

INTERIM RECOVERY PLAN NO. 95

WHITE FEATHERFLOWER

(VERTICORDIA ALBIDA)

INTERIM RECOVERY PLAN

2001-2004

Robyn Phillimore, Diana Papenfus & Val English



Photograph: Anne Cochrane

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Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
PO Box 51, Wanneroo, WA 6946



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.

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.

CALM is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from June 2001 to May 2004 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Director of Nature Conservation on 26 June 2001. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at June 2001.

SUMMARY

Scientific Name:	<i>Verticordia albida</i>	Common Name:	White featherflower
Family:	Myrtaceae	Flowering Period:	November to January
CALM Region:	Midwest	CALM District:	Moora
Shire:	Three Springs	Recovery Team:	Moora District Threatened Flora Recovery Team

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.

Current status: *Verticordia albida* was originally listed as a Priority One species in 1992. In August 1994, it was declared as Rare Flora and ranked in September 1995 as Critically Endangered (CR). It currently meets World Conservation Union (IUCN) Red List Category 'CR' under criterion A2c (IUCN 2000) as it is only known from three populations that currently contain live plants, and the area, extent and quality of habitat are continuing to decline. The main threats are road, rail and firebreak maintenance activities, poor regeneration, weed invasion, rabbits, inappropriate fire regimes and chemical drift.

Critical habitat: The critical habitat for *Verticordia albida* comprises the area of occupancy of the known populations; areas of similar habitat ie. white-grey to yellow sand over gravel in scrub or thicket within 200 metres of known populations; corridors of remnant vegetation that link populations; and additional occurrences of white-grey to yellow sand over gravel in scrub or thicket, that do not currently contain the species.

Habitat requirements: *Verticordia albida* is currently known from south west of Three Springs in Western Australia. It grows in white-grey to yellow sand over gravel in scrub or thicket up to 3 m high, with *Banksia prionotes* and *Eucalyptus todtiana* dominating the habitat (Brown *et al.* 1998).

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

1. All relevant land managers have been informed of the species' locations and the associated legal obligations.
2. Declared Rare Flora (DRF) markers have been installed at Subpopulations 1a, 2a, 2b and 4a.
3. Dashboard stickers and posters that illustrate DRF markers and note their purpose, and a contact telephone number to use if such a marker is encountered, have been produced and distributed.
4. Subpopulation 4b was fenced by Westrail to avoid threats from ongoing rail maintenance.
5. Subpopulation 1b, located within 32 hectares of remnant vegetation, was fenced in 1995 to exclude sheep from the area.
6. Botanic Garden and Parks Authority (BGPA) currently have 25 plants produced from four different clones.
7. *Verticordia albida* seed was collected in 1995, 1996 and 1997 and is stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C.
8. Research on six threatened *Verticordia* species, including *Verticordia albida*, was undertaken by CALMScience Division in 1998 and 1999.
9. An A4 sized poster, which provides a description of the species, and information about threats and recovery actions, has been developed for *Verticordia albida*.
10. Staff from CALM's Moora District office monitor the populations.
11. The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP.

IRP Objective: The objective of this Interim Recovery Plan 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 individuals within populations and/or the number of populations have increased.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

Recovery actions

1. Coordinate recovery actions.
2. Assess and reposition DRF markers as necessary.
3. Stimulate and monitor germination.
4. Undertake weed control.
5. Propagate plants for translocation.
6. Undertake and monitor translocation.
7. Conduct further surveys.
8. Undertake rabbit control.
9. Collect seed and cutting material.
10. Monitor populations.
11. Develop and implement a fire management strategy.
12. Seek measures to achieve conservation management.
13. Promote awareness.
14. Obtain biological and ecological information.
15. Write a full Recovery Plan.

1. BACKGROUND

History

The first collection of *Verticordia albida* was made by Fred Lullfitz in 1961 from the Eneabba area. The specimen was originally identified as *V. chrysostachys*. During the 1960s Fred Lullfitz and Charles Chapman made collections of *V. albida* from the Eneabba area and the north west corner of what is now Alexander Morrison National Park. Despite extensive surveys populations in these areas have not been relocated, and the species is now only known from south west of Three Springs, where it was later collected.

Verticordia albida is currently known from four populations containing around 1500 mature individuals. Only three of these populations currently contain live plants.

Description

Verticordia albida is a tall shrub to 2.6 m high. It has rounded leaves 2 to 4.5 mm wide, with smooth margins. The otherwise white flowers have a pink centre and are held in dense spikes. The sepals are 4 to 6 mm long with 10 to 13 feathery lobes. The petals are 4 to 5 mm long, almost rounded in shape, with a fringe 1 mm long and with small basal ear-shaped appendages. The anthers are attached basally with a swollen filament apex, opening by slits. The style is 6 to 6.5 mm long, curved in the upper part with a beard of sparse hairs, 0.5 to 0.7 mm long (Brown *et al.* 1998).

Verticordia albida differs from *V. chrysostachys* (variable featherflower) in its white (rather than yellow) flowers, shorter, broader petals, sparsely glandular stamens, less curved style and sparse hairs on the upper style. The species hybridises with *V. muelleriana* (Mueller's featherflower) with the hybrids having flowers varying from creamy white to pale or dark pink on separate plants or on the same plant (Brown *et al.* 1998).

Distribution and habitat

Verticordia albida is currently known from south west of Three Springs in Western Australia. It grows in white-grey to yellow sand over gravel in heath to 3 m high, with *Banksia prionotes* (acorn banksia) and *Eucalyptus todtiana* (coastal blackbutt) dominating the habitat (Brown *et al.* 1998). Associated species include *Xylomelum angustifolium*, *Acacia saligna*, *Gastrolobium spinosum*, *Pericalymma ellipticum*, *Allocasuarina campestris*, *Verticordia densiflora* and *Verticordia drummondii*, as well as another DRF species *Hensmania chapmanii* that is ranked as vulnerable.

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999*).

The critical habitat for *Verticordia albida* comprises:

- the area of occupancy of the known populations,
- areas of similar habitat ie. white-grey to yellow sand over gravel in scrub or thicket, within 200 metres of known populations (these areas provide potential habitat for natural range extension),
- corridors of remnant vegetation that link populations (these areas are necessary to allow pollinators to move between populations and are usually road verges),
- additional occurrences of similar habitat ie. white-grey to yellow sand over gravel in scrub or thicket, that do not currently contain the species (these areas represents possible translocation sites).

Biology and ecology

Verticordias in general are shrubs 1-2 m tall with masses of colourful flowers commonly in spring-summer. Many species are grown for the horticulture industry.

Verticordia albida appears to be a disturbance opportunist as several healthy new plants have been recorded growing on firebreaks that were graded 12 months previously. Seed set by *V. albida* is variable but generally low, with germination stimulated by smoke. The fire history of the populations is unknown, however there has been some recruitment in the recent past as plants of varying ages are present at some populations.

Research indicates that the quality of *Verticordia albida* habitat effects the reproductive output of many of the populations. Plants in weedy sites, or in areas with extensive leaf litter and overhead canopy cover were found to produce less flowers and disperse less seeds than plants in more open, weed-free sites (Ginger 1999). Application of smoke water stimulates the germination of soil stored seed. The population size is a critical factor in determining the level of inbreeding in populations of this species (Yates *et al.* 2000).

Threats

Verticordia albida was listed as a Priority One species in 1992. In August 1994, it was declared as Rare Flora and ranked in September 1995 as Critically Endangered (CR). It currently meets World Conservation Union (IUCN 2000) Red List Category 'CR' under criterion A2c (IUCN 2000) as it is only known from three populations that currently contain live plants, and the area, extent and quality of the habitat are continuing to decline. The main threats are road, rail and firebreak maintenance activities, poor regeneration, weed invasion, rabbits, inappropriate fire regimes and chemical drift.

Reliable anecdotal evidence (E. George¹ pers comm.) suggests that the range of the private property population (Population 1) is contracting, however few details of the original population are available.

- **Road, rail and firebreak maintenance activities** threaten all populations. Threats include actions such as grading of road reserves and access tracks, spraying of chemicals, constructing drainage channels and mowing or completely removing the roadside vegetation to improve visibility. These disturbance events also often encourage weed invasion into adjacent habitat, as well as causing damage to actual plants. Relevant authorities have been informed of the location of populations so that appropriate protective measures can be implemented. Other relevant land managers have also been informed of the locations to prevent possible damage due to grazing, crop maintenance, firebreak and access track maintenance or other activities that may damage populations.
- **Poor regeneration**, due to lack of appropriate disturbance events, threatens most populations as very few young plants of *Verticordia albida* have been observed.
- **Weed invasion** is a threat to all populations. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads that are produced annually by many grass weed species.
- **Rabbits** (*Oryctolagus cuniculus*) have the potential to impact on Populations 1 and 2. It is not clear whether the rabbits are grazing on the *Verticordia albida* plants however they may impact on the establishment of seedlings thereby limiting natural recruitment. In addition, disturbance of soil by rabbit warren construction, and an increase in nutrient levels from their droppings may result in increased weed invasion. In recent years, the impact of rabbits in the areas where the populations occur has declined due to rabbit baiting by many landholders, and the introduction of the calici virus.

¹ Elizabeth George, *Verticordia* authority

- **Inappropriate fire regimes** may affect the viability of populations. Occasional fire may be required to stimulate germination of soil stored seed, but too frequent fire is likely to deplete the soil seed bank. Disturbances such as fire appear to occur very infrequently in the habitat of *Verticordia albida* and this is likely to be contributing to the general lack of recruitment.
- **Chemical drift** from herbicide and fertiliser applications from adjacent farmland may impact on the species' growth and survival.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1A. SW of Three Springs	Shire Road Reserve	1991 10+ 1993 10+ 1994 50+ (6+) 1995 20 (30) 1996 500+	Disturbed	Road maintenance, weeds, poor regeneration, rabbits, inappropriate fire regimes
1B. SW of Three Springs	Private Property	1994 50+ (10) 1995 250+ 1997 1000+	Moderate	Firebreak maintenance, weeds, poor regeneration, rabbits, chemical drift, inappropriate fire regimes
2A. SW of Three Springs	Shire Road Reserve	1994 20+ 1996 <50 1997 <50	Moderate	Road maintenance, weeds, poor regeneration, rabbits, inappropriate fire regimes
2B. SW of Three Springs	Shire Road Reserve	1995 10 1996 <20 1997 <20 2000 10	Moderate	Road maintenance, weeds, poor regeneration, rabbits, inappropriate fire regimes
3. NW of Three Springs	National Park	1967 ? 1992 0	Not relocated	Not relocated
4A. SE of Arrino	Shire Road Reserve	1996 *16 1997 *16	Disturbed	Road maintenance, weeds, poor regeneration, inappropriate fire regimes
4B. SE of Arrino	Rail Reserve	1996 *16 1997 *16	Moderate	Rail maintenance, weeds, poor regeneration, inappropriate fire regimes

Numbers in brackets = number of seedlings.

* = total for subpopulations combined.

Note: Population 3 = Chapman collection from 1967.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of any of the populations or within the defined critical habitat of *Verticordia albida* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the species, its habitat or potential habitat.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan 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 individuals within populations and/or the number of populations have increased.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

3. RECOVERY ACTIONS

Existing recovery actions

All relevant land managers and land owners have been made aware of the locations and Critically Endangered status of the species. A private property owner, the Shire of Three Springs and Westrail have been formally notified of the presence of *Verticordia albida* populations on or adjacent to their land. This notification details the Declared Rare status of the taxon and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at Subpopulations 1a, 2a, 2b and 4a. These alert people working in the area to the presence of significant flora, helping to prevent accidental damage during maintenance operations. Awareness of the significance of these markers is being promoted to relevant bodies such as Shires. To this end, dashboard stickers and posters have been produced and distributed. These illustrate DRF markers, inform of their purpose and provide a contact telephone number to use if such a marker is encountered.

Subpopulation 4b was fenced by Westrail to prevent threats from ongoing rail maintenance.

Subpopulation 1b, located within 32 hectares of remnant vegetation, was fenced in 1995 to exclude sheep from the area.

Botanic Garden and Parks Authority (BGPA) currently have 25 plants from four different clones in the nursery and gardens. Twenty of these were recently propagated for planting out in the garden beds. The success of propagation of the species from cuttings is dependent on the quality of the source material (pers. comm. A. Shade²).

Approximately 331 seeds were collected from Population 1 in January 1995 and stored in CALM's TFSC at –18°C. The TFSC test the viability of the seed initially and after one year in storage. The initial germination rate of *Verticordia albida* seed was found to be 0% and after one year in storage was 3%. In January 1996, other collections consisted of 9438 seeds from Population 1, 900 seeds from Population 2, and 835 seeds from Population 3. The initial germination rates were 26%, 87% and 14%, and after one year in storage were 24%, 69% and 19% respectively. In January 1997, 1211 seeds were collected from Population 1, 335 seeds from Population 2 and 410 seeds from Population 3. The initial germination rates were 20%, 18% and 30%, and after one year in storage were 58%, 73% and 12% respectively (unpublished data, A. Cochrane³).

Research on six threatened *Verticordia* species, including *Verticordia albida*, was undertaken by CALM Science Division in 1998 and 1999. The project investigated:

1. Soil seed bank dynamics, recruitment and seedling survival.
2. Phenology and seasonal growth.
3. Impact and control of diseases and invasive weeds.
4. *Ex situ* propagation and germplasm storage.

An A4 sized poster, that provides a description of the species, and information about threats and recovery actions, has been developed for *Verticordia albida*. It is hoped that the poster will result in the discovery of new populations.

Staff from CALM's Moora District office monitor the populations.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

² Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

³ Anne Cochrane, Manager, CALM Threatened Flora Seed Centre

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken.

1. Coordinate recovery actions

The MDTFRT will continue to oversee the implementation of recovery actions for *Verticordia albida* and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$500 per year

2. Assess and reposition DRF markers as necessary

The positioning of Declared Rare Flora markers at all populations needs to be examined, and the markers repositioned or installed as necessary.

Action: Assess and reposition DRF markers as necessary
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$600 in first year

3. Stimulate and monitor germination

Burning, smoke water and other disturbance techniques may be effective in stimulating germination of *Verticordia albida* and will be trialed around a number of dead plants and extinct populations. The time when flowering first occurs, seed is produced and the age at senescence will be monitored.

Action: Stimulate and monitor germination
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$4,000 in first and second years, \$1,500 in third year

4. Undertake weed control

Weeds are a threat to all populations. The following actions will be implemented:

1. Selection of appropriate herbicides after determining which weeds are present.
2. Controlling invasive weeds by hand removal or spot spraying around *Verticordia albida* plants when weeds first emerge.
3. Scheduling weed control to include spraying at other threatened flora populations within the district.

The tolerance of associated native plant species to herbicides at the site of *Verticordia albida* is not known and weed control programs will be undertaken in conjunction with research.

Action: Undertake weed control
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$1,000 per year

5. Propagate plants for translocation

The propagation of plants in readiness for translocation is essential as the only known wild populations of *Verticordia albida* are under serious threat. Seed and/or cuttings will be taken for germination and propagation by the BGPA for use in translocations.

Action: Propagate plants for translocation
Responsibility: CALM (Moora District) and the BGPA through the MDTFRT
Cost: \$2,800 in first and second years

6. Undertake and monitor translocation

Although translocations are generally undertaken under full Recovery Plans, the many threats to the wild populations of this species indicate the need for development of a translocation proposal within the time frame of this IRP. This will be coordinated by the MDTFRT. Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Director of Nature Conservation.

Monitoring of the translocation is essential and will be undertaken according to the timetable to be set out in the Translocation Proposal.

Action: Undertake and monitor translocation
Responsibility: CALM (CALMScience, Moora District) through the MDTFRT
Cost: \$13,100 in first year, and \$5,900 in subsequent years

7. Conduct further surveys

Previous collections of *Verticordia albida* covered a larger geographic range than currently known populations, therefore it is possible that there are more as yet undiscovered populations. Community-based groups and individuals will be encouraged to be involved in further surveys during the species' flowering period (November to January), supervised by CALM staff.

Action: Conduct further surveys
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$2,500 per year

8. Undertake rabbit control

Rabbits have the potential to cause minor damage to the species at Populations 1 and 2. Where rabbits are identified as a threat, CALM will initiate control using the most appropriate method, in cooperation with land owners and managers. There are legislative restrictions on the use of 1080 Poison by CALM staff on land not under direct CALM management, and this will be taken into account when determining control methods.

Action: Undertake rabbit control
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$800 per year

9. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Seed has been collected from Populations 1, 2 and 3 but is also required from Population 4. Seed and cutting collections are also needed to propagate plants for translocations.

Action: Collect seed and cutting material
Responsibility: CALM (Moora District, TFSC) through the MDTFRT
Cost: \$3,300 in first and second years

10. Monitor populations

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

Action: Monitor populations
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$1,100 per year

11. Develop and implement a fire management strategy

The fire response of *Verticordia albida* is not known, but it is likely that fire is needed to stimulate the germination of soil-stored seed. Frequent fire may, however, prevent the accumulation of sufficient seed to allow regeneration of the population. A fire management strategy will be developed that describes fire control measures and appropriate fire characteristics including timing and frequency.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$2,700 in first year and \$1,100 in subsequent years.

12. Seek measures to achieve conservation management

Ways and means of achieving protection of the private land on which Subpopulation 1b of *Verticordia albida* occurs will be investigated. Possible methods of achieving future conservation management include developing a Management Plan in consultation with the land manager, covenanting, and acquiring the land.

Action: Seek measures to achieve conservation management
Responsibility: CALM (Moora District) through the MDTFRT
Cost: To be determined

13. Promote awareness

The importance of biodiversity conservation and the protection of the Critically Endangered *Verticordia albida* will be promoted to the public. Awareness will be encouraged in the community by a publicity campaign through the local print and electronic media and poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: CALM (Moora District) through the MDTFRT
Cost: \$900 per year

14. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Verticordia albida* in the wild. Investigations will include:

1. Investigation of the pollination biology of *Verticordia albida*.
2. Investigation of population genetic structures, levels of genetic diversity and minimum viable population size

Action: Obtain biological and ecological information
Responsibility: CALM (CALMSscience, Moora District) through the MDTFRT
Cost: \$7,700 per year

15. Write a full Recovery Plan

At the end of the second year of implementation of this IRP, the need for further recovery will be assessed. If *Verticordia albida* is still ranked Critically Endangered at that time, a full Recovery Plan will be developed that prescribes actions required for the long-term recovery of the species.

Action: Write a full Recovery Plan
Responsibility: CALM (WATSCU, Moora District) through the MDTFRT

Cost: \$20,600 once in the final year

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2001 to May 2004 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

5. ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this Interim Recovery Plan:

Anne Cochrane	Manager, CALM Threatened Flora Seed Centre
Alice Reaveley	Flora Conservation Officer, CALM Moora District
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

Thanks also to staff of the WA Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for assistance.

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

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

Verticordia albida A.S. George, **sp. nov.** is related to *V. chrysostachys* from which it differs in the flowers white (rarely pink) with pink centre, petals shorter and broader, stamens sparsely glandular, and style less curved and with \pm sparse hairs surrounding the upper style. Petals 4-5 mm long, 3-4 mm wide. Style 6-6.5 mm long with hairs 0.5-0.7 mm long.