INTERIM RECOVERY PLAN NO. 126

PINE FEATHERFLOWER (*VERTICORDIA STAMINOSA* SUBSP. *CYLINDRACEA* VAR. *ERECTA*)

INTERIM RECOVERY PLAN

2002-2007

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Photo A. Brown

November 2002

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Western Australian Threatened Species and Communities Unit (WATSCU)
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Government of Western Australia
DEPARTMENT OF Conservation AND LAND MANAGEMENT Conserving the nature of WA
Natural Heritage Trust Helping Communities Helping Australia

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) 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.

The Department 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This Interim Recovery Plan will operate from November 2002 to October 2007 but will remain in force until withdrawn or replaced.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 reviewed after five years and the need for a full Recovery Plan assessed.

This IRP was approved by the Director of Nature Conservation on 20 June, 2002. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at November 2002.

SUMMARY

Scientific Name:	*Verticordia staminosa* subsp. *cylindracea* var. *erecta*	**Common Name:**	Pine Featherflower
Family:	Myrtaceae	**Flowering Period:**	June-October
Dept Region:	Wheatbelt	**Dept District:**	Katanning
Shire:	Shire of Lake Grace	**Recovery Team:**	Katanning District Threatened Flora Recovery Team

Illustrations and/or further information: A. Brown, C. Thomson-Dans and N. Marchant (Eds) (1998) *Western Australia's Threatened Flora*; A.S. George (1991) Verticordia *(Myrtaceae: Chamelaucieae)*.

Current status: *Verticordia staminosa* subsp. *cylindracea* var. *erecta* was declared as Rare Flora in December 1999. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(iii,v)+2ab(iii,v) due to the severe fragmentation of populations (just two known) and a continuing decline in the quality of habitat and the number of mature individuals. The main threats are the taxon's narrow distribution, insecurity of tenure, weeds and poor rainfall.

Critical habitat: The critical habitat for *Verticordia staminosa* subsp. *cylindracea* var. *erecta* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; and additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so and may be suitable for future translocations.

Habitat critical to the survival of the species, and important populations: Given that this variety is listed as Critically Endangered it is considered that all known habitat for wild and future translocated populations is habitat critical.

Benefits to other species/ecological communities: There are no threatened ecological communities or other threatened species in the immediate vicinity of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. However, recovery actions implemented to improve the quality or security of the habitat of the subspecies, such as weed control and rehabilitation, will benefit the remnant bushland habitat in which it occurs.

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. However, as *Verticordia staminosa* subsp. *cylindracea* var. *erecta* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people: There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this variety.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. The variety occurs on and around large granite outcrops which are partially on private property. However, negotiations between relevant parties have ensured that the area directly supporting the species will be left uncleared.

Evaluation of the Plans Performance: The Department of Conservation and Land Management, in conjunction with the Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Habitat requirements: *Verticordia staminosa* subsp. *cylindracea* var. *erecta* is currently known from just two populations north of Buniche. It grows in shallow coarse soils on domed granite outcrops with *Borya* (George 1991).

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

1. Managers of land on which Population 1a and b occur have been made aware of the location and threatened status of the taxon.
2. Both populations are fenced from stock.
3. Approximately 850 seeds have been collected from Population 1, some in 1995 and more in 1998. These are stored in the Department's Threatened Flora Seed Centre at –18°C.

4. The Botanic Garden and Parks Authority currently have 97 plants of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. Ten are in the Botanic Gardens, and the remainder are in the Nursery.
5. Staff from the Department's Katanning District regularly monitor populations of the taxon.
6. The Katanning District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include information on progress in an annual report to the Department's Corporate Executive and funding bodies.

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 taxon in the wild.

Recovery criteria
Criterion for success: The number of individuals within populations and/or the number of populations have increased by 10% or more.
Criterion for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

Recovery actions
1. Coordinate recovery actions
2. Formally notify land managers
3. Achieve long-term protection of habitat
4. Conduct further surveys
5. Monitor populations
6. Collect seed and cutting material
7. Promote awareness
8. Collect biological and ecological information
9. Rabbit control, if required in future
10. Weed control, if required in future
11. Develop a fire management strategy, if required
12. Review the need for a full Recovery Plan

1. BACKGROUND

History

E. Bishop first collected *Verticordia staminosa* subsp. *cylindracea* var. *erecta* from private property north of Buniche in September 1980. Subpopulation 1B was discovered on adjacent private property a short time later.

In August and October 1981, Elizabeth Berndt collected cutting material for propagation from both subpopulations. This material was distributed to members of the W.A. Wildflower Society's *Verticordia* Study Group.

Population 2 was discovered in June 2002. Interestingly, at this location the variety *erecta* grows with the variety *cylindracea* (Population 5).

Description

Verticordia staminosa subsp. *cylindracea* var. *erecta* is a small, erect, pine-like shrub to 1 m tall. Its distinctive upright habit distinguishes it from the variety *cylindracea* which has spreading branches. Both varieties share floral characters that distinguish subspecies *cylindracea* from subspecies *staminosa*; namely, smaller flowers (sepals 5-6 mm rather than 7 mm), shorter stamens (6-7 mm long compared to 9-12 mm long) that are united for half their length instead of 2-3 mm, and staminode (infertile stamens) insertion between the stamens rather than outside the staminal tube (George 1991). The solitary flowers have yellow very feathery sepals, with protruding red stamens which have yellow tips. Below these are two shiny red persistent bracts (Brown *et al*. 1998). The flowers fade to brown-white with age.

Distribution and habitat

Verticordia staminosa subsp. *cylindracea* var. *erecta* is currently known from just two populations north of Buniche. At both locations it grows with *Borya* and *Kunzea pulchella* in shallow coarse loamy soils in crevices on and at the base of large granite outcrops.

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* (EPBC Act)).

The critical habitat for *Verticordia staminosa* subsp. *cylindracea* var. *erecta* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. coarse loamy soils on domed granite outcrops with *Borya* and *Kunzea pulchella* (these provide potential habitat for natural range extension);
- additional occurrences of similar habitat on nearby granite outcrops that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites).

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

Given that this variety is listed as Critically Endangered it is considered that all known habitat for wild and any future translocated populations is habitat critical.

Benefits to other species/ecological communities

There are no threatened ecological communities in the immediate vicinity of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. One other threatened plant (*Verticordia staminosa* subsp. *cylindracea* var. *cylindracea*) occurs in the area of one population and recovery actions implemented to improve the quality or security of the habitat of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*, such as weed control and rehabilitation, will benefit it and the remnant bushland habitat in which it occurs.

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. However, as *Verticordia staminosa* subsp. *cylindracea* var. *erecta* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this variety.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Both populations of the species occur on nature reserves.

Evaluation of the Plans Performance

The Department of Conservation and Land Management, in conjunction with the Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Biology and ecology

Verticordia species have highly variable seed set and viability within population over different years and between populations in the same year (personal communication, A. Cochrane[1]).

The floral morphology of *Verticordia staminosa* differs from most species in the subgenus *Chrysoma* in that its staminal filaments form a tube. This, combined with the showy red and yellow colouration and the presentation of flowers hanging beneath branchlets, suggest that the species is bird pollinated (Yates and Ladd, in press). Yates and Ladd studied the breeding system, pollinator activity, flowering rates, frequency of pollination, seed production, seedling demography, mature plant mortality and population structure of the closely related *Verticordia staminosa* subsp. *staminosa* over a period of three years. It is likely that *Verticordia staminosa* subsp. *cylindracea* var. *erecta* would share many of the same characteristics (personal communication C. Yates[2]).

Yates and Ladd (in press) suggest that feral honeybees have displaced birds as the dominant pollinators of *Verticordia staminosa* subsp. *staminosa*, and although the honeybee doesn't harvest the oily pollen, it does deplete nectar resources, changing bird foraging behavior and, potentially, patterns of pollen dispersal. *V. staminosa* subsp. *staminosa* has been found to be hermaphroditic and capable of self-fertilisation. This means that although rates of intra-plant foraging and crossing between near neighbours may have increased, there is no reduction in the number of seeds produced. (Yates and Ladd, in press).

[1] Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre
[2] Dr. Colin Yates, Senior Research Scientist, the Department's Science Division

The fruits of *Verticordia staminosa* subsp. *staminosa* are passively dispersed each year, and may accumulate in organic matter at the base of plants or be dispersed across the rock surface by wind and water flow. Germination and growth of seedlings occurred in each year of the study but the highest numbers were associated with the wettest years. Germination and initial growth occurred in moss mats or mineral soils, but recruitment was much more likely where individuals were found in rock fissures. Yates and Ladd (in press) noted that recruitment far exceeded mature plant mortality in the three year study period.

Yates and Ladd (in press) concluded that the constraints to population growth in *V. staminosa* subsp. *staminosa* were climate and suitable establishment crevices rather than the breeding system, pollinator activity or vector, or seed production. They noted that increasingly dry winters and springs in south-western Australia (CSIRO 2001, cited in Yates and Ladd, in final draft) and competition from annual weeds in the rock crevices are likely to be factors in the survival of the taxon. This seems likely to also apply to *V. staminosa* subsp. *cylindracea* var. *erecta*.

Verticordia staminosa subsp. *cylindracea* var. *erecta* has demonstrated a capacity for some recovery from drought stress. A number of plants observed during monitoring in June 2002 would have been considered dead, as they were mostly leafless and sometimes had also collapsed. However, following rain they produced small, vigorous tufts of new growth on the tips of old branches.

Threats

Verticordia staminosa was declared as Rare Flora in March 1982. *Verticordia staminosa* subsp. *cylindracea* var. *erecta* was separated as a distinct taxon and declared as Rare Flora in December 1999. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(iii,v)+2ab(iii,v) due to the severe fragmentation of the two known populations and a continuing decline in the quality of habitat and the number of mature individuals. The main threats are the taxon's limited geographical range, insecurity of tenure and poor rainfall.

- **Limited geographical range** is a threat to the taxon as single catastrophic events have the potential to cause extinction.
- **Weeds** are evident in many of the soil pockets occupied by *Verticordia staminosa* subsp. *cylindracea* var. *erecta* and may be inhibiting recruitment. Weeds also encourage grazing.
- **Insecure tenure** could result in a change of land ownership and may place populations at risk from innapropriate future management practices.
- **Poor rainfall** has resulted in a number of plants in both populations becoming stressed. However, some of these plants may recover following seasons of better rainfall.
- **Rabbits and kangaroos** are present in the area of both populations but do not appear to graze or disturb adult plants. The soils that *Verticordia staminosa* subsp. *cylindracea* var. *erecta* occupy are not targeted by rabbits for burrowing purposes, as they are too shallow and small in area. However, rabbits do graze native plant seedlings, presumably including those of the *Verticordia* thus affecting recruitment. A number of semi mature seedlings were seen at both populations in June 2002, so the threat does not seem high at this time. If monitoring detects an increase in the rabbit population or a fall in the proportion of seedlings seen, rabbit control should be undertaken.
- **Fire** is presumed to kill mature plants but is only a potential threat as the large surrounding areas of exposed rock prevent it from reaching most *Verticordia staminosa* subsp. *cylindracea* var. *erecta* plants. However, if there were a rise in quantity of grassy weeds the threat would become more significant, and a fire management plan should be prepared.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. W of Newdegate	Private Property	1981 40 1990 240* (80)* 2002 49 (1)	Moderate	Drought stress, weeds
1b. W of Newdegate	Private Property	1981 180+ (several) 1990 see 1a above 2002 357 (10)	Moderate	Drought stress, weeds
2. W of Newdegate	Private Property	2002 615 (ca. 50)	Moderate	Drought stress, weeds

Numbers in brackets = number of seedlings. * = total for both subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks etc) in the immediate vicinity of *Verticordia staminosa* subsp. *cylindracea* var. *erecta* will require assessment. On ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the taxon, 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 taxon in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased by 10% or more.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

3. RECOVERY ACTIONS

Existing recovery actions

The managers of land containing Population 1A and 1B have been notified of the location and threatened status of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. The notification details the Declared Threatened status of the taxon and the associated legal responsibilities.

All populations are fenced to prevent grazing by stock.

Approximately 570 seeds were collected from Population 1 in December 1995 and a further 280 seeds in December 1998. These are stored in the Department's TFSC at –18°C. Staff of the Threatened Flora seed Centre(TFSC) test the viability of seed soon after collection and again after one year in storage. The initial germination rate of *Verticordia staminosa* subsp. *cylindracea* var. *erecta* seed ranged from 45 to 81%. After one year in storage the germination rate was 88% (unpublished data A. Cochrane).

The Botanic Gardens and Parks Authority (BGPA) currently have 97 plants of *Verticordia staminosa* subsp. *cylindracea* var. *erecta.* Ten of these have been planted into the Botanic Gardens, with the majority of the remainder likely to follow. Propagation of this taxon by cuttings has generally been very successful, particularly from second generation stock, with strike rates of higher than 70% (personal communication A. Shade[3]).

Staff from the Department's Katanning District regularly monitor all populations of this taxon.

[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

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

Future recovery actions

As both populations occur on private property, permission has been or will be sought from the land owners prior to recovery actions being undertaken.

1. Coordinate recovery actions

The KDTFRT will continue to oversee the implementation of recovery actions for *Verticordia staminosa* subsp. *cylindracea* var. *erecta* and will include information on progress in its annual report to the Department's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $400 per year

2. Formally notify land managers

The owners of land containing subpopulations 2A and 2B need to be formally notified of the presence of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. They are already aware that the closely related *Verticordia staminosa* subsp. *cylindracea* var. *cylindracea* occurs on the same granite outcrop.

Action: Formally notify land owners
Responsibility: The Department (Wildlife Branch)
Cost: $100 in first year

3. Achieve long-term protection of habitat

Staff from the Department's Katanning District will continue liaison with land landowners and managers to ensure that populations are not accidentally damaged or destroyed. In addition, ways and means of improving the security of populations and their habitat will be investigated. This may include purchase, conservation covenants or the Land for Wildlife scheme.

Action: Achieve long-term protection of habitat
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $1,000 per year

4. Conduct further surveys

Further surveys by Departmental staff and community volunteers will be conducted during the flowering period of the taxon (July to October).

Action: Conduct further surveys
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $3,000 per year for first four years

5. Monitor populations

Annual monitoring of factors such as population stability (expansion or decline), habitat degradation, pollinator activity, seed production, recruitment, longevity and predation is essential. Particular attention should be paid to the level of threat posed by weeds and rabbits. If this should increase, appropriate control should be undertaken.

Action: Monitor populations
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $2,000 per year

6. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for possible future translocations. Some seed has been collected from Population 1 but further collections from both populations would be beneficial to expand the range of genetic material available. At this time cuttings will also be obtained to enhance the living collection at the BGPA.

Action: Collect seed and cutting material
Responsibility: The Department (TFSC, Katanning District) through the KDTFRT
Cost: $3,000 for the first two years and $1,000 in subsequent years

7. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this taxon will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet, which includes a description of the plant, its habitat, threats, recovery actions and photos will be produced.

A reply paid postal drop illustrating *Verticordia staminosa* subsp. *cylindracea* var. *erecta* and describing its distinctive features and habitat will be produced and distributed by the Department's Katanning District office to local farmers and other residents in Shires containing possible habitat of the taxon. This will apply to both *Verticordia staminosa* subsp. *cylindracea* var. *erecta* and *V. staminosa* subsp. *cylindracea* var. *cylindracea*. The identification of any populations found through this action will be confirmed by staff from Katanning District. Postal drops aim to stimulate interest, provide information about threatened species and provide a name and number to contact if new populations are found by members of the community.

Action: Promote awareness
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $1,200 in first year and $900 in subsequent years

8. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Verticordia staminosa* subsp. *cylindracea* var. *erecta* will provide a better scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

1. The soil seed bank dynamics and the role of disturbance, competition, rainfall and grazing in recruitment and seedling survival.
2. The pollination biology of the species.
3. The reproductive needs, phenology and seasonal growth of the species.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Katanning District) through the KDTFRT
Cost: $7,000 per year

9. Rabbit control, if required in future

Rabbits do not appear to graze adult plants of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*, and there is no evidence of disturbance of those plants by diggings. However, rabbits are known to preferentially graze soft young growth of native species and it is likely that they would impact on young seedlings. A number of large

seedlings were seen during the 2002 survey, so it would seem that this threat is currently low. This will be monitored, and if the threat increases, rabbit control will be implemented in consultation with the landholders.

Action: Rabbit control, if required in future
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $200 per year (if required)

10. Weed control, if required in future

Presently, the level of threat from weeds to both populations is very low. However, if weed numbers increase there is potential that they will impact on *Verticordia staminosa* subsp. *cylindracea* var. *erecta* by preventing seed germination, competing for resources, exacerbating grazing pressure, and increasing the risk and severity of fire. If during monitoring it is deemed that the threat from weeds has increased, weed control will be undertaken in consultation with the landholders. The method used will have to be hand weeding or spot spraying to minimise herbicide washing off the rock and into surrounding vegetation.

Action: Weed control, if required in future
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $700 per year (if required)

11. Develop a fire management strategy, if required in future

Fire is thought to kill adult plants of *Verticordia staminosa* subsp. *cylindracea* var. *erecta*. It is also unlikely to stimulate germination of soil-stored seed as the taxon occurs in habitat that is unlikely to experience fire naturally. Currently, fire presents a low level of threat to the taxon as the large areas of surrounding exposed granite provides a buffer. However, if vegetation were to become more continuous through the introduction of weeds the fire risk would increase sharply. This may occur if grassy weeds succeed in establishing in very small fissures between soil pockets. If during monitoring it is deemed that the fire risk has increased, a fire management strategy will be developed to determine fire control measures and fire frequency.

Action: Develop a fire management strategy, if required in future
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: $2,400 for preparation in year deemed necessary and $1,000 for implementation in subsequent years (if required)

12. Review the need for a full Recovery Plan

At the end of the fourth year of the five-year term of this Interim Recovery Plan, if the taxon is still ranked as Critically Endangered, the need for a full Recovery Plan or a review of this IRP will be assessed and a plan prepared if necessary.

Action: Review the need for a full Recovery Plan
Responsibility: The Department (WATSCU, Katanning District) through the KDTFRT
Cost: $20,300 in the fifth year (if required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from November 2002 to October 2007 but will remain in force until withdrawn or replaced. If the taxon is still ranked Critically Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. ACKNOWLEDGMENTS

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

Anne Cochrane	Manager, the Department's Threatened Flora Seed Centre
Bethea Loudon	Conservation Officer, the Department's Katanning District
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

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

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

George, A.S. (1991) *Verticordia* (Myrtaceae: Chamelaucieae). *Nuytsia*, 7(3), 231-394.

***Verticordia staminosa* subsp. *staminosa* -** Shrub with widely spreading branches, to 30cm tall. Sepals 7mm long. Stamens 9-12mm long, united for 2-3mm; staminodes subulate, inserted on outside of staminal tube, the free part c. 1.5mm long.
Distribution and habitat. Recorded only near Wongan Hills, W.A. Grows on exposed granitic slopes.
Flowering period. June-October.

***Verticordia staminosa* subsp. *cylindracea* -** Differs from *Verticordia staminosa* subsp. *staminosa* in the smaller flowers, the longer staminal tube, and the staminodes inserted between the staminal filaments. Sepals 5-6mm long. Stamens 6-7mm long. Staminodes c. 1mm long, obtuse.
Distribution and habitat. Occurs on granitic hills from Pingaring to east of Newdegate, W.A.
The smaller flowers, shorter stamens but united for half their length, and the staminode insertion between the stamens, distinguish this subspecies from subsp. *staminosa*.
Etymology. From the Latin *cylindraceus* (cylindrical), in reference to the androecium.

***Verticordia staminosa* subsp. *cylindracea* var. *cylindracea* -** Shrub with widely spreading branches.
Distribution and habitat. Occurs on several granitic outcrops from Pingaring to east of Newdegate, W.A.
Flowering period. July-October.

***Verticordia staminosa* subsp. *cylindracea* var. *erecta* -** Differs from *V. staminosa* var. *cylindracea* in the erect habit (to 1m tall).

Distribution and habitat. Recorded only from two localities on private property. Grows in coarse soil on granitic hills with *Borya*.
Flowering period. June-October.
Etymology. Named from the Latin *erectus*, in reference to the habit.
The erect, pine-like growth, consistent in the population, distinguishes this taxon from *V. staminosa* var. *cylindracea*, with which it shares the same floral characters that separate the subspecies from subsp. *staminosa*.