



Government of **Western Australia**  
Department of **Environment and Conservation**



**Australian Government**

INTERIM RECOVERY PLAN NO. 304

# **SOUTHERN SHY FEATHERFLOWER**

*(Verticordia fimbrilepsis subsp. fimbrilepsis)*

## **INTERIM RECOVERY PLAN**

**2010-2015**



December 2010  
Department of Environment and Conservation  
Kensington

## 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: 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.

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.

DEC is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of plans 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This plan will operate from December 2010 to November 2015 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Vulnerable (VU), this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was approved by the Director of Nature Conservation on 2 December 2010. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this plan was accurate at December 2010.

## IRP PREPARATION

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## ACKNOWLEDGMENTS

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

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Cover photograph by Bethea Loudon.

## CITATION

This plan should be cited as:

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**SUMMARY**

<b>Scientific Name:</b>	<i>Verticordia fimbrialepis</i> subsp. <i>fimbrialepis</i>	<b>Common Name:</b>	Southern Shy Featherflower
<b>Family:</b>	Myrtaceae	<b>Flowering Period:</b>	July to December
<b>DEC Regions:</b>	Wheatbelt, Swan	<b>DEC Districts:</b>	Perth Hills, Great Southern
<b>Shires:</b>	Woodanilling, West Arthur, Brookton, Kojonup, Narrogin, Pingelly, Beverley, Wandering, Cuballing	<b>NRM Regions:</b>	Avon, South West
<b>Recovery Teams:</b>	Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT); Great Southern Threatened Flora Recovery Team (GSTFRT)		

**Illustrations and/or further information:** Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; George, A.S. (1991) New taxa, combinations and typifications in *Verticordia* (Myrtaceae: Chamelaucieae). *Nuytsia* 7 (3): 231–394; George, A.S. (2002) *Verticordia: the turner of hearts*. University of Western Australia Press, Crawley; Western Australian Herbarium (1998–) *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>.

**Current status:** *Verticordia fimbrialepis* subsp. *fimbrialepis* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in September 1987 and is currently ranked Vulnerable. The subspecies is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) as Endangered. The main threats to the subspecies are insecure land tenure, road maintenance activities, weed invasion, poor recruitment, inappropriate fire regimes, grazing, trampling, feral pigs, *Phytophthora* dieback, powerline maintenance, salinity, farming activities and gravel extraction.

**Description:** *Verticordia fimbrialepis* subsp. *fimbrialepis* is a small bushy shrub, 30–70 cm tall and 20–70 cm wide. It has pale-pink or occasionally white flowers on short peduncles. Flowers are in small rounded groups at the tips of branches. The petals are markedly narrowed towards the tip with margins finely fringed. The staminodes are fringed across their broad apex, and a single hair in the centre is much longer than the others (George 2002).

**Habitat requirements:** *Verticordia fimbrialepis* subsp. *fimbrialepis* is widely distributed from southeast of Armadale to Brookton and Kojonup. It grows in low-lying shallow grey sand and yellowish-white sandy loam over gravel, sometimes with clay, in heath and scrubland and open wandoo woodland (George 2002).

**Habitat critical to the survival of the species, and important populations:** It is considered that the habitat for populations 4, 5, 7, 8, 10, 11, 12, 14 and 16 is critical to the survival of *Verticordia fimbrialepis* subsp. *fimbrialepis* and that these populations are important populations. Habitat critical to the survival of *V. fimbrialepis* subsp. *fimbrialepis* includes the area of occupancy of these populations, areas of similar habitat surrounding these populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the subspecies or be suitable for future translocations, and the local catchment of these populations 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 *Verticordia fimbrialepis* subsp. *fimbrialepis* will also improve the status of associated native vegetation including four Declared Rare Flora, 16 Priority flora and one Priority Ecological Community.

**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 listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), however this IRP does not affect Australia's obligations under any other international agreements.

**Indigenous Consultation:** A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified two sites of Aboriginal significance within Populations 3 and 7. These sites are listed as Measles Bridge Camp (#19933) a historical camp (open, no restrictions) and Nalya/Brookton (#5718) man-made structure (open, no restrictions).

**Social and economic impacts:** As Subpopulation 5b occurs on private property and Population 13 occurs on land where gravel is extracted, the protection of *Verticordia fimbriolepis* subsp. *fimbriolepis* may affect future development on these sites.

**Affected interests:** The protection of the subspecies may impact on maintenance operations conducted by local Shires, Western Power, Main Roads WA, Water Corporation and private landholders.

**Evaluation of the Plan's Performance:** The DEC in conjunction with the Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) and Great Southern Threatened Flora Recovery Team (GSTFRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

**Existing Recovery Actions:** The following recovery actions have been or are currently being implemented:

1. All relevant stakeholders have been made aware of the existence of this subspecies and its locations.
2. Declared Rare Flora (DRF) markers have been installed at Populations 1, 2, 4, 5a, 5b, 6 and 12.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.
4. In July 1998, 150 plants of *Verticordia fimbriolepis* subsp. *fimbriolepis* were planted into a proposed Timber Reserve near Beaufort, in accordance with an approved Translocation Proposal.
5. Weed control trials were conducted by DEC Katanning District at Population 1 of *Verticordia fimbriolepis* subsp. *fimbriolepis* following an uncontrolled fire in 1990.
6. In 1997, surveys were conducted for new populations of *Verticordia fimbriolepis* subsp. *fimbriolepis* by Robert Buehrig.
7. In 2009, a new population of *Verticordia fimbriolepis* subsp. *fimbriolepis* was found south east of Armadale by volunteers Fred and Jean Hort.
8. A research study on six *Acacia* and five *Verticordia* DRF taxa was undertaken by DEC Science Division.
9. A total of 31,535 *Verticordia fimbriolepis* subsp. *fimbriolepis* seeds collected between 1996 and 2004 are stored in DEC's Threatened Flora Seed Centre at -18°C and 4°C.
10. Cutting material from *Verticordia fimbriolepis* subsp. *fimbriolepis* was collected from Population 3 in 1994, 1997, 1998, 1999 and 2000 and forwarded to BGPA for propagation.
11. Staff from DEC's Perth Hills and Great Southern Districts regularly monitor populations.
12. The SRTFCRT and GSTFRT 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.

**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 subspecies in the wild.

### Recovery Criteria

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

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

### Recovery actions

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| <ol style="list-style-type: none"> <li>1. Coordinate recovery actions</li> <li>2. Stimulate germination</li> <li>3. Install DRF markers or replace where necessary</li> <li>4. Undertake weed control and follow up with additional control if required</li> <li>5. Maintain disease hygiene</li> <li>6. Monitor populations</li> <li>7. Rehabilitate habitat</li> <li>8. Collect seed and other material to preserve genetic diversity</li> <li>9. Implement rabbit control where necessary</li> </ol> | <ol style="list-style-type: none"> <li>10. Implement feral pig control where necessary</li> <li>11. Develop and implement a fire response strategy</li> <li>12. Conduct further surveys</li> <li>13. Achieve long-term protection of habitat</li> <li>14. Map habitat critical to the survival of <i>Verticordia fimbriolepis</i> subsp. <i>fimbriolepis</i></li> <li>15. Liaise with relevant land managers and Indigenous groups</li> <li>16. Promote awareness</li> <li>17. Review this IRP and assess the need for further recovery actions</li> </ol> |
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## 1. BACKGROUND

### History

*Verticordia fimbriolepis* subsp. *fimbriolepis* was originally collected by James Drummond in the 1840's and for more than a century it was known only from that collection. In November 1983 the subspecies was rediscovered near Woodanilling by Norm Stevens. Due to the low number of plants and threats associated with growing on narrow, degraded road reserves and small areas of remnant vegetation, a translocation was undertaken in 1998 by the then Conservation and Land Management (CALM) Katanning District.

In 2000, two large populations were discovered in State Forest near Wandering by DEC volunteer Fred Hort. The area had been burnt in 1998/99 and many thousands of seedlings were present. A resurvey in 2003 found that the populations occupied a much greater area than realised when surveyed in 2000. Over 20,000 plants of the subspecies were estimated to be present.

Currently *Verticordia fimbriolepis* subsp. *fimbriolepis* is known from 16 populations consisting of approximately 36,128 mature plants.

### Description

Named from the Latin *fimbria* (fringe) and *lepis* (a scale), referring to its staminodes (George 2002), *Verticordia fimbriolepis* subsp. *fimbriolepis* is a small bushy shrub, 30–70 cm tall and 20–70 cm wide. It has pale pink or occasionally white flowers on short peduncles. Flowers are in small rounded groups at the tips of branches. The petals are markedly narrowed towards the tip with margins finely fringed. The staminodes are fringed across their broad apex, and a single hair in the centre is much longer than the others.

*Verticordia fimbriolepis* subsp. *fimbriolepis* is distinguished by its flowers which have persistent bracteoles, fringed staminodes, and a very short style. In particular it differs from subspecies *australis* in having flowers borne on shorter peduncles, petals with a broader lamina, a shorter finer fringe and staminodes bearing one long terminal hair (George 2002).

### Distribution and habitat

*Verticordia fimbriolepis* subsp. *fimbriolepis* is widely distributed from southeast of Armadale to Brookton and Kojonup, with an extent of occurrence of 7,794 km<sup>2</sup>. The subspecies grows in low-lying shallow grey sand and yellowish-white sandy loam over gravel, sometimes with clay, in heath and scrubland and open wandoo woodland (George 2002). Associated species include *Adenanthos cygnorum* subsp. *cygnorum*, *Banksia sphaerocarpa*, *B. grandis*, *B. armata*, *B. drummondii*, *B. nivea*, *Hakea incrassata*, *H. trifurcata*, *Isopogon teretifolius*, *Allocasuarina campestris*, *A. huegeliana*, *A. humilis*, *A. microstachya*, *Caustis dioica*, *Mesomelaena pseudostygia*, *Epilobium hirtigerum*, *Cassytha glabella*, *Acacia leptospermoides*, *A. saligna*, *Daviesia benthamii*, *D. cardiophylla*, *D. hakeoides*, *Gastrolobium spinosum*, *Jacksonia racemosa*, *Dodonaea pinifolia*, *Astroloma pallidum*, *Desmocladius fasciculata*, *Callistemon phoeniceus*, *Calothamnus quadrifidus*, *Eucalyptus wandoo*, *Leptospermum erubescens*, *Melaleuca systema*, *Verticordia acerosa* var. *preissii*, *V. brachypoda*, *V. densiflora*, *V. eriocephala*, *V. habrantha*, *V. huegelii*, *V. multiflora*, *V. pennigera* and *V. picta*.

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

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1. West of Woodanilling	Great Southern	Woodanilling	Shire of Woodanilling	Road Reserve	Shire of Woodanilling
2. West of Woodanilling	Great Southern	Woodanilling	Shire of Woodanilling	Road Reserve	Shire of Woodanilling
3. South of Arthur River	Great Southern	West Arthur	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
4. SE of Aldersyde	Great Southern	Brookton	Shire of Brookton	Road Reserve	Shire of Brookton
5a. NE of Kojonup	Great Southern	Kojonup	Shire of Kojonup	Road Reserve	Shire of Kojonup
5b. NE of Kojonup	Great	Kojonup	Freehold	Private Property	Landowners

	Southern				
6. East of Narrogin	Great Southern	Narrogin	Shire of Narrogin	Road Reserve	Shire of Narrogin
<b>7a. SE of Aldersyde</b>	Great Southern	Pingelly	Shire of Pingelly	Road Reserve	Shire of Pingelly
<b>7b. SE of Aldersyde</b>	Great Southern	Pingelly	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
8a. Aldersyde	Great Southern	Brookton	Shire of Brookton	Road Reserve	Shire of Brookton
8b. West of Aldersyde	Great Southern	Brookton	Shire of Brookton	Road Reserve	Shire of Brookton
8c. West of Aldersyde	Great Southern	Brookton	Shire of Brookton	Reserve (Parkland & Recreation)	Shire of Brookton
8d. West of Aldersyde	Great Southern	Brookton	Shire of Brookton	Reserve (Golf)	Shire of Brookton
<b>8e. West of Aldersyde</b>	Great Southern	Brookton	Shire of Brookton	Reserve (Golf)	Shire of Brookton
9. West of Brookton	Perth Hills	Beverley	Minister for Water Resources	Water Reserve	Department of Water
<b>10. NE of North Bannister</b>	Perth Hills	Wandering	Land and Forests Commission	State Forest	DEC
<b>11. NE of North Bannister</b>	Perth Hills	Wandering	Land and Forests Commission	State Forest	DEC
<b>12. West of Woodanilling</b>	Great Southern	Woodanilling	Shire of Woodanilling	Road Reserve	Shire of Woodanilling
13. East of Aldersyde	Great Southern	Brookton	Shire of Brookton	Reserve (gravel pit)	Shire of Brookton
<b>14a. South of Pingelly</b>	Great Southern	Cuballing	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
14b. South of Pingelly	Great Southern	Cuballing	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
14c. South of Pingelly	Great Southern	Cuballing	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
15. North of Kojonup	Great Southern	Woodanilling	MRWA	Road Reserve	MRWA
<b>16. SE of Armadale</b>	Perth Hills	Armadale	Land and Forests Commission	State Forest	DEC

Note: Populations in **bold text** are considered to be important populations, MRWA = Main Roads Western Australia.

## Biology and ecology

Research conducted into the reproductive biology and ecology of *Verticordia fimbriolepis* subsp. *fimbriolepis* by Yates and Ladd (2005) found that insect visitors to the taxon included wasps, bees, flies, beetles and butterflies. The diversity of insect visitors to flowers, rates of pollination, and seed production were equal or greater for small populations on road reserves compared with the larger populations in conservation reserves.

Yates and Ladd (2005) also concluded that seeds of *Verticordia fimbriolepis* subsp. *fimbriolepis* remained dormant in the soil for at least 30 months. Germination of soil-stored seed was stimulated by the use of smoke. Adult plants were killed by fire but mass recruitment from soil-stored seed occurred in the first and second winters following. Seedling survival depended on water availability, nutrient levels and grazing pressure. Fire suppression may adversely affect the *Verticordia* as most populations are declining and cannot recover without the occurrence of fire. Small, fragmented populations however, are more affected by weeds which are also abundant after fire, thereby outweighing any positive effects of fire without intervention management.

*Verticordia fimbriolepis* subsp. *fimbriolepis* is considered susceptible to dieback caused by *Phytophthora cinnamomi* with 80% mortality observed after testing 20 individuals.

## Threats

*Verticordia fimbrialepis* subsp. *fimbrialepis* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* on 25 September 1987 and is currently ranked Vulnerable. The subspecies is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) as Endangered. The main threats to the subspecies are insecure land tenure, road maintenance activities, weed invasion, poor recruitment, inappropriate fire regimes, grazing, trampling, feral pigs, *Phytophthora* dieback, powerline maintenance, salinity, farming activities and gravel extraction.

- **Insecure land tenure.** The majority of populations are found on land tenure that is not consistent with conservation and is of poor and deteriorating quality.
- **Road maintenance activities** threaten Populations 1, 2, 4, 5, 6, 7, 8, 12, 13 and 15. Threats include grading, chemical spraying, construction of drainage channels and the mowing/maintenance of roadside vegetation. Several of these actions also encourage weed invasion.
- Habitat degradation by **weed invasion** is a threat to Populations 1, 2, 3, 4, 5, 6, 7, 8, 12 and 13. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species.
- **Poor recruitment** has been observed in all populations, possibly due to a reduction of fire or other factors that may influence reproduction.
- **Inappropriate fire regimes** may affect the viability of populations. As seeds of *Verticordia fimbrialepis* subsp. *fimbrialepis* germinate following fire, occasional fires are needed for reproduction, however, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity. Fire may facilitate weed invasion and should be followed up with appropriate weed control.
- **Grazing and trampling** by stock (sheep) and rabbits (*Oryctolagus cuniculus*) is a threat to Populations 3, 4, 7, 8, 13 and 14. As well as directly grazing *Verticordia fimbrialepis* subsp. *fimbrialepis*, the animals impact on the habitat by potentially spreading dieback and also by digging, trampling and breaking foliage. An increased nutrient level in the soil from droppings is likely and may encourage weed invasion. Grazing would have an impact on the establishment of young plants of *V. fimbrialepis* subsp. *fimbrialepis* thereby limiting natural recruitment.
- **Feral Pigs** (*Sus scrofa*) have been recorded in Population 16. Feral Pigs can directly damage the subspecies and its habitat when digging in search of food. They can also introduce weed seeds and nutrients. Soil disturbance also encourages the establishment of weeds.
- **Phytophthora dieback** caused by *Phytophthora cinnamomi*, a pathogen that causes root rot resulting in susceptible plants dying of drought stress, is a threat to *Verticordia fimbrialepis* subsp. *fimbrialepis*. Although it is not known if the pathogen is prevalent in the area of populations, the subspecies is considered to be susceptible to the pathogen.
- **Powerline maintenance** is a potential threat to Populations 2 and 3. Disturbance during maintenance may encourage weed invasion and also directly damage plants. Western Power has been notified of the populations.
- **Salinity** is a potential threat to Population 3. The vegetation in the reserve where the subspecies occurs is being impacted by salinity with EM38 readings ranging from 52 to 92 (slightly saline). It is not known how *Verticordia fimbrialepis* subsp. *fimbrialepis* will respond to changes in soil salt levels.
- **Farming activities** including fence maintenance and spray drift are a threat to Populations 4 and 12. Part of Population 4 is located near a property gate and maintenance may damage the population. Herbicide and fertilizer applied on properties adjacent to Populations 4 and 12 have the potential to drift onto the road reserve.
- **Gravel extraction** is a threat to Population 13 as it occurs in an active gravel pit. The subspecies may be damaged or completely removed during this process, and the risk of increasing the spread of dieback disease through the area is increased. Gravel extraction is also a potential risk to Subpopulation 8c as the area is a possible future source of gravel for the Shire.

The intent of this plan is to provide actions that will deal with immediate threats to *Verticordia fimbrialepis* subsp. *fimbrialepis*. Although climate change may have a long-term effect on the subspecies, actions taken directly to prevent the impact of climate change are beyond the scope of this plan.

**Table 2. Summary of population information and threats**

Pop. No. & Location	Land Status	Year / No. of plants	Current Condition	Threats
1. West of Woodanilling	Shire Road Reserve	1984 53 1987 17 1991 13 1996 11 1998 4 [1] 1999 6 [2]	Poor	Weeds, road maintenance
2. West of Woodanilling	Shire Road Reserve	1984 20 1987 7 1988 10 1991 0 1996 0 1997 0 1998 0 1999 0	Population extinct	Road maintenance, weeds, powerline maintenance
3. South of Arthur River	Nature Reserve	1987 1 1991 28 1994 6 1996 3 [2] 1998 4 (1) 1999 3 [1] 2000 0 [4]	Poor	Powerline maintenance, salinity, weeds, grazing, trampling
4. SE of Aldersyde	Shire Road Reserve	1993 50 1995 46 1997 83 (7) 1998 83 2005 61	Poor	Road maintenance, farming activities, grazing (rabbits), weeds
5a. NE of Kojonup	Shire Road Reserve	1992 2 1996 2 1999 0	Poor	Road maintenance, weeds
5b. NE of Kojonup	Private Property	1999 95 2000 100 2001 25	Healthy	
6. East of Narrogin	Shire Road Reserve	1992 17 1995 13 1997 1 2003 0	Poor	Road maintenance, weeds
7a. SE of Aldersyde	Shire Road Reserve	1995 100 (230) 1996 330 1998 796+	Healthy	Road maintenance, weeds, grazing (rabbits)
7b. SE of Aldersyde	Nature Reserve	1995 2 1998 305+	Healthy	Grazing (rabbits)
8a. Aldersyde	Shire Road Reserve	1995 0 1996 1 1998 0 2005 0	Disturbed	Road maintenance, weeds, grazing (rabbits)
8b. West of Aldersyde	Shire Road Reserve	1997 40 1998 40	Moderate	Road maintenance, weeds
8c. West of Aldersyde	Shire Reserve (Parklands and Recreation)	1995 23 1998 27 2006 2 [1]	Healthy	Weeds, grazing, gravel extraction
8d. West of Aldersyde	Shire Reserve	1995 17 1998 10 2005 12 [2]	Healthy	Weeds, grazing
8e. West of Aldersyde	Shire Reserve	1999 43 2005 30	Healthy	Weeds, grazing
9. West of Brookton	Water Reserve	1970 0	Population extinct	<i>Phytophthora</i> dieback
10. NE of North Bannister	State Forest	2000 757 (100+) 2003 10040	Healthy	
11. NE of North Bannister	State Forest	2000 2000+ (2000+) 2003 19120	Healthy	
12. West of Woodanilling	Shire Road Reserve	1999 185 (6) 2005 77 [5]	Moderate	Road maintenance, weeds, farming activities



13. East of Aldersyde	Shire Reserve (Gravel pit)	2005	0		Road maintenance, weeds, grazing, gravel extraction
14a. South of Pingelly	Nature Reserve	2001	482	Healthy	<i>Phytophthora</i> dieback
14b. South of Pingelly	Nature Reserve	2001	12	Healthy	<i>Phytophthora</i> dieback
14c. South of Pingelly	Nature Reserve	2004	110+ (9) [1]	Healthy	<i>Phytophthora</i> dieback, grazing (rabbits)
15. North of Kojonup	MRWA Road Reserve	2003	10	Moderate	Road maintenance
16. SE of Armadale	State Forest	2009	5000+	Healthy	Feral pigs

Note: \* = total for both subpopulations, ( ) = number of seedlings, [ ] = number dead, MRWA = Main Roads Western Australia.

## Guide for decision-makers

Section 1 provides details of current and possible future threats. Development and/or land clearing in the immediate vicinity of *Verticordia fimbrialepis* subsp. *fimbrialepis* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that their actions will not have any significant negative impact on the subspecies, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the subspecies would be altered.

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

It is considered that the habitat for populations 4, 5, 7, 8, 10, 11, 12, 14 and 16 is critical to the survival of *Verticordia fimbrialepis* subsp. *fimbrialepis* and that these populations are important populations. Habitat critical to the survival of *V. fimbrialepis* subsp. *fimbrialepis* includes the area of occupancy of these populations, areas of similar habitat surrounding these populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the subspecies or be suitable for future translocations, and the local catchment of these populations 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 *Verticordia fimbrialepis* subsp. *fimbrialepis* will also improve the status of other rare species and associated native vegetation. Four Declared Rare Flora (DRF) species and 15 Priority flora taxa occur within 500 m of *V. fimbrialepis* subsp. *fimbrialepis*. These taxa are listed in the table below:

**Table 3. Conservation-listed flora species occurring within 500m of *Verticordia fimbrialepis* subsp. *fimbrialepis***

Species name	Conservation Status (WA)	Conservation Status (EPBC Act 1999)
<i>Banksia ionthocarpa</i> subsp. <i>chrysophoenix</i>	DRF (CR)	Endangered
<i>Hemigenia ramosissima</i>	DRF (CR)	Critically Endangered
<i>Conostylis drummondii</i>	DRF (EN)	Endangered
<i>Tribonanthes purpurea</i>	DRF (VU)	Vulnerable
<i>Banksia dallanneyi</i> subsp. <i>agricola</i>	Priority 2	-
<i>Calytrix</i> sp. <i>Jingaring</i>	Priority 2	-
<i>Leucopogon cymbiformis</i>	Priority 2	-
<i>Stylidium emarginatum</i> subsp. <i>exappendiculatum</i>	Priority 2	-
<i>Trichocline</i> sp. <i>Treeton</i>	Priority 2	-
<i>Acacia anarthros</i>	Priority 3	-
<i>Anigozanthos bicolor</i> subsp. <i>exstans</i>	Priority 3	-
<i>Brachyloma mogin</i>	Priority 3	-
<i>Goodenia trichophylla</i>	Priority 3	-
<i>Grevillea manglesii</i> subsp. <i>dissectifolia</i>	Priority 3	-
<i>Stylidium marradongense</i>	Priority 3	-
<i>Stylidium pseudohirsutum</i>	Priority 3	-
<i>Synaphea drummondii</i>	Priority 3	-
<i>Anthotium junciforme</i>	Priority 4	-

<i>Calothamnus brevifolius</i>	Priority 4	-
<i>Verreauxia verreauxii</i>	Priority 4	-

For a description of the Priority categories see Atkins (2008).

*Verticordia fimbrialepis* subsp. *fimbrialepis* at Subpopulation 5b occurs within one kilometre of a Priority Ecological Community (PEC). This PEC is described as Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs.

**Table 4: Threatened Ecological Communities that *Verticordia fimbrialepis* subsp. *fimbrialepis* occurs near**

Community Name	Conservation status (WA)	Conservation Status (EPBC Act 1999)
Claypans with dense shrublands of <i>Melaleuca lateritia</i> over herbs	Priority 1	-

For a description of the PEC categories see DEC (2007)

### 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 listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), however this IRP does not affect Australia's obligations under any other international agreements.

### Indigenous Consultation

A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified two sites of Aboriginal significance in the areas of Populations 3 and 7. These sites are listed as Measles Bridge Camp (#19933) a historical camp (open, no restrictions) and Nalya/Brookton (#5718) man-made structure (open, no restrictions).

Input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. As this is not expected to be completed before the approval of the IRP, further consultation has been included as a recovery action to ensure there has been Indigenous engagement in relation to the recovery actions posed in this plan.

### Social and economic impacts

As subpopulation 5b occurs on private property; and Population 13 occurs on land where gravel is extracted, the protection of *Verticordia fimbrialepis* subsp. *fimbrialepis* may potentially affect development on these sites. Two sites of Aboriginal significance also occur in the areas of Populations 3 and 7 and recovery actions may potentially impact on Indigenous interests.

### Affected interests

Affected interests are relevant Indigenous groups, local Shires, Western Power, Main Roads WA, Department of Water and private landholders.

### Evaluation of the Plan's Performance

The DEC in conjunction with the Swan Region Threatened Flora and Communities Recovery Team (SRFCRT) and Great Southern Region Threatened Flora Recovery Team (GSRTFRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

## 2. RECOVERY OBJECTIVE AND CRITERIA

### Objective

The objective of this Interim Recovery Plan (IRP) is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the subspecies in the wild.

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

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

### 3. RECOVERY ACTIONS

#### Existing recovery actions

Relevant stakeholders have been made aware of the existence of this subspecies and its locations. These notifications detail the current status of the species as Declared Rare Flora (DRF) and the associated legal obligations in regards to their protection.

Declared Rare Flora (DRF) markers have been installed at Populations 1, 2, 4, 6 and 12 and Subpopulations 5a and 5b. These serve to alert people working in the vicinity to the presence of the DRF and the need to avoid work that may damage plants or their habitat. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.

In July 1998, 150 plants of *Verticordia fimbrialepis* subsp. *fimbrialepis* were translocated into a proposed Timber Reserve near Beaufort (Bone and Graham 1998). All plants were grown from cuttings taken from five plants in Population 3 and grown by the Botanic Gardens and Parks Authority (BGPA). The translocation was conducted on an experimental basis and has provided information about effective techniques for future translocations. Three treatments were tested: water, mulch and control (no watering or mulching). The number of surviving plants, height, crown width, reproductive state, number of inflorescences and follicles, and general health are being monitored. By March 1998, 56 of 150 introduced plants (37.3%) were dead. The least number of deaths (26%) were in watered plants and the most (44%) were in mulched plants. In March 2004, only five plants were still alive. Native grass had re-established at the site along with wild oats and veldt grass.

Weed control trials were conducted by DEC Katanning District at Population 1 following an uncontrolled fire in 1990. The population, located on a road reserve, was heavily infested with Veldt grass (*Ehrharta longiflora*) and the grass-selective herbicide, Fusilade<sup>®</sup>, was applied twice per year from 1993 to 1996. Initially, a smaller area of 200m<sup>2</sup> was sprayed covering eight *Verticordia* plants. Then in 1994, the trial was expanded to include the whole population. During the three years of the trial, no detrimental effects were noted on any *Verticordia* plants. Although a reduction in grass mass was observed other bulbous and broadleaf weeds, which Fusilade<sup>®</sup> did not control, replaced them. Also Guildford grass (*Romulea rosea*) became abundant.

In 1997, Robert Buehrig conducted surveys for new populations of *Verticordia fimbrialepis* subsp. *fimbrialepis*. Over 40 waypoints were visited from Aldersyde southward to Woodanilling but no new populations were found (Buehrig 1997).

In 2009, a new population of *Verticordia fimbrialepis* subsp. *fimbrialepis* was found south east of Armadale by Fred and Jean Hort.

Some 31,535 *Verticordia fimbrialepis* subsp. *fimbrialepis* seeds collected between 1996 and 2004 are stored in DEC's Threatened Flora Seed Centre at -18°C and 4°C (Table 5). The TFSC test the viability of the seed and the initial germination rate was found to range from 29 to 92%, averaging 53% (A. Cochrane unpublished data).

**Table 5: DEC's Threatened Flora Seed Centre collections for *Verticordia fimbrialepis* subsp. *fimbrialepis***

Date	Population No.	No. seeds	Germination (%)
24 January 1996	6	670	38
24 January 1996	4	2988	92
24 January 1996	7	5242	86
20 February 1996	4	1945	48

20 February 1996	7	2437	39
20 February 1996	8	723	64
2 March 1997	7	3462	77
2 March 1997	4	1228	62
2 March 1997	8	227	30
20 January 1998	4	946	29
21 January 1998, 3 February 1998, 2 February 1998	1	228	35
4 February 1998	7	5255	83
4 February 1998	8	405	38
9 February 2000	5	488	31
11 February 2000	10	668	38
12 February 2004	14	4623	Test not complete

A further collection of approximately 9.6 g of *Verticordia fimbrilepis* subsp. *fimbrilepis* seed from 20 plants at Subpopulation 7b was made in January 2000 by DEC's Colin Yates. The seed was forwarded to the Botanic Gardens and Parks Authority (BGPA) for storage.

Cutting material from Population 3 was collected in 1994, 1997, 1998, 1999 and 2000 and forwarded to the BGPA at Kings Park for propagation. Of the 3,061 propagules (eight from graftings; 3,053 from cuttings), 702 struck, with an average propagation rate of approximately 25%. The majority of the material grown between 1999 and 2000 was used for a translocation with the remainder since dying. The only living specimens currently at Kings Park are two plants, approximately 12 months old, which were germinated by the TFSC from seed collected at Population 14 on February 2004.

Staff from DEC's Perth Hills and Great Southern Districts regularly monitor populations.

The SRTFCRT and GSDTFRT 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.

### Future recovery actions

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

#### 1. Coordinate recovery actions

The SRTFCRT and GSDTFRT will continue to oversee the implementation of recovery actions for *Verticordia fimbrilepis* subsp. *fimbrilepis* and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions  
**Responsibility:** DEC (Swan Region and Great Southern District) through the SRTFCRT and GSDTFRT  
**Cost:** \$6,000 per year

#### 2. Stimulate germination

*Verticordia fimbrilepis* subsp. *fimbrilepis* appears to germinate well following smoke water treatment or fire. Further treatments will be undertaken at senescing populations. Records will need to be maintained for future research. Any disturbance trials will need to be undertaken in conjunction with weed control.

**Action:** Stimulate germination  
**Responsibility:** DEC (Science Division, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$7,000 in years 1 and 3, \$2,000 in years 2, 4 and 5

### 3. Install DRF markers or replace where necessary

DRF markers are required at Population 15 and need to be replaced at Population 4.

**Action:** Install DRF markers or replace where necessary  
**Responsibility:** DEC (Great Southern District) through the GSDFRT  
**Cost:** \$3,000 in year 1

### 4. Undertake weed control and follow up with additional control if required

Weeds are a major threat to most populations and control is required. The following actions will be implemented:

1. Determine which weeds are present and map them.
2. Select appropriate technique; herbicide, mowing or hand weeding.
3. Control invasive weeds by hand removal and/or spot spraying around the *Verticordia fimbrialepis* subsp. *fimbrialepis* plants when weeds first emerge.
4. Revegetation with site-specific species is required (in Autumn) to maintain low weed levels.
5. Monitor the success of the treatment on weed death, and the tolerance of *Verticordia fimbrialepis* subsp. *fimbrialepis* and associated native plant species to the treatment.
6. Report on the method and success of the treatment, and effect on *Verticordia fimbrialepis* subsp. *fimbrialepis* plants and associated species.

**Action:** Undertake weed control and follow up with additional control if required  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDFRT  
**Cost:** \$6,000 per year, as required

### 5. Maintain disease hygiene

*Verticordia fimbrialepis* subsp. *fimbrialepis* is susceptible to dieback caused by *Phytophthora cinnamomi*. Dieback hygiene (outlined in CALM 2003 (now DEC)) will be followed for activities such as 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 where required.

**Action:** Maintain disease hygiene  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDFRT  
**Cost:** \$2,000 per year

### 6. Monitor populations

Monitoring of factors such as weed invasion, habitat degradation, hydrology (including salinity), population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. The populations will be inspected and an accurate location recorded.

**Action:** Monitor populations  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDFRT  
**Cost:** \$10,000 per year

### 7. Rehabilitate habitat

Once gravel extraction has finished at the site, the habitat containing Population 13 should be deep ripped and allowed to regenerate naturally.

**Action:** Rehabilitate habitat  
**Responsibility:** DEC (Great Southern District) through the GSDFRT  
**Cost:** \$5,000 in first year

**8. Collect seed and other material to preserve genetic diversity**

Although a large number of seeds have been collected, the subspecies is not well represented in the seed store. The germination rate for most of the seed collected is relatively low so the actual number of germinants that can be produced is also quite low. Although populations 10, 11 and 16 will be the priority for seed collection as they account for a large percentage of known plants, populations 3, 12 and 15 will also be targeted to ensure as much genetic diversity is captured as possible.

**Action:** Collect seed and other material to preserve genetic diversity  
**Responsibility:** DEC (Perth Hills and Great Southern Districts, TFSC), BGPA through the SRTFCRT and GSDTFRT  
**Cost:** \$5,000 per year

**9. Implement rabbit control where necessary**

The level of threat posed by rabbits in Populations 4, 7, 8, 13 and 14 appears to vary from year to year. When monitoring ascertains the threat is high, control measures may be required. Control should be undertaken in summer when less green feed is available as an alternative food source.

**Action:** Implement rabbit control where necessary  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT; relevant land managers  
**Cost:** \$7,000 in years 1, 3 and 5

**10. Implement feral pig control where necessary**

Feral pigs can damage threatened flora and its habitat when digging in search of food. Pigs can also introduce weed seeds and nutrients and the soil disturbance encourages establishment of weeds. Feral pig activity has been recorded at Population 16 and control may be necessary.

**Action:** Implement feral pig control where necessary  
**Responsibility:** DEC (Perth Hills District) through the SRTFCRT  
**Cost:** \$5,000 per year

**11. Develop and implement a fire response strategy**

A fire response strategy will be developed that recommends fire frequency, intensity, season, and control measures.

**Action:** Develop and implement a fire response strategy  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$10,000 in first year and \$2,000 in subsequent years

**12. Conduct further surveys**

It is recommended that areas of potential habitat, particularly recently burnt areas, be surveyed for the presence of *Verticordia fimbriolepis* subsp. *fimbriolepis* during its flowering period between July and December.

All surveyed areas will be recorded and the presence or absence of the subspecies documented to increase survey efficiency and reduce unnecessary duplicate surveys. Where possible volunteers from the local community, Landcare groups, wildflower societies and naturalists clubs will be encouraged to be involved.

**Action:** Conduct further surveys  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$5,000 in years 1, 3 and 5

**13. Achieve long-term protection of habitat**

DEC will investigate the possibility of land containing populations of *Verticordia fimbrialepis* subsp. *fimbrialepis* being declared as reserves for the purpose of conservation and vested with the Conservation Commission.

**Action:** Achieve long-term protection of habitat  
**Responsibility:** DEC (Perth Hills and Great Southern Districts, Land Unit); Department of Planning (DoP); Department of Mines and Petroleum (DMP), through the SRTFCRT and GSDTFRT  
**Cost:** \$3,000 per year

**14. Map habitat critical to the survival of *Verticordia fimbrialepis* subsp. *fimbrialepis***

Although habitat critical to the survival of *Verticordia fimbrialepis* subsp. *fimbrialepis* is alluded to in Section 1, it has not yet been mapped. If additional populations are located, then habitat critical to their survival will also be determined and mapped.

**Action:** Map habitat critical to the survival of *Verticordia fimbrialepis* subsp. *fimbrialepis*  
**Responsibility:** DEC (SCB, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$6,000 in year 2

**15. Liaise with relevant land managers and Indigenous groups**

Staff from DEC’s Perth Hills and Great Southern Districts will liaise with relevant land managers to ensure that populations of *Verticordia fimbrialepis* subsp. *fimbrialepis* are not accidentally damaged or destroyed. Indigenous consultation will also take place to determine if there are any issues or interests in areas that are habitat for *V. fimbrialepis* subsp. *fimbrialepis*.

**Action:** Liaise with relevant land managers and Indigenous groups  
**Responsibility:** DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$2,000 per year

**16. Promote awareness**

The importance of biodiversity conservation and the protection of *Verticordia fimbrialepis* subsp. *fimbrialepis* will be promoted to the public. This will be achieved through an information campaign using local print and electronic media and by setting up poster displays. An information sheet that includes a description of the plant, its habitat type, threats and management actions, and photos will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

**Action:** Promote awareness  
**Responsibility:** DEC (Perth Hills and Great Southern Districts, SCB, Strategic Development and Corporate Affairs Division) through the SRTFCRT and GSDTFRT  
**Cost:** \$4,000 in year 1 and \$2,000 in years 2-5

**17. Review this IRP and assess the need for further recovery actions**

If *Verticordia fimbrialepis* subsp. *fimbrialepis* is still listed as Threatened at the end of the five-year term of this IRP, the need for further recovery actions, or a review of this IRP, including an evaluation of the plans performance, will be assessed and a revised plan prepared if necessary.

**Action:** Review this IRP and assess the need for further recovery actions  
**Responsibility:** DEC (SCB, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT  
**Cost:** \$3,000 in year 5

**Table 6. Summary of Recovery Actions**

Recovery Action	Priority	Responsibility	Completion Date
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Coordinate recovery actions	High	DEC (Swan Region and Great Southern District) through the SRTFCRT and GSDTFRT	Ongoing
Stimulate germination	High	DEC (Science Division, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	2015
Install DRF markers or replace where necessary	High	DEC (Great Southern District) through the GSDTFRT	2011
Undertake weed control and follow up with additional control if required	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Ongoing
Maintain disease hygiene	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Ongoing
Monitor populations	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Ongoing
Rehabilitate habitat	High	DEC (Great Southern District) through the GSDTFRT	2011
Collect seed and other material to preserve genetic diversity	High	DEC (Perth Hills and Great Southern Districts, TFSC), BGPA through the SRTFCRT and GSDTFRT	2015
Implement rabbit control where necessary	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT; relevant land managers	Ongoing
Implement feral pig control where necessary	High	DEC (Perth Hills District) through the SRTFCRT	Ongoing
Develop and implement a fire management strategy	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Developed by 2011 with implementation ongoing
Conduct further surveys	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Ongoing
Achieve long-term protection of habitat	High	DEC (Perth Hills and Great Southern Districts, Land Unit); Department of Planning (DoP); Department of Mines and Petroleum (DMP), through the SRTFCRT and GSDTFRT	Ongoing
Map habitat critical to the survival of <i>Eremophila glabra</i> subsp. <i>chlorella</i>	High	DEC (SCB, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	2012
Liaise with relevant land managers and Indigenous groups	High	DEC (Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	Ongoing
Promote awareness	Medium	DEC (Perth Hills and Great Southern Districts, SCB, Strategic Development and Corporate Affairs Division) through the SRTFCRT and GSDTFRT	Ongoing
Review this IRP and assess the need for further recovery actions	Medium	DEC (SCB, Perth Hills and Great Southern Districts) through the SRTFCRT and GSDTFRT	2015

#### 4. TERM OF PLAN

This IRP will operate from December 2010 to November 2015 but will remain in force until withdrawn or replaced. If the subspecies is still listed as threatened after five years, the need for further recovery actions will be determined.

#### 5. REFERENCES

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## 6. TAXONOMIC DESCRIPTION

### *Verticordia fimbrialepis* subsp. *fimbrialepis*

George, A.S. (1991) New taxa, combinations and typifications in *Verticordia* (Myrtaceae : Chamelaucieae). *Nuytsia* 7 (3): 231–394.

Peduncles 2–4 mm long. Petal lamina 1.3–1.5 mm wide, fimbriate. Staminodes fimbriate across broad apex, one cilium much longer than the others.