Silky Frankenia (*Frankenia conferta*)



Department of Environment and Conservation Kensington



Australian Government





FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

DEC is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) taxa, always within one year of endorsement of that rank by the Minister.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced.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

This IRP was approved by the Director of Nature Conservation on 30 April 2008. The allocation of staff time and provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate at April 2008.

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

IRP PREPARATION

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ACKNOWLEDGMENTS

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

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Craig Douglas	Project Officer, Species and Communities Branch, DEC

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

Cover photograph by Diana Papenfus.

CITATION

This Recovery Plan should be cited as:

Department of Environment and Conservation (2009). Silky Frankenia (*Frankenia conferta*) Recovery Plan. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	Frankenia conferta Diels	Common Name:	Silky Frankenia
Family:	Frankeniaceae	Flowering Period:	October
DEC Regions:	Wheatbelt, Midwest	DEC Districts:	Avon Mortlock, Geraldton, Moora
Shires:	Koorda, Dalwallinu,	Recovery Teams:	Avon Mortlock, Moora and
	Perenjori, Coorow		Geraldton districts Threatened Flora
			Recovery Teams

Illustrations and/or further information: Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*, Department of Environment and Conservation, Western Australia; Barnsley, B. (1982) Frankeniaceae p112-146. *Flora of Australia Volume 8 Lecythidales to Batales*. Commonwealth of Australia, New South Wales; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Western Australian Herbarium (2007) FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Frankenia conferta* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in August 2001 and currently meets World Conservation Union (IUCN 2001) Red List Category Vulnerable (VU) under criteria B1ab(iii)+2ab(iii) due to the limited area of occupancy and number of locations, and a continuing decline in the area, extent and/or quality of habitat. The main threat to the species is changes to hydrology from rising salinity and waterlogging. The species is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Description: *Frankenia conferta* is a small shrub with the stems, leaves and calyx covered with short, soft hairs. The stalkless, linear leaves are clustered at the nodes of the stem. They are 2 to 5 mm long, 1 mm wide and their margins are recurved to cover the midrib. Each pair of leaves is united by a sheath, edged with fine hairs. Flowers are grouped in dense heads at the tops of the branches. The calyx is a pleated tube, 3.5 to 4.7 mm long. The flowers are 6 to 8mm long and have five petals, which are usually pale pink. There are six stamens and the style branches into 3 linear segments. There are three placentas on the walls of the ovary, each with five to seven ovules attached. The seed is covered with small protuberances (Brown *et al.* 1998).

Habitat requirements: *Frankenia conferta* is widely distributed between Koorda, Dalwallinu, Perenjori and Coorow, growing in clayey soils on the edge of salt lakes.

Habitat critical to the survival of the species, and important populations: Habitat critical to the survival of the species includes the area of occupancy of important populations; areas of similar habitat surrounding important populations (i.e. among other halophytic shrubs on clay sands with gypsum or white-grey shallow sand over clay) provide potential habitat for natural range extension and are necessary to provide habitat for pollinators; the local catchment of the surface and possibly ground waters that maintain the habitat of the species; and additional occurrences of similar habitat that may contain the species or be suitable sites for future translocations.

On the basis of current knowledge it appears that all the populations of this species are important. This will need to be reappraised when further survey for possible new populations has been completed and also after the results of genetic studies are known.

Benefits to other species/ecological communities: There are no other known listed threatened species or ecological communities in the habitat of *Frankenia conferta*. However, recovery actions implemented to improve the quality or security of the habitat of populations of *F. conferta* are likely to also improve the status of habitat in which populations are located.

International Obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is not listed under any specific international treaty and this Interim Recovery Plan (IRP) does not affect Australia's obligations under these international agreements.

Indigenous Consultation: Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Frankenia conferta*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near populations of the species covered by this IRP. Where no

role is identified for the indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social or economic impacts. However, as one population (Population 8) is located on a Shire Reserve its protection may potentially affect Shire activities. In addition, exploration licences have been applied for in the areas containing populations 5 and 7 and subpopulations 6a and 6b. Actions will involve liaison and cooperation with all stakeholders with regard to these areas.

Affected interests: Stakeholders potentially affected by the implementation of this plan include the Shire of Koorda, as managers of the land that contains Population 8.

Evaluation of the Plans Performance: DEC will evaluate the performance of this IRP in conjunction with the Avon Mortlock, Moora and Geraldton districts Threatened Flora Recovery Teams. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Completed recovery actions

- 1. Land managers have been notified of the location and threatened status of the species.
- 2. An article on the rediscovery of *Frankenia conferta* appeared in the March/April 2001 Newsletter of the former Department of Conservation and Land Management (CALM).
- 3. A survey of *Frankenia conferta* and a number of other rare wheatbelt species was undertaken in spring 2003. Five new populations of the species were located (Papenfus 2003).
- 4. Research into the population characteristics of *Frankenia conferta* was undertaken in 2003/2004 by staff from the Species and Communities Branch (Harris 2004).

Ongoing and future recovery actions

- 1. Staff from DEC's Avon Mortlock, Moora and Geraldton Districts regularly monitor populations of this species.
- 2. The Avon Mortlock, Moora and Geraldton districts Threatened Flora Recovery Teams (MDTFRT, MDTFRT & GDTFRT) are overseeing the implementation of this IRP and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

IRP Objective: The objective of this IRP is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria

Criteria for success: The number of populations have increased or individuals within populations have increased by ten percent or more over the five year term of this plan.

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

Recovery actions

- 1. Coordinate recovery actions
- 2. Map habitat
- 3. Conduct further surveys
- 4. Collect seed
- 5. Monitor populations
- 6. Monitor salinity and groundwater levels
- 7. Obtain biological and ecological information
- 8. Promote awareness
- 9. Achieve long-term protection of habitat
- 10. Liaise with relevant land managers
- 11. Review the IRP and assess the need for further recovery actions

1. BACKGROUND

History

Frankenia conferta was first collected from the Avon District and at Cummening, east of York by Martha Heal in 1890. It was subsequently thought to have become extinct until rediscovered northwest of Ballidu during a survey conducted in 2000/2001 as part of a 'Botanical Survey of the Wheatbelt'.

In 2003, surveys were conducted resulting in five new populations being discovered, one population near Marchagee north of Moora and the others in Koorda and Cowcowing. Currently the species is known from nine populations which together contain approximately 2000 plants.

Description

Frankenia conferta is a small shrub; stems simple, with short, spreading or retrorse hairs. Leaves sessile, linear, 2-5mm long, clustered at nodes, puberulous; upper surface sometimes encrusted; margins recurved covering midrib; sheath ciliate, puberulous outside. Flowers in dense dichasia; bracts similar to leaves; bracteoles sessile and attached to sheath or shortly petiolate and free or adnate to inside of sheath. Calyx 3.5-4.7mm long, 1-1.5mm wide, puberulous. Petals 5, 6-8mm long. Stamens 6. Style 3-branched; stigmas linear. Ovules 5-7 on each of 3 parietal placentas. Seed papillose (Barnsley 1982).

Frankenia conferta differs from its relatives *F. brachyphylla* (short-leaved frankenia) and *F. decurrens* (decurrent-leaved frankenia) in its dense head-like inflorescence, which is neither solitary nor greatly branched, and the shape of the leaf lamina which is free below the point of attachment and does not extend down the stem (Brown *et al.* 1998).

Distribution and habitat

Frankenia conferta is widely distributed between Koorda, Dalwallinu, Perenjori and Coorow. However, sites are localised and sparsely scattered within lake chains and major drainage lines in the Yarra Yarra, Ninghan and Avon catchments. The species is located around the high water mark of lake shorelines to the tops of low berms within saline pans. Plants also occur on the floor of major drainage lines within localised swales where they are subject to seasonal inundation. The species grows among other halophytic shrubs on clay sands with gypsum or white-grey shallow sand over clay. Associated species include *Halosarcia* spp. and *Atriplex holocarpa* (Harris 2004).

Pop.	. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1.	NW of Ballidu	Avon Mortlock	Dalwallinu	Unvested Reserve	Public Utility	DEC / DPI
2.	SW of Koorda	Avon Mortlock	Koorda	Aboriginal Affairs	Use and benefit of	Department of
				Planning Authority	Aboriginal	Indigenous
					inhabitants	Affairs
3.	SW of Koorda	Avon Mortlock	Koorda	Department of Land	Sanitary site and	DPI
				Information	common	
4.	N of Kalannie	Avon Mortlock	Dalwallinu	Department of Land	Un-allocated	DEC /DPI
				Information	Crown Land	
5.	E of Kalannie	Avon Mortlock	Koorda	Department of Land	Un-allocated	DEC /DPI
				Information	Crown Land	
6A.	E of Kalannie	Avon Mortlock	Koorda	Department of Land	Un-allocated	DEC /DPI
				Information	Crown Land	
6 B .	E of Kalannie	Avon Mortlock	Koorda	Department of Land	Un-allocated	DEC /DPI
				Information	Crown Land	

Summary of population land vesting, purpose and tenure

Pop	. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
7.	NW of Latham	Geraldton	Perenjori	Department of Land	Un-allocated	DEC / DPI
				Information	Crown Land	
8.	W of Burakin	Avon Mortlock	Koorda	Shire of Koorda	Recreation	Shire of
						Koorda
9.	Marchagee	Moora	Coorow	Conservation	Conservation of	DEC
	(Nature Reserve)			Commission of	Flora and Fauna	
				Western Australia		

Populations in **bold text** are considered to be Important Populations; DPI = Department of Planning and Infrastructure, DEC = Department of Environment and Conservation

Biology and ecology

In 2003/2004, staff from CALM's (now DEC) former Western Australian Threatened Species and Communities Unit (WATSCU) researched plant size and vigour, reproductive characteristics and soil characteristics and developed a framework for monitoring changes in five different locations of *Frankenia conferta* (Harris 2004). This study concluded the following:

- Smaller sized populations may have limited variability with a smaller gene pool, resulting in less tolerance to various stresses and threats;
- Regular monitoring using the framework established is necessary to verify that some populations may be in decline (populations 7 and 9 particularly);
- A high proportion of plants from lower size classes were also in low vigour classes;
- The high number of juveniles present in one population suggests that recruitment of plants may be associated with episodic events;
- The greater proportion of plants (78.6%) produced flowers but fruit set was low. Viable seed production was also low with a high proportion of empty and predated fruits;
- The pattern of recruitment by seed of juveniles in clumps around adult plants along residual stems suggest that seeds are held in fruits on the plant for at least one season and are not immediately dehisced until conditions for germination are favourable;
- *Frankenia conferta* recruits both sexually and vegetatively. Clonal reproduction dominates in four of the five populations by the proliferation of plants from adventitious roots;
- The production of adventitious roots is advantageous for survival through unfavourable seasons;
- Results of soil analysis varied between sites from 107mSm⁻¹ to 1770mSm⁻¹ (Harris 2004).

Threats

The main threat to the species is changes to hydrology from rising salinity and waterlogging.

- **Rising salinity** resulting from broad scale clearing of the catchment for agriculture may impact on all populations by leading to degradation of the species' habitat and, if not addressed, is likely to become worse in the medium to long term.
- Waterlogging and changes to hydrology resulting from catchment modification for agricultural purposes. Very high water levels resulted in erosion of the lake edge at Population 1 in 2000.

Pop	. No. & Location	Land Status	Year/No). plants	Condition	Threats
1.	NW of Ballidu	Unallocated Crown	2000	50	Healthy	Hydrological changes
		Land	2003	76		
			2008	76		
2.	SW of Koorda	Unallocated Crown	2003	200+	Healthy	Hydrological changes
		Land	2008	200		
3.	SW of Koorda	Unallocated Crown	2003	95+	Healthy	Hydrological changes
		Land	2008	95		
4.	N of Kalannie	Unallocated Crown	2003	100 +	Moderate	Hydrological changes
		Land	2008	100		
5.	E of Kalannie	Unallocated Crown	2003	1000 +	Healthy	Hydrological changes
		Land	2008	1000		
6A.	E of Kalannie	Unallocated Crown	2003	100 +	Healthy	Hydrological changes
		Land	2008	100		
6B.	E of Kalannie	Unallocated Crown	2003	100 +	Healthy	Hydrological changes
		Land	2008	0		
7.	NW of Latham	Unallocated Crown	2003	38	Healthy	Hydrological changes
		Land	2008	38		
8.	W of Burakin	Shire Reserve	2003	Not counted	Healthy	Hydrological changes
			2008	0		
9.	Marchagee	Nature Reserve	2003	650	Moderate	Hydrological changes
			2008	650		

Summary of population information and threats

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

Guide for decision-makers

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

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

Habitat critical to the survival of the species includes the area of occupancy of important populations; areas of similar habitat surrounding important populations (i.e. among other halophytic shrubs on clay sands with gypsum or white-grey shallow sand over clay) provide potential habitat for natural range extension and are necessary to provide habitat for pollinators; the local catchment of the surface and possibly ground waters that maintain the habitat of the species; and additional occurrences of similar habitat that may contain the species or be suitable sites for future translocations.

On the basis of current knowledge it appears that all the populations of this species are important. This will need to be reappraised when further survey for new populations has been completed and also after the results of genetic studies are known.

Benefits to other species/ecological communities

There are no other known threatened flora species or ecological communities in the habitat of *Frankenia conferta*. However, recovery actions implemented to improve the quality or security of the habitat of populations of the species are likely to improve the status of the habitat in which they are located.

International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is not listed under any specific international treaty and this Interim Recovery Plan (IRP) does not affect Australia's obligations under these international agreements.

Indigenous consultation

Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Frankenia conferta*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near populations of the species covered by this IRP. Where no role is identified for the indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social or economic impacts. However, as Population 8 is located on a Shire Reserve its protection may potentially affect Shire activities. In addition, exploration licences have been applied for in the areas containing populations 5 and 7 and subpopulations 6a and 6b. Actions will involve liaison and cooperation with all stakeholders with regard to these areas.

Affected interests

Stakeholders potentially affected by the implementation of this plan include the Shire of Koorda, as the manager of the area that contains Population 8.

Evaluation of the Plan's Performance

DEC will evaluate the performance of this IRP in conjunction with the Avon Mortlock, Moora and Geraldton districts Threatened Flora Recovery Teams. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this IRP is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Criteria for success: The number of populations have increased or individuals within populations have increased by ten percent or more over the five year term of the plan.

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

3. RECOVERY ACTIONS

Completed recovery actions

Land managers have been notified of the location and threatened status of the species. The notification details the Declared Rare status of *Frankenia conferta* and associated legal obligations.

An article on the rediscovery of *Frankenia conferta* appeared in the March/April 2001 Newsletter of the former Department of Conservation and Land Management (CALM).

A survey of *Frankenia conferta* and a number of other rare wheatbelt species was undertaken in spring 2003. Five new populations of the species were located (Papenfus 2003).

Research into the population characteristics of *Frankenia conferta* was undertaken in 2003/2004 by staff from the Threatened Species and Communities Unit (WATSCU) (Harris 2004). The aims of this project were to establish a quantitative monitoring framework and data baseline to obtain information on populations and species growth characteristics and for detecting changes in population abundance, health, life stage structure and reproductive potential. The project included:

- establishing five permanently marked quadrats at five different locations;
- permanently labelling at least 100 Frankenia conferta plants for long-term monitoring;
- assessing canopy dimensions of each labelled plant by measuring width;
- assessing health and vigour of each plant by estimating the percentage of live canopy;
- counting the total number of inflorescences on each plant labelled;
- recording life-stage classification of each plant assessed, i.e. mature or juvenile; and
- recording other ecological and biological observations relevant to *F. conferta* populations that will assist in management of the species (eg. soil characteristics) (Harris 2004).

Ongoing and future recovery actions

Staff from DEC's Avon Mortlock, Moora and Geraldton Districts regularly monitor all populations of this species.

The Avon Mortlock, Moora and Geraldton districts Threatened Flora Recovery Teams (AMTFRT, MDTFRT and GDTFRT) are overseeing the implementation of this IRP and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Where populations occur on lands other than those managed by DEC, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the Plan. However this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate recovery actions

The Avon Mortlock, Moora and Geraldton districts Threatened Flora Recovery Teams (MDTFRT, MDTFRT and GDTFRT) will continue to coordinate recovery actions for *Frankenia conferta* and other Declared Rare Flora in their districts. They will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Action:	Coordinate recovery actions
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$2,000 per year

2. Map habitat critical to survival

Although habitat critical to the species' survival is described in Section 1, the areas as described have not yet been mapped and that will be redressed under this action. If any additional populations are located, then total habitat will also be determined and mapped for these locations.

Action:	Map habitat critical to survival
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts, SCB) through the
	AMTFRT, MDTFRT and GDTFRT recovery teams
Cost:	\$4,000 in the first year

3. Conduct further surveys and confirm populations

Further surveys by DEC staff and community volunteers will be conducted during the flowering period of this species (October). A number of sites that were identified in previous surveys as either containing the species or containing potential habitat for the species will need to be surveyed. In addition most populations were located in a part of a large lake system and further survey is required in the rest of the lake system. Hundreds of a similar looking *Frankenia* plants were found growing adjacent to Population 1 of *F. conferta*. A specimen will be collected to confirm whether this is the same species. In addition, a specimen of the species is required to be collected from Population 9 and identification confirmed. Records of areas surveyed will be sent to SCB and also retained in the relevant districts, even if the species is not found. Population 7 was resurveyed by GDTFRT in 2006 after it was initially recorded in 2003. Two Frankenia species were identified and specimens collected, however as they were not in flower there was not enough material for positive identification. The site was surveyed again in 2007, however many of the Frankenia plants appeared to be dead. This population requires confirmation, further survey and monitoring.

Action:	Conduct further surveys and confirm populations
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$7,200 per year

4. Collect and store seed

Seed should be stored as a genetic resource for future translocations and to provide an ex-situ conservation collection for the species. The germplasm stored will include seed and live plants in cultivation. No seed has been collected yet, so collections are required from all populations to maintain an adequate representation of the species. The patterns of viability that emerge from standard tests on seed collected may indicate the need for other recovery actions. For example, if viability is consistently low, it may be appropriate to conduct some hand pollination trials. The *Germplasm Conservation Guidelines for Australia* produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process (Offord & Meagher 2009).

Action:	Collect and store seed
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts, TFSC) through the
	AMTFRT, MDTFRT and GDTFRT recovery teams
Cost:	\$3,200 in the first, third and fifth years

5. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollinator activity, grazing, seed production, recruitment, longevity and predation is essential.

Action:	Monitor populations
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$2,000 per year

6. Monitor salinity and groundwater levels

Monitoring bores will need to be installed in most populations to monitor groundwater levels. Soil salinity and pH readings will also be taken annually during winter (as per methods used in Harris 2004). Soil samples may be collected using an auger to provide a soil profile. The monitoring results will continue to be examined and the implications for management determined. If the decline of the

species is confirmed at population 7, monitoring may be particularly valuable in identify factors that have contributed to its decline.

Action:	Monitor salinity and groundwater levels
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$10,500 in year one; \$4,500 per year thereafter

7. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Frankenia conferta* will provide a scientific basis for its management in the wild. The five quadrats established at Populations 2, 3, 4 and 5 in 2003/2004 will provide a basis for re-monitoring (Harris 2004). An understanding of the following is necessary for effective management:

- 1. Soil seed bank dynamics, including seedbank location and viability.
- 2. The role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
- 3. The pollination biology of the species.
- 4. The requirements of pollinators.
- 5. The reproductive strategies, phenology and seasonal growth of the species.
- 6. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action:	Obtain biological and ecological information
Responsibility:	DEC (Science Division, Avon Mortlock, Moora & Geraldton Districts) through
	the AMTFRT, MDTFRT and GDTFRT recovery teams
Cost:	\$12,500 per year in the first, second and third years

8. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of *Frankenia conferta* will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet will be produced, and will include a description of the plant, its habitat, threats, recovery actions and photos. This will be distributed to the public through DEC's Avon Mortlock, Moora and Geraldton District offices and at the offices and libraries of the Shires of Koorda, Dalwallinu, Perenjori and Coorow. Such information distribution may lead to the discovery of new populations.

Action:	Promote awareness
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$1,300 in first year; \$600 per year thereafter

9. Achieve long-term protection of habitat

Ways and means of improving the security of populations of *Frankenia conferta* and its habitat will be investigated. On private land, this may include conservation covenants with a range of agencies, or registration through the Land for Wildlife Scheme. The reservation status of the land parcel that supports Population 1 should be reviewed, and the possibility of additional protection through the reservation system investigated.

Action:	Achieve long-term protection of habitat
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$1,500 per year

10. Liaise with relevant land managers

Staff from DEC's Avon Mortlock, Moora and Geraldton Districts will continue to liaise with relevant land managers to ensure that populations are not accidentally damaged or destroyed. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Frankenia conferta*.

Action:	Liaise with relevant land managers
Responsibility:	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT,
	MDTFRT and GDTFRT recovery teams
Cost:	\$900 per year

11. Review the IRP and assess the need for further recovery actions

If *Frankenia conferta* is still ranked VU at the end of the fourth year of the five-year term of this IRP, the plan will be reviewed and the need for further recovery actions assessed.

Action:	Review the IRP and assess the need for further recovery actions				
Responsibility:	DEC (SCB, Avon Mortlock, Moora & Geraldton Districts) through the				
	AMTFRT, MDTFRT and GDTFRT recovery teams				
Cost:	\$22,700 in the fifth year (if required)				

Summary of Recovery Actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery	Ongoing
Map habitat critical to survival	High	DEC (Avon Mortlock, Moora & Geraldton Districts, SCB) through the AMTFRT, MDTFRT and GDTFRT recovery teams	2009
Conduct further surveys and confirm populations	High	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Collect seed	High	DEC (Avon Mortlock, Moora & Geraldton Districts, TFSC) through the AMTFRT, MDTFRT and GDTFRT recovery teams	2013
Monitor populations	High	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Monitor salinity and groundwater levels	High	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Obtain biological and ecological information	High	DEC (Science Division, Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	2011
Promote awareness	Medium	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Achieve long-term protection of habitat	Medium	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Liaise with relevant land managers	Medium	DEC (Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	Ongoing
Review the IRP and assess the need for further recovery actions	Medium	DEC (SCB, Avon Mortlock, Moora & Geraldton Districts) through the AMTFRT, MDTFRT and GDTFRT recovery teams	2013

4. TERM OF PLAN

Western Australia

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the species is still ranked VU after five years, the need for further recovery actions and an update of this IRP will be assessed.

Commonwealth

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

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

5. **REFERENCES**

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- World Conservation Union (2001) *IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 51st meeting of the IUCN Council.* Gland, Switzerland.

6. TAXONOMIC DESCRIPTION

- Diels, L. and Pritzel, E. (1904) Fragmenta phytographiae Australiae occidentalis : Beitrage zur kenntnis der Pflanzen Westaustraliens, ihrer Verbreitung und ihrer Lebens-Verhaltnisse. *Botanische Jahrbucher fur Systematik, Pflanzengeschichte und Pflanzengeographie* 35, 389.
- *Frankenia conferta* **Diels n. sp.** folia 4-5 mm long, ca. 1 mm crassa. Calyx 4mm long; corolla 6 mm long; stamina 4-5 mm, anthera 1 mm long; ovarium 2 mm, stylus 4-5 mm long.

SUMMARY OF RECOVERY ACTIONS AND COSTS

5
r Ext.
0
0 3100
1800
1400
4500
500
7400
00 18700
0

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

TOTAL COSTS:	\$174,000
Total External Funding:	\$90,500
Total Other:	\$11,500
Total DEC:	\$72,000