INTERIM RECOVERY PLAN NO. 212

TUFTED PLUMED FEATHERFLOWER

(*VERTICORDIA PLUMOSA* VAR. *ANANEOTES)*

INTERIM RECOVERY PLAN

2005-2010

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Photo: Diana Papaenfus

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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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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This Interim Recovery Plan will operate from September 2005 to August 2010 but will remain in force until withdrawn or replaced.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 will be assessed.

This IRP was given regional approval on 21 November 2005 and was approved by the Director of Nature Conservation on 13 December 2005. The allocation of staff time and 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 September 2005.

ACKNOWLEDGMENTS

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

Dennis Cooper	Amateur Botanist, Busselton Naturalist Club
Anne Cochrane	Manager, CALM's Threatened Flora Seed Centre
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 CALM's Wildlife Branch for assistance.

SUMMARY

Scientific Name: *Verticordia plumosa* var. *ananeotes*
Common Name: Tufted Plumed Featherflower
Family: Myrtaceae
Flowering Period: November - December
CALM Regions: Southwest
CALM District: Blackwood
Shires: Busselton
Recovery Team: South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT)

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; CALM (1998) Florabase – *Information on the Western Australian Flora* (http://www/calm.wa.gov.au/science/). George, A.S. (1991) New Taxa, combinations and typifications in *Verticordia* (Myrtaceae: Chamelaucieae). *Nuytsia*. 7: 231-394.

Current status: *Verticordia plumosa* var. *ananeotes* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in October 1996 and ranked as Critically Endangered in 1998. It currently meets World Conservation Union (IUCN) Red List Category 'CR' (IUCN 2000) under criteria B1ab(iii)+2ab(iii) due to its narrow distribution, severely fragmented populations, and a continuing decline in the quality of the habitat. The variety is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

The variety is currently known from three wild populations in CALM's Blackwood District. The populations are now restricted to areas of remnant vegetation surrounded by land that has been extensively cleared for agriculture. The major threats to the population are degraded habitat, weeds, inappropriate fire regimes and limited genetic diversity.

Distribution and habitat: *Verticordia plumosa* var. *ananeotes* was recorded at Serpentine, 'Murray District' (i.e. between Mundijong and Waroona), where it was believed to have grown in open Jarrah woodland. It has also been recorded along the Blackwood and Vasse Rivers and at the 'Malloy Plains' near Busselton. These recorded specimens are yet to be confirmed for the areas. It is fairly abundant in a reserve south of Busselton, growing in low-lying swampy flats on a mixture of clay or sandy soils in association with *Eucalyptus calophylla* (Marri), *Kingia, Xanthorrhoea, Stirlingia, Isopogon,* sedges, *Conostylis* spp., *Melaleuca* spp. and *Adenanthos* spp.

Guide for decision-makers: Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of populations or within the habitat that is defined as critical to survival require assessment. Any on-ground works (clearing, firebreaks, roadworks, spraying of herbicides, burning, drainage etc) in the immediate vicinity of *Verticordia plumosa* var. *ananeotes* will require assessment. Proponents should demonstrate that on-ground works will not have an impact on the variety, or on its habitat or potential habitat.

Habitat critical to the survival of the variety, and important populations: Habitat critical to the survival of the variety includes the area of occupancy of known populations, similar habitat adjacent to known populations (within 200 m), and additional occurrences of similar habitat in nearby areas that do not currently contain the variety but may have done so in the past. Given that this variety is listed as Critically Endangered, it is considered that all wild and translocated populations are important populations.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Verticordia plumosa* var. *ananeotes* will also improve the status of remnant vegetation in which it is located. Two threatened ecological communities occur in the habitat of Population 1, and actions such as improving the quality or security of the reserve habitat will be of

benefit to them. Actions to conserve the *Verticordia* will also be beneficial for another Declared Rare Flora taxon that occurs in the habitat of Population 1. This is the perennial sedge *Tetraria australiensis* (listed as Vulnerable under the *Wildlife Conservation Act* 1950 and Endangered under the EPBC Act).

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 taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: Indigenous communities interested or involved in the region affected by this plan have not yet been identified, however, implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities in the region. The Department of Indigenous Affairs Aboriginal Heritage Sites Register lists Busselton (5613) as a site in the vicinity of the variety and input and involvement will be sought from indigenous groups that have an active interest in the area. The site is registered as a permanent site with no gender restrictions, open access and is classed as unreliable.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts, as all plants are located on Shire reserves. Some populations occur adjacent to private land, however, so there is potential for some recovery actions to influence the activities on neighboring farms.

Evaluation of the Plan's Performance: CALM, in conjunction with the South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will evaluate the performance of this IRP. The plan is to be reviewed within five years.

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

The reserve that contains Population 1 is being managed and monitored by the Busselton Naturalist Club.

Populations 2 and 3 have Declared Rare Flora (DRF) markers installed to help protect them from accidental damage.

Relevant land managers have been notified of the presence of V*erticordia. plumosa* var. *ananeotes,* its threatened status and the legal obligations to protect it.

Seed has been collected and stored at –18°C in CALM's Threatened Flora Seed Centre (TFSC). The seed collected includes 62 seeds from Population 1a and 1b.

The Botanic Garden and Parks Authority (BGPA) currently have 22 plants of *V. plumosa* var. *ananeotes* grown from material collected from Population 1 in 1992 in their nursery and botanic gardens.

Surveys have been conducted in areas of suitable habitat to locate new populations.

Preliminary studies have been undertaken on seed viability, the effects of smoke on germination and the growth of the partial lignotuber in the variety.

Procedures to manage dieback disease are being implemented in the habitat of Population 1.

A poster has been produced that provides a description of *V. plumosa* var. *ananeotes,* and information about threats and recovery actions.

The SWRTFCRT is overseeing the implementation of recovery actions for this taxon.

Staff from CALM's Blackwood District regularly monitor all populations of this variety.

IRP Objective: 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.

Recovery criteria

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

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

1. Coordinate recovery actions	9. Develop and implement a fire management strategy
2. Maintain DRF markers	10. Map critical habitat
3. Install fences and undertake weed control	11. Rehabilitate habitat and buffers
4. Manage dieback disease	12. Obtain biological and ecological information
5. Conduct further surveys	13. Collect seed and cutting material
6. Monitor populations	14. Promote community awareness
7. Liaise with relevant landowners	15. Seek increased security for Population 1
8. Develop a translocation proposal	16. Review this Plan

1. BACKGROUND

History

V. plumosa var. *ananeotes* was first collected in Serpentine in December 1839 by Ludwig Preiss, and was named by Alex George in 1991. The population located by Ludwig Preiss has not been re-discovered in recent times. The variety has also been recorded along the Blackwood and Vasse Rivers and at the 'Malloy Plains' near Busselton but sightings have yet to be confirmed for these areas.

The variety is named from the Greek *ana* (again) and *neos* (new, recent) in reference to the plant's ability to resprout after fire from its small lignotuber. It was collected six times between 1839 and 1900, but was not then relocated until early 1992, when rediscovered by Dennis Cooper[1].

The reserve south of Busselton in which the taxon occurs is one of only a few reserves in the area, as most land has been cleared for agriculture and urban developments. Dennis Cooper has spent many voluntary hours studying *V. plumosa* var. *ananeotes*, and has recently conducted preliminary experiments on the effects of smoked water on germination and the growth of the lignotuber in seedlings. The lignotuber has been identified as the key means for the variety to survive the effects of fires.

Description

Verticordia plumosa var. *ananeotes* is a tufted shrub to 40 cm tall. It has a small lignotuber and several to many simple or sparsely branched stems. The leaves, which are abruptly pointed, and 6 - 14 mm long x 0.7 mm wide, are sparsely arranged on main stems but crowded on short axillary branchlets. Flowers, on stalks 4-7mm long, are in small groups with peduncles 4 - 7 mm long. They are deep mauve-pink fading to white. Sepals are 3-3.5 mm long. The three or four main lobes have very short, irregular lobes towards the apex.

Verticordia plumosa var. *ananeotes* is distinguished from *V. plumosa* var. *plumosa* by a shorter stature (it is approximately 40cm shorter) and the absence of glaucous colouration to its leaves.

Distribution and habitat

Verticordia plumosa var. *ananeotes* is known from three populations over a range of 30km in the Busselton area. It has also been noted at Serpentine, 'Murray District' (i.e. between Mundijong and Waroona), where it was recorded in open Jarrah woodland. It has also been seen along the Blackwood and Vasse Rivers and at the 'Malloy Plains' near Busselton, however these populations have not been confirmed. The variety is abundant in a reserve south of Busselton, growing on low-lying sandy or clay soils in association with *Eucalyptus calophylla* (Marri), *Kingia, Xanthorrhoea, Stirlingia, Isopogon,* sedges, *Conostylis* ssp., *Melaleuca* spp. and *Adenanthos* spp.

Biology and ecology

The genus *Verticordia* is well known for its colourful, showy flowers. Most species make excellent cut flowers and a considerable market has been established. Propagation of *Verticordia*s has been mainly from cuttings, with a few grown from seed. In general, *Verticordias* produce only one seed per flower in the wild. Germination occurs from within old flowers that have fallen to the ground. Research by CALM's Threatened Flora Seed Centre (TFSC) indicates that seed set in *Verticordias* is generally low (less than 51%) and variable between species, within the same species in different locations, and in different years at the same location (Cochrane and McChesney 1995). Subsequent germination is also often unsatisfactory even under generally favorable conditions, and germination techniques need to be further investigated (Turnbull and Doran 1987). Testing carried out by CALM'S TFSC indicates the initial germination rate of *Verticordia plumosa* var. *ananeotes* varied greatly within samples and over time, but was found to be between 9% and 47% (unpublished data A. Cochrane[2]).

[1] Dennis Cooper - member of the Busselton Naturalist Club.
[2] Anne Cochrane – Manager CALM's TFSC

Verticordias are generally considered to be fire sensitive with post-fire regeneration occurring mainly from seed. However, general health and flowering in *Verticordia plumosa* var. *ananeotes* is believed to deteriorate without some regular burning. *V. plumosa* var. *ananeotes* is one of seven *Verticordia* taxa that possess a small lignotuber which aids in recovery after fire. This has been observed in Population 1.

The BGPA currently have 22 plants from Population 1 grown from material collected by Elizabeth George in 1992. 11 of these will be planted in the Botanic Gardens Verticordia garden. The success of propagation of the variety from cuttings (30-87%) is dependent on the quality of the source material (A. Shade[3], personal communication).

Members of the genus *Verticordia* are not, on the whole, susceptible to *Phytophthora* species. However, preliminary studies with five *Verticordia plumosa* var. *ananeotes* seedlings have shown that it is highly likely that *V. plumosa* var. *ananeotes* is susceptible to *Phytophthora*.

Threats

Verticordia plumosa var. *ananeotes* was declared as Rare Flora in October 1996 and ranked as Critically Endangered in 1998. It currently meets World Conservation Union (IUCN) Red List Category 'CR' (IUCN 2000) under criteria B1ab(iii)+2ab(iii) due to its narrow distribution, severely fragmented populations, and a continuing decline in the quality of the habitat.

The variety is currently known from three populations in CALM's Blackwood District. The Shire reserve that contains Population 1 is currently under the management of the Busselton Naturalists Club. However, Populations 2 and 3 are now restricted to areas of remnant vegetation surrounded by land that has been extensively cleared for agriculture. The major threats to these populations are weeds, inappropriate fire regimes, grazing and trampling by livestock, road track and firebreak maintenance, dieback disease and chemical drift.

- **Weeds** are invading the habitat of Populations 2 and 3, in particular. 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, which are produced annually by many weed species.

- **Inappropriate fire regimes** threaten populations of *Verticordia plumosa* var. *ananeotes*, especially Population 2, that has been subject to regular burning. This taxon has a lignotuber, and therefore adult plants can survive fire. It is likely that the taxon requires occasional fire for recruitment from soil stored seed, but frequent fires during the flowering and seeding phase (November to February) may be detrimental to the long term survival of the taxon. Fire also promotes the introduction of weed species, and if too frequent, is likely to deplete the lignotuber.

- **Grazing and trampling** by livestock in the habitat of Population 2 is leading to soil compaction, aiding the spread of weeds and lowering seedling survival.

- **Road/track/firebreak maintenance activities** such as construction of drainage channels, grading activities and other road maintenance activities has the potential to impact on the road reserve populations of *Verticordia plumosa* var. *ananeotes* (Populations 2 and 3).

- **Chemical drift** from herbicide and fertilizer applications from adjacent farmland has the potential to impact on Population 2.

- **Dieback disease** caused by the plant pathogen *Phytophthora cinnamomi* is a threat to *Verticordia plumosa* var. *ananeotes*, as preliminary studies indicate that it is susceptible to the disease.

Summary of population information and threats

[3] Amanda Shade - Horticulturalist BGPA

Pop. No. & Location	Land Status	Year/No. plants		Condition	Threats
1a. Ambergate Reserve	'C' Class Shire Reserve	1994 1995 1995 1997 1998 1999	 253 15 250 250 250	Healthy condition	Inappropriate fire regime, weed invasion, dieback disease
1b. Ambergate Reserve	'C' Class Shire Reserve	2000 2000	379 300	Healthy condition in SW block	Inappropriate fire regime, weed invasion, dieback disease
2. Edwards Road	Shire Reserve	1996 1996 2004	7 7 1	Healthy condition: vegetative	Inappropriate fire regimes, firebreak and road maintenance activities, weed invasion, trampling and grazing by livestock, dieback disease, chemical drift
3 Payne Road, Treeton	Shire Reserve	2002	20	Moderate: old and young plants	Inappropriate fire regimes, weed invasion, trampling and grazing by livestock, dieback disease

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks, spraying of herbicides, burning, drainage etc) in the immediate vicinity of *Verticordia plumosa* var. *ananeotes* will require assessment. Proponents should demonstrate that on-ground works will not have an impact on the variety, or on its habitat or potential habitat.

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

Habitat critical to the survival of the variety includes the area of occupancy of known populations, similar habitat adjacent to known populations (within 200 m), i.e. sandy soil in open jarrah (*Eucalyptus marginata*) woodland or in sandy plain for southern populations (these provide potential habitat for natural expansion) and additional occurrences of similar habitat in nearby areas that do not currently contain the species but may have done so in the past (these represents possible future translocation sites). 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 (EPBC Act). Given that this species is listed as Critically Endangered, it is considered that all wild and translocated populations are important populations.

Benefits to other species/ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Verticordia plumosa* var. *ananeotes* will also improve the status of remnant vegetation in which it is located. Two Threatened ecological communities occur in the habitat of Population 1. These are 'southern wet shrublands' (listed as Endangered in WA), and 'woodlands on heavy soils of the southern Swan Coastal Plain' (listed as Vulnerable in WA). Both communities are described by Gibson *et al.* (1994). Actions to conserve the *Verticordia* will also be beneficial for the other Declared Rare Flora taxon that occurs in the habitat of Population 1. This is the perennial sedge *Tetraria australiensis* (listed as Vulnerable under the *Wildlife Conservation Act* 1950 and Endangered under the EPBC Act). The reserve that contains Population 1 also contains two threatened ecological communities. These are 'southern wet shrubland' (listed as Endangered in WA), and '*Eucalyptus calophylla* woodlands on heavy soils of the southern Swan Coastal Plain' (listed as Vulnerable in WA). These communities are described in Gibson *et al.* (1994), as community types '2' and '1b' respectively.

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 taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

Indigenous communities interested or involved in the region affected by this plan have not yet been identified, however, implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities in the region. The Department of Indigenous Affairs Aboriginal Heritage Sites Register lists Busselton (5613) as a site in the vicinity of the variety and input and involvement will be sought from indigenous groups that have an active interest in the area. The site is registered as a permanent site with no gender restrictions, open access and is classed as unreliable.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts, as all plants are located on Shire reserves. Some populations occur adjacent to private land, however, so there is potential for some recovery actions to influence the activities on neighboring farms.

Evaluation of the Plans Performance

CALM, in conjunction with the South West Region Threatened Flora and Communities Recovery Team will evaluate the performance of this interim recovery plan. In addition to annual reporting on progress against the criteria for success and failure, the plan is to be reviewed within five years of its implementation. Any changes to management / recovery actions made in response to monitoring results will be documented accordingly.

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 variety 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

Population 1 has been under threat from inappropriate (too frequent) fire regimes, grazing and weed invasion. The Busselton Naturalist's Club now manages the reserve that contains this population, and is developing a fire management strategy that includes consideration of fire frequency, intensity, seasonality and control measures. The Draft Management Plan for the reserve was also prepared by the group in November 2003 for the Shire of Busselton, and this includes consideration of weed control as an actions for this reserve and highlights the conservation, recreation and educational values of the area (Massey 2003).

Managers of land on which populations occur have been notified of the presence of the variety. Adjacent landowners have also been notified of the presence of the rare flora.

The BGPA currently have 22 plants from the Population 1 from material collected by Elizabeth George in 1992. 11 of these will be planted in the Botanic Gardens Verticordia garden. The success of propagation of the variety from cuttings (30-87%) is dependent on the quality of the source material (A. Shade, personal communication).

Approximately 32 seeds were collected in February 1998 and 30 in January 2000 from Population 1a and 1b. These have been stored in the CALM's Threatened Flora Seed Centre (TFSC) at –18°C. Staff of the TFSC generally test the viability of seed soon after collection and again after one year in storage. The initial

germination rate of *Verticordia plumosa* var. *ananeotes* varied greatly within samples and over time, but was found to be between 9% and 47% (unpublished data, A. Cochrane). It was not retested as there is only a very small quantity of seed.

Propagation of the taxon from seed has also been successfully conducted by Dennis Cooper and used in preliminary studies into the growth, survival and seed viability. He found that seed viability was relatively low (<5%) in the variety, and the best germination results occurred with the use of smokewater (D. Cooper, personal communication).

There are DRF markers in place for Populations 2 and 3. The significance of the DRF markers is being promoted to relevant local authorities, such as Shires and Main Roads WA. However relevant landowners may need to be informed of the importance of the markers.

Dieback hygiene procedures have been implemented at Population 1 by the Busselton Naturalist Club. This entails requiring visitors to disinfect their shoes in a soak pad prior to entering the walk trails through the reserve, installation of limestone walk tracks which are hostile to the disease, and mapping of the boundaries of the disease within the reserve.

An A4 sized poster has been developed and distributed for the taxon. This provides a description of *V. plumosa* var. *ananeotes*, photos and information about threats and recovery actions. It is hoped the distribution of this information will increase knowledge of the taxon, and possibly lead to the discovery of new populations.

Surveys have been conducted in nearby areas of similar habitat in an attempt to locate new populations.

The South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) is overseeing the implementation of recovery actions and will include information on progress in its annual report to CALM's Corporate Executive.

Future recovery actions

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

1. Coordinate recovery actions

The South West Region Threatened Flora and Communities Recovery Team are coordinating recovery actions for *Verticordia plumosa* var. *ananeotes* and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $1,000 per year

2. Maintain Declared Rare Flora markers

An additional DRF marker is required at Population 3. Annual checks on the DRF markers will be conducted when population surveys are completed.

Action: Maintain DRF markers
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $100 in the first year.

3. Install fencing and undertake weed control

One of the largest pressures on Population 2 is the grazing of livestock on the road reserve. This has caused degradation of the habitat, including soil compaction, and has contributed to the severe weed invasion in the area. A 5m by 5m fence to protect the plants will alleviate this grazing pressure. The fenced area will also be hand weeded annually. Adjacent land owners will also be informed of this activity.

Action: Install fencing and undertake weed control
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $ 1,500 in year 1 and $500 pa thereafter

4. Manage dieback disease

Strategies to manage dieback disease will be implemented in the habitat of populations of *Verticordia plumosa* var. *ananeotes.* This will involve ongoing implementation of dieback hygiene procedures in the habitat of Population 1, which is a reserve utilized for passive recreation including bush-walking. The Management Plan for this reserve also recommends that the disease be mapped (Massey 2003). This would help to determine suitable management actions for the reserve, including determination of suitable routes for bush-walkers, and the requirement for any other disease control actions.

Hygiene procedures will also be implemented by CALM staff when monitoring Populations 2 and 3.

Action: Manage dieback disease
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $ 2,000 in first year

5. Conduct further surveys

Further survey will be conducted for the taxon in areas of suitable habitat on a systematic basis during its flowering period. Volunteers will be encouraged to be involved in surveys to be supervised by CALM staff. Appropriate habitat on private lands will be surveyed if permission is obtained. Any areas considered suitable habitat for the taxon will be noted and these will be considered as possible future translocation sites. Population 3 also will be re-surveyed during the flowering period to confirm its identity. There is also an unconfirmed report of an additional subpopulation in the south east corner of the reserve that contains Population 1, and this will be clarified.

Action: Conduct further surveys
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $1,500 per year.

6. Monitor populations

Annual monitoring of habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. The Busselton Naturalist Club has been monitoring Population 1 and intends to continue this work.

Action: Monitor populations
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $1,500 per year

7. Liaise with relevant landowners

Staff from CALM's Blackwood district will continue to liaise with relevant land managers, including managers of areas adjacent to populations of the taxon, to ensure that the known populations are not accidentally damaged or destroyed. Input and involvement will also be sought from any indigenous groups that have an active interest in areas that are habitat for *V. plumosa* var. *ananeotes*. CALM will continue to liaise with the Shire of Busselton with regard the management of all populations, and with the Busselton Naturalists Club, in particular, with regard to management of Population 1.

Action: Liaise with relevant landholders
Responsibility: CALM (Blackwood District) and through SWRTFCRT
Cost: $700 pa

8. Develop a translocation proposal

Translocations will be essential for the long-term conservation of this variety. Threats to the habitat of Population 1 have probably declined in recent years, however Populations 2 and 3 are subject to some severe threats. 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.* Suitable habitat for potential translocation sites will be sought during the life of this IRP and translocation will be addressed in a full Recovery Plan if deemed necessary. All translocation proposals require endorsement by the Director of Nature Conservation.

Action: Develop a translocation proposal
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $13,300 in third year and $6,200 in years 4 and 5

9. Develop and implement a fire management strategy

This taxon has a lignotuber, and therefore adult plants can survive fire. It is likely that the taxon requires occasional fire for recruitment from soil stored seed, but frequent fires during the flowering and seeding phase (November to February) may be detrimental to the long term survival of the taxon. Fire also promotes the introduction of weed species, and if too frequent, is likely to deplete the lignotuber.

The Busselton Naturalist Club produced a Draft Management Plan for the habitat of Population 1 in November 2003, and this includes a Fire Management Strategy. A fire management strategy will be developed for the taxon as a whole in consultation with relevant parties. This plan will include consideration of the maintenance of strategic firebreaks in the habitat, the establishment and maintenance of firebreaks on adjoining land, and recommended fire frequency, intensity, seasonality and method of control.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $3,500 in first year and $1,500 in subsequent years

10. Map critical habitat

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be done under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action: Map critical habitat
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $1,500 in the first year

11. Rehabilitate habitat and buffers

The habitat of *V. plumosa* var. *ananeotes* at Populations 2 and 3 will be rehabilitated by re-introduction of local native plant species. This would ideally involve fencing off the area of road reserve concerned, weeding the area and then reintroducing native plants to the site.

Action: Rehabilitate habitat and buffers
Responsibility: CALM (Blackwood District, SCB) through SWRTFCRT
Cost: $3,500 in years 1, 2 and 3.

12. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *V. plumosa* var. *ananeotes* will provide a better scientific basis for management of the wild populations. Dennis Cooper has undertaken some preliminary studies examining seed viability, effects of smoke, and lignotuber formation. An understanding of the following is particularly necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including fire/smoke water), competition, rainfall and grazing in germination and recruitment.
2. Effects of weeds on recruitment and establishment.
3. Longevity of plants, and time taken to reach maturity.
4. The longevity of the lignotuber, its viability and time taken to develop.
5. The reproductive strategies, phenology and seasonal growth of the variety.
6. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division, Blackwood District) through SWRTFCRT
Cost: $18,000 for the first 3 years

13. Collect seed and cutting material

It is important that the genetic diversity of the taxon is conserved. Some seed has been collected for this taxon however further collections are required. Collecting more seed or cutting material from a higher proportion of all populations (all seed collections to date have been from 8 plants in Population 1) will ensure adequate representation of genetic diversity. It is also important that the size and viability of the soil seed bank is determined and further research is undertaken to develop techniques for stimulating germination of soil stored seed.

Action: Collect seed and cutting material
Responsibility: CALM (TFSC, Blackwood District, SCB) through SWRTFCRT
Cost: $3000 in years 1 and 2

14. Promote community awareness

An A4 sized information sheet, that provides a description of the variety and information about threats and recovery actions, has been developed for *V. plumosa* var. *ananeotes*. It is hoped that the poster will result in the discovery of new populations. A publicity campaign will increase local community awareness of this variety. Publicity may be in the form of exposure in the local print or electronic media. Formal links with local naturalist groups and interested individuals will also continue to be encouraged.

Action: Promote community awareness
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $800 pa

15. Seek increased security for Population 1

Currently the reserve that contains Population 1 is a ‘C’ Class reserve. Due to the restricted habitat of this taxon, and the excellent condition of the reserve, the Busselton Naturalist Club and CALM will develop a proposal for the Shire of Busselton to change the vesting to an ‘A’ Class Reserve.

Action: Seek increased security for Population 1
Responsibility: CALM (Blackwood District) through SWRTFCRT
Cost: $500 for the development of the proposal in the first year

16. Review this Plan

If the taxon is still ranked as Critically Endangered at the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for further recovery actions, or to review this IRP will be assessed and a revised plan prepared if necessary.

Action: Review this Plan
Responsibility: CALM (SCB and Blackwood District) through the SWRTFCRT
Cost: $15,700 in the fifth year (if required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from September 2005 to August 2010 but will remain in force until withdrawn or replaced. If the taxon is still ranked as Critically Endangered after five years, the need for further recovery actions, or to review this IRP will be determined.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

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

Verticordia plumosa var. *ananeotes* is a shrub with small lignotuber and several to many simple or sparsely branched stems to 40cm. Leaves sparsely arranged on main stem but crowded on short axillary branchlets, 6-14mm long, 0.4-0.7mm wide, abruptly acute. Flowers in small groups. Penduncles 4-7mm long. Hypanthium 1.5mm long, stiffly hirsute. Sepals 3-3.5mm long; main lobes 3 or 4, very short and irregularly lobed towards apex.

It is easily recognized from other *Verticordia sp*. by its distinctive habitat, the simple stems, long internodes and long, slender leaves are also distinctive.