Department of Parks and Wildlife

Interim Recovery Plan No. **366**

Eremophila microtheca subsp. narrow leaves (J.D.Start D12-150)

Interim Recovery Plan

2016–2021

Department of Parks and Wildlife, Western Australia

November 2016

List of Acronyms

The following acronyms are used in this plan:

BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
CCWA	Conservation Commission of Western Australia
CFF	Conservation of Flora and Fauna
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs
DPaW	Department of Parks and Wildlife
DRF	Declared Rare Flora
EPBC	Environment Protection and Biodiversity Conservation
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
MDTFRT	Moora District Threatened Flora Recovery Team
MRWA	Main Roads Western Australia
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
SCB	Species and Communities Branch
SWALSC	South West Aboriginal Land and Sea Council
TFSC	Threatened Flora Seed Centre
TPFL	Threatened and Priority Flora System
TSSC	Threatened Species Scientific Committee
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
WA	Western Australia

Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015*a*) and Department of Parks and Wildlife Corporate Guideline No. 35 (DPaW 2015*b*). Plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened flora, fauna and ecological communities, and begin the recovery process.

Parks and Wildlife is committed to ensuring that threatened flora 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) flora, always within one year of endorsement of that rank by the Minister.

This plan will operate from November 2016 to October 2021 but will remain in force until withdrawn or replaced. It is intended that if *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) is still listed as Threatened in Western Australia following 5 years of implementation this plan will be reviewed and the need for further recovery actions assessed.

This plan was given regional approval on 8 August 2016 and was approved by the Director of Science and Conservation on 23 November 2016. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting the Department of Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at November 2016.

Plan preparation: This plan was prepared by:

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Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information and Wildlife Species and Communities Branch staff for assistance.

Cover photograph by Joan and Joff Start.

Citation: This plan should be cited as: Department of Parks and Wildlife (2016) *Eremophila microtheca* subsp. narrow leaves Interim Recovery Plan 2016–2021. Interim Recovery Plan No. 366. Department of Parks and Wildlife, Western Australia.

Summary

Scientific name:	*Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150)	**Shire:**	Carnamah
Family:	Scrophulariaceae	**NRM region:**	Northern Agricultural
Common name:	None	**IBRA region:**	Geraldton Sandplains
Flowering period:	July–September	**IBRA subregion:**	Lesueur Sandplain GES02
DPaW region:	Midwest	**Recovery team:**	Moora District Threatened Flora Recovery Team
DPaW district:	Moora		

Distribution and habitat: *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) is currently known from a small area southwest of Eneabba, growing in slightly saline, pale brown sandy-clay on the margins of winter-wet flats and lakes. Associated species include *Acacia saligna*, *Casuarina obesa* and *Melaleuca rhaphiophylla*.

Habitat critical to the survival of the subspecies, and important populations: It is considered that all known habitat for wild populations is critical to the survival of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150), and that all wild populations are important populations. Habitat critical to the survival of the subspecies includes the area of occupancy of populations and areas of similar habitat surrounding and/or linking populations (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the subspecies or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Conservation status: *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B1ab(ii,iii,v)+2ab(ii,iii,v) due to its extent of occurrence estimated to be less than 100km^2; it being found at a single location; there being continuing decline in area, extent and quality of habitat, and number of mature individuals; and its area of occupancy estimated to be less than 10km^2. The subspecies is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: The main threats to *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) are periodic flooding, road and fence maintenance, farming practices, weeds, changed fire regimes, poor recruitment and low genetic diversity.

Existing recovery actions: The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. Land owners and land managers have been made aware of the subspecies and its location and their legal obligations in regards to its protection.
1. Declared Rare Flora (DRF) markers have been installed at Subpopulation 1a.
2. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to Shires and other organisations.
3. Following a land swap for the location containing Subpopulation 1b, the area was added to Lake Logue Nature Reserve.
4. The subspecies has been extensively surveyed for in areas of suitable habitat.
5. 3,763 fruits collected from Population 1 are stored at the Threatened Flora Seed Centre (TFSC).
6. Monitoring has been carried out opportunistically.
7. Global Positioning System (GPS) locations of all populations have been recorded in Geographic Information System databases at Moora District and Species and Communities Branch.

Plan objective: The objective of this plan is to abate identified threats and maintain or enhance extant populations to ensure the long-term conservation of the subspecies in the wild.

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following take place.

- No important populations have been lost and the number of mature plants within those populations has remained within a 15% range or has increased by >15% over the term of the plan from 82 to 94 or more; or
- New populations have been found, increasing the number of known populations from two to three or more over the term of the plan with no net loss of mature plants; or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following take place.

- Important populations have been lost; or
- The number of mature plants in important populations has decreased by >15% from 82 to 70 or less; or
- The area of occupancy has decreased by >10% over the term of the plan with a loss of mature plants.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Undertake weed control
4. Fence population
5. Develop and implement a translocation proposal
6. Replace DRF markers
7. Undertake regeneration trials
8. Collect and store seed
9. Rehabilitate habitat in flood damaged areas
10. Obtain biological and ecological information
11. Undertake surveys
12. Develop and implement a fire management strategy
13. Ensure long-term protection of habitat
14. Liaise with land managers and Aboriginal communities
15. Promote awareness
16. Map habitat critical to the survival of the subspecies
17. Review this plan and prepare a revised plan if necessary

1. Background

History

Eremophila microtheca was described as a species of *Pholidia* by Ferdinand von Mueller in 1870 from specimens collected at Port Gregory and Murchison River by Augustus Oldfield. It was later placed in *Eremophila* by Mueller. The species was listed as threatened (specially protected) flora under the Western Australian *Wildlife Conservation Act 1950* in July 1982 but, following the discovery of 10,000 plus plants in Kalbarri National Park in 1993, was delisted in 2000. It occurs in two disjunct areas - between Kalbarri and Port Gregory and 265km to the south near Lake Logue.

In 2004, the Western Australian Threatened Species Scientific Committee (TSSC) recommended that samples be collected from the Kalbarri and Lake Logue areas to see if there were any genetic differences between the plants at the two locations. Molecular studies (Llorens *et al*. 2015) showed that plants in the Lake Logue area were genetically divergent from those found in the Kalbarri area. As the Kalbarri taxon represents the type of the species, the Lake Logue taxon was provided the phrase name *Eremophila microtheca* subsp. narrow leaves (J.D. Start D12-150) in December 2013.

Eremophila microtheca subsp. narrow leaves (J.D. Start D12-150) is known from two extant populations (these may have been one population prior to clearing). Flooding in 1999 caused a substantial decline in Population 1 and just 66 plants were located in November 2013. Population 2 has declined from 10,000 mature plants in 1992 to just 16 plants in January 2014. The subspecies was listed as threatened flora on 2 December 2014.

Description

Eremophila microtheca subsp. narrow leaves (J.D. Start D12-150) is an erect heath-like shrub, 70cm to 1.6m high. The branches are finely stellate-pubescent, except for some glabrous resinous bands extending down below leaf bases. The leaves are 6 to 12mm (rarely 5 to 18mm) long by 0.5 to 1mm wide, erect to spreading, linear, and grey-green. There is one flower per axil. The pedicel is 3 to 6mm long, terete, and sparsely stellate-pubescent. There are five sepals which are 4 to 6mm by 0.5 to 1.5mm, lanceolate, attenuate, and the outer surface sparsely to densely stellate-pubescent. The corolla is 10 to 15mm long. The outside of the tube is glabrous and pale lilac, while the inside of tube is white, lilac spotted, and glabrous, except for scattered villous hairs extending down from medial lobe of lower lip. The four stamens are glabrous. The style and ovary are glabrous. The ovary is ovoid, four-locular with one ovule per locule. The fruit is 3 to 4mm by 2 to 2.5mm, dry, and ovoid-conical (A. Brown pers. comm.).

Eremophila microtheca subsp. narrow leaves (J.D. Start D12-150) differs morphologically from the typical subspecies in having narrower, more or less terete leaves 0.5 to 1mm wide (1.5 to 2mm wide on the typical subspecies). The leaves are also consistently longer, usually between 6 to 12mm (rarely 5 to 18mm) as opposed to 3 to 6mm (rarely 2 to 10mm) (A. Brown pers. comm.). Flowering is between July and September.

Illustrations and/or further information

Brown, A. and Buirchell, B. (2011) A field guide to the Eremophilas of Western Australia. Simon Nevill Publications, Western Australia; Chinnock, R.J. (2007) *Eremophila* and Allied Genera. A Monograph of the plant family Myoporaceae. Rosenberg Publishing Pty Ltd, New South Wales; Western Australian Herbarium (1998–) FloraBase- the Western Australian Flora. Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au/.

Distribution and habitat

Eremophila microtheca subsp. narrow leaves (J.D. Start D12-150) is currently known from a small area south of Lake Logue. The area of occupancy is 0.052km^2 and the extent of occurrence is 0.60km^2. The subspecies grows in slightly saline, pale brown sandy-clay on the margins of winter-wet flats and lakes. Associated species include *Acacia saligna*, *Casuarina obesa* and *Melaleuca rhaphiophylla*.

Table 1. Summary of population land vesting, purpose and manager

TPFL population number & location	DPaW district	Shire	Vesting	Purpose	Manager
1a. SW of Eneabba	Moora	Carnamah	MRWA	Road reserve	MRWA
1b. SW of Eneabba	Moora	Carnamah	CCWA	Nature reserve	Parks and Wildlife
1e. SW of Eneabba	Moora	Carnamah	Private property	Freehold	Landowners
2. SW of Eneabba	Moora	Carnamah	Private property	Freehold	Landowners

Biology and ecology

Molecular studies conducted by Science and Conservation Division (Llorens *et al*. 2015) using nine microsatellite markers showed the Lake Logue populations (subsp. narrow leaves) to be genetically divergent from the Kalbarri populations (subsp. *microtheca*). Plants in the two Kalbarri populations were moderately differentiated from each other, but were extremely differentiated from the Lake Logue populations (F_{ST} = 0.301–0.383; D_{est} = 0.756–0.774; P<0.001). Results from several other statistical methods also supported these results in showing a clear divergence in the two forms of *E. microtheca*.

Eremophila microtheca subsp. narrow leaves (J.D. Start D12-150) flowers are insect pollinated with resulting seed held in fleshy fruits that dry out, becoming hard and woody. Vegetative reproduction is unknown. The subspecies is thought to be a relatively short-lived disturbance opportunist, germinating from soil-stored seed following fire or light soil disturbance and senescing sometime following maturity.

Within the road reserve population, genetic diversity is relatively low (H_e= 0.376) (Llorens *et al*. 2015). This places *Eremophila microtheca* subsp. narrow leaves (J.D. Start D12-150) at risk of inbreeding and its associated effects, and demographic failure if there is a lack of compatible mates. Genetic material used in translocations should be collected from as many of the existing plants as possible so as to maximise the genetic diversity of any new or augmented population. All genetic material should be sourced from within the existing populations and should not be supplemented with material from the typical subspecies, which is substantially different genetically (Brown and Llorens 2014).

Conservation status

Eremophila microtheca subsp. narrow leaves (J.D.Start D12-150) was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B1ab(ii,iii,v)+2ab(ii,iii,v) due to its extent of occurrence estimated to be less than 100km^2; it being found at a single location; there being continuing decline in area, extent and quality of habitat, and number of mature individuals; and its area of occupancy estimated to be less than 10km^2. The subspecies is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats

- **Flooding.** Flooding following substantial summer rainfall in 1999 led to significant plant deaths at both populations. Population 2 in particular declined from over 10,000 plants in 1992 to 16 plants in 2014.
- **Road and fence line maintenance.** Subpopulation 1a is located on a road reserve and threats include grading, chemical spraying, construction of drainage channels and the slashing of roadside vegetation. Plants that occur along the boundary of a private property are threatened by fence maintenance.
- **Farming practices.** The habitat of Population 2 was subject to scrub-rolling and grazing by stock prior to being fenced. This fence has fallen into disrepair allowing stock entry.
- **Weed invasion.** The habitat of Population 2 comprises mostly introduced grasses. Weeds suppress early plant growth by competing with germinants for soil moisture, nutrients and light. They also increase the fire hazard due to the high fuel loads that are produced annually by many grass weed species. Slashing of road verges also promotes weeds.
- **Inappropriate fire regimes.** The subspecies is relatively short-lived and requires infrequent fire to stimulate germination of soil-stored seed. Frequent fire however may result in a reduced seed bank if it occurs before plants reach maturity. Fire should therefore occur at appropriate intervals between germination events.
- **Poor recruitment.** Both populations of the subspecies are showing little natural recruitment with many plants senescing.
- **Low genetic diversity.** The subspecies has relatively low genetic diversity which places it at risk of inbreeding.

The intent of this plan is to provide actions that will mitigate immediate threats to *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150). Although climate change and drought may have a long-term effect on the subspecies, actions taken directly to prevent their impact are beyond the scope of this plan.

Table 2. Summary of population information and threats

TPFL population number & location	Land status	Year/no. mature plants		Condition		Threats
				Plants	Habitat	
1a. SW of Eneabba	Road reserve	1986 1990 1991 1992 1993 1999-2002 2003 2013	26 20 12 12 5 0 42 (30) 65	Healthy	Degraded	Road and fence maintenance, weeds, flooding, fire, poor recruitment, low genetic diversity
1b. SW of Eneabba	Nature reserve	1985 1990 1992 1996 1999-2003 2013	22 11 20 20 0 1	Healthy	Good	Poor recruitment, low genetic diversity, flooding, fire, weeds
1e. SW of Eneabba	Private property	1985	20			Subpopulation likely extinct
2. SW of Eneabba	Private property	1992 2003 2014	10,000 [200] 7 [200] 16	Moderate	Poor	Flooding, clearing, grazing, weeds, fire, poor recruitment, low genetic diversity

Note: Populations in **bold text** are considered to be important populations; Subpopulations 1d and 1c have been merged with other subpopulations; ( ) = number of seedlings/juveniles; [ ] = number dead.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) may require assessment.

Actions that result in any of the following may potentially have a significant impact on the subspecies:

- Damage or destruction of occupied or potential habitat
- Alteration of the local surface hydrology or drainage
- Reduction in population size
- A major increase in disturbance in the vicinity of a population.

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

Eremophila microtheca subsp. narrow leaves (J.D.Start D12-150) is ranked as CR in Western Australia and it is considered that all known habitat for wild populations is critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of the subspecies includes the area of occupancy of populations and areas of similar habitat surrounding populations (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the subspecies or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) will also benefit the Priority flora listed in the table below.

Table 3. Conservation-listed flora species occurring within 500m of *Eremophila microtheca* subsp. narrow leaves

Species name	Conservation status (WA)	Conservation status (EPBC Act 1999)
Korthalsella arthroclada	Priority 1	-
Acacia telmica	Priority 3	-
Banksia elegans	Priority 4	-
Calytrix chrysantha	Priority 4	-

For a description of conservation codes for Western Australian flora and fauna see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf.

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 microtheca* subsp. narrow leaves (J.D.Start D12-150) is not listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), and this plan does not affect Australia's obligations under any other international agreements.

Aboriginal consultation

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed that there were no sites of Aboriginal significance adjacent to populations of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150). However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and DAA to determine if there are any issues or interests with respect to management for this subspecies. Indigenous opportunity for future involvement in the implementation of the plan is included as an action in the plan. Aboriginal involvement in management of land covered by an agreement under the *Conservation and Land Management Act 1984* is also provided for under the joint management arrangements in that Act, and will apply if an agreement is established over any reserved lands on which this subspecies occurs.

Social and economic impacts

Management practices carried out on private land adjacent to populations of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) may require modification. It is likely that protecting the subspecies will also impact on road maintenance in the vicinity of Subpopulation 1a which is on a road reserve managed by the Shire of Carnamah. Recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Affected interests

Affected interests include private landholders and the Shire of Carnamah.

Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Moora District Threatened Flora Recovery Team (MDTFRT), will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

2. Recovery objective and criteria

Plan objective

The objective of this plan is to abate identified threats and maintain or enhance extant populations to ensure the long-term conservation of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) in the wild.

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following take place.

- No important populations have been lost and the number of mature plants within those populations has remained within a 15% range or has increased by >15% over the term of the plan from 82 to 94 or more or
- New populations have been found, increasing the number of known populations from two to three or more over the term of the plan with no net loss of mature plants or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following take place.

- Important populations have been lost or
- The number of mature plants in important populations has decreased by >15% from 82 to 70 or less or
- The area of occupancy has decreased by >10% or more over the term of the plan with a net loss of mature plants.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with assistance from the MDTFRT is overseeing the implementation of recovery actions for *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150).

Landholders and land managers have been notified of the location and threatened status of the subspecies and their legal responsibility to protect it.

Declared Rare Flora (DRF) markers have been installed at Subpopulation 1a. These alert people to the presence of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) and the need to avoid work that may damage the subspecies or its habitat. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to the Shire and other organisations.

The habitat containing Subpopulation 1b has been added to Lake Logue Nature Reserve.

Surveys for *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) include:

- Surveys by Parks and Wildlife staff between 1984 and 2014.
- Surveys by Joff Start (volunteer) in September 2013.
- Surveys by Luke Sweedman from the Botanic Gardens and Parks Authority (BGPA) in 1994.
- Survey by Sue Patrick and Andrew Brown during the preparation of Wildlife Management Programs No. 26 "*Declared Rare and Poorly Known Flora in the Geraldton District*" (Patrick 2001) and Wildlife Management Program No. 28 "*Declared Rare and Poorly Known Flora in the Moora District*" (Patrick and Brown 2001).

No new populations were located during these surveys.

Some 3,763 fruits of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) collected from Population 1 are stored at the Threatened Flora Seed Centre (TFSC) at –20°C.

Table 4. TFSC seed collection details for *Eremophila microtheca* subsp. narrow leaves

Accession number	Date collected	TPFL population number	Type	Seed in storage	Estimated germinable seed
00428	23/02/1997	1	I/10	2,400 fruit	1,541
01371	15/12/2003	1	B/?	1,363 fruit	Not yet tested

Note: 'I' = a collection of individuals and the number of plants collected; 'B' = a bulked collection and the number of plants sampled.

Global Positioning System (GPS) locations of all populations have been recorded in Geographic Information System databases at Moora District and Species and Communities Branch (SCB).

Future recovery actions

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 recovery action if funding is available and other opportunities arise. Where these recovery actions are implemented on lands other than those managed by Parks and Wildlife, permission has been or will be sought from the appropriate land managers prior to actions being undertaken.

1. Coordinate recovery actions

Parks and Wildlife with assistance from the MDTFRT will coordinate the implementation of this plan and include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Moora District), with assistance from the MDTFRT
Cost:	$8,000 per year

2. Monitor populations

Monitoring of populations and their habitat should be undertaken to identify trends or potential management requirements. Population monitoring should record the health and expansion or decline in the population, and other observations such as pollinator activity or seed production. Site monitoring should include observations of grazing, habitat degradation including weed invasion, and hydrological status (inundation and drought). Specific monitoring of hydrology and activities relating to research into the biology and ecology of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) are included in other recovery actions detailed below.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Moora District), with assistance from the MDTFRT
Cost:	$8,000 per year

3. Fence population

The fence currently erected around Population 2 is degraded and, as plants are being subject to grazing and damage by livestock, should be replaced.

Action:	Fence Populations
Responsibility:	Parks and Wildlife (Moora District), land manager
Cost:	$10,000 in year 1

4. Undertake weed control

Weeds are a threat to *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) and the following actions should be implemented:

1. Determine which weeds are present and map them.
2. Select appropriate control technique; herbicide, mowing/slashing or hand weeding.

3. Control invasive weeds by hand removal and/or spot spraying when weeds first emerge.
4. Monitor the success of the treatment on weed death, and the tolerance of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) and associated native plant species to the treatment.
5. Report on the method and success of the treatment.
6. Revegetate with local native plant species (in autumn) to maintain low weed levels.

Note: it is important that road verge mowing/slashing practices are examined and reviewed so that they do not continue a cycle that promotes weeds in the vicinity of populations.

Action:	Undertake weed control
Responsibility:	Parks and Wildlife (Moora District)
Cost:	$10,000 per year, as required

5. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) if natural populations decline.

Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015*a*), Parks and Wildlife Corporate Guideline No. 36 (DPaW 2015*c*) and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al*. 2004). The 2004 guidelines state that a translocation may be needed when a species is represented by few populations and the creation of additional self-sustaining, secure populations may decrease its susceptibility to catastrophic events and environmental stochasticity. For small populations which may be declining in size or subject to high levels of inbreeding, successful population enhancement may increase population stability and hence long-term viability. Translocation is not an alternative to *in situ* conservation and is not a suitable ameliorative, compensatory, or mitigating measure for development and should be considered as a last resort when all other options are deemed inappropriate or have failed (Vallee *et al*. 2004).

Depending on the characteristics of the species, Vallee *et al*. (2004) suggest a minimum viable population size estimated between 50 and 2,500 individuals will be required. Suitable translocation sites may include where the taxon occurs, where it was known to have occurred historically and other areas that have similar habitat (soil, associated vegetation type and structure, aspect etc.), within the known range of the taxon (Vallee *et al*. 2004).

All translocation proposals require endorsement by the Department's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action:	Develop and implement a translocation proposal
Responsibility:	Parks and Wildlife (Science and Conservation Division, Moora District), BGPA
Cost:	$42,000 in years 1 and 2; and $26,500 in subsequent years as required

6. Replace DRF markers

The old DRF markers at Subpopulation 1a require replacement.

Action:	Replace DRF markers
Responsibility:	Parks and Wildlife (Moora District), MRWA
Cost:	$4,000 in year 1

7. Undertake regeneration trials

Different disturbance techniques should be investigated (i.e. soil disturbance and fire) to determine the most effective means of germinating *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) seed in the wild.

Action:	Undertake regeneration trials
Responsibility:	Parks and Wildlife (Science and Conservation Division, Moora District)
Cost:	$10,000 in years 1 and 3, $4,000 in years 2, 4 and 5

8. Collect and store seed

To guard against the extinction of natural populations of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) it is recommended that seed be collected and stored at the Parks and Wildlife TFSC. Collections should aim to sample and preserve the maximum range of genetic diversity possible by collecting from the widest range of reproductive plants.

Action:	Collect and store seed
Responsibility:	Parks and Wildlife (Moora District, TFSC)
Cost:	$5,000 per year

9. Rehabilitate habitat in flood damaged areas

Flood damaged habitat of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) should be rehabilitated by introducing local native plant species.

Action:	Rehabilitate habitat in flood damaged areas
Responsibility:	Parks and Wildlife (Moora District), land managers
Cost:	$20,000 in years 1, 3 and 5

10. Obtain biological and ecological information

Research on the biology and ecology of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) should include:

1. Identification of pollinators and their habitat requirements.
2. Soil seed bank dynamics.
3. Seed viability.
4. Conditions necessary for natural germination.

5. Response to disturbance, competition, drought, inundation and grazing.
6. Longevity of plants, time taken to reach maturity, and minimum viable population size.
7. The impact of changes in hydrology.

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (Science and Conservation Division, Moora District)
Cost:	$50,000 in years 1–3

11. Undertake surveys

Further surveys should be undertaken in areas of potentially suitable habitat with all surveyed areas recorded and the presence or absence of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) documented to improve survey efficiency and prevent duplication of effort. Where feasible, volunteers will be encouraged to participate.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Moora District), with assistance from the MDTFRT and volunteers
Cost:	$10,000 per year

12. Develop and implement a fire management strategy

A fire management strategy which includes recommendations on fire frequency, intensity and seasonality, precautions to prevent wildfire and strategies for reacting to wildfire, and the need, method of construction and maintenance of firebreaks will be developed in consultation with land managers and implemented if necessary. Fire, where possible, will be prevented from occurring in the habitat of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) populations, except where it is being used as a recovery tool.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Moora District)
Cost:	$10,000 in year 1, and $6,000 in years 2–5

13. Ensure long-term protection of habitat

Possible methods of achieving the long-term conservation of Population 2 include covenanting and land purchase.

Action:	Ensure long-term protection of habitat
Responsibility:	Parks and Wildlife (Moora District, SCB), land managers
Cost:	$4,000 per year

14. Liaise with land managers and Aboriginal communities

Staff from Parks and Wildlife Moora District will liaise with land managers to ensure that populations of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) are not accidentaly damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the subspecies. Aboriginal consultation will take place to determine if there are any issues or interests in areas that are habitat for the subspecies.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Moora District)
Cost:	$4,000 per year

15. Promote awareness

The importance of biodiversity conservation and the protection of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) will be promoted through the print and electronic media and by setting up poster displays. Formal links with naturalist groups and other interested individuals will also be encouraged.

Action:	Promote awareness
Responsibility:	Parks and Wildlife (Moora District, SCB, Public Information and Corporate Affairs (PICA)), with assistance from the MDTFRT
Cost:	$7,000 in years 1 and 2; $5,000 in years 3–5

16. Map habitat critical to the survival of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150)

Although spatial data relating to habitat critical to the survival of *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) is alluded to in Section 1, it has not yet been mapped. 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 microtheca* subsp. narrow leaves
Responsibility:	Parks and Wildlife (SCB, Moora District)
Cost:	$6,000 in year 2

17. Review this plan and prepare a revised plan if necessary

If *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) is still listed as Threatened Flora at the end of the five-year term of this plan, the need for further recovery actions and/or a review of this plan will be assessed and a revised plan prepared if necessary.

Action:	Review this plan and prepare a revised plan if necessary
Responsibility:	Parks and Wildlife (SCB, Moora District)
Cost:	$6,000 at the end of year 5

Table 5. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Moora District), with assistance from the MDTFRT	Ongoing
Monitor populations	High	Parks and Wildlife (Moora District), with assistance from the MDTFRT	Ongoing
Fence population	High	Parks and Wildlife (Moora District), land manager	2016
Undertake weed control	High	Parks and Wildlife (Moora District)	Ongoing
Develop and implement a translocation proposal	High	Parks and Wildlife (Science and Conservation Division, Moora District), BGPA	2021
Replace DRF markers	High	Parks and Wildlife (Moora District), MRWA	2016
Undertake regeneration trials	High	Parks and Wildlife (Science and Conservation Division, Moora District)	2021
Collect and store seed	High	Parks and Wildlife (Moora District, TFSC)	2021
Rehabilitate habitat in flood damaged areas	High	Parks and Wildlife (Moora District), land manager	2021
Obtain biological and ecological information	High	Parks and Wildlife (Science and Conservation Division, Moora District)	2019
Undertake surveys	High	Parks and Wildlife (Moora District), with assistance from the MDTFRT and volunteers	Ongoing
Develop and implement a fire management strategy	High	Parks and Wildlife (Moora District)	Developed by 2016, implementation ongoing
Ensure long-term protection of habitat	High	Parks and Wildlife (Moora District, SCB), land managers	2021
Liaise with land managers and Aboriginal communities	High	Parks and Wildlife (Moora District)	Ongoing
Promote awareness	Medium	Parks and Wildlife (Moora District, SCB, PICA), with assistance from the MDTFRT	2021
Map habitat critical to the survival of *Eremophila microtheca* subsp. narrow leaves	Medium	Parks and Wildlife (SCB, Moora District)	2018
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Moora District)	2021

4. Term of plan

This plan will operate from November 2016 to October 2021 but will remain in force until withdrawn or replaced. If *Eremophila microtheca* subsp. narrow leaves (J.D.Start D12-150) is still listed as Threatened Flora at the end of the five year term of this plan, a review of this plan will be completed, the need for further recovery actions determined and a revised plan prepared if necessary.

5. References

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6. Taxonomic description

Eremophila microtheca subsp. narrow leaves (A. Brown pers. comm.)

An erect heath-like shrub 70 cm–1.6 m high. Branches finely stellate-pubescent, except for some glabrous resinous bands extending down below leaf bases. Leaves 6–12 mm (rarely 5–18 mm) by 0.5–1 mm wide, erect to spreading, linear, grey-green, sessile, margins entire, sparsely to densely stellate-pubescent, often with resin globules. Flowers one per axil. Pedicel 3–6 mm long, terete, sparsely stellate-pubescent. Sepals five, 4–6 mm x 0.5–1.5 mm, lanceolate, attenuate, outer surface sparsely to densely stellate-pubescent. Corolla 10–15 mm long, outside of tube pale lilac, glabrous, inside of tube white, lilac spotted, glabrous except for scattered villous hairs extending down from medial lobe of lower lip. Stamens four, glabrous. Style glabrous. Ovary glabrous, ovoid, four-locular with one ovule per locule. Fruit 3–4 mm × 2–2.5 mm, dry, ovoid-conical.