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

INTERIM RECOVERY PLAN NO. 323

HAY RIVER FEATHERFLOWER / SCRUFFY VERTICORDIA

(*Verticordia apecta*)

INTERIM RECOVERY PLAN

2012–2017

March 2012
Department of Environment and Conservation

Warren Region

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

These plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

DEC is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered taxa, always within one year of endorsement of that rank by the Minister.

This plan will operate from March 2012 to February 2017 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endangered in WA, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 30th March 2012 and was approved by the Director of Nature Conservation on 19th April 2012. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this plan was accurate at March 2012.

PLAN PREPARATION

This plan was prepared by Nikki Rouse[1], Karlene Bain[2], Roger Hearn[3], Andrew Brown[4], Cassidy Newland[5] and Robyn Luu[6].

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ACKNOWLEDGMENTS

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

Brad Barton	Regional Leader, DEC Warren Region
Anne Cochrane	Senior Research Scientist, DEC Science Division
Janine Liddelow	Flora Officer, DEC Frankland District
John Riley	Previously Administrative Officer Flora, DEC Species and Communities Branch
Amanda Shade	Assistant Curator (Nursery), Botanic Gardens and Parks Authority

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information.

Cover photograph by Janine Liddelow.

CITATION

This Interim Recovery Plan should be cited as: Department of Environment and Conservation (2012) *Verticordia apecta*, Interim Recovery Plan 2012–2017. Interim Recovery Plan No. 323. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	***Verticordia apecta***	**Common Name:**	Scruffy Verticordia/Hay River Featherflower
Family:	Myrtaceae	**Flowering Period:**	November
DEC Region:	Warren	**DEC District:**	Frankland
Shire:	Plantagenet	**NRM Region:**	South Coast Natural Resource Management Inc.
Recovery Team:	Warren Region Threatened Flora Recovery Team (WRTFRT)		

Illustrations and/or further information: George, E. A. and George, A. S. (1994) New Taxa of *Verticordia* (Myrtaceae: Chamelaucieae) from Western Australia. *Nuytsia* 9 (3): 33-341; George, E. A. (2002) *Verticordia: the turner of hearts.* University of Western Australia Press, Perth, Western Australia; Hearn R.W., Meissner R., Brown A.P., Macfarlane T.D., and Annels T.R. (2006) *Declared Rare and Poorly Known Flora in the Warren Region*. Department of Environment and Conservation, Perth, Western Australia; Western Australian Herbarium (1998−) *FloraBase − The Western Australian Flora*. Department of Environment and Conservation. http://florabase.dec.wa.gov.au/.

Current status: *Verticordia apecta* is declared as rare flora (DRF) under the Western Australian *Wildlife Conservation Act 1950* and is ranked as Critically Endangered (CR) under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(ii,v) in WA due to it being known from a single population and there being a continuing decline in the area of occupancy of mature individuals. The species is listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The main threats to the species are dieback disease, fire, feral pigs, grazing, weeds, small population size, poor recruitment and competition.

Description: *Verticordia apecta* is a lignotuberous slender shrub to 45 cm tall with linear lower stem leaves 3 to 9 mm long and upper narrow elliptic stem leaves about 7 mm long. Floral leaves are elliptic to obovate. Flowers are scarce in the upper axils and have peduncles 9 to 19 mm long. Sepals are deep pink with white fine fringe segments (Hearn *et al*. 2006).

Habitat requirements: *Verticordia apecta* is known from a single population in an area approximately 8m^2 adjacent to the Hay River, southwest of Mt Barker. It grows in sandy clay with loam and broken granite on a west-facing slope in *Eucalyptus wandoo* low open woodland and low open shrub land.

Habitat critical to the survival of the species, and important populations:
Verticordia apecta is ranked in WA as CR, and as such it is considered that all known habitat for the wild population is critical to the survival of the species and that the wild population is an important population. Habitat critical to the survival of *V. apecta* includes the area of occupancy of the population, areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Verticordia apecta* will also improve the status of associated native vegetation. The species occurs in association with three Priority species.

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

Role and interests of Indigenous people: A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register revealed no sites of Aboriginal significance adjacent to the population of *Verticordia apecta*. Input and involvement is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the Recovery plan is included as an action in the plan.

Social and economic impact: The implementation of this recovery plan may cause some economic impact to DEC through the cost of implementing recovery actions. Also, as the population is located near private property, its conservation may potentially affect activities on that land.

Affected interests: The known population is on Crown land vested in the Conservation Commission and managed by DEC.

Evaluation of the plan's performance: DEC, with assistance from the Warren Region Threatened Flora Recovery Team (WRTFRT), will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

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

1. Cuttings were collected in 2000 and 2005 by Frankland District staff for propagation trials by Botanic Gardens and Parks Authority (BGPA).
2. Potential habitat has been surveyed by field staff from DECs Frankland District, Warren Region and Science Division.
3. A fire response plan has been developed by DEC Frankland District to be used in the event of further wildfires in the area.
4. Genetic material was collected from *Verticordia habrantha*, *V. endlicheriana* var. *angustifolia* and *V. apecta* and sent to DEC Science Division to investigate the potential of the species being a hybrid.
5. Staff from DEC's Frankland District regularly monitors the single known population of the species.
6. The WRTFRT is assisting DEC to coordinate recovery actions for *Verticordia apecta* along with other threatened species in the Region. Information on progress in implementing recovery actions will be reported through annual reports to DEC's Corporate Executive and funding bodies.

Objective: The objective of this plan is to abate identified threats and maintain or enhance populations to ensure the long-term preservation of the species in the wild.

Recovery Criteria

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by 20 per cent or more over the term of the plan.

Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by 20 per cent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Confirm species through genetic analysis
3. Collect and hold propagation material
4. Monitor population
5. Obtain biological and ecological information
6. Determine *Phytophthora cinnamomi* susceptibility
7. Map and monitor dieback fronts
8. Maintain disease hygiene
9. Undertake regeneration trials
10. Undertake surveys
11. Implement fire response plan
12. Develop and implement a translocation proposal
13. Promote awareness
14. Map habitat critical to the survival of *Verticordia apecta*
15. Liaise with Indigenous groups
16. Review this plan and assess the need for further recovery actions

1. BACKGROUND

History

Verticordia apecta was first collected by Elizabeth George and Tony Annels while visiting a small *V. endlicheriana* var. *angustifolia* population in 1993. The species was described by Elizabeth and Alex George the following year. Despite searches of the known location and other similar sites in and adjacent to the area, the species was not seen again until 1999 (Hearn *et al*. 2006).

The single population currently consists of 22 mature plants and encompasses an area approximately 10m² on a granite outcrop adjacent to the Hay River, southwest of Mt Barker. The population was burnt in a wildfire in autumn 2004. When inspected in November 2005, plants had resprouted and 10 were flowering at that time. An additional four nearby plants are believed to be *Verticordia apecta* but were not flowering when last seen and this could not be confirmed. No seedlings were present.

Description

Verticordia apecta is a lignotuberous slender shrub to 45 cm tall with linear lower stem leaves 3 to 9 mm long and upper narrow elliptic stem leaves about 7 mm long. Floral leaves are elliptic to obovate. Flowers are scarce in the upper axils and have peduncles 9 to 19 mm long. Sepals are deep pink with white fine fringe segments (Hearn *et al*. 2006).

The species name is derived from the Greek *apektos* meaning uncombed or unkempt, in reference to the untidy appearance of the flowers. The species differs from *Verticordia habrantha* in having flowers with coarsely lobed and fringed petals, and from *V. inclusa* in its spindly habit and scruffy striped pink and white flowers with more sparsely fringed sepals (George 2002).

Distribution and habitat

Verticordia apecta is known from a single population in an area approximately 8m^2 adjacent to the Hay River, southwest of Mt Barker. It grows in sandy clay with loam and broken granite on a west-facing slope in *Eucalyptus wandoo* low open woodland and low open shrub land. Associated species include *Verticordia habrantha*, *Gastrolobium coriaceum*, *Grevillea acerosa*, *Hypocalymma angustifolium* and *V. endlicheriana* var. *angustifolia*.

Map 1: Distribution of *Verticordia apecta*

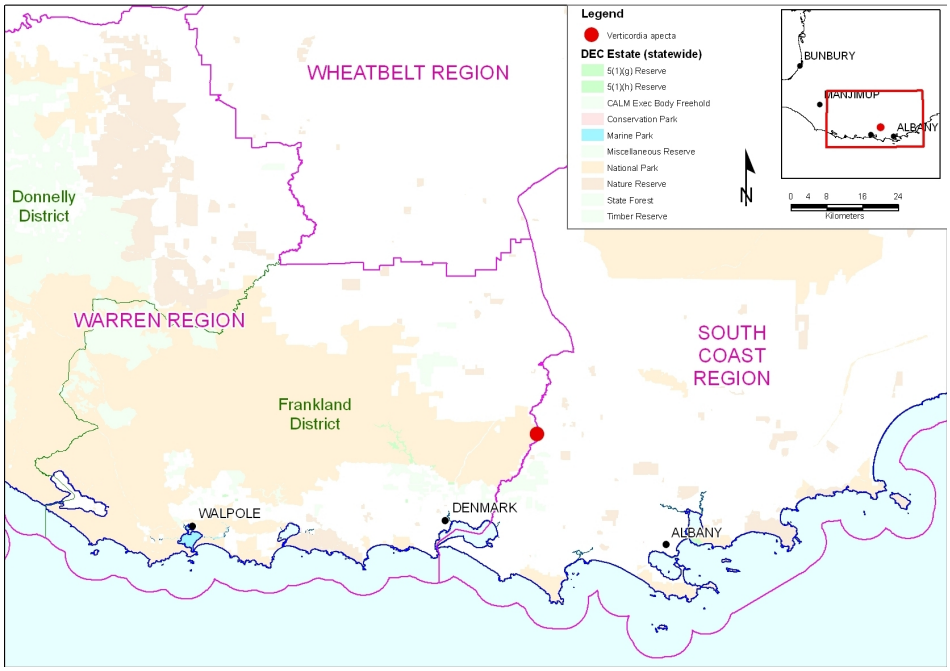

Table 1: Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1. SW of Mt Barker	Frankland	Plantagenet	Conservation Commission of WA	Conservation of Flora and Fauna	DEC

Biology and ecology

The intermediate morphological appearance of *Verticordia apecta* and the lack of seedlings present in the population have brought into question the current taxonomy of the species. It has been suggested that *V. apecta* may be a hybrid between a combination of *V. habrantha*, *V. endlicheriana* var. *angustifolia* and/or *V. densiflora*. However, informal investigations undertaken so far from material collected from *V. habrantha*, *V. endlicheriana* var. *angustifolia* and *V. apecta* by DEC Science Division suggest that *V. apecta* has little genetic similarity to *V. endlicheriana* var. *angustifolia* and a strong affinity with *V. habrantha*. However, the floristic appearance of *V. habrantha* is so dissimilar from *V. apecta* that it is unlikely to be a mutation. So unless another parent plant can be found its hybrid status is unlikely to be proven. It is also possible that all stems may arise from a common lignotuber and genetic analysis is thus required to investigate if it is a clone.

Verticordia apecta appears to regenerate from underground lignotubers with no regeneration occurring from seed following a fire in 2004.

The susceptibility of *Verticordia apecta* to the effects of dieback disease caused by *Phytophthora cinnamomi* is unknown, however given the susceptibility of other species in the genus, it should be assumed to be susceptible until shown otherwise (Hearn *et al*. 2006).

Threats

Verticordia apecta is declared as rare flora (DRF) under the Western Australian *Wildlife Conservation Act 1950* in WA and is ranked as Critically Endangered (CR) under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(ii,v) due to it being known from a single population and there being a continuing decline in the area of occupancy of mature individuals. The species is listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The main threats to the species are:

- **Dieback disease:** The susceptibility of *Verticordia apecta* to the effects of dieback disease caused by *Phytophthora cinnamomi* is unknown. However, given the susceptibility of other species in the genus, it should be assumed to be susceptible until shown otherwise (Hearn *et al*. 2006). In relatively undisturbed habitat *Phytophthora* spreads through root-to-root contact and through free water flow (Shearer and Tippet 1989). Although it spreads most quickly downhill it is also capable of moving uphill. It also spreads through movement of infected soil, usually by vehicles during firebreak and track use. *P. cinnamomi* thrives best in mild moist conditions such as that produced by spring, autumn or summer rainfall. This pathogen is a potential threat to this species and its habitat.
- **Inappropriate fire regimes** may affect the viability of the population which was burnt in a wildfire in 2004. Although a large proportion of the plants in the population have resprouted, it is not known how a subsequent fire will affect the reproductive capacity of the species, particularly given that there is no evidence that the population is producing seed.
- **Feral pig activity** has been noted along Mitchell River, just west of the population, and has the potential to harm the species by disturbing both the plants and nearby soil. Pigs may also act as a vector for *Phytophthora cinnamomi*.
- **Grazing** by rabbits and kangaroos may be a threat if they increase in numbers, possibly following a disturbance event such as fire. Soil disturbance, weed invasion and the addition of nutrients are secondary effects of animal movement in the area inhabited by the species.
- **Weeds** are not currently a threat, however as the site is approximately 600m from private property, weeds may become a threat in the future. Weeds are likely to invade the species' habitat following a significant disturbance such as fire or soil disturbance caused by feral pigs. Weeds may also alter grazing pressure and fire behaviour in the habitat.

- **Small population size** and limited range of this species leaves it highly vulnerable to a single threat event such as dieback or pigs which has the potential to impact on all plants within the one known population. The limited number of plants of the species would also suggest limited genetic diversity which may impact on the long term survival of the species.
- **Poor recruitment** is a threat to the species due to a reduction of factors in the habitat which may positively influence reproduction as well as an increase in factors (grazing) which may negatively influence reproduction.
- **Competition** from a local species *Gastrolobium coriaceum* is a potential threat to the species. The *Nemcia* is a small shrub which grows over the top of the existing *Verticordia* stems, thereby burying the plants. This may be suppressing growth of the *Verticordia*.

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

Table 2: Summary of population information and threats

Pop. No. & Location	Land Status	Year / No. of plants		Condition	Threats
1. SW Mt Barker	National Park	1993 1994 1999 2005 2006 2008 2010	30 0 14 12 10 16 22 [2 dead]	Healthy	Dieback disease, fire, feral pig activity, grazing, weeds, small population size, poor recruitment, competition

Populations in **bold text** are considered to be Important Populations.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Verticordia apecta* may require assessment.

Actions that could result in any of the following may potentially result in a significant impact on the species:

- Damage or destruction of occupied or potential habitat
- Alteration of the local surface hydrology or drainage
- Reduction in population size
- A major increase in disturbance in the vicinity of a population
- Spread or amplification of dieback disease.

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

Verticordia apecta is ranked in WA as CR, and as such it is considered that all known habitat for the wild population is critical to the survival of the species and that the wild population is an important population. Habitat critical to the survival of *V. apecta* includes the area of occupancy of the population, areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Verticordia apecta* will also improve the status of associated native vegetation. The species occurs in association with three Priority species which are listed in the table below:

Table 3: Conservation-listed flora species occurring in habitat of *Verticordia apecta*

Species name	Conservation Status (WA)	Conservation Status (EPBC Act)
Carex tereticaulis	Priority 1	-
Verticordia endlicheriana var. *angustifolia*	Priority 3	-
Pleurophascum occidentale	Priority 4	-

For a description of the Priority categories see Smith (2010).

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

Indigenous consultation

A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register revealed no sites of Aboriginal significance adjacent to the population of *Verticordia apecta*. Input and involvement is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the Recovery plan is included as an action in the plan.

Social and economic impacts

The implementation of this recovery plan may cause some economic impact to DEC through the cost of implementing recovery actions. Also, as the population is located near private property, its conservation may potentially affect activities on that land.

Affected interests

The known population is on Crown land vested in the Conservation Commission and managed by DEC.

Evaluation of the plan's performance

DEC, with assistance from the Warren Region Threatened Flora Recovery Team (WRTFRT), will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

The objective of this plan is to abate identified threats and maintain or enhance populations to ensure the long-term preservation of the species in the wild.

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by 20 per cent or more over the term of the plan.

Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by 20 per cent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Cuttings were collected in 2000 and 2005 by DEC Frankland District staff for propagation trials by staff from Botanic Gardens and Parks Authority (BGPA). Twenty two plants were propagated but only nine remain alive (Table 4).

Table 4: BGPA *Verticordia apecta* propagation trial results for material collected by DEC Frankland District staff in 2000 and 2005

Accession	No. Plants	Collection info	Propagation information	Comments
20000040	4	Cuttings, collected 10 Jan 2000. Clone 1	33% cuttings, 71% grafted	The four plants are grafted and currently recorded as being in the Conservation Garden within the Botanic Gardens
20051346	1	Plant 1, collected 23 Nov 2005	28% from cuttings	Plants held in container collection in nursery
20051350	1	Plant 4, collected 23 Nov 2005	43% from cuttings	Plants held in container collection in nursery
20051352	1	Plant 10, collected 23 Nov 2005	67% from cuttings	Plants held in container collection in nursery
20051354	2	Plant 7, collected 23 Nov 2005	67% from cuttings	Plants held in container collection in nursery

Note: A number of other clones were propagated in 2000 and 2005 but the plants listed above are the only ones still alive.

Potential habitat has been surveyed by field staff from DEC's Frankland District, Warren Region and Science Division. Suitable habitat was searched throughout the District for a number of species by Roger Hearn, Ray Cranfield, Tony Annells, Edward Middelton and Brenda Hammersley in 1993-1997 with no new populations of *Verticordia apecta* located. Additional areas were searched in Roe forest block in 2002 by T. Middelton and D. Coffey. This area has similar granite habitat, and species assemblages, however, no populations were located.

A fire response plan has been developed by Frankland District to be used in the event of further wildfires in the area (Appendix A). It briefly outlines hygiene practices and water use in the event of a wildfire to prevent the chances of *Phytophthora cinnamomi* infection. It also makes recommendations regarding vehicle damage to flora on the outcrop.

Genetic material was collected from *Verticordia habrantha*, *V. endlicheriana* var. *angustifolia* and *V. apecta* and sent to DEC Science Division to investigate the potential of the species being a hybrid.

Staff from DEC's Frankland District regularly monitor the population of the taxon.

The WRTFRT is assisting DEC to coordinate recovery actions for *Verticordia apecta* along with other threatened species in the Region. Information on progress in implementing recovery actions will be reported through annual reports to DEC's Corporate Executive and funding bodies.

Future recovery actions

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

1. Coordinate recovery actions

The WRTFRT will assist DEC in coordinating recovery actions for *Verticordia apecta* along with other threatened species. Information on progress in implementing recovery actions will be reported through annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions

Responsibility: DEC (Frankland District) with assistance from the WRTFRT
Cost: $6,000 per year

2. Confirm species through genetic analysis

There is some uncertainty regarding the status of *Verticordia apecta* due to intermediate morphological features and its apparent inability to reproduce. Investigations so far suggest its potential as a hybrid between *V. habrantha*, *V. endlicheriana* var. *angustifolia* and *V. apecta* is unlikely unless another parent plant can be found. Further genetic analysis is also required to investigate if all stems arise from a common lignotuber and its potential as a clone.

Action: Confirm species through genetic analysis
Responsibility: DEC (Frankland District, Science Division)
Cost: $10,000 in year 1

3. Collect and hold propagation material

Preservation of genetic material is essential to guard against extinction of the species if the wild population is lost. It is recommended that seed be collected and stored by TFSC and cutting material obtained for propagation at the BGPA.

Action: Collect and hold propagation material
Responsibility: DEC (Frankland District and TFSC) and BGPA
Cost: $5,000 per year

4. Monitor population

Monitoring of factors such as grazing, weed invasion, habitat degradation, hydrology, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. In addition, competition from *Gastrolobium coriaceum* will be monitored and if needed, pruning undertaken.

Feral pig activity has been observed to the west of the population and needs to be monitored to ensure it does not occur at the *Verticordia apecta* population. Fencing of the population may need to be considered.

Action: Monitor population
Responsibility: DEC (Frankland District) with assistance from the WRTFRT
Cost: $5,000 per year

5. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Verticordia apecta* in the wild. Overall investigations will ideally include:

1. Study of the soil seed bank dynamics and the role of various factors including disturbance, competition, drought, inundation and grazing in recruitment and seedling survival.
2. Determination of reproductive strategies, phenology and seasonal growth.
3. Investigation of reproductive success and pollination biology.
4. Investigation of minimum viable population size.
5. The impact of changes in hydrology in the habitat.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Frankland District)
Cost: $10,000 per year

6. Determine *Phytophthora cinnamomi* susceptibility

The susceptibility of *Verticordia apecta* to *Phytophthora cinnamomi* is not known. Root and soil samples will be taken from any plants that are found to be recently dead in suspect areas. Significant fronts will be mapped

and monitored in the vicinity of critical habitat. Aerial phosphite application may be used to target high priority areas and reduce the spread of *P. cinnamomi* into currently uninfected areas.

Action: Determine *Phytophthora cinnamomi* susceptibility
Responsibility: DEC (Frankland District)
Cost: $2,000 in year 1

7. Map and monitor dieback fronts

The *Phytophthora cinnamomi* status of the surrounding landscape is undetermined but it is likely there is *P. cinnamomi* nearby. Determine and map the *P. cinnamomi* status of the surrounding local landscape and identify likely points of transmission into the population. After the *P. cinnamomi* status has been mapped, continue to monitor the development of fronts and any new infections.

Action: Map and monitor dieback fronts
Responsibility: DEC (Frankland District)
Cost: $5,000 in year 1, $3,000 per year in years 2-5

8. Maintain disease hygiene

Dieback hygiene (outlined in CALM 2003 (now DEC)) will be followed for activities such as installation and maintenance of firebreaks and walking into the population in wet soil conditions. If *Verticordia apecta* is susceptible, a dieback response plan will be prepared to prevent infection within the critical habitat and manage any outbreaks. This may include installing purpose built signs advising of the dieback risk and high conservation values of the sites.

Action: Maintain disease hygiene
Responsibility: DEC (Frankland District)
Cost: $2,000 per year

9. Undertake regeneration trials

Natural disturbance events (physical or fire) may be the most effective means of germinating *Verticordia apecta* in the wild. Different disturbance techniques should be investigated (i.e. soil disturbance and fire), to determine the most successful and appropriate method. As well as the known population site, trials will also be carried out at historical locations. Records will need to be maintained for future research. Any disturbance trials will need to be undertaken in conjunction with weed control.

Action: Undertake regeneration trials
Responsibility: DEC (Science Division and Frankland District)
Cost: $7,000 in years 1 and 3, $2,000 in years 2, 4 and 5

10. Undertake surveys

The species has been thoroughly surveyed in the past with likely habitat looked at. However, if additional areas of suitable habitat are found, it is recommended that these areas be surveyed for the presence of *Verticordia apecta*. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce unnecessary duplicate surveys. Where possible, volunteers from the local community, Landcare groups, wildflower societies and naturalists clubs will be encouraged to become involved.

Action: Undertake surveys
Responsibility: DEC (Frankland District) with assistance from the WRTFRT
Cost: $5,000 per year

11. Implement fire response plan

A fire response plan developed by Frankland District (Appendix A) will be implemented. The plan briefly outlines hygiene practices and water use in the event of a wildfire to prevent the chances of *Phytophthora cinnamomi* infection. It also makes recommendations regarding vehicle damage to flora on the outcrop.

Action: Implement fire response plan
Responsibility: DEC (Frankland District)
Cost: $2,000 per year

12. Develop and implement a translocation proposal

Translocation may be deemed desirable for the conservation of this species. A translocation proposal will be developed, suitable translocation sites selected and the translocation implemented. Information on the translocation of threatened plants and animals in the wild is provided in DEC's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995), and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al*. 2004). All translocation proposals require endorsement by DEC's Director of Nature Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action: Develop and implement a translocation proposal
Responsibility: DEC (Science Division and Frankland District)
Cost: $10,000 in years 1 and 2; and $5,000 in subsequent years

13. Promote awareness

The importance of biodiversity conservation and the protection of *Verticordia apecta* will be promoted to the public. This will be achieved through an information campaign using local print and electronic media and by setting up poster displays. An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos will be produced. These will be distributed to the public through DEC's Frankland District office and at the offices and libraries of the Shire of Denmark. Such information distribution may lead to the discovery of new populations. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: DEC (Frankland District, SCB and Corporate Relations) with assistance from the WRTFRT
Cost: $4,000 in year 1 and $2,000 in years 2-5

14. Map habitat critical to the survival of *Verticordia apecta*

Although habitat critical to the survival of the species is alluded to in Section 1, it has not yet been mapped and this will be addressed under this action. If additional populations are located, then habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of *Verticordia apecta*
Responsibility: DEC (SCB and Frankland District)
Cost: $6,000 in year 2

15. Liaise with Indigenous groups

Indigenous consultation will take place to determine if there are any issues or interests in areas that are habitat for the species.

Action: Liaise with Indigenous groups
Responsibility: DEC (Frankland District)
Cost: $2,000 per year

16. Review this plan and assess the need for further recovery actions

If *Verticordia apecta* is still ranked CR at the end of the five-year term of this plan, the need for further recovery actions, or a review of this plan will be assessed and a revised plan prepared if necessary.

Action: Review this plan and assess the need for further recovery actions
Responsibility: DEC (SCB and Frankland District) with assistance from the WRTFRT
Cost: $3,000 in year 5

Table 5. Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	DEC (Frankland District) with assistance from the WRTFRT	Ongoing
Confirm species through genetic analysis	High	DEC (Frankland District and Science Division)	2013
Collect and hold propagation material	High	DEC (Frankland District and TFSC) and BGPA	2017
Monitor population	High	DEC (Frankland District) with assistance from the WRTFRT	Ongoing
Obtain biological and ecological information	High	DEC (Science Division and Frankland District)	2017
Determine *Phytophthora cinnamomi* susceptibility	High	DEC (Frankland District)	2013
Map and monitor dieback fronts	High	DEC (Frankland District)	2017
Maintain disease hygiene	High	DEC (Frankland District)	Ongoing
Undertake regeneration trials	High	DEC (Science Division and Frankland District)	2017
Undertake surveys	High	DEC (Frankland District) with assistance from the WRTFRT	Ongoing
Implement fire response plan	High	DEC (Frankland District)	Ongoing
Develop and implement a translocation proposal	High	DEC (Science Division and Frankland District)	2017
Promote awareness	Medium	(Frankland District, SCB and Corporate Relations) with assistance from the WRTFRT	Ongoing
Map habitat critical to the survival of *Verticordia apecta*	Medium	DEC (SCB and Frankland District)	2014
Liaise with Indigenous groups	Medium	DEC (Frankland District)	Ongoing
Review this plan and assess the need for further recovery actions	Medium	DEC (SCB and Frankland District) with assistance from the WRTFRT	2017

4. TERM OF PLAN

This plan will operate from March 2012 to February 2017 but will remain in force until withdrawn or replaced. If the species is still ranked CR after five years, the need for further recovery actions will be determined.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Excerpt from: George, E. A. and George, A. S. (1994) New Taxa of *Verticordia* (Myrtaceae: Chamelaucieae) from Western Australia. *Nuytsia* 9 (3): 33-341.

Verticordia apecta

A slender, erect *shrub* with 1 stem to 45 cm tall, ?with lignotuber. *Lower leaves* linear, triquetrous, obtuse, often minutely mucronate, 3-9 mm long; stem leaves narrowly elliptic, obtuse but minutely mucronate, c. 7 mm long; floral leaves elliptic, to obovate, triquetrous, obtuse. *Flowers* few, in upper axils. *Peduncles* 9-19 mm long, ascending, thickened upwards. *Bracteoles* not cuspidate. *Hypanthium* broadly turbinate, 1.5 mm long, 10-ribbed, shortly and finely pubescent; top of hypanthium finely pitted. *Sepals* deep pink including main lobes, the finer fringe segments white, widely spreading but main lobes upturned, 4 mm long overall; lamina semi-elliptic, c. 1 mm long, 2 mm wide; fringe finely scabrid; auricles on broad claw, the upturned lamina semi-orbicular, deeply fimbriate, exceeding hypanthium. *Petals* deep pink, the finer fringe lobes white, 4 mm long overall, spreading with upturned fringe; lamina transversely semi-orbicular, deeply lacerate with 4-6 main lobes and many smaller ones; lamina 1 mm long, 1.8 mm wide. *Stamens and staminodes* united for c. 0.5 mm; stamens 0.8-1 mm long, glabrous; anthers 0.5-0.7 mm long, strongly incurved, depressed-globular with lateral shallow vertical grooves, and with small obtuse umbonate apical appendage; staminodes 3.5 mm long, irregularly lacerate, otherwise glabrous. *Style* erect, 0.3 mm long, with short hairs around stigma; stigma slightly enlarged. *Ovules* 2, laterally attached at base of ovary.

Habitat and Distribution: Known only from the type locality. Grows in sandy clay with loam and broken granite, on an upper west-facing slope in *Eucalyptus wandoo* low open woodland and low open shrubland.

Flowering Period: November.

Conservation Status: Rare, Critically Endangered. Only known from type collection, population consists of approximately 14 plants.