Department of Parks and Wildlife

Interim Recovery Plan No. **367**

Eremophila glabra subsp. *chlorella*

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
CFF	Conservation of Flora and Fauna
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
CWDTFRT	Central Wheatbelt District Threatened Flora Recovery Team
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs
DPaW	Department of Parks and Wildlife
DRF	Declared Rare Flora (also shown as Threatened flora)
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
MDTFCRT	Moora District Threatened Flora and Communities Recovery Team
MRWA	Main Roads Western Australia
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
PTA	Public Transport Authority
RP	Recovery Plan
SCB	Species and Communities Branch
SRTFCRT	Swan Region Threatened Flora and Communities Recovery Team
SWALSC	South West Aboriginal Land and Sea Council
TEC	Threatened Ecological Community
TFSC	Threatened Flora Seed Centre
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
VU	Vulnerable
WA	Western Australia
WAPC	Western Australian Planning Commission

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 glabra* subsp. *chlorella* 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 Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at November 2016.

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Cover photograph by Andrew Brown.

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Summary

Scientific name:	*Eremophila glabra* subsp. *chlorella*	**Shires:**	Gingin, Victoria Plains, Carnamah, City of Canning, Gosnells
Family:	Myoporaceae	**NRM regions:**	Northern Agricultural, Perth
Common name:	None	**IBRA regions:**	Swan Coastal Plain, Jarrah Forest, Geraldton Sandplains
Flowering period:	July–November		
DPaW regions:	Midwest, Wheatbelt, Swan	**IBRA subregions:**	Northern Jarrah Forest JAF01, Perth SWA02, Lesueur Sandplain GES02
DPaW districts:	Swan Coastal, Central Wheatbelt, Moora	**Recovery teams:**	SRTFCRT, CWDTFRT, MDTFCRT

Distribution and habitat: *Eremophila glabra* subsp. *chlorella* is known from a few widely separated populations between Cannington and Eneabba, growing on sandy-clay soils in winter-wet depressions.

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 glabra* subsp. *chlorella*, 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 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 glabra* subsp. *chlorella* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 22 January 2008. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D due to its extent of occurrence estimated to be less than 100km^2 and area of occupancy less than 10km^2; severe fragmentation; continuing decline in quality of habitat and number of mature individuals; and population size estimated to be less than 50 mature individuals at that time. *Eremophila glabra* subsp. *chlorella* is not currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: Threats to *Eremophila glabra* subsp. *chlorella* include clearing, road, rail, track and firebreak maintenance, weeds, recreational activities, fire, grazing, poor recruitment, utilities maintenance, salinity and dieback disease (*Phytophthora cinnamomi*).

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 managers have been notified of the location and threatened status of *Eremophila glabra* subsp. *chlorella*. Notifications detail the current DRF status of the subspecies, the associated legal obligations in regards to its protection and contact details for management assistance.
2. Declared Rare Flora (DRF) markers have been installed on the road verge at Subpopulation 5a and along the water pipeline at Subpopulation 5b.
3. Dashboard stickers and posters have been produced and distributed.
4. Seed collections were made between 2007 and 2013.
5. The Botanic Gardens and Parks Authority (BGPA) are maintaining 17 plants grown from cutting material collected in August 1996.
6. In 2010 and 2011 monitoring of post-fire regeneration and recruitment was undertaken in Subpopulations 1a, 1b and 1c.
7. Weed control was undertaken in 2011 to protect regenerating and seedling *Eremophila glabra* subsp. *chlorella* plants.
8. Rubbish removal was undertaken at Population 1 in 2011.

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

Recovery criteria

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

- There is no reduction in the extent of occurrence and the number of mature plants within the known populations has remained within a 10% range or has increased by >10% over the term of the plan from 6,084 to 6,692 or more or
- New populations have been found, increasing the number of known populations from five to six 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 considered a failure if one or more of the following take place.

- Populations have been lost which result in a reduction in the extent of occurrence or
- The number of mature plants has decreased by >10% from 6,084 to 5,476 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Undertake surveys
4. Achieve long-term protection of habitat
5. Install DRF markers
6. Undertake weed control
7. Remove rubbish
8. Collect and store seed
9. Prevent access into Populations
10. Undertake regeneration trials
11. Control grazing
12. Develop and implement a fire management strategy
13. Determine susceptibility to *Phytophthora cinnamomi*
14. Maintain disease hygiene
15. Develop and implement a translocation proposal
16. Obtain biological and ecological information
17. Liaise with land managers and Aboriginal communities
18. Promote awareness
19. Map habitat critical to the survival of *Eremophila glabra* subsp. *chlorella*
20. Review this plan and assess and prepare a revised plan if necessary

1. Background

History

Originally named *Eremophila chlorella*, by Michel Gandoger in 1918 from specimens collected near the "Lower Canning River" by Alexander Morrison in July 1901 this taxon was later (2007) reduced to a subspecies of *E. glabra* Bob Chinnock.

Following its discovery in 1901, the next collection of *Eremophila glabra* subsp. *chlorella* was made at Cannington by Alexander Morrison in July 1910. The subspecies was then not seen again until June 1972 when collected from the Kenwick area by H. Demarz. Greg Keighery made a further collection from the Kenwick area in July 1983, Ray Cranfield made a collection from the Cannington area in October 1996 and Bob Dixon located it near Kenwick the same year, however, none of these populations have been seen since. A new population was discovered near Mogumber in June 2007.

The correct identity of the subspecies has been confused and at one time included all green flowered members of the *Eremophila glabra* complex in the Dandaragan, Moora, Arrowsmith, Watheroo and Perth areas. Plants in many of these areas are now considered distinct from *E. glabra* subsp. *chlorella* and have been provided the phrase names *E. glabra* subsp. green flowers (E.A. Griffin 5347) and *E. glabra* subsp. Pinjarrega (I. Greeve MG 35) at the Western Australian Herbarium.

As at March 2016, *Eremophila glabra* subsp. *chlorella* is known from five populations at Cannington, Mogumber, Eneabba and Kenwick.

Description

Eremophila glabra subsp. *chlorella* is a sprawling shrub 20cm to 1m high with green, mostly glabrous leaves (when mature) 15 to 22mm long by 2.8 to 5mm wide, small sepals 4 to 6mm long by 1 to 1.5mm wide, and a green to yellow-green corolla to 25 to 30mm long (Brown and Buirchell 2011). The Latin name *chlorella* (slightly green) refers to its corolla colour (Chinnock 2007).

Eremophila glabra subsp. *chlorella* is distinguished by the prominent band of stellate hairs running along its leaf and sepal margins. These are particularly obvious on immature leaves (Chinnock 2007).

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, Kenthurst, 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 glabra subsp. *chlorella* is found in scattered populations between Cannington and Eneabba, growing in sandy-clay soils in winter-wet depressions (Brown and Buirchell 2011). Associated species include *Casuarina obesa*, *Viminaria juncea*, *Melaleuca lateritia*, *M. acutifolia*, *M. rhaphiophylla*, *M. viminea*, *M. teretifolia*, *M. brevifolia*, *Chorizandra enodis*, *Eucalyptus wandoo*, *E. loxophleba*, *Acacia saligna*, *A. microbotrya*, *Banksia telmatiaea*, *B. nivea* subsp. *nivea*, *Regelia ciliata*, *Petrophile seminuda*, *Verticordia densiflora* var. *densiflora* and *Calothamnus hirsutus*.

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

Population number & location	DPaW district	Shire	Vesting	Purpose	Manager
1a. Cannington	Swan Coastal	Canning	Private property	Freehold	Western Power
1b. Cannington	Swan Coastal	Canning	Private property	Freehold	Landowners
1c. Cannington	Swan Coastal	Canning	Private property	Freehold	Western Power
2a. South of Mogumber	Swan Coastal	Gingin	CCWA	CFF	DPaW
2b. South of Mogumber	Swan Coastal	Gingin	MRWA	Road reserve	MRWA
2c. South of Mogumber	Central Wheatbelt	Victoria Plains	PTA	Rail reserve	Brookfield Rail
2d. South of Mogumber	Central Wheatbelt	Victoria Plains	LGA	Road reserve	Shire of Victoria Plains
5a. S of Eneabba	Moora	Carnamah	LGA	Road reserve	Shire of Carnamah
5b. S of Eneabba	Moora	Carnamah	CCWA	CFF	DPaW
6. Kenwick	Swan Coastal	Gosnells	WAPC	WAPC	WAPC
7. Kenwick	Swan Coastal	Gosnells	Private property	Freehold	Landowners

Biology and ecology

It is thought that *Eremophila glabra* subsp. *chlorella* is a disturbance opportunist that requires occasional fire to produce new growth from root stock and induce germination of soil-stored seed. Flowers are bird and insect pollinated.

Conservation status

Eremophila glabra subsp. *chlorella* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 22 January 2008. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D due to its extent of occurrence being less than 100km^2 and area of occupancy less than 10km^2; severe fragmentation; continuing decline in quality of habitat and number of mature individuals; and population size estimated to be less than 50 mature individuals at that time. The subspecies is not currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats

- **Clearing for subdivision development**. Population 1 may be threatened by future clearing for development.
- **Road, rail, track and firebreak maintenance.** Subpopulations 2b–d and 5a are threatened by grading, chemical spraying, construction of drainage channels and mowing of roadside vegetation.
- **Weeds.** Weeds are a threat to all populations and include Tambookie grass (*Hyparrhenia hirta*) at Population 1.
- **Recreational activities.** Populations 1 and 6 are threatened by off-road vehicles, rubbish dumping and illegal camping.
- **Inappropriate fire regimes.** It is thought *Eremophila glabra* subsp. *chlorella* regenerates from root stock and seed following fire. However, there may be negative post-fire effects due to habitat modification and weed invasion. Fire should therefore occur at appropriate intervals.
- **Grazing by rabbits and kangaroos**. Populations 2 and 5 are threatened by grazing which is likely to reduce recruitment and encourage weed invasion.
- **Poor recruitment.** Several populations of *Eremophila glabra* subsp. *chlorella* have little or no natural recruitment, possibly due to a lack of suitable fire regimes.
- **Utilities maintenance**. Populations 1 (powerlines) and 5 (pipeline) are threatened by maintenance activities.
- **Salinity.** The reserve containing Subpopulation 2a is being impacted by rising salinity.
- **Dieback disease.** Dieback (*Phytophthora cinnamomi*) may kill plants or degrade associated habitat. Note: it is not known if *Eremophila glabra* subsp. *chlorella* is directly susceptible to dieback disease and testing is required.

The intent of this plan is to provide actions that will mitigate immediate threats to *Eremophila glabra* subsp. *chlorella*. Although climate change and drought may have a long-term effect on the subspecies, direct actions to prevent their impact are beyond the scope of this plan.

Table 2. Summary of population information and threats

Population number & location	Land status	Year / no. of plants	Current condition (habitat)	Threats
1a. Cannington	Private property	2006 20 2010 3 (78) [2 dead] 2011 3 (18) [2 dead]	Burnt Jan 2010	Clearing, weeds, firebreak maintenance, recreational activities, utility works, fire, poor recruitment
1b. Cannington	Private property	2008 4 2011 1 (2)	Burnt Jan 2010	Clearing, weeds, firebreak maintenance, altered fire regimes, poor recruitment, recreational activities
1c. Cannington	Private property	2010 2 2011 2	Burnt Jan 2010	Clearing, weeds, altered fire regimes, recreational activities
2a. South of Mogumber	Nature reserve	2005 30 2012 5,362 [60 dead]	Healthy	Grazing (rabbits/kangaroos), firebreak maintenance, salinity, altered fire regimes, poor recruitment
2b. South of Mogumber	MRWA road reserve	2012 24	Degraded	Road maintenance, altered fire regimes, weeds
2c. South of Mogumber	Rail reserve	2012 184 (1) [17 dead]	Degraded	Rail maintenance, altered fire regimes, grazing
2d. South of Mogumber	Road reserve	2012 396 (3) [14 dead]	Degraded	Road maintenance, grazing, altered fire regimes
5a. S of Eneabba	Road reserve	2010 353 (2) [5] 2014 To be determined	Burnt Dec 2011	Altered fire regimes, pipeline maintenance, weeds, grazing, dieback
5b. S of Eneabba	Nature reserve	2009 100 2010 104	Burnt Dec 2011	Pipeline maintenance, dieback, grazing, weeds, altered fire regimes
6. Kenwick	WAPC	1996 15 2012 4	Excellent	Recreational activities, weeds, altered fire regimes, poor recruitment
7. Kenwick	Private property	2007 4	Degraded	

Note: Populations in **bold text** are considered to be important populations; ( ) = number of seedlings/juveniles; Populations 3 and 4 are now known to be *Eremophila glabra* subsp. *carnosa*.

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 glabra* subsp. *chlorella* may require assessment.

Actions that result in any of the following may potentially significantly impact the species:

- Damage or destruction of occupied or potential habitat.
- Alteration of the local surface hydrology or drainage.
- Reduction in population size.
- Altered fire regimes.

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

Eremophila glabra subsp. *chlorella* is ranked as CR in Western Australia and it is considered that all known habitat for wild populations is habitat critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of *E. glabra* subsp. *chlorella* includes the area of occupancy of populations and areas of similar habitat surrounding and 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.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Eremophila glabra* subsp. *chlorella* will also benefit the Priority flora listed in the table below:

Table 3. Conservation-listed flora species occurring within 500m of *Eremophila glabra* subsp. *chlorella*

Species name	Conservation status (WA)	Conservation status (EPBC Act)
Banksia dallanneyi subsp. *pollosta*	Priority 3	-
Eryngium pinnatifidum subsp. Palustre	Priority 3	-
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	Priority 3	-
Schoenus capillifolius	Priority 3	-
Schoenus sp. Waroona (G.J. Keighery 12235)	Priority 3	-
Verticordia amphigia	Priority 3	-
Aponogeton hexatepalus	Priority 4	-
Anigozanthos humilis subsp. *chrysanthus*	Priority 4	-
Hydrocotyle lemnoides	Priority 4	-
Schoenus natans	Priority 4	-

For a description of conservation codes for Western Australian flora see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_ 18092013.pdf

Eremophila glabra subsp. *chlorella* occurs within or adjacent to the four Threatened Ecological Communities (TECs) listed in the table below.

Table 4: Threatened Ecological Communities associated with *Eremophila glabra* subsp. *chlorella*

Community name	Conservation status (WA)	Conservation status (EPBC Act 1999)
Shrublands and woodlands on Muchea Limestone	EN	EN
Shrublands on dry clay flats (SCP 10a)	EN	CR
Herb rich saline shrublands in clay pans (SCP 07)	VU	CR
Dense shrublands on clay flats (SCP09)	VU	CR
Ferricrete floristic community (Rocky Springs type)	VU	-

For a description of TEC categories see Department of Environment and Conservation (2010).

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 subspecies 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 no sites of Aboriginal significance associated with or adjacent to populations of *Eremophila glabra* subsp. *chlorella*. 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 other 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

Social and economic impacts may occur through the implementation of recovery actions (controlling weeds and rabbits, fencing maintenance) and management restrictions imposed on land containing populations of *Eremophila glabra* subsp. *chlorella*.

Affected interests

The implementation of this plan has implications for Western Power (Subpopulations 1a and 1c), Western Australian Planning Commission (WAPC) (Population 6), private property (Population 7 and Subpopulation 1b), Brookfield Rail (Subpopulation 2c), Shires of Victoria Plains and Carnamah (Subpopulations 2d and 5a), and Main Roads Western Australia (MRWA) (Subpopulation 2b) and may have some implications for the City of Gosnells during possible future re-zoning and development.

Evaluation of the plan's performance

Parks and Wildlife with assistance from the Swan Region and Moora District Threatened Flora and Communities Recovery Teams (SRTFCRT, MDTFCRT) and Central Wheatbelt District Threatened Flora Recovery Team (CWDTFRT) 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 *in situ* populations to ensure the long-term conservation of the subspecies in the wild.

Recovery criteria

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

- There is no reduction in the extent of occurrence and the number of mature plants within the known populations has remained within a 10% range or has increased by >10% over the term of the plan from 6,084 to 6,692 or more or
- New populations have been found, increasing the number of known populations from five to six 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 considered a failure if one or more of the following take place.

- Populations have been lost which result in a reduction in the extent of occurrence or
- The number of mature plants has decreased by >10% from 6,084 to 5,476 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

See table 2 for important populations.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with assistance from the SRTFCRT, CWDTFRT and MDTFCRT is overseeing the implementation of recovery actions for *Eremophila glabra* subsp. *chlorella*.

Land managers have been notified of the location and threatened status of *Eremophila glabra* subsp. *chlorella*. Notifications detail the current DRF status of the subspecies, the associated legal obligations in regards to its protection and contact details for management assistance.

DRF markers have been installed at Subpopulation 5a and along the water pipeline at Subpopulation 5b.

Between 2007 and 2013, staff from Parks and Wildlife's Swan Coastal District made seed collections of *Eremophila glabra* subsp. *chlorella* in consultation with the Threatened Flora Seed Centre (TFSC).

The Botanic Gardens and Parks Authority (BGPA) is maintaining 17 *Eremophila glabra* subsp. *chlorella* plants grown from cutting material collected by Luke Sweedman in August 1996.

In 2010 and 2011, Swan Coastal District undertook monitoring of *Eremophila glabra* subsp. *chlorella* regeneration and recruitment post-fire in subpopulations 1a, 1b and 1c. Seventy nine seedlings were located eight months after fire. However, just 18 of these were still alive after 22 months.

Weed control was undertaken in 2011 to protect regenerating *Eremophila glabra* subsp. *chlorella* plants and seedlings post fire.

Rubbish removal was undertaken at Population 1 in 2011.

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 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 SRTFCRT, CWDTFRT and MDTFCRT will oversee the implementation of recovery actions for *Eremophila glabra* subsp. *chlorella* and will include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT
Cost:	$8,000 per year

2. Monitor populations

Monitoring of populations and 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 glabra* subsp. *chlorella* are included in other recovery actions detailed below.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT
Cost:	$10,000 per year

3. Undertake surveys

Surveys for *Eremophila glabra* subsp. *chlorella* 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 subspecies documented to increase survey efficiency and prevent duplication of effort.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT
Cost:	$10,000 per year

4. Achieve long-term protection of habitat

Parks and Wildlife will seek to have the land that contains Population 1 declared as a reserve.

Action:	Achieve long-term protection of habitat
Responsibility:	Parks and Wildlife (Swan Region, Species and Communities Branch (SCB))
Cost:	$4,000 in years 1–3

5. Install DRF markers

DRF markers are required on the firebreak at Subpopulation 2a, and on the road and rail reserves at Subpopulations 2c and 2d, to reduce the risk of accidental damage during road and rail maintenance activities.

Action:	Install DRF markers
Responsibility:	Parks and Wildlife (Swan Coastal District), Shire of Victoria Plains, Brookfield Rail
Cost:	$4,000 in year 1

6. Undertake weed control

Weeds are a threat to all populations 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:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts), land managers
Cost:	$10,000 per year, as required

7. Remove rubbish

Remove rubbish dumped at Populations 1 and 6.

Action:	Remove rubbish
Responsibility:	Parks and Wildlife (Swan Coastal District), Western Power, WAPC
Cost:	$10,000 in years 3 and 5

8. Collect and store seed

To guard against the extinction of natural populations of *Eremophila glabra* subsp. *chlorella* it is recommended that seed 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:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts, TFSC)
Cost:	$5,000 per year

9. Deter access

To deter access (in particular 4WD's) into the habitat of populations 1 and 6, barriers such as bollards should be erected. Signs indicating the significance of the area may also need to be erected.

Action:	Deter access
Responsibility:	Parks and Wildlife (Swan Coastal District), WAPC
Cost:	$20,000 in year 1

10. Undertake regeneration trials

As many *Eremophila glabra* subsp. *chlorella* plants are dead or senescing with little natural recruitment taking place, soil disturbance or fire* may be required to stimulate germination of soil stored seed. This will need to be undertaken in conjunction with weed control.

*Monitoring of Population 1 following a fire in 2010 and Population 5 following a fire in 2011 has shown *Eremophila glabra* subsp. *chlorella* responds well to fire with successful recruitment taking place.

Action:	Undertake regeneration trials
Responsibility:	Parks and Wildlife (DPaW Science, Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$10,000 in years 1 and 3, $4,000 in years 2, 4 and 5

11. Control grazing

The level of threat posed by rabbits and kangaroos at populations 2 and 5 is unknown. However, if monitoring ascertains the threat is high, control measures may be required.

Action:	Control grazing
Responsibility:	Parks and Wildlife (Swan Coastal and Moora Districts), land managers
Cost:	$15,000 in years 1, 3 and 5

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 glabra* subsp. *chlorella* populations, except where it is being used as a recovery tool.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$10,000 in year 1 and $6,000 in subsequent years

13. Determine susceptibility to *Phytophthora cinnamomi*

As the level of susceptibility of *Eremophila glabra* subsp. *chlorella* to *Phytophthora cinnamomi* is not currently known, plants grown from seed will be forwarded to Forest and Ecosystem Management Division for testing. The susceptibility of associated species that comprise the habitat of *Eremophila glabra* subsp. *chlorella* will also be recorded to determine the susceptibility of the species habitat to dieback.

Action:	Determine susceptibility to *Phytophthora cinnamomi*
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts, Forest and Ecosystem Management Division)
Cost:	$3,000 in years 1 and 2

14. Maintain disease hygiene

To protect *Eremophila glabra* subsp. *chlorella* populations from disease, dieback hygiene (as outlined in Department of Parks and Wildlife 2014) will be followed during installation and maintenance of firebreaks and when walking into populations in wet soil conditions. Purpose built signs advising of the dieback risk and high conservation values of the sites will be installed if required.

Action:	Maintain disease hygiene
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$4,000 per year

15. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Eremophila glabra* subsp. *chlorella* 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, Swan Coastal, Central Wheatbelt and Moora Districts), BGPA
Cost:	$42,000 in years 1 and 2; and $26,500 in years 3–5 as required

16. Obtain biological and ecological information

Research on the biology and ecology of *Eremophila glabra* subsp. *chlorella* will include:

1. Identification of pollinators and their habitat requirements.
2. Seed viability.
3. Conditions necessary for natural germination.
4. Response to disturbance, competition, drought, inundation and grazing.
5. Longevity of plants, time taken to reach maturity, and minimum viable population size.
6. The impact of dieback and the effectiveness of control techniques.
7. The impact of changes in hydrology.

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (DPaW Science, Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$50,000 in years 1–3

17. Liaise with land managers and Aboriginal communities

Parks and Wildlife will liaise with land managers to ensure that populations of *Eremophila glabra* subsp. *chlorella* are not accidentaly damaged or destroyed, and habitat is maintained in a suitable condition for the conservation of the subspecies. Consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the taxon.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$4,000 per year

18. Promote awareness

The importance of biodiversity conservation and the protection of *Eremophila glabra* subsp. *chlorella* 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:	Parks and Wildlife (Swan Coastal, Central Wheatbelt and Moora Districts, SCB and Public Information and Corporate Affairs (PICA), with assistance from the SRTFCRT and MDTFCRT
Cost:	$7,000 in years 1 and 2; $5,000 in years 3–5

19. Map habitat critical to the survival of *Eremophila glabra* subsp. *chlorella*

Although habitat critical to the survival of *Eremophila glabra* subsp. *chlorella* is alluded to in Section 1, it has not 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 glabra* subsp. *chlorella*
Responsibility:	Parks and Wildlife (SCB, Swan Coastal, Central Wheatbelt and Moora Districts)
Cost:	$6,000 in year 2

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

If *Eremophila glabra* subsp. *chlorella* 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, Swan Coastal and Moora Districts)
Cost:	$6,000 in year 5

Table 5. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT	Ongoing
Monitor populations	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT	Ongoing
Undertake surveys	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts), with assistance from the SRTFCRT, CWDTFRT and MDTFCRT	2020
Achieve long-term protection of habitat	High	Parks and Wildlife (Swan Region, SCB)	2020
Install DRF markers	High	Parks and Wildlife (Swan Coastal District), Shire of Victoria Plains, Brookfield Rail	2016
Undertake weed control	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts), land managers	Ongoing
Remove rubbish	High	Parks and Wildlife (Swan Coastal District), Western Power, WAPC	2017
Collect and store seed	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts, TFSC)	Ongoing
Deter access	High	Parks and Wildlife (Swan Coastal District), WAPC	2016
Undertake regeneration trials	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal, Central wheatbelt and Moora Districts)	2020
Control grazing	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts), land managers	Ongoing
Develop and implement a fire management strategy	High	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts)	Developed by 2016 with implementation ongoing
Determine susceptibility to *Phytophthora cinnamomi*	Medium	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts, Forest and Ecosystem Management Division)	2017
Maintain disease hygiene	Medium	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts)	Ongoing
Develop and implement a translocation proposal	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal, Central wheatbelt and Moora Districts), BGPA	2020
Obtain biological and ecological information	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal, Central wheatbelt and Moora Districts)	2018
Liaise with land managers and Aboriginal communities	Medium	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts)	Ongoing
Promote awareness	Medium	Parks and Wildlife (Swan Coastal, Central wheatbelt and Moora Districts, SCB and PICA), with assistance from the SRTFCRT and MDTFCRT	Ongoing
Map habitat critical to the survival of *Eremophila glabra* subsp. *chlorella*	Medium	Parks and Wildlife (SCB, Swan Coastal, Central wheatbelt and Moora Districts)	2017
Review this plan and prepare a revised plan if necessary	Medium	Parks and Wildlife (SCB, Swan Coastal, Central wheatbelt and Moora Districts)	2020

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 glabra* subsp. *chlorella* 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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Department of Parks and Wildlife (2015*c*) Corporate Guideline No. 36 *Recovery of Threatened Species through Translocation and Captive Breeding or Propagation*. Perth, Western Australia.

Department of Parks and Wildlife (2014) Policy Statement No. 3 Management of *Phytophthora* disease. Department of Parks and Wildlife, Western Australia.

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6. Taxonomic description

Taxonomic description from: Chinnock (2007).

Low spreading or erect shrub 0.25−1m tall. *Branches* glandular-papillate, very sparsely stellate-pubescent towards tips. *Leaves* sessile, narrowly elliptic or rarely some oblanceolate, acute; margins entire, surfaces glandular-papillate, prominently punctate, (13-) 15−22 (-26) x (2.2-) 2.8−4.3 (-5.8)mm; prominently stellate-pubescent along margins, especially on immature leaves, resinous. *Pedicel* terete, shorter than sepals, 3.5−4.5mm long, glandular-papillate, sometimes sparsely stellate-pubescent, resinous. *Sepals* imbricate, narrowly triangular to lanceolate, attenuate, 4−6 (-6.7) x 1−1.5mm; outer surface glandular-papillate, margins stellate-pubescent; inner surface glandular-papillate, resinous. *Corolla* green, more rarely yellow, outer and inner surfaces glandular-pubescent. *Fruit* oblong-cylindrical, compressed distally and tapering to apex, furrowed between the carpels on the compressed faces, 4−4.5 x 2.4−2.5mm.