INTERIM RECOVERY PLAN NO 140

GINGIN WAX

(*CHAMELAUCIUM* SP. GINGIN)

INTERIM RECOVERY PLAN

2003-2008

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Photograph: Andrew Brown

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Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
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Natural Heritage Trust
Helping Communities Helping Australia

Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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.

This Interim Recovery Plan replaces number 27 Gingin Wax, (*Chamelaucium* sp. Gingin) (Rebecca Evans and Val English, 1999). It incorporates current information on factors such as population, land tenure plant numbers and threats that, if changed from the previous plan, may affect appropriate recovery actions. In addition, it provides an update of which recovery actions have occurred.

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This Interim Recovery Plan will operate from February 2003 to January 2008 but will remain in force until withdrawn or replaced.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.

This IRP was approved by the Director of Nature Conservation on 11 July, 2003. 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 March 2003.

SUMMARY

Scientific Name:	*Chamelaucium* sp. Gingin	**Common Name:**	Gingin Wax
Family:	Myrtaceae	**Flowering Period:**	September-November (December)
Dept Region:	Swan	**Dept District:**	Swan Coastal, Perth Hills
Shire:	Gingin, Chittering	**Recovery Team:**	Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT)

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

Current status: *Chamelaucium* sp. Gingin was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in September 1986 and ranked as Critically Endangered (CR) in November 1998. It is also listed as Endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation* (EPBC) Act 1999. It is now to be recommended for listing under World Conservation Union (IUCN, 2000) Red List category 'VU' because it meets criterion B1ab(iii)+2ab(iii) for Vulnerable and no longer meets criteria for Endangered. The six populations of *Chamelaucium* sp. Gingin are highly fragmented. The main threats are road, track, firebreak and fence maintenance activities, road construction projects, mining, inappropriate fire regimes, grazing, weed invasion, chemical drift and potentially disease.

An Interim Recovery Plan was written for *Chamelaucium* sp. Gingin in 1999 (Evans and English 1999). This plan is based on that document, includes additional information compiled since 1999, and replaces that plan.

Habitat requirements: *Chamelaucium* sp. Gingin is endemic to Western Australia and is apparently confined to the Gingin / Chittering area, where it is known from a range of only 3 km. The six known populations contain a total of approximately 4700 adult plants and 1800 juveniles. The species occurs on white/yellow sand supporting open low woodland with *Eucalyptus todtiana*, *Banksia attenuata* and *Hibbertia* sp.

Critical habitat: The critical habitat for *Chamelaucium* sp. Gingin comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; corridors of remnant vegetation that link populations and additional nearby occurrences of similar habitat that do not currently contain the species but may have done in the past and so may be suitable for translocations.

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

Given that this species is endangered it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the species as genetic variation between populations and/or individual plants has not been determined.

Benefits to other species/ecological communities

Population 1a is also located within an occurrence of a Threatened Ecological Community (TEC) listed as Endangered in Western Australia. Recovery actions implemented to improve the quality or security of the habitat of *Chamelaucium* sp. Gingin Population 1a are likely to improve the status of the TEC in which this population is located.

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 *Chamelaucium* sp. Gingin 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 involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

There are mineral leases over the area that contains population 1a of *Chamelaucium* sp. Gingin (refer Table 1); however, negotiations are in train with relevant State Agencies and lease holders with regard the future management of these areas. There are also populations located on private land. Recovery actions refer to continued negotiations between stakeholders with regard these areas.

Evaluation of the Plan's 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.

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

1. Relevant land managers have been made aware of the location and threatened status of the species.
2. DRF (Declared Rare Flora) markers have been placed at all roadside locations.
3. Populations 1b, 2a and 5 have been fenced from stock.
4. Purchase of two parcels of private land on which the species occurs is complete, and both areas are in the process of becoming Nature Reserves.
5. Seed has been collected from some populations by the Department's Threatened Flora Seed Centre (TFSC).
6. The species has been successfully cultivated by several nurseries.
7. The Botanic Garden and Parks Authority currently have 86 plants of *Chamelaucium* sp. Gingin from 3 clones.
8. An information sheet for *Chamelaucium* sp. Gingin has been produced.
9. Staff from the Department's Swan Coastal and Perth Hills Districts regularly monitor populations of the species.
10. The Swan Region Threatened Flora and Communities 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 species 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.

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

Recovery actions

1. Coordinate recovery actions
2. Map critical habitat
3. Seek long-term protection of habitat
4. Complete reservation process
5. Develop and implement fire management strategy
6. Monitor populations
7. Collect seed and cutting material
8. Conduct further surveys
9. Promote awareness
10. Obtain biological and ecological information

1. BACKGROUND

History

Chamelaucium sp. Gingin was known to local farmers and nurseries for many years prior to the official recognition of the species as distinctly different. It was first recognised as a new species when G. Lullfitz, an established nurseryman, brought the species to the attention of N. Marchant[1]. Between 1991 and 1994 various Departmental staff then extensively surveyed the area of the Darling Scarp near the original location. In 1995 D. Papenfus[2] located an additional three populations after an intensive survey of the area. A fifth population was located on private property in 1997. To date there are only five known populations of this species. These are confined to a very limited geographical range and are highly fragmented.

An Interim Recovery Plan was developed for *Chamelaucium* sp. Gingin in 1999 (Evans and English 1999). This plan is based on that document, includes additional information compiled since 1999, and replaces that plan.

Description

Chamelaucium sp. Gingin is an open straggly shrub 1 to 2 m tall with many slender stiff branches that bear numerous 5 to 20 mm long axillary shoots. Its erect, glandular, bright green leaves are 5.4-11.5 mm long by 1.2-1.4 mm wide, and are scattered along the main branches, but are mostly crowded on numerous short axillary shoots. Leaves are attached to a 0.5-1.5 mm long petiole, which is frequently appressed to the stem. The inflorescence is composed of a small head on short axillary shoots or sometimes a larger flower head at the end of main branches. The 6.6 – 9.2 mm flowers occur in groups of two to nine in small heads on axillary shoots. Up to 20 flowers are held in clusters at the end of main branches. The flowers are pale pinkish-white, and the buds are tinged a deeper pink. The calyx lobes are erect, ovate, glandular, 2-2.8 mm long and have margins that are irregularly denticulate and ciliate. The erect corolla lobes are 4.6-6 mm long, and are covered with fine scattered glands. The corolla margins are irregularly denticulate and very sparsely but finely ciliate.

Distribution and habitat

Chamelaucium sp. Gingin is endemic to Western Australia and is apparently confined to the Gingin area. It is known from a range of only 3 km. The six known populations contain a total of approximately 4700 adult plants and 1800 juveniles. The species occurs on white/yellow sand supporting open low woodland over open scrub, with *Eucalyptus todtiana*, *Banksia attenuata* and *Hibbertia* sp. *Chamelaucium* sp. Gingin does not occur in the nearby *Adenanthos cygnorum* and *Kunzea ericifolia* thickets.

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 *Chamelaucium* sp. Gingin comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. white/yellow sand supporting open low woodland over open scrub (these provide potential habitat for natural range extension);
- corridors of remnant vegetation that link populations (these are necessary to allow pollinators to move between populations and are usually road and rail verges); and

[1] Dr. Neville Marchant, Group Manager, the Department's Western Australian Herbarium

[2] Diana Papenfus, previously consultant to the Department's Western Australian Threatened Species and Communities Unit

- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).

Although a description of location and habitat requirements is provided, adequate spatial data/maps have not been included as these are not yet available. Recovery actions include reference to mapping of critical habitat.

Threats that apply to individual populations are listed in table 1, below.

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

Given that this species is endangered it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the species as genetic variation between populations and/or individual plants has not been determined. Recovery actions include survey for further populations that would lead to the identification of additional habitat critical.

Benefits to other species/ecological communities

Population 1a is also located within an occurrence of a Threatened Ecological Community (TEC) (English and Blyth 1997) listed as Endangered in Western Australia. Gibson *et al*. (1994) describe the community as '*Banksia attenuata* woodland over species-rich dense shrublands'. Recovery actions implemented to improve the quality or security of the habitat of *Chamelaucium* sp. Gingin Population 1a are likely to improve the status of the TEC in which this population is located.

Biology and ecology

Chamelaucium sp. Gingin appears to be a reasonably long lived taxon, with plants in Population 1a known to be up to 16 years old prior to a fire in January 1995. Some adult plants survived due to protection provided by the landholder. The landholder also noted that the species tends to produce suckers after fire. The plants then take up to five years before flowers and seeds are produced. Due to the species' ability to sucker, it is possible that the genetic diversity within populations is low and this has implications for reproductive capacity.

European bees, native bees, native wasps, flies, and beetles have all been observed feeding on the nectar. A. Cochrane[3] has noted European bees and 'small furry' native bees pollinating the taxon, but has also noted a low seed set, with many seeds aborting or not being pollinated.

To date there has been no field observation of the natural seed dispersal mechanisms, however, germination of seedlings in new areas has been achieved through movement of sand from underneath mature plants (landholder personal communication) The landholder also noted that germination was enhanced following the fire in 1995, and that reducing the competition from species with dense habit, such as *Adenanthos cygnorum* and *Kunzea ericifolia,* helps the plants to thrive.

Most plants in one Population on private land were burnt and killed in an intense fire in January 1995. Some 30 plants survived where the fire was contained by the local bush fire brigade. As the plants take five years to reach maturity and produce seed, a fire frequency of five years or less would severely threaten this species.

Anecdotal evidence suggests that *Chamelaucium* sp. Gingin is frost resistant as mature plants on a landholder's property were observed to survive a very heavy frost in 1987, and winter frosts are common in the area (landholder, personal communication.).

Chamelaucium sp. Gingin appears to be a disturbance opportunist. It occurs only on disturbed road reserves, firebreaks, powerline maintenance tracks, and in burnt bushland. A landholder cleared around juveniles of this species occurring near thicket areas and recorded 'superior survival' of the taxon as a consequence of reduced competition (landholder, personal communication). In a number of areas firebreaks have been installed or

[3] Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre

maintained and a proliferation of juveniles has been observed. It seems likely that many of these are rootstocks regenerating after the disturbance. This has also been observed following fire (Harris, unpublished report).

A number of taxa in the genus *Chamelaucium* are susceptible to dieback caused by *Phytophthora* spp., however resistance to the disease varies between species (personal communication G. Keighery[4]). Initial tests indicate that *Chamelaucium* sp. Gingin is highly susceptible to *Phytophthora cinnamomi* (personal communication B. Shearer[5])

There is little information about predation of flowers and fruit, or response to weed invasion and herbicide application.

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 *Chamelaucium* sp. Gingin 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 involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

There are mineral leases over the area that contains population 1a of *Chamelaucium* sp. Gingin (refer Table 1), however, negotiations are in train with relevant State Agencies and lease holders with regard the future management of these areas. There are also populations located on private land. Recovery actions refer to continued negotiations between stakeholders with regard these areas.

Evaluation of the Plan's 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.

Threats

Chamelaucium sp. Gingin was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in September 1986 and ranked as Critically Endangered (CR) in November 1998. It is also listed as Endangered under the EPBC Act. It is now to be recommended for listing under World Conservation Union (IUCN, 2000) Red List category 'VU' because it meets criterion B1ab(iii)+2ab(iii) for Vulnerable (due to the severe fragmentation of populations and continuing decline in the quality of habitat) and no longer meets criteria for Endangered. The level of threat to the species has declined recently as a consequence of the acquisition of two properties that contain populations of the species for conservation, and other recovery actions.

The main remaining threats are road, track, firebreak and fence maintenance activities, road construction projects, mining, inappropriate fire regimes, grazing, weed invasion, chemical drift and potentially disease.

[4] Greg Keighery, Principal Research Scientist, the Department's Science Division
[5] Dr Bryan Shearer, Principal Research Scientist, the Department's Science Division

- **Road, track, firebreak and fence maintenance activities** threaten all road reserve populations and most populations on private property. Threats include grading, chemical spraying, construction of drainage channels and the mowing of roadside vegetation. Several of these actions also encourage weed invasion.

- **Road construction** may threaten Populations 1a and 1e. The proposed Perth-Darwin Highway Corridor goes through the area of Population 1e, and the Shire of Chittering advised the Department in February 2000 that a link road to the Highway may transect the north east corner of the proposed Nature Reserve that contains Population 1a.

- **Mining** is a threat to Population 1a as a mining lease exists over the site, and the leaseholder was investigating the viability of this area for mining in September 2000. The pursuit of this goal is affecting the process of the site becoming an A Class Nature Reserve.

- **Inappropriate fire regimes** may affect the viability of populations, as seeds of *Chamelaucium* sp. Gingin germinate following fire. The soil seed bank may rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, it is likely that occasional fires are needed for reproduction of this species. Field evidence suggests that it takes five years for plants to reach maturity and to flower and produce seed. It is thought that regeneration also occurs from root stock after fire, and this material may be able to flower and produce seed within a shorter period.

- **Grazing** by rabbits (*Oryctolagus cuniculus*) has had a minor impact on all populations. In addition, disturbance of soil from rabbit warren construction, and the increased levels of nutrients and weeds from droppings is affecting the habitat of the species. Grazing may also limit natural recruitment through impacting the establishment of juvenile plants of *Chamelaucium* sp. Gingin.

- **Trampling** by stock may be occurring in Population 1a, as cattle appear to come in from the south east corner of the Reserve, but do not seem to graze this species.

- **Weed invasion** is a threat to isolated sections of some road reserve populations, although generally invasion is low. 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 grass weed species.

- **Chemical drift** of herbicide and fertiliser applications may affect populations of *Chamelaucium* sp. Gingin close to farmland.

- **Disease** is a potential threat, as dieback (caused by *Phytophthora* spp.) is thought to be spreading through the broader area. *Chamelaucium* sp. Gingin appears to be highly susceptible to this plant pathogen and the prevention of the spread of dieback into the habitat of the populations is therefore very important. Dieback can also have an indirect impact through degradation of habitat.

Table 1: Summary of population information and threats

Pop. No. & Location	Land Status	Departmental District	Year/No. plants	Condition	Threats
1a. South of Gingin	Proposed Nature Reserve	Perth Hills	1995 78 2000 724 (269)	Healthy	Firebreak maintenance activities, mining, road construction, cattle degrading habitat, inappropriate fire regimes
1b. South of Gingin	Private property	Swan Coastal	1995 1 2000 2	Healthy	Firebreak maintenance activities, inappropriate fire regimes
1c. South of Gingin	Road reserve	Perth Hills and Swan Coastal	1996 290 2000 482 (185)	Healthy	Road and fence maintenance activities, weed invasion, inappropriate fire regimes
1d. South of Gingin	Private property	Swan Coastal	1996 170 2000 482 (177)	Healthy	Firebreak maintenance activities, inappropriate fire regimes
1e. South of Gingin	Private property	Perth Hills	1999 226 (367) 2000 241 (78)	Healthy	Road, firebreak and powerline maintenance activities, road construction, inappropriate fire regimes
2a. South of Gingin	Private property	Swan Coastal	1996 2 1999 6 (4) 2000 8 (6)	Healthy	Firebreak and fence maintenance activities, road realignment, inappropriate fire regimes, disease
2b. South of Gingin	Road reserve	Swan Coastal	2000 2	Healthy	Road and firebreak maintenance activities, inappropriate fire regimes, disease
3a. South of Gingin	Road reserve	Perth Hills and Swan Coastal	1995 300 2000 386 (186)	Healthy	Road and fence maintenance activities, weed invasion, inappropriate fire regimes
3b. South of Gingin	Private property	Swan Coastal	2000 128 (37)	Healthy	Firebreak maintenance activities, inappropriate fire regimes
4a. South of Gingin	Private property	Swan Coastal	2000 200+ (140+)	Healthy	Firebreak maintenance activities, inappropriate fire regimes
4b. South of Gingin	Proposed Nature Reserve	Swan Coastal	1995 200+ 2000 ca. 850 (ca 500)	Healthy	Firebreak and fence maintenance activities, inappropriate fire regimes
4c. South of Gingin	Private property	Swan Coastal	Unknown (seen, but not surveyed)		Firebreak and fence maintenance activities, inappropriate fire regimes
5. South of Gingin	Private property	Swan Coastal	1997 ca. 500 2000 ca. 600	Healthy	Weed invasion, inappropriate fire regimes
6a. South of Gingin	Private property	Swan Coastal	2000 314 (136)	Healthy	Firebreak and fence maintenance activities, inappropriate fire regimes
6b. South of Gingin	Private property (Western Power powerline strip)	Swan Coastal	2000 367 (108)	Healthy	Firebreak and powerline maintenance activities, inappropriate fire regimes

Numbers in brackets = number of juveniles.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Chamelaucium* sp. Gingin will require assessment. On-ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the species, its habitat or potential habitat.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

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

Criteria for success: The number of individuals within populations and/or the number of populations have

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

3. RECOVERY ACTIONS

Existing recovery actions

All land managers have been notified of the location and threatened status of the species. The notification details the Declared Rare status of *Chamelaucium* sp. Gingin and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at all roadside populations. These serve to alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage it in that area. The Shire of Gingin and the Shire of Chittering have been informed of the placement of these markers and their importance in the conservation of this species.

Fencing has been completed around Populations 1b, 2a and 5. Most populations are protected by boundary fences, with stock excluded from paddocks that contain *Chamelaucium* sp. Gingin. There has previously been evidence of trampling near Population 1a, but information provided to landholders appears to have helped to prevent a recurrence of this problem.

One landholder who had this species on his property was fostering the species as an attractive native garden plant before the species was declared as rare, and has made and shared many observations regarding this taxon's biology and ecology. In 1996, he transplanted several seedlings to Hollywood Reserve near Nedlands, Perth. One survived to flower in 1999. This is considered to be cultivated rather than a wild or translocated population, as it was not undertaken under an approved translocation proposal with due consideration of genetic and ethical issues.

Survey has indicated that Population 1a occurs in the Threatened Ecological Community, '*Banksia attenuata* woodlands over species rich dense shrublands' (Gibson *et al*. 1994; English and Blyth 1997). This private land was purchased by the Department with assistance from Environment Australia in 1999. It was intended that this area become a Nature Reserve, but this process has been delayed by negotiations with a mining company who has mineral interests in the area concerned.

Another block containing Population 4b was purchased more recently, and is also in the process of becoming a Nature Reserve. Both new acquisitions are currently being managed as conservation reserves.

Dieback samples have been taken from one Population to confirm *Phytophthora* presence. There is visual evidence that the disease is affecting surrounding habitat, but it does not appear to be impacting on *Chamelaucium* sp Gingin. In addition, initial laboratory testing indicates that the species is highly susceptible to *Phytophthora cinnamomi*.

Approximately 1650 seeds have been collected from Populations 1b, 1c and 3 since 1995, and stored in the Department's Threatened Flora Seed Centre (TFSC) at –18°C. Staff of the TFSC test the viability of seed soon after collection and again after one year in storage. The initial germination rate of *Chamelaucium* sp. Gingin seed has varied across collections from 10 to 60%. After one year in storage the germination rate has ranged from nil to 22% (unpublished data A. Cochrane). Germinants from these trials are delivered to Botanic Garden and Parks Authority (BGPA) nursery for maturation into full plants.

The BGPA currently have 86 plants of *Chamelaucium* sp. Gingin from three clones. Cuttings of this species show moderate success, with strike rates between 10% and 34% (personal communication A. Shade[6]).The species was successfully cultivated by several other nurseries, but due to lack of commercial interest it only exists as stock plants in several gardens.

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

A double-sided information sheet has been produced, and includes a description and photos of *Chamelaucium* sp. Gingin, its habitat, threats, and recovery actions. This is being distributed to the community through local libraries, wildflower shows and other avenues. It is hoped that this may result in the discovery of new populations.

Staff from the Department's Swan Region regularly monitor all populations of this species.

The Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) 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

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

1. Coordinate recovery actions

The Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) will coordinate recovery actions for *Chamelaucium* sp Gingin and other Declared Rare flora in the region. They will include information on progress in their annual report to the Department's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: The Department (Swan Region) through the SRTFCRT
Priority: Moderate
Cost: $600 per year

2. 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: The Department (Swan Region, WATSCU) through the SRTFCRT
Priority: Moderate
Cost: $2000 in the first year

3. Seek long-term protection of habitat

Liaison with land managers and landowners will continue to help ensure that populations are not accidentally damaged or destroyed. This will include information about dieback hygiene practices and why these are necessary. In addition, negotiations will continue with regard the future management of habitat that is covered by mineral leases.

Ways and means of improving the security of populations and their habitat will also be investigated. This may include conservation covenants through a range of agencies, the Land for Wildlife scheme, possibly land acquisition, and maintenance of Declared Rare Flora markers on road reserves and near powerlines.

Action: Seek long-term protection of habitat
Responsibility: The Department (Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: Moderate
Cost: $3,200 in the first year and $2,700 in subsequent years

4. Complete reservation process

Two parcels of land have been purchased from landholders with the intention of these areas becoming Nature Reserves. The first contains Population 1a, and the other contains Population 4b. Although the purchase of both blocks is now complete, the process of them becoming Nature Reserves is still underway.

One block in particular (containing Population 1a) is affected by negotiations with a mining company over the possibility of mining this area. Liaison will continue between stakeholders, including the mining company, the Department of Industry and Resources (previously Department of Mineral and Petroleum Resources), and the Natural Heritage Trust who supplied a grant to assist with purchase of the land for conservation purposes.

Action: Complete reservation process
Responsibility: The Department (Land and External Funding Unit, Environmental Protection Section, Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: High
Cost: $2,000 in the first year

5. Develop and implement a fire management strategy

Fire results in destruction of above-ground growth in mature plants. Field evidence suggests that the plants then produce suckers which take up to five years to become reproductive. It is likely that the species requires occasional fire for recruitment from soil-stored seed. However, frequent fire may prevent the accumulation of sufficient soil-stored seed for recruitment to occur. Fire also promotes the introduction and proliferation of weed species. Fire has occurred relatively recently in many populations, and should therefore be prevented from occurring in the area of populations, except where it is being used experimentally as a recovery tool. A fire management strategy will be developed to determine fire control measures and a recommended fire frequency.

Action: Develop and implement a fire management strategy
Responsibility: The Department (Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: Low
Cost: $2,300 in first year and $1,000 in subsequent years

6. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion, plant diseases such as *Phytophthora cinnamomi*), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. For roadside populations, the visibility of DRF markers will also be monitored and their visual prominence maintained.

Weeds and rabbits are a minor threat at many *Chamelaucium* sp. Gingin populations. These factors will be monitored to determine if and when action is required.

Action: Monitor populations
Responsibility: The Department (Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: High
Cost: $2000 per year

7. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Some seed has been collected from Populations 1 and 3 but further collections are required from those and other populations to maximise the genetic diversity of the material in storage, and also ‘update’ the material as the shelf life of this seed in storage seems relatively low. At this time cuttings will also be obtained to add to the number of clones in the living collection at the BGPA.

Action: Collect seed and cutting material
Responsibility: The Department (TFSC) through the SRTFCRT

Priority: Moderate
Cost: $3,400 in first, third and fifth years

8. Conduct further surveys

There have been extensive surveys for this species since 1988, when it was first recognised as a distinct species. However, there are still areas that contain suitable habitat that have not been surveyed, particularly on private lands. Further surveys by Departmental staff and community volunteers will be conducted during the flowering period of the species (May and October to February).

Action: Conduct further surveys
Responsibility: The Department (Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: Low
Cost: $2,300 in second and fourth years

9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species 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 has been produced, and will be distributed through wildflower shows and Shire libraries.

Action: Promote awareness
Responsibility: The Department (Perth Hills and Swan Coastal Districts) through the SRTFCRT
Priority: Moderate
Cost: $500 per year

10. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Chamelaucium* sp. Gingin will provide a better scientific basis for its management in the wild. An understanding of the following is particularly necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the species.
3. The requirements of pollinators.
4. The reproductive strategies, phenology and seasonal growth of the species.
5. The population genetic structure, levels of genetic diversity and minimum viable population size.
6. The impact of weeds and control methods on *Chamelaucium* sp. Gingin and its habitat.
7. The impact of dieback disease and control techniques on *Chamelaucium* sp. Gingin and its habitat.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division) through the SRTFCRT
Priority: Low
Cost: $22,000 per year in the second, third and fourth years

4. TERM OF PLAN

This Interim Recovery Plan will operate from February 2003 to January 2008, when it will be reviewed, but will remain in force until withdrawn or replaced.

5. ACKNOWLEDGMENTS

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

Norm Caporn	Coordinator Mining, Petroleum, Environmental Impact Assessment, the Department's Environmental Protection Branch
John Carter	District Nature Conservation Coordinator, the Department's Perth Hills District
Anne Cochrane	Manager, the Department's Threatened Flora Seed Centre
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Rebecca Walker	Previously the Department's W.A. Threatened Species and Communities Unit
Alan Wright	Conservation Officer, the Department's Perth Hills District
Stefan de Haan	Land Planning Officer, the Department's Swan Coastal District

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7. TAXONOMIC DESCRIPTION

Marchant, N. (1998)
(Undescribed taxon from Iopollo Road, south of Gingin referred to as *Chamelaucium* sp. Gingin)

Shrub with many slender ± stiff branches bearing numerous ultimate short axillary shoots 5-20 (-30) mm long. *Decurrences* strongly and abruptly raised but short, 0.2-0.6 mm long. *Leaves* glandular, scattered and erect along main branches, but mostly crowded on the numerous short axillary shoots where they are semi-spreading to spreading, narrowly obovate-very narrowly obovate-linear-narrowly elliptic-very narrowly elliptic, 5.4-11.5 mm long, 1.2-1.4 mm wide, 0.6-0.8 mm deep; adaxial surface flat, midrib region sometimes very slightly raised; abaxial surface convex, rounded or angular; leaf blade plano-convex to triquetrous; margins entire; apex mucronate. *Petiole* 0.5-1.5 mm long, frequently appressed to stem. *Inflorescence* a small pseudoterminal head on short axillary shoots, sometimes there is a larger pseudoterminal head at the end of main branches; floral leaves flattened, glandular, ovate-triangular-oblong, 1.3-2.2 mm long, 0.9-1.3 mm wide; adaxial surface concave; margins entire to finely uneven, rarely ciliate on the upper half; apex mucronate. *Flowers* 2-9 in small heads on axillary shoots and up to 20 in the clusters at the end of main branches, 6.6-9.2 mm diameter; disc diameter 3.0-4.2 mm; pedicels 0.8-2.0 mm long. *Bracteoles* caducous, deeply concave, cucullate, 3.4-4.3 mm tall; midrib region brownish, with scattered raised glands; margins ± entire; umbo incurved, narrowly conic-acicular, 0.3-1.0 mm long. *Floral tube* broadly-very broadly obconic-broadly-very broadly turbinate, glandular, ± smooth, obscure-shallowly 10 ribbed, 4.4-

5.4 mm long; lower floral tube 2.8-3.4 mm long, not foveolate, shallowly 10-ribbed; upper tube 1.5-2.2 mm long, obscurely or not ribbed. *Calyx lobes* ± erect, ovate, glandular, 2.0-2.8 mm long; margins irregularly denticulate and ciliate, cilia 0.5-2.0 mm long; sinuses broad. *Corolla lobes* ± erect, with fine scattered glands, broadly elliptic-broadly obovate, concave, 4.6-6.0 mm long; margins irregularly denticulate, very sparsely and finely ciliate. *Staminal tube* 0.6-1.0 mm long, erect or arching inwards. *Stamens* 10; filaments and staminodes borne at the same level, erect or inarching; filaments narrowly triangular, 0.7-1.1 mm long, slightly constricted just beneath the connective (anthers eventually break off at this constriction); anthers 0.4-0.5 mm diameter; connectives swollen, reddish brown, projecting abaxially and frequently dorsally as a ridge. *Staminodes* 10, oblong-narrowly ovate, sometimes slightly swollen in the subapical region, 0.9-1.3 mm long; apex obtuse or acute, sometimes bent inwards. *Styles* narrowly conic, 6.2-7.1 mm long, reaching to the top of corolla lobes. *Stigma* strongly dilated resembling a swollen disc, finely papillate, 0.5-0.6 mm diameter; hairs from the base of the disc and directed backwards, 0.4-1.0 mm long, tapering to the tip. *Ovules* 5-8.

Western Australian Herbarium (1998)
Myrtaceae: *Chamelaucium*

Chamelaucium sp. Gingin (N. Marchant s.n. 4/11/88)
Taxon 13930 is current.

Conservation Status: R

Description:
Open shrub, 1-2 m high. Flowers white; flowering September to December. Soils: white or yellow sand. Habitat: undulating plains, rises.