

INTERIM RECOVERY PLAN NO. 90

WONGAN FEATHERFLOWER

(*VERTICORDIA STAMINOSA* SUBSP. *STAMINOSA*)

INTERIM RECOVERY PLAN

2001-2004

Rebecca Evans & Andrew Brown

Photograph: B. Wells

May 2001

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This Interim Recovery Plan will operate from May 2001 to April 2004 but will remain in force until withdrawn or replaced.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 27 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 May 2001.

SUMMARY**Scientific Name:** *Verticordia staminosa* subsp. *staminosa***Family:** Myrtaceae**CALM Region:** Wheatbelt**Shire:** Wongan-Ballidu**Common Name:** Wongan Featherflower**Flowering Period:** June to October**CALM District:** Merredin**Recovery Team:** Merredin District Threatened Flora Recovery Team (MDTFRT)

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; Gardner, C. A. and George, A. S. (1963) Eight New Plants from Western Australia. *Journal of the Royal Society of Western Australia* 46: 129-138; George, A.S. (1991) New combinations and typifications in *Verticordia* (Myrtaceae: Chamelaucieae). *Nuytsia* 7 (3): 231-394.

Current status: *Verticordia staminosa* subsp. *staminosa* was declared as Rare Flora in October 1996 and ranked as Critically Endangered (CR) in November 1998. It currently meets World Conservation Union (IUCN 1994) Red List Category 'CR' under criteria B1+2c, as there is a single population of 1206 mature individuals with continuing habitat degradation. Threats include rabbit activity, weeds and vehicle access. There are also possible long-term threats associated with lack of genetic diversity.

Habitat requirements: *Verticordia staminosa* subsp. *staminosa* is endemic to Western Australia where it is confined to a single granite outcrop east of Wongan Hills, growing in association with *Kunzea*, *Wurmbea* sp., *Borya sphaerocephala*, *Hakea petiolaris*, *Cheilanthes* sp., *Drosera* sp., *Gastrolobium callistachys*, Mosses, Liverworts, and Lichens.

Critical habitat: The critical habitat for *Verticordia staminosa* subsp. *staminosa* comprises the area of occupancy of the known population, areas within 200 metres of the known population, corridors of vegetation that link subpopulations and additional occurrences of suitable habitat that do not currently contain the subspecies.

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

1. Land managers have been made aware of the subspecies and its location.
2. Staff from the Threatened Flora Seed Centre (TFSC) have collected over 2,000 seeds from the population and have stored them at -18°C. Initial testing showed a viability rate of between 32% and 72%.
3. The fence separating the reserve from private land was repaired and partly replaced in 1999 to stop stock grazing on the plants.
4. An A4 sized poster, which provides a description of the subspecies, and information about threats and recovery actions, has been produced.
5. A research proposal that includes *Verticordia staminosa* subsp. *staminosa* and five other *Verticordia* species has been produced which, once implemented, will investigate aspects of their biology and ecology.
6. Staff from CALM's Merredin District Office regularly monitor the population.
7. The MDTFRT is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive.

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

Criterion for success: The number of individuals within populations and/or the number of populations have increased.

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

Recovery actions

1. Coordinate recovery actions.
2. Liaise with relevant land managers.
3. Install Declared Rare Flora markers and restrict access.
4. Write and implement a rabbit control strategy.
5. Repair fence.
6. Undertake weed control.
7. Develop and implement a fire management strategy.
8. Monitor population.
9. Conduct further surveys.
10. Promote awareness.
11. Write a full Recovery Plan.

1. BACKGROUND

History

S. Elliott made the first known collection of *Verticordia staminosa* subsp. *staminosa* (now housed at the Western Australian Herbarium) in 1955, however, the type specimen was not collected until 1961 when W. H. Butler collected it from the same area. A further ten collections were made between 1979 and 1995. In 1999 A. S. George divided the species into two subspecies (*Verticordia staminosa* subsp. *staminosa* and *V. staminosa* subsp. *cylindracea*). He subsequently further divided subsp. *cylindracea* into two varieties, (var. *cylindracea* and var. *erecta*) (Brown, *et. al.*, 1998). All taxa are confined to granite outcrops in the wheatbelt of Western Australia and are declared as rare flora.

Both *Verticordia staminosa* subsp. *staminosa* and *Verticordia staminosa* subsp. *cylindracea* var. *cylindracea*, are in cultivation in eastern Australia (personal communication, E. George¹).

Description

Verticordia staminosa subsp. *staminosa* is a small spreading, much branched shrub with hairy branchlets and very narrow, more or less stalkless leaves, up to 1.5 cm long. The flowers are about 5 mm long. Sterile stamens do not protrude from the flower and the style is not hairy. It has 10 long protruding stamens that are bright red with yellow tips. Below these are yellow, feathery sepals and two bright red persistent bracts. Wongan Featherflower differs from Granite Featherflower (*V. staminosa* subsp. *cylindracea*) in having larger flowers, a shorter staminal tube, longer stamens, and staminodes that are outside the staminal tube, rather than inserted between the staminal filaments (Gardner & George, 1963).

Distribution and habitat

It is not known whether the rarity of *Verticordia staminosa* subsp. *staminosa* is due to the destruction of suitable habitat or if it has always been naturally rare. It is known from a single granite outcrop east of Wongan Hills where it grows in association with *Kunzea pulchella*, *Wurmbea* sp., *Borya sphaerocephala*, *Hakea petiolaris*, *Cheilanthes* sp., *Drosera* sp., *Gastrolobium callistachys*, mosses, liverworts and lichens.

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 that the potential to be reintroduced. (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

The critical habitat for *Verticordia staminosa* subsp. *staminosa* comprises:

- the area of occupancy of the known population,
- areas of similar habitat ie. vegetation of *Kunzea pulchella* over a lithic complex, within 200 metres of the known population (these provide potential habitat for natural recruitment),
- corridors of remnant vegetation that link populations (these are necessary to allow pollinators to move between subpopulations),
- additional occurrences of similar habitat ie. vegetation of *Kunzea pulchella* over a lithic complex that do not currently contain the subspecies (these are possible translocation sites).

Biology and ecology

Little is known about the biology and ecology of *Verticordia staminosa* subsp. *staminosa* and what is known is limited to field observations. CALM is currently carrying out a study in order to obtain more information.

Verticordia species, including *V. staminosa* subsp. *staminosa*, are most commonly propagated from cuttings and are rarely grown from seed. There is commonly only one seed per flower and seed set is generally low (less than 51%) but highly variable, from both plant to plant and from location to location (Cochrane & McChesney 1995).

The fire or disturbance response of *Verticordia staminosa* subsp. *staminosa* is not known, however, *Verticordia* species are thought to be killed by fire and regenerate from soil-stored seed.

¹ Elizabeth George, Local enthusiast and Volunteer WA Herbarium.

Verticordia species are not generally susceptible to *Phytophthora*. However, it has been isolated from several species (personal communication, M. Grant²). Further research is required to determine the susceptibility of *Verticordia staminosa* subsp. *staminosa* to this pathogen.

Threats

Verticordia staminosa subsp. *staminosa* was declared as Rare Flora in October 1996 and ranked as Critically Endangered (CR) in November 1998. It currently meets World Conservation Union (IUCN 1994) Red List Category 'CR' under criteria B1+2c, as there is a single population of 1206 mature individuals with continuing habitat degradation. Threats include rabbit activity, weeds and vehicle access. There are also possible long-term threats associated with lack of genetic diversity.

- **Inappropriate fire regimes** would adversely affect the long-term viability of the population, as it is likely to kill mature plants. If frequent fire occurs it would deplete the soil seed-bank before juvenile plants reach maturity.
- **Weed invasion** is a threat. Weeds appear to be competing directly with *Verticordia staminosa* subsp. *staminosa* in the shallow soil pockets in which it grows. Weeds not only compete for nutrients, water and light, and are detrimental to recruitment, but also exacerbate grazing pressure and increase the fire hazard.
- **Rabbits** (*Oryctolagus cuniculus*) and to a smaller extent kangaroos (*Macropus fuliginosus*) are having a major impact on the population through soil disturbance during warren construction, increased nutrient levels from droppings and the introduction of weeds. Grazing may also be effecting the establishment of seedlings.
- **Grazing** by sheep has damaged some *Verticordia staminosa* subsp. *staminosa* plants and other nearby native species, and has increased the threat of weeds. Soil compaction is also evident in some places. Sheep have been able to enter the reserve a damaged fence between the reserve and adjacent farmland.
- **Vehicles** are damaging plants along an access track.

Summary of population information and threats

Pop. No. & Location	Land Status	No. plants/Year	Condition	Threats
1. Wongan Hills	Water Reserve	1999 1206	Plants are mostly healthy but the habitat is disturbed.	Rabbit and kangaroo activity, weeds, vehicles, low genetic diversity

Guide for decision-makers

Section 1 provides details of current and possible future threats. Development in the immediate vicinity of the population or within the defined critical habitat of *Verticordia staminosa* subsp. *staminosa* will require assessment. Developments should not be approved unless the proponents can demonstrate that they will not have a negative impact on the subspecies, and its habitat or potential habitat or have the potential to spread or amplify dieback disease.

2. RECOVERY OBJECTIVES AND CRITERIA

Objectives

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

Criterion for success: The number of individuals within populations and/or the number of populations have increased.

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

3. RECOVERY ACTIONS

Existing recovery actions

The land managers (Water Corporation) have been made aware of the subspecies and its location. The notification detailed the Declared Rare status of the taxon and associated legal responsibilities.

⁵ Malcolm Grant - CALM, Albany District

Approximately 2,250 seeds were collected from 35 plants in October and November 1995 and are stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C. Staff of the TFSC test the viability of the seed immediately, after one year in storage and after five years. The initial germination rate of *Verticordia staminosa* subsp. *staminosa* was found to be 65%, and was 32% after one year in storage. In October 1996, a further 700 seeds were collected from 50 plants with an initial germination rate of 73%, and 100% after one year in storage (personal communication, C. Cochrane³).

The fence between the reserve and private land was repaired in 1999 to prevent stock access.

An A4 sized poster that provides a description of the subspecies and information about threats and recovery actions, has been produced. It is hoped that the poster will result in the discovery of new populations.

A research proposal on six threatened *Verticordia* species, including *Verticordia staminosa* subsp. *staminosa*, has been developed by Dr David Coates (CALM Science Division). The project is underway and is investigating:

1. Pollination biology
2. Soil seed bank dynamics, recruitment and seedling survival
3. Phenology and seasonal growth
4. Population genetics
5. Impact and control of weeds
6. *Ex situ* propagation and germplasm storage
7. Experimental translocation

Staff from CALM's Merredin District Office regularly monitor the population.

The Merredin District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive.

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 oversee the implementation of recovery actions for *Verticordia staminosa* subsp. *staminosa* and will include progress information in its annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$1,000 per year

2. Liaise with relevant land managers

Staff from CALM's Merredin District will continue to liaise with the Water Corporation, Wongan Hills Shire and adjacent landowners to ensure the population is not damaged or destroyed accidentally.

Action: Liaise with relevant land managers
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$800 per year

3. Install Declared Rare Flora markers and restrict access

DRF markers have not previously been thought necessary because it was thought that there was no public access into the water reserve, however, several plants have been damaged from vehicles turning around on an access track. CALM will install DRF markers indicating that the area is environmentally sensitive and that all vehicles must remain on the designated track.

Access will also be restricted to those people managing the reserve. It appears that current access into the reserve is available to a large number of unauthorized people. The locks on the access gate need to be changed and keys re-issued to relevant persons.

³ Anne Cochrane, Manager Threatened Flora Seed Centre

Action: Install DRF markers and restrict access
Responsibility: CALM (Merredin District) and the Water Corporation through the MDTFRT
Cost: \$1,600 in the first year

4. Write and implement a rabbit control strategy

The reserve is currently used as a water supply for the Shire of Wongan Hills. For this reason the use of 1080 to control rabbits may not be deemed appropriate. CALM will develop and implement a rabbit control strategy in consultation with the Water Corporation, Wongan Hills Shire and adjacent land owners.

Action: Write and implement a rabbit control strategy
Responsibility: CALM (Merredin District) adjacent land managers, Water Corporation, Wongan Hills Shire, through the MDTFRT
Cost: \$1,300 in the first year and \$1,900 in the second and third years

5. Repair fence

The fence that separates the reserve from adjoining farmland is in disrepair and there is evidence that sheep have been able to get through it into the area of the population. While some parts of the fence have been recently replaced, further maintenance is required. CALM will, in consultation with the Water Corporation, Wongan Hills Shire and adjacent land owners, repair and maintain the fence.

Action: Repair fence
Responsibility: CALM (Merredin District), adjacent land managers, Water Corporation, Wongan Hills Shire through the MDTFRT
Cost: \$3,700 in the first year

6. Undertake weed control

Weeds are a major threat as they readily germinate in the soil pockets in which *Verticordia staminosa* subsp. *staminosa* grows. The following actions will be implemented:

1. Appropriate herbicides will be selected after determining which weeds are present.
2. Invasive weeds will be controlled by hand removal or spot spraying around *Verticordia staminosa* subsp. *staminosa* plants when weeds first emerge.
3. Weed control will be scheduled to coincide with spraying of other threatened flora populations within the district.

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

Action: Undertake weed control
Responsibility: CALM (Moora District, CALMScience) through the MDTFRT
Cost: \$1,800 per year

7. Develop and implement a fire management strategy

Fire kills adult and, following such an event, regeneration will be largely from soil-stored seed. Frequent fire may prevent the accumulation of sufficient soil stored seed for the long-term conservation of the population. Fire should therefore be prevented from occurring in this area, at least in the short term.

A fire management strategy based on the one developed by Central Forest Region, which defines fire control measures, and fire frequency and timing will be developed in consultation with relevant authorities and land managers.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Merredin District), Water Corporation, Wongan Hills Shire and adjacent land managers through the MDTFRT
Cost: \$1,700 in the first year, and \$1,200 in subsequent years

8. Monitor population

Monitoring of factors such as weed invasion, habitat degradation, and population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity are essential. The population will be monitored annually.

Action: Monitor population
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$600 per year

9. Conduct further surveys

Surveys in areas of suitable habitat (granite outcrops) will be conducted during the subspecies' flowering period (June to October).

Action: Conduct further surveys
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$2,000 per year

10. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Verticordia staminosa* subsp. *staminosa* in the wild will be promoted to the public through the local print and electronic media and through poster displays. An information sheet that includes a description of the plant, its habitat type, threats and management actions has been produced and circulated. Formal links with local naturalist groups and interested individuals will be encouraged.

Action: Promote awareness
Responsibility: CALM (Merredin District, Corporate Relations) through the MDTFRT
Cost: \$900 in the second year

11. Write a full Recovery Plan

At the end of the third-year of this IRP, the need for further recovery will be assessed. If *Verticordia staminosa* subsp. *staminosa* 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, Merredin District) through the MDTFRT
Cost: \$16,600 in the final year

4. TERM OF PLAN

This Interim Recovery Plan will operate from May 2001 to April 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:

Alex Agafonoff	Former Flora Conservation Officer, CALM Merredin District
Brett Beecham	Regional Ecologist, CALM Wheatbelt Region
Karen Bettink	Flora Conservation Officer, CALM Merredin District
Anne Cochrane	Manager, CALM Threatened Flora Seed Centre, CALMScience Division
Digby Gowns	Research Officer, Agriculture WA
Elizabeth George	Volunteer and <i>Verticordia</i> expert, WA Herbarium
Moyle Family	Private enthusiasts, Mandurah
Robyn Phillimore	Project Officer, Western Australian Threatened Species and Communities Unit, Nature Conservation Division, CALM
Paul Roberts	District Manager, CALM Merredin District
Colin Yates	Research Ecologist, CALMScience Division

We would like to thank the staff of CALM's W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for their extensive assistance.

6. REFERENCES

Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.

- CALM (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- CALM (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Cochrane, A. and McChesney, C. (1995) *Verticordia* Seed. *Australian Plants* 18 (145): 206-207.
- Elliot, W.R. and Jones, D.L. (1982) *Encyclopaedia of Australian Plants Suitable for Cultivation (Vol 2)*. Lothian Publishing Co., Melbourne.
- Gardner, C. A. and George, A. S. (1963) Eight New Plants from Western Australia. *Journal of the Royal Society of Western Australia* 46: 129-138.
- George, A.S. (1991) New combinations and typifications in *Verticordia* (Myrtaceae: Chamelaucieae). *Nuytsia* 7 (3): 231-394.
- Hopper, S., Van Leeuwen, S., Brown, A., and Patrick, S. (1990) *Western Australia's Endangered Flora*. Department of Conservation and Land Management, Perth.
- Western Australian Herbarium (1998) FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. <http://www.calm.wa.gov.au/science/>
- World Conservation Union (1994) *IUCN red list categories prepared by the IUCN Species Survival Commission*, as approved by the 40th meeting of the IUCN Council. Gland, Switzerland.

7. TAXONOMIC DESCRIPTION

Gardner, C. A. and George, A. S. (1963) Eight New Plants from Western Australia. *Journal of the Royal Society of Western Australia* 46: 129-138.

A spreading, much-branched shrub. Branches setose, at length glabrous. Leaves crowded towards the ends of the branches, linear-terete, 7-14 mm long, on short, thick, setose bases which remain on the branch for some time after the leaves have fallen but at length are deciduous. Flowers yellow, on slender glandular pedicels in the upper axils. Bracteoles large, 5-6 mm long, ovate, scarious, red-brown, persistent for some time but deciduous with the flowers. Calyx-tube turbinate, 1.5-2 mm long, 2-2.5 mm wide, 10-ribbed, glabrous; lobes orbicular, deeply divided into 5-7 pectinate-ciliate lobes, the whole 5 mm long. Petals ovate, divided into 5-7 subulate lobes, 5 mm long. Stamens much exceeding the petals, united for about 1/3 of their length in a tube, the free portion of the filaments flat; staminodes subulate, inserted on the outside of the tube; anthers basifixed, 2-porose, the dorsal connective gland prominent. Style as long as the stamens (9-10 mm), stigma small, cushion-shaped. Ovary with 2 ovules.

A.S. George, New combinations and typifications in *Verticordia* (Myrtaceae: Chamelaucieae), (1991).

Two subspecies and two further varieties of *Verticordia staminosa* are recognised in the following key.

- | | | |
|----|---|---------------------------------------|
| 1a | Stamens 9-12 mm long, united for 2-3 mm; staminodes inserted on outside of tube, the free part c. 1.5 mm long, subulate; sepals 7 mm long | subsp. <i>staminosa</i> |
| 1b | Stamens 6-7.5 mm long, united for 3 mm; staminodes inserted between stamens, the free part 1 mm long, obtuse, sepals 5-6 mm long | subsp. <i>cylindracea</i> A.S. George |
| 2a | Shrub with widely spreading branches | var. <i>cylindracea</i> |
| 2b | Shrub erect, pine-like | var. <i>erecta</i> A.S. George |