Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Interim Recovery Plan No. **386**

Silky Eremophila (*Eremophila nivea*)

Interim Recovery Plan

Department of Biodiversity, Conservation and Attractions, Western Australia

December 2018

List of Acronyms

The following acronyms are used in this plan:

BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
CFF	Conservation of Flora and Fauna
CITES	Convention on International Trade in Endangered Species
CPC	Conservation and Parks Commission
CR	Critically Endangered
DEC	Department of Environment and Conservation
DPLH	Department of Planning, Lands and Heritage
DBCA	Department of Biodiversity, Conservation and Attractions
DPaW	Department of Parks and Wildlife
DRF	Declared Rare Flora
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
GDTFCRT	Geraldton District Threatened Flora and Communities Recovery Team
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
MDTFRT	Moora District Threatened Flora Recovery Team
NRM	Natural Resource Management
PEC	Priority Ecological Community
PICA	Public Information and Corporate Affairs
SCP	Species and Communities Program
SWALSC	South West Aboriginal Land and Sea Council
TEC	Threatened Ecological Community
TFSC	Threatened Flora Seed Centre
TPFL	Threatened and Priority Flora database
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 Biodiversity, Conservation and Attractions (DBCA) Corporate Policy Statement No. 35 (DPaW 2015*a*) and DBCA 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 taxa or ecological communities, and begin the recovery process.

DBCA are committed to ensuring that Threatened Flora (also known as Declared Rare Flora (DRF)) are conserved through the preparation and implementation of Recovery Plans (RPs) or Interim Recovery Plans (IRPs), and by ensuring that conservation actions commence as soon as possible.

This plan, which replaces IRP No. 101 Silky Eremophila, *Eremophila nivea* (Phillimore, Papenfus and English 2001), will operate from December 2018 to December 2023 but will remain in force until withdrawn or replaced. It is intended that, if *Eremophila nivea* is still listed as Threatened Flora in Western Australia following five years of implementation, this plan will be reviewed and the need for further recovery actions assessed.

This plan was given regional approval on 12 December 2018 and was approved by the Executive Director of Biodiversity and Conservation Science on 14 December 2018. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DBCA, as well as the need to address other priorities.

Information in this plan was accurate at November 2018.

Plan preparation: This plan was prepared by:

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Summary

Scientific name:	*Eremophila nivea*	**IBRA region:**	Avon-Wheatbelt
Common name:	Silky Eremophila	**IBRA subregion:**	Avon-Wheatbelt P1
Family:	Scrophulariaceae	**Recovery teams:**	Moora District Threatened Flora Recovery Team (MDTFRT) and Geraldton District Threatened Flora and Communities Recovery Team (GDTFCRT)
Flowering period:	August–October		
DBCA region:	Midwest		
DBCA districts:	Moora, Geraldton		
Shires:	Three Springs, Perenjori, Morawa		
NRM region:	Northern Agricultural		

Distribution and habitat: *Eremophila nivea* is found near Three Springs, Morawa and Perenjori, growing in sandy-clay and brown clay-loam in open York Gum (*Eucalyptus loxophleba*) woodland over low scrub (Brown and Buirchell 2011).

Habitat important for the survival of the species, and important subpopulations: *Eremophila nivea* is listed as Threatened Flora (Critically Endangered) in Western Australia and it is considered that all known habitat for wild subpopulations is important for the survival of the species, and that all wild subpopulations are important subpopulations. Habitat important for the survival of *E. nivea* includes the area of occupancy of subpopulations and areas of similar habitat surrounding and linking subpopulations (these providing potential habitat for subpopulation expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered subpopulations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Conservation status: *Eremophila nivea* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 25 September 1987. It was subsequently ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 Red List criteria A2c; B1+2c due to a ≥80% reduction in population size and a decline in extent of occurrence, area of occupancy and quality of habitat. The species is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Government of Australia 1999).

Threats: The main threats to the species are habitat fragmentation, weeds, road and firebreak maintenance, changed fire regimes, poor recruitment, hydrological changes and grazing.

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. DBCA, with assistance from the MDTFRT and GDTFCRT, is overseeing the implementation of recovery actions for *Eremophila nivea*.
2. DBCA staff searched for the species with one new subpopulation found.
3. Landholders and land managers have been notified of the location and Threatened status of the species.
4. Threatened Flora markers have been installed at Subpopulations 1a, 1b, 2, 3a and 7a.
5. Protective fencing has been erected at Subpopulations 1b, 6, 7b, 7c and 9.
6. Firebreaks have been established at Subpopulation 3b.
7. Weed control trials using three treatments were conducted at Subpopulations 2, 3 and 6 during 1998 to 2000.
8. Weed control has been undertaken at a Subpopulations 7b and 11T.
9. Approximately 23,000 *Eremophila nivea* fruits from six subpopulations are stored at the Threatened Flora Seed Centre (TFSC) at –20°C.
10. Botanic Gardens and Parks Authority (BGPA) currently has 65 *Eremophila nivea* plants, most of which are in containers or planted in the BGPA gardens.

11. Translocations and seed trials were conducted in 2001, 2004, 2010, 2011 and 2015.
12. In May 2004 a trial was conducted at Subpopulations 7b and 7c to test the effects of a range of stimuli on germination of *Eremophila nivea* and associated species. No seedlings were found on return visits in 2004, 2005, 2007 and 2009.
13. A prescribed burn was undertaken on a sub-section of Subpopulation 6 in winter 1994 by DBCA Moora District staff.
14. Habitat rehabilitation was undertaken at Subpopulation 7b.
15. An A4 sized poster containing a description of the species, and information about threats and recovery actions, was produced.
16. Monitoring has been carried out opportunistically with plant numbers and threats recorded.

Plan objective: The objective of this plan is to abate identified threats and maintain or enhance extant subpopulations to ensure the long-term conservation of the species 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 over the term of the plan.

- There is no reduction in the extent of occurrence, and the number of mature plants within the known subpopulations has remained within a 10% range or has increased by >10%; or
- New subpopulations have been found, increasing the number of extant subpopulations from seven to eight or more with no net loss of mature plants; or
- The area of occupancy has increased by >10%.

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

- Subpopulations have been lost which result in a reduction in the extent of occurrence; or
- The number of mature plants has decreased by >10%; or
- The area of occupancy has decreased by >10%.

Recovery actions

1. Coordinate recovery actions
2. Monitor subpopulations
3. Undertake weed control
4. Install Threatened Flora markers
5. Undertake regeneration trials
6. Fence subpopulations
7. Undertake additional translocations
8. Protect from grazing
9. Collect and store seed
10. Obtain biological and ecological information
11. Undertake surveys
12. Ensure long-term protection of habitat
13. Develop and implement a fire management strategy
14. Liaise with land managers and Aboriginal communities
15. Promote awareness
16. Undertake habitat rehabilitation
17. Map habitat important for the survival of *Eremophila nivea*
18. Review this plan and assess the need for further recovery actions

1. Background

Review of Silky Eremophila (*Eremophila nivea*) Interim Recovery Plan 2001-2004 (Phillimore, Papenfus and English 2001)

Following 18 years of implementation, the criteria for success "the number of mature individuals within subpopulations and/or the number of subpopulations have increased" has been met, with the number of extant mature individuals increasing from 301 in 2001 to 927 (some counts included adults and juveniles) and the number of subpopulations increasing by one. The number of subpopulations without any extant plants has remained the same at three (Subpopulations 4, 5 and 8). However this number could be higher if Subpopulation 6, which has not been monitored since 2003, is found to be extinct. A translocation has established an additional subpopulation (11T). Note: Subpopulation 10 was determined to be cultivated. The main recovery actions from the previous plan and their outcomes are listed in Table 1.

Table 1: Status of the implementation of recovery actions listed in the previous Interim Recovery Plan

Recovery action	Status	Outcome
Coordinate recovery actions	Ongoing	Recovery actions have been coordinated by DBCA Moora and Geraldton Districts with assistance from the Moora District Threatened Flora and Communities Recovery Team (MDTFCRT) and Geraldton District Threatened Flora and Communities Recovery Team (GDTFCRT).
Undertake weed control	Ongoing	Weed control has been conducted at Subpopulations 7b and 11 and is ongoing.
Stimulate and monitor germination	Ongoing	Raking and smoke treatment in combination with weed control resulted in a ten-fold increase in recruitment in Subpopulations 2, 3 and 6 (Obbens 2000).
Install fencing	Complete	Fencing has been erected at Subpopulations 1b, 6, 7b, 7c and 9.
Install Declared Rare Flora Markers	Complete	Threatened Flora markers have been installed at Subpopulations 1a, 1b, 2, 3a and 7a.
Continue to rehabilitate habitat	Ongoing	Habitat rehabilitation was undertaken at Subpopulation 7b. The subpopulation on private property was fenced in August 1997 and included a large buffer zone where seedlings were planted to help reduce salt encroachment. Three thousand seedlings of Salmon Gums (*Eucalyptus salmonophloia*), York Gums and *Melaleuca eleuterostachya* were planted.
Conduct further surveys	Ongoing	One new subpopulation has been located.
Propagate plants for translocation	Complete	The Botanic Gardens and Parks Authority (BGPA) propagated 500 *Eremophila nivea* seedlings which have been translocated to Subpopulation 11T.
Undertake and monitor translocation	Complete	Translocations were conducted in 2001, 2004, 2010, 2011 and 2015 through both direct seeding and planting of seedlings to one site (Subpopulation 11). All seedlings planted in 2010, 2011 and 2015 were irrigated over the summer months for two years. Survival has been poor with only 32 mature plants remaining in 2018.
Develop and implement a fire management strategy	Not yet undertaken	To be completed.
Monitor subpopulations	Ongoing	DBCA Moora and Geraldton District flora conservation officers have opportunistically monitored subpopulations with information obtained stored in District offices and at Species and Communities Program (SCP).
Collect seed and cutting material	Ongoing	Approximately 23,000 *Eremophila nivea* fruits was collected from six subpopulations between 1996 and 2009 and are stored at the Threatened Flora Seed Centre (TFSC) at –20°C.
Notify and liaise with	Complete	Land owners and land managers have been informed of the Threatened

relevant land managers		nature of the species and its location.
Seek measures to achieve conservation management	Not yet undertaken	To be completed.
Promote awareness	Ongoing	An A4 sized poster containing a description of the species and information about threats and recovery actions has been produced.
Obtain biological and ecological information	Ongoing	A prescribed burn was undertaken to determine the species response to fire.
Write full Recovery Plan	No longer relevant	DBCA does not generally produce full Recovery Plans for flora. The previous IRP has been reviewed as part of the preparation of this replacement IRP.

The majority of the recovery actions included in the previous plan have been partially implemented. *Action 17* Write a full Recovery Plan is redundant as DBCA does not generally produce full Recovery Plans for flora and current Interim Recovery Plans have been extended to five year terms. Ongoing recovery actions included in the previous plan are included in this revised plan. New recovery actions included in this plan are to implement rabbit control, map habitat important for the survival of *E. nivea*, and review this plan and assess the need for further recovery actions.

History

Eremophila nivea was first collected near Three Springs in 1960 and four years later was found north-east of Morawa. In 1996 a subpopulation was found north-west of Perenjori and in 1997 further subpopulations were found in the Three Springs area. Although naturally rare, the species is a popular ornamental garden plant in Western Australia and South Australia (Richmond and Coates 1995), and has been in cultivation in nurseries for many years. Its popularity is due to its attractive soft, silvery-grey foliage and pale to purple/violet flowers.

Eremophila nivea is currently known from 10 natural subpopulations comprising at most 927 mature plants (some 2018 counts included mature and juveniles). An additional subpopulation is the result of a translocation (Subpopulation 11T). Three natural subpopulations (4, 5 and 8) no longer contain extant plants.

Description

Eremophila nivea is a tomentose shrub 80 cm to 1.6 m high with greyish-white leaves 8 to 18 mm long by 1.5 to 2.5 mm wide. It has densely-hairy sepals 7 to 11 mm long by 0.7 to 2.5 mm wide and a variably blue, purple or violet corolla 15 to 23 mm long. The name is derived from the Latin *nivea* which means 'of the snow' referring to its snow-white leaves and branches (Brown and Buirchell 2011).

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. (1986) Five endangered new species of Myoporaceae from south-western Australia. *Nuytsia* 5(3): 391–400.

Western Australian Herbarium (1998–) *FloraBase*- the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. https://florabase.dpaw.wa.gov.au/.

Distribution and habitat

Eremophila nivea is found between Three Springs, Morawa and Perenjori, growing in sandy-clay and brown clay-loam in open York Gum (*Eucalyptus loxophleba*) woodland (Brown and Buirchell 2011), in low lying areas, such as broad valleys and seasonal creeks (Beard 1976). Associated species include *Acacia andrewsii*, *Austrostipa elegantissima*, *Enchylaena tomentosa*, *Melaleuca eleuterostachya*, *Ptilotus exaltatus* and *Atriplex* species. The extent of occurrence for extant subpopulations is 69.7 km^2 and the area of occupied habitat is 0.0069 km^2. The area of occupancy is estimated to be 20 km^2 using the IUCN 2 km x 2 km grid method.

Table 2. Summary of subpopulation land vesting, purpose and manager

TPFL subpopulation number & location	DBCA district	Shire	Vesting	Purpose	Manager
1a. NNW of Three Springs	Moora	Three Springs	Local Government Authority (LGA)	Road reserve	Shire of Three Springs
1b. NNW of Three Springs	Moora	Three Springs	Private property		Landowners
2. NNW of Three Springs	Moora	Three Springs	LGA	Road reserve	Shire of Three Springs
3a. NNW of Three Springs	Moora	Three Springs	LGA	Road reserve	Shire of Three Springs
3b. NNW of Three Springs	Moora	Three Springs	Private property		Landowners
4. SW of Morawa	Geraldton	Morawa	LGA	Road reserve	Shire of Morawa
5. N of Three Springs	Moora	Three Springs	LGA	Road reserve	Shire of Three Springs
6. N of Three Springs	Moora	Three Springs	Private property		Landowners
7a. S of Morawa	Geraldton	Perenjori	LGA	Road reserve	Shire of Perenjori
7b. S of Morawa	Geraldton	Perenjori	Private property		Landowners
7c. S of Morawa	Geraldton	Perenjori	Private property		Landowners
8. NE of Three Springs	Geraldton	Perenjori	LGA	Road reserve	Shire of Perenjori
9. NNW of Three Springs	Moora	Three Springs	Private property		Landowners
11T. W of Perenjori	Geraldton	Perenjori	Conservation and Parks Commission (CPC)	Conservation of Flora and Fauna (CFF)	DBCA
12. NNW of Three Springs	Moora	Three Springs	LGA	Road reserve	Shire of Three Springs

Note: Subpopulation 11T is a translocated subpopulation; Subpopulation 10 was determined to be cultivated and hence deleted.

Biology and ecology

Eremophila is a genus endemic to Australia that is represented in all mainland states. While most species occur in semi-arid and arid regions, they can be found in a range of environmental conditions. Species in this genus are commonly known as emu bush or poverty bush.

Monitoring following a prescribed burn found that *Eremophila nivea* was partially fire tolerant, as its foliage was not highly flammable compared with other *Eremophila* species. The relative density of starch grains in the root system of eremophilas, which determines the likelihood of the species being a reseeder versus a resprouter, and hence its fire sensitivity, also indicates that this species is likely to be partially fire tolerant (Richmond and Coates 1995).

Eremophila nivea has been observed to recruit from soil-stored seed following road verge grading and likely scarification, which suggests that it is a disturbance opportunist. Germination may also be enhanced by good summer rain (A. Chant pers. com.). Weeds are a major threat and weed control,

when combined with regeneration techniques including raking and smoke treatment, increases recruitment (Obbens 2000).

Eremophila species have potential for use in minesite rehabilitation, revegetation and horticulture as they are able to tolerate fire, drought, salinity, frost and grazing (Cochrane *et al*. 2002). *Eremophila nivea*, in particular, is used widely throughout Western Australia and South Australia as an ornamental garden plant (Richmond and Coates 1995). The seeds are able to be stored *ex situ* with little loss of viability. Cochrane *et al*. (2002) found that initial germination ranged from 63 to 80%, and then 50 to 100% after one year in storage, with two out of three cohorts exhibiting greater percent germination after storage. However, growing the species from seed is difficult and unreliable and can often fail due to poor germination and specialised conditions for breaking dormancy. Most *E. nivea* are propagated from cuttings or by grafting onto *Myoporum* rootstock (Brown and Buirchell 2011; Cochrane 2002; Cochrane *et al*. 2002).

Conservation status

Eremophila nivea was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 25 September 1987. It was ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 Red List criteria A2c; B1+2c due to a ≥80% reduction in population size over the last 10 years and a decline in area of occupancy, extent of occurrence and quality of habitat. The species is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Government of Australia 1999).

Threats

- **Habitat fragmentation**. *Eremophila nivea* occurs in an area that has been subject to extensive clearing for agriculture. Subpopulations are subject to the effects of habitat fragmentation, often occurring in narrow road reserves and on private property in remnants less than 100 hectares in size, from less than a kilometre to 20 km apart.
- **Weed invasion.** Paddock weeds and grass suppress early plant growth by competing for soil moisture, nutrients and light. They also increase the threat of fire due to the high fuel loads produced annually by many grass weed species.
- **Road and firebreak maintenance.** Threats include grading, chemical spraying, construction of drainage channels and the slashing of roadside vegetation. These actions may also promote weed invasion.
- **Altered fire regimes.** Fire may be needed to stimulate recruitment. However, frequent burning will deplete the soil seed store and facilitate weed invasion.
- **Poor recruitment.** Drought, little remaining natural habitat, small subpopulation size and changed disturbance regimes has resulted in poor recruitment.
- **Hydrological changes.** Rising salinity is a risk to subpopulations in low lying areas and has resulted in the degradation of habitat at Subpopulations 6 and 7b. Drought may also affect recruitment of the species with little germination occurring in years of poor rain.
- **Grazing.** Grazing by rabbits (*Oryctolagus cuniculus*), kangaroos (*Macropus rufus and M. fuliginosus*) and sheep is a threat to some subpopulations. Grazing and trampling by horses is also a potential threat to the associated habitat of Subpopulation 9.

The intent of this plan is to identify actions that will mitigate immediate threats to *Eremophila nivea*. Although climate change and drought may have a long-term effect on the species, actions taken directly to prevent their impact are beyond the scope of this plan.

Table 3. Summary of subpopulation information and threats

TPFL subpopulation number & location	Land status	Year/no. mature plants	Condition		Threats
			Plants	Habitat	
1a. NNW of Three Springs	Road reserve	1987 5 1989 3 1998 16 (3) [1] 2001 21 2013 20 2018 *31	Moderate	Degraded	Road maintenance, weeds, fire, poor recruitment, salinity
1b. NNW of Three Springs	Private property	1989 1 1993 2 (26) [2] 1998 13 2013 29 2018 *22	Moderate	Degraded	Weeds, fire, firebreak maintenance, grazing, poor recruitment, salinity
2. NNW of Three Springs	Road reserve	1990 15 1998 17 (9) 2003 52 (20) 2013 50 (150) 2018 *128	Moderate	Good	Road maintenance, weeds, fire, salinity
3a. NNW of Three Springs	Road reserve	2001 93 2002 80+ 2005 111 2013 100 2018 *262	Moderate	Degraded	Road maintenance, weeds, fire, grazing, salinity
3b. NNW of Three Springs	Private property	2001 1 2004 3 2005 6 (2) 2013 47 2018 *28	Moderate	Degraded	Cropping, firebreak maintenance, stock grazing, weed invasion, fire, poor recruitment
4. SW of Morawa	Road reserve	1977 4 2000 0 2001 0	Extinct		
5. N of Three Springs	Road reserve	1991 1 1998 1 2001 0 [1] 2013 0 2018 0	Extinct		
6. N of Three Springs	Private property	1993 265 (20) 2001 100+ 2003 68 (3) [20] 2018 *349	Moderate	Good	Weeds, grazing, salinity, fire, poor recruitment
7a. S of Morawa	Road reserve	1997 45 2000 50+ 2009 82 (1) 2012 84 [11] 2015 58 2018 61 (5) [6]	Moderate	Degraded	Road maintenance, weeds, fire, salinity
7b. S of Morawa (east subpop.)	Private property	1997 9 2001 11 2005 10 2012 12 2015 12	Moderate	Very good	Weeds, fire, poor recruitment, salinity

		2018	10			
7c. S of Morawa (west subpop.)	Private property	2005 2008 2012 2015 2018	(2) 2 (1) 3 3 3	Moderate	Very good	Weeds, poor recruitment, fire, salinity
8. NE of Three Springs	Road reserve	1997 2001 2005	1 0 0	Extinct		
9. NNW of Three Springs	Private property	1998 2003 2015	1 1 1	Moderate	Degraded	Weeds, fire, poor recruitment, salinity
11T. W of Perenjori	Nature Reserve	2001 2008 2011 2014 2017 2018	0 0 0 (183) [13] 83 43 32	Moderate	Good	Weeds
12. NNW of Three Springs	Road reserve	2018	1	Moderate	Degraded	Road maintenance, weeds

Note: ( ) = number of juveniles/seedlings; and [ ] = number of dead plants; Subpopulation 11T is a translocated subpopulation; Subpopulation 10 was removed as it was not considered a natural subpopulation; *counts include juveniles and mature individuals.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions that result in any of the following may potentially have a significant impact on the species:

- damage or destruction of occupied or potential habitat
- alteration of the local surface hydrology or drainage
- reduction in subpopulation size
- a major increase in disturbance in the vicinity of a subpopulation.

Habitat important for the survival of the species, and important subpopulations

Eremophila nivea is listed as Threatened Flora (Critically Endangered) in Western Australia and it is considered that all known habitat for wild subpopulations is important for the survival of the species, and that all wild subpopulations are important subpopulations. Habitat important for the survival of *E. nivea* includes the area of occupancy of subpopulations and areas of similar habitat surrounding and linking subpopulations (these providing potential habitat for subpopulation expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered subpopulations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Eremophila nivea* will also improve the status of associated native vegetation, including a Priority 2 taxon *Stylidium* sp. Three Springs (J.A. Wege & C. Wilkins JAW 600), which occurs within 500 m of an *E. nivea* subpopulation[3].

Eremophila nivea does not occur in association with any Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

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 species 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 Planning, Lands and Heritage (DPLH) Aboriginal Heritage Sites Register revealed one site (#24380 Mongers Lake Waterway) of Aboriginal significance adjacent to Subpopulation 4 of *Eremophila nivea*. Immediately west of this subpopulation there is also an unregistered site of Heritage significance (#5362 Billeranga Well). Input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and DPLH to determine if there are any issues or interests with respect to management for this species in the vicinity of these sites. 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 species occurs.

Social and economic impacts

There may be some economic impact through the need to modify management practices on land (including private land) adjacent to and containing subpopulations of *Eremophila nivea*, so as to prevent damage to the species and its habitat. It may be necessary to maintain fences and other infrastructure and control weeds on private land. Shire road maintenance and other activities in the vicinity of subpopulations may also require modification. Recovery actions refer to continued liaison between DBCA and stakeholders with regard to these areas.

[3] For a description of conservation codes for Western Australian flora see: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/conservation_code_definitions.pdf

Affected interests

Affected interests include private landholders and the Shires of Three Springs, Perenjori and Morawa.

Evaluation of the plan's performance

DBCA, with assistance from the Moora District Threatened Flora Recovery Team (MDTFRT) and Geraldton District Threatened Flora and Communities Recovery Team (GDTFCRT), will evaluate the performance of this plan 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 subpopulations to ensure the long-term conservation of the species 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 over the term of the plan.

- There is no reduction in the extent of occurrence, and the number of mature plants within the known subpopulations has remained within a 10% range or has increased by >10%; or
- New subpopulations have been found, increasing the number of extant subpopulations from seven to eight or more with no net loss of mature plants; or
- The area of occupancy has increased by >10%.

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

- Subpopulations have been lost which result in a reduction in the extent of occurrence; or
- The number of mature plants has decreased by >10%; or
- The area of occupancy has decreased by >10%.

3. Recovery actions

Existing recovery actions

DBCA, with assistance from the MDTFRT and GDTFCRT, is overseeing the implementation of recovery actions for *Eremophila nivea*. The following recovery actions have been or are being implemented.

Notifications to land owners/managers detail the current Threatened status of *Eremophila nivea* and the associated legal obligations in regards to its protection.

Threatened Flora markers have been installed at Subpopulations 1a, 1b, 2, 3a and 7a.

DBCA staff have searched for *E. nivea* in areas of remnant bushland. In early 2004, DBCA Moora District staff searched for the species in much of the remaining suitable habitat near Three Springs, and no new subpopulations were found. Searches were also conducted in private property adjacent to known subpopulations. A plant was found near Corrigin in 2001, and although this has since been destroyed, it seems unlikely that 'Subpopulation 10' was natural or a range extension because this species was planted throughout local shires. One new subpopulation that contained a single plant was found in degraded roadside habitat in 2018.

Protective fencing has been erected at Subpopulations 1b, 6, 7b, 7c and 9. The fenced area containing Subpopulation 7b also included a large buffer zone where seedlings were planted to help reduce salt encroachment. Three thousand seedlings of Salmon Gums (*Eucalyptus salmonophloia*), York Gum (*Eucalyptus loxophleba*) and *Melaleuca eleuterostachya* were planted.

Firebreaks have been established at Subpopulation 3b.

Weed control trials using three treatments were conducted at Subpopulations 2, 3 and 6 from 1998 to 2000. The treatments included experimental controls, weed control using fusilade, and weed control plus regeneration involving raking and spraying with concentrated smoke water. Data suggests that weed control alone provided no clear benefit in terms of plant growth, plant health or seedling recruitment in subpopulations of *Eremophila nivea*. However, when weed control was combined with regeneration techniques, short-term regeneration of subpopulations was achieved (Obbens 2000). Weed control was also implemented at Subpopulations 7 and 11 in winter 2002 and 2003 but has failed to benefit the subpopulations in the longer term.

Approximately 23,000 *Eremophila nivea* fruits from six subpopulations are stored at the Threatened Flora Seed Centre (TFSC) at –20°C (see table 4).

Table 4. TFSC seed collection details for *Eremophila nivea*

Accession number	Date collected	TPFL subpop number	Plants in storage	Fruit in storage	Estimated germinable seed
00294-1	9/01/1996	6	I/10	2,504	
00294-2	9/01/1996	6	B/10	75	56
00295-1	9/01/1996	3	B/50	2,505	2,047
00305-1	22/01/1996	2	B/13	1,800	698

00458-1	29/01/1997	8	I/1	160	
00554-1	10/02/1998	1	B/8	457	640
00555-1	11/02/1998	7	I/21	1,273	
00555-2	11/02/1998	7	B/11	300	308
00565-1	11/02/1998	8	I/1	221	166
00959-1	5/02/2002	3	B/22	494	476
01363-1	16/12/2003	6	B/5	259	164
01560-1	1/12/2004	3	I/11	1,781	2,005
01560-2	1/12/2004	3	B/11	100	89
01579-1	1/12/2004	2	I/15	913	1,195
01580-1	1/12/2004	1	I/6	567	975
02579-1	28/11/2007	7	B/9	452	414
02711-1	11/01/2008	2	B/13	111	19
02712-1	11/01/2008	1	B/10	439	456
03142-1	27/11/2009	7	I/90	4,865	5,594
03143-1	2/12/2009	1	I/8	350	389
03144-1	2/12/2009	3	I/25	1,277	1,535
03145-1	2/12/2009	2	I/40	1,567	2,053
03561-1	30/01/2001	3	B/40	408	0
03562-1	30/01/2001	6	B/20	103	0
03563-1	29/01/2001	7	B/40	212	0

Collection type: 'I' = a collection of individuals/number of plants collected; 'B' = a bulked collection/number of plants sampled.

The Botanic Gardens and Parks Authority (BGPA) currently have 45.2542 g of seed in storage from three extant collections made in 1993, 1998 and 2004. An additional 0.283 g of seed is also in storage from material collected from nursery stock. BGPA has 65 individuals of *Eremophila nivea*, most of which are in containers or planted out in the gardens (see table 5 below). Plants are primarily propagated by grafting onto *Myoporum* rootstock and through cuttings (pers. comm. A. Shade).

Table 5. BGPA propagation results for *Eremophila nivea*

Accession*	Plants	Collection information	Average strike success (cuttings)	Average strike success (grafts)
19880386	7 plants in nursery (all grafted & destined for planting); 22 plants in Botanic Gardens	Sourced from a commercial nursery	Unsuccessful (1 attempt)	50% (numerous attempts)
19889386	1 plant in nursery (grafted, destined for planting); 20 plants in Botanic Gardens	Sourced from a commercial nursery	16%	34%
19920862	3 plants in Botanic Gardens	Wild cuttings collection, L. Sweedman	34%	30%
19920864	No plants	Wild cuttings collection, L. Sweedman		Unsuccessfully grafted on one occasion
19920865	No plants	Wild cuttings collection, L. Sweedman	18%	32%
19920866	No plants	Wild cuttings collection, L. Sweedman	11%	77%
19930657	No plants	Domestic cuttings collection, N. and P. Moyle, private garden	Unsuccessful	63%
19931024	No plants	Wild cuttings collection, G Richmond, Pop 6	Unsuccessful	
19980662	No plants	Wild cuttings collection, L.	23%	11%

		Sweedman		
20100158	No plants	TFSC germinants, Pop 7	25%	
20021005	No plants	Wild cuttings collection, L. Monks, Pop 7	Unsuccessful	
20021006	No plants	Wild cuttings collection, L. Monks, Pop 7	18%	
20021008	No plants	Wild cuttings collection, L. Monks, Pop 7	Unsuccessful	
20021010	No plants	Wild cuttings collection, L. Monks, Pop 7	Unsuccessful	
20021011	No plants	Wild cuttings collection, L. Monks, Pop 3	Unsuccessful	
20021012	No plants	Wild cuttings collection, L. Monks, Pop 3	21%	
20021013	No plants	Wild cuttings collection, L. Monks, Pop3	4%	
20021020	3 plants in nursery (grafted); 40 plants in Botanic Gardens	Wild cuttings collection, L. Monks	35%	45%
20150001	14 plants in nursery, ~3 years old. Poor condition	Seedlings supplied by TFSC (TFSC 00295-1)	No propagations	

Note: not all Botanic Gardens specimens have been confirmed as still alive as of May 25th 2018; all plants growing in the Botanic Gardens are grafted specimens; * first four numbers of the accession number correspond to the year the material was collected.

A translocation (species introduction) was undertaken at Subpopulation 11 in 2001 with additional plantings and seed trials taking place in 2004, 2010, 2011 and 2015. All seedlings planted in 2010, 2011 and 2015 were irrigated in the summer months for two years (see table below for results).

Table 6. Translocation introduction results for *Eremophila nivea* Subpopulation 11.

Year planted	Material used	Number planted	Treatments	Number alive 7/4/2016
19/7/2001	Seedlings	35 (sourced from Subpopulations 1,2,3,6)	Site burnt prior to planting	0
19/7/2001	Seeds	600 fruit (direct seeding; sourced from Subpopulations 1,2,3,6)	Burning/no burning	0
27/5/2004	Seeds	2,560 fruit (direct seeding) (sourced from Subpopulations 1,2,3,6)	Burning/raking	0
22/7/2010	Seedlings	198 (sourced from Subpopulations 1, 2, 3, 6, 7)	None (all plants watered)	28 (14%)
17/5/2011	Seedlings	270 (sourced from Subpopulations 1, 2, 3, 6, 7)	None (all plants watered)	33 (12%)
9/6/2015	Seedlings	36 (sourced from Subpopulation 6)	None (all plants watered)	29 (80%)

The Botanic Gardens and Parks Authority (BGPA) propagated 500 *Eremophila nivea* seedlings which have now been translocated into Subpopulation 11T.

A prescribed burn was undertaken on a sub-section of Subpopulation 6 in winter 1994 by DBCA Moora District staff.

Trials to stimulate habitat regeneration were conducted at Subpopulation 7b in 2002 with seedlings of various local native species planted, smoke water applied to encourage germination of soil-stored seed and weed control undertaken. Translocation via restocking was also attempted at this

subpopulation. Seed and 12 seedlings from the subpopulation were used and seedlings watered. All seedlings were dead in January 2002.

In May 2004 a trial was conducted at Subpopulations 7b and 7c to stimulate germination of soil-stored *Eremophila nivea* and other local native species. Trials included smoke water; burning; raking; burning + smoke water; burning + raking; raking + smoke water; burning + raking + smoke water and no treatment. No seedlings were found on return visits in 2004, 2005, 2007 and 2009.

An A4 sized poster, that provides a description of the species, and information about threats and recovery actions, was produced for *Eremophila nivea*. It is hoped that the poster will result in the discovery of new subpopulations.

Monitoring has been carried out opportunistically. Global Positioning System (GPS) locations of all subpopulations have been recorded in Geographic Information System databases at Moora and Geraldton Districts, and at Species and Communities Program (SCP).

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 recovery actions are implemented on lands other than those managed by DBCA, permission has been or will be sought from the appropriate land managers prior to actions being undertaken.

1. Coordinate recovery actions

DBCA, with the assistance of the MDTFRT and GDTFCRT, will coordinate recovery actions for *Eremophila nivea* and will include information on progress in annual reports.

Action: Coordinate recovery actions
Responsibility: DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT and GDTFCRT
Cost: $8,000 per year

2. Monitor subpopulations

Monitoring of subpopulations and habitat should be undertaken to identify trends or potential management requirements. Subpopulation monitoring should record the health and expansion or decline of the subpopulation, 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 nivea* are included in other recovery actions detailed below.

Action: Monitor subpopulations
Responsibility: DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT and GDTFCRT
Cost: $8,000 per year

3. Undertake weed control

Weeds are a threat to all subpopulations and where practicable the following actions will be implemented:

1. Determine which weeds are present.
2. Control weeds through hand removal and/or spot spraying.
3. Monitor treatment and any observed negative effects.
4. Report on the method and success of the treatment.
5. Revegetate with site-specific species (in autumn) to suppress weeds.

Action: Undertake weed control
Responsibility: DBCA (Moora and Geraldton Districts), land managers
Cost: $10,000 per year, as required

4. Install Threatened Flora markers

Threatened Flora markers are required at Subpopulations 1b and 12.

Action: Install Threatened Flora markers
Responsibility: DBCA (Moora District), Shire of Three Springs
Cost: $2,000 in year 1

5. Undertake regeneration trials

Raking and smoke treatment has been shown by Obbens (2000) to be an effective method of stimulating germination of *Eremophila nivea* seed and it is recommended that further trials be undertaken in conjunction with weed control.

Action: Undertake regeneration trials
Responsibility: DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts)
Cost: $10,000 in years 1 and 3, $4,000 in years 2, 4 and 5

6. Fence subpopulations

Fences are required to be erected/repaired/extended at Subpopulations 1b, 3b, 6 and 9 to protect them from livestock and/or farming practices.

Action: Fence subpopulations
Responsibility: DBCA (Moora District), land managers
Cost: $20,000 in year 1

7. Undertake additional translocations

Further translocations may be required for the long term conservation of *Eremophila nivea* if natural subpopulations continue to decline.

Information on the translocation of Threatened plants and animals in the wild is provided in DBCA Corporate Policy Statement No. 35 (DPaW 2015*a*), DBCA Corporate Guideline No. 36 (DPaW 2015*c*) and the Australian Network for Plant Conservation (ANPC) Translocation Guidelines (Commander *et al*. 2018). A translocation may decrease the risk of extinction when a species is represented by few subpopulations and the creation of additional self-sustaining, secure subpopulations may decrease its susceptibility to catastrophic events and environmental stochasticity (Commander *et al*. 2018). For small subpopulations which may be declining in size or subject to high levels of inbreeding, successful subpopulation enhancement may increase subpopulation stability and hence long-term viability (Commander *et al*. 2018).

Depending on the characteristics of the species, a minimum viable subpopulation size of 200 to 250 mature individuals is a useful initial target (Commander *et al*. 2018), but 1,000 or more plants may be required to maintain evolutionary potential (Frankham *et al*. 2014). Suitable translocation sites may include where the taxon currently occurs, where it was known to have occurred historically, and other areas that contain similar habitat (soil, associated vegetation type and structure, aspect, mutualisms *etc*.), preferably within the known range of the taxon (Commander *et al*. 2018). Other factors that should be considered when selecting recipient sites include the security of land tenure for conservation, the ability to effectively mitigate threats to the taxon, and potential negative consequences to existing biodiversity and cultural values at the site (Commander *et al*. 2018).

All Translocation Proposals require endorsement by the department's Executive Director of Biodiversity and Conservation Science. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action: Undertake additional translocations
Responsibility: DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts), BGPA
Cost: $42,000 in years 1 and 2 and $26,500 in subsequent years as required

8. Protect from grazing

When monitoring ascertains the threat from grazing is high, control measures including additional fencing, protective cages and baiting for rabbits using 1080 oats may be required.

Action: Protect from grazing
Responsibility: DBCA (Moora and Geraldton Districts), land managers
Cost: $4,000 in years 1, 3 and 5

9. Collect and store seed

To guard against the extinction of natural subpopulations of *Eremophila nivea* it is recommended that additional seeds be collected and stored at the 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: DBCA (Moora and Geraldton Districts, TFSC)
Cost: $10,000 per year

10. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Eremophila nivea* will provide a scientific basis for management of the species in the wild, and requires the following investigations to be undertaken:

1. Reproductive success and pollination biology.
2. Reproductive strategies, phenology and seasonal growth.
3. The role of various factors including disturbance, competition, drought, inundation and grazing in recruitment and seedling survival.
4. Longevity of plants, time taken to reach maturity, and minimum viable population size.
5. The impact of changes in hydrology to habitat condition.

Action: Obtain biological and ecological information
Responsibility: DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts)
Cost: $50,000 in years 1–3

11. Undertake surveys

Further surveys for *Eremophila nivea* should be undertaken in areas of potentially suitable habitat. Where feasible, volunteers from landcare groups, wildflower societies and naturalists clubs will be encouraged to participate. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and prevent duplication of effort.

Action: Undertake surveys
Responsibility: DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT, GDTFCRT and volunteers
Cost: $10,000 per year

12. Ensure long-term protection of habitat

Strategies for achieving additional protection of private land on which the species occurs will be investigated.

Action: Ensure long-term protection of habitat
Responsibility: DBCA (Moora and Geraldton Districts, Species and Communities Program (SCP))
Cost: $4,000 per year

13. 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. Where possible, fire will be prevented from occurring in the habitat of *Eremophila nivea* subpopulations, except where it is being used as a recovery tool.

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

14. Liaise with land managers and Aboriginal communities

Staff from DBCA Midwest Region will liaise with land owners/managers to ensure that subpopulations of *Eremophila nivea* are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species. Consultation with Aboriginal communities will take place to determine if there are any issues or interests in areas that provide habitat for the species.

Action: Liaise with land managers and Aboriginal communities
Responsibility: DBCA (Moora and Geraldton Districts)
Cost: $4,000 per year

15. Promote awareness

The importance of biodiversity conservation and the protection of *Eremophila nivea* will be promoted through the print and electronic media and by setting up poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: DBCA (Moora and Geraldton Districts, SCP, Public Information and Corporate affairs (PICA)), with assistance from the MDTFRT and GDTFCRT
Cost: $7,000 in years 1 and 2; $5,000 in years 3–5

16. Undertake habitat rehabilitation

The habitat at Subpopulation 7b is in poor condition and requires rehabilitation through the reintroduction of local plant species. Site rehabilitation should extend beyond the current boundary of the subpopulation to provide a buffer.

Action: Undertake habitat rehabilitation
Responsibility: DBCA (Geraldton District), land manager
Cost: $15,000 in years 4 and 5

17. Map habitat important for the survival of *Eremophila nivea*

Although habitat that is important to the survival of *Eremophila nivea* has been previously identified, it has not been mapped. If additional subpopulations are located, habitat important for their survival will also be determined and mapped.

Action: Map habitat important for the survival of *Eremophila nivea*
Responsibility: DBCA (SCP, Moora and Geraldton Districts)
Cost: $6,000 in year 2

18. Review this plan and assess the need for further recovery actions

If *Eremophila nivea* is still listed as Threatened at the end of the five-year term of this plan, the need for further recovery actions or a review of this plan will be assessed and a revised plan prepared if necessary.

Action: Review this plan and assess the need for further recovery actions
Responsibility: DBCA (SCP, Moora and Geraldton Districts)
Cost: $6,000 at the end of year 5

Table 7. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT and GDTFCRT	Ongoing
Monitor subpopulations	High	DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT and GDTFCRT	Ongoing
Undertake weed control	High	DBCA (Moora and Geraldton Districts), land managers	Ongoing
Install Threatened Flora markers	High	DBCA (Moora and Geraldton Districts), Shire of Three Springs	2019
Undertake regeneration trials	High	DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts)	2023
Fence subpopulations	High	DBCA (Moora District), land managers	2019
Undertake additional translocations	High	DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts), BGPA	2023
Protect subpopulations from grazing	High	DBCA (Moora and Geraldton Districts), land managers	2023
Collect and store seed	High	DBCA (Moora and Geraldton Districts, TFSC)	2023
Obtain biological and ecological information	High	DBCA (Biodiversity and Conservation Science, Moora and Geraldton Districts)	2021
Undertake surveys	High	DBCA (Moora and Geraldton Districts), with assistance from the MDTFRT, GDTFCRT and volunteers	Ongoing
Ensure long-term protection of habitat	High	DBCA (Moora and Geraldton Districts, SCP)	2023
Develop and implement a fire management strategy	High	DBCA (Moora and Geraldton Districts)	Developed by 2019, implementation ongoing
Liaise with land managers and Aboriginal communities	High	DBCA (Moora and Geraldton Districts)	Ongoing
Promote awareness	Medium	DBCA (Moora and Geraldton Districts, SCP,	2023

		PICA), with assistance from the MDTFRT and GDTFCRT	
Undertake habitat rehabilitation	Medium	DBCA (Geraldton District), land manager	2023
Map habitat important for the survival of *Eremophila nivea*	Medium	DBCA (SCP, Moora and Geraldton Districts)	2020
Review this plan and assess the need for further recovery actions	Medium	DBCA (SCP, Moora and Geraldton Districts)	2023

4. Term of plan

This plan will operate from December 2018 to December 2023 but will remain in force until withdrawn or replaced. If the species is still listed as Threatened after five years, a review of this plan will be completed, the need for further recovery actions determined, and a revised plan prepared if necessary.

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6. Taxonomic description

Chinnock, R.J. (1986) Five endangered new species of Myoporaceae from south-western Australia. *Nuytsia* 5(3): 391–400.

Eremophila nivea is a 1.6 m tall shrub with branches, leaves, pedicels and sepals (outer surface) completely clothed in white to greyish white lanate tomentum. Branches terete, non-tuberculate, hairs branched and often floccose in older parts. Leaves sessile, alternate but occasionally with a few opposite, linear, (6)8–18(22) x 1.5–3.5 mm, acute, margins entire, slightly revolute, purplish black sometimes visible through indumentum, subequal, triangular to lanceolate, 7–11 x 0.7–2.5 mm, acute to attenuate, inside surface glabrous below, with dense white branched hairs above especially towards the margins. Corolla 15–23 mm long, lilac, tube white inside on the lower side, faintly lilac to brownish spotted, 2-lipped, outside surface glabrous or with a few scattered branched hairs, inside of tube arachnoid hairy and lobes glabrous; lobes obtuse, medial one of lower lip dilated, emarginate. Stamens 4, included, glabrous. Ovary ovoid, c. 3 x 1 mm, pale yellow, quadrilocular with one ovule per loculus, glabrous; style eccentric, pilose. Fruit ovoid, 4–5 x 2.2–2.6 mm, prominently beaked, splitting at apex, glabrous; exocarp buff-coloured, papery, endocarp brown, smooth. Seed ovoid, c. 1.5 x 0.7 mm, buff-coloured.