2,500 in years 3 and 5

6. Monitor populations

Monitoring of weed encroachment, habitat degradation, population stability (expansion or decline), pollination activity, seed production, recruitment, and longevity is essential.

Action: Monitor populations
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $1,400 in years 1,3,and 5.

7. Undertake weed control

As weeds are a major threat to several populations, the following actions will be implemented.

1. Select appropriate herbicides after determining which weeds are present.
2. Control invasive weeds by hand removal or spot spraying around *Eremophila resinosa* plants when weeds first emerge.
3. Schedule weed control to include spraying at other threatened flora populations within the district.

The tolerance of associated native plant species to herbicides at the site of *Eremophila resinosa* is not known and weed control programs will be undertaken in conjunction with research.

Action: Undertake weed control
Responsibility: DEC (Yilgarn District, Science Division) through the YDTFRT
Cost: $1,500 per year

8. Fencing

Population 7 on Private Property requires an extension of protective fencing.

Action: Fencing
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $600 in the first year

9. Obtain biological and ecological information

Research designed to increase understanding of the biology and ecology of the species will provide a scientific base for management of *Eremophila resinosa* in the wild. Research will include:

1. Pollination biology of the species and the requirements of pollinators.
2. Seed dispersal mechanisms.
3. Role of disturbance in reproduction of *E. resinosa*.
4. Response of *E. resinosa* to fire intensity and frequency.
5. Response of *E. resinosa* to applications of various herbicides.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Yilgarn District) through the YDTFRT
Cost: $7,500 in years 2 and 3.

10. Collect and store seed

Collection of seed is essential to guard against extinction if wild populations are lost. Some seed has been collected and stored by DEC's TFSC and the BGPA, however additional collections should be made from a wider range of populations. The "Germplasm Conservation Guidelines for Australia" produced by the

Australian Network for Plant Conservation (ANPC) should be used to guide this process (Offord & Meagher 2009).

Actions: Collect and store seed
Responsibility: DEC (Yilgarn District, TFSC), and BGPA through the YDTFRT
Cost: $2,300 in years 1, 3 and 5.

11. Promote awareness

The importance of biodiversity conservation and the protection of *Eremophila resinosa* will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media and by setting up poster displays. An A4 sized information sheet, which includes a description of the plant, its habitat type, status, threats, management actions and photos, will be developed for *Eremophila resinosa* and distributed to local land owners, relevant authorities and volunteer organizations, libraries and schools. Formal links with local naturalist groups and interested individuals are encouraged. It is hoped that these actions will result in the discovery of new populations.

Action: Promote awareness
Responsibility: DEC (Yilgarn District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the YDTFRT
Cost: $1,600 in the first year, $1,000 in years 3 and 5.

12. Map habitat critical to the survival of *Eremophila resinosa*

Although habitat critical to the survival of the species is mentioned in Section 1, the areas described have not been fully mapped and this will be addressed under this action. If additional populations are located, habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of *Eremophila resinosa*
Responsibility: DEC (Yilgarn District) through the YDTFRT
Cost: $2,000 in the first year

12. Review the plan and need for further recovery actions

At the end of its five-year term this IRP will be reviewed and the need for further recovery actions assessed.

Action: Review the need for further recovery actions
Responsibility: DEC (Yilgarn District, Species and Communities Branch) through the YDTFRT
Cost: $1,500 in the fourth year.

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	YDTFRT	Ongoing
Conduct further surveys	High	DEC (Yilgarn District) through the YDTFRT	2011
Liaise with relevant land managers	High	DEC (Yilgarn District) through the YDTFRT	Ongoing
Install DRF markers	High	DEC (Yilgarn District) through the YDTFRT	2009
Conduct further translocations	High	DEC (Yilgarn District) and BGPA through the YDTFRT	
Monitor populations	High	DEC (Yilgarn District) through the YDTFRT	Ongoing
Undertake weed control	High	DEC (Yilgarn District, Science Division) through the YDTFRT	Ongoing
Fencing	Medium	DEC (Yilgarn District) through the YDTFRT	2009
Obtain biological and ecological information	Medium	DEC (Science Division, Yilgarn District) through the YDTFRT	2011

Collect and store seed	Medium	DEC (Yilgarn District, TFSC), and BGPA through the YDTFRT	2013
Promote awareness	Medium	DEC (Yilgarn District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the YDTFRT	2013
Map habitat critical to the survival of *Eremophila resinosa*	Medium	DEC (Yilgarn District) through the YDTFRT	2009
Review the plan and need for further recovery actions	Medium	DEC (Yilgarn District, Species and Communities Branch) through the YDTFRT	2013

4. TERM OF PLAN

Western Australia

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If *Eremophila resinosa* is still ranked EN after five years, this IRP will be reviewed and, if necessary, further recovery actions put in place.

Commonwealth

In accordance with the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* this adopted recovery plan will remain in force until revoked.

The recovery plan must be reviewed at intervals of not longer than five years.

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6. TAXONOMIC DESCRIPTION

Excerpt from: Bentham, G. (1870). *Flora Australiensis: A description of the plants of the Australian Territory*. London, L. Reeve and Co. 5: 11-12; Ewart, A.J., White, J. and Tovey, J.R. (1908). Contributions to the flora of Australia. *Journal and Proceedings of the Royal Society of New South Wales*. 42: 186-187 and; Brown, A. (2005). *The Eremophila of Western Australia*. In Press.

Spreading *shrub* 40-80 cm tall, 60-100 cm wide. *Branches* densely covered in short white tomentum (short woolly hairs) and sprinkled with resinous tubercles. *Leaves* 4-8 mm long by 2-3 mm wide; alternate, obovate, obtuse with a minute point, rather thick, flat, hoary with stellate hairs on both sides. *Peduncles* axillary, solitary, exceedingly short. *Calyx-segments*, linear-lanceolate. *Corolla* 15 mm long, funnel-shaped, the tube scarcely exceeding the calyx, the throat dilated with 5 free lobes, each 5 mm long, all pointed, the upper ones recurved, the lower ones spreading, all sprinkled outside with stellate tomentum; *throat* covered in long sparse hairs with a ring of numerous hairs occurring at the base. *Flowers* blue or purple, spotted inside; when young corolla is white. Four *stamens* not exceeding the length of the corolla. *Ovary* densely tomentose, 4 celled, with 1 ovule in each cell.

SUMMARY OF RECOVERY ACTIONS AND COSTS

	Year 1			Year 2			Year 3			Year 4			Year 5		
Recovery action	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.
Coordinate recovery actions	1,000	500	100	1,000	500	100	1,000	500	100	1,000	500	100	1,000	500	100
Conduct further surveys				1,300	300	300	1,300	300	300						
Liaise with relevant managers	800		400	800		400	800		400	800		400	800		400
Install / Replace DRF markers			3,300												
Conduct further translocations							1000	5000					1000	5000	
Monitor populations	800	300	300				800	300	300				800	300	300
Fence populations	500		100												
Undertake weed control and follow up with regular monitoring and additional control if required	800	500	200	800	500	200	800	500	200	800	500	200	800	500	200
Obtain biological and ecological information				1,000	2,500	4,000	1,000	2,500	4,000						
Collect seed and other material to preserve genetic diversity	1,300		1,000				1,300		1,000				1,300		1,000
Promote awareness	1,000		600						1,000						1,000
Map habitat critical to the survival of *Eremophila resinosa*.	1,300		700												
Review the need for further recovery actions										1,500					
Total	7,500	1,300	6,700	4,900	3,800	5,000	8,000	9,100	7,300	4,100	1,000	700	5,700	6,300	3,000
Yearly Total		**15,500**			**13,700**			**24,400**			**5,800**			**15,000**	

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

Total DEC: $ 30,200
Total Other: $ 21,500
Total External Funding: $ 22,700
Total Costs: $ 74,400