INTERIM RECOVERY PLAN NO 225

BAILEY'S SYMONANTHUS

(*SYMONANTHUS BANCROFTII*)

INTERIM RECOVERY PLAN

2006-2011

May 2006

Department of Conservation and Land Management
Species and Communities Branch (SCB)
Kensington

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 the Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50.

IRPs outline the recovery actions required to urgently address those threatening processes most affecting the ongoing *in-situ* survival of threatened taxa or ecological communities, and begin the recovery process.

CALM 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 (CR) taxa, always within one year of endorsement of that rank by the Minister.

This IRP, which results from a review of, and replaces, IRP No.84 *Symonanthus bancroftii* (Kershaw *et al*, 2000), will operate from May 2006 to April 2011 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endangered, this IRP will be reviewed after five years and the need for further recovery actions and an update to this IRP assessed.

This IRP was given regional approval on 13 February, 2006 and was approved by the Director of Nature Conservation on 22 February, 2006. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at May 2006.

IRP PREPARATION

This IRP was prepared by Heather Taylor[1], Kim Kershaw[2], Greg Durell[3,] Andrew Brown[4], Jeanette Buegge[5] and Brett Beecham[6].
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ACKNOWLEDGMENTS

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

Mark Brown	Landcare Implementation Officer, Shire of Bruce Rock
Eric Bunn	Research Botanist (Micropropagation), Botanic Gardens and Parks Authority
Anne Cochrane	Manager, CALM's Threatened Flora Seed Centre
Kingsley Dixon	Director Plant Science, Botanic Gardens and Parks Authority
Robyn Luu	Project Officer, CALM's Species and Communities Branch
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 Species and Communities Branch for assistance.

Cover photograph by Kim Kershaw.

CITATION

This Interim Recovery Plan should be cited as:

Department of Conservation and Land Management (2006). Bailey's Symonanthus (*Symonanthus bancroftii*) Interim Recovery Plan 2006-2011. Interim Recovery Plan No. 225. Department of Conservation and Land Management, Western Australia.

SUMMARY

Scientific Name:	*Symonanthus bancroftii*	**Common Name:**	Bailey's Symonanthus
Family:	Solanaceae	**Flowering Period:**	June – September
CALM Region:	Wheatbelt	**CALM District:**	Narrogin
Shire:	Bruce Rock	**Recovery Team:**	Narrogin District Threatened Flora Recovery Team (NDTFRT)

Illustrations and/or further information: Brown, A.P., Thomson-Dans C. and Marchant N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Buehrig, R. M. (1997). *Symonanthus bancroftii Report*. Durell, G. S. and Buehrig, R. M. (2001). *Declared Rare and Poorly Known Flora in the Narrogin District*; Department of Conservation and Land Management, Western Australia; Haegi, L. (1982). *Flora of Australia 29* 13-16; Mueller, F. (1882). Syst. Census Austral. *Symonanthus bancroftii*.

Current status: *Symonanthus bancroftii* was declared as Rare Flora Western Australian *Wildlife Conservation Act* 1950 in October 1996 and ranked as Critically Endangered (CR) in November 1997. It currently meets IUCN 2000 Red List Criteria A1c and D based on a suspected population reduction of 90% over the last three generations due to a decline in area and quality of habitat and a population size of less than 50 mature individuals. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act).

The species was formerly known from two mature plants (one male and one female) approximately 500 metres apart. However, the female plant died in 2000. Threats to the species include senescence, accidental destruction during firebreak, rail and road maintenance, herbicide spraying, drought and weed invasion.

Description: *Symonanthus bancroftii* is a low, many-stemmed herbaceous undershrub to 25 cm. Its stalkless, egg-shaped to narrow, more or less spreading leaves are 5-17 mm long and up to 3 mm wide. They are hairy, somewhat warty and rolled over at the margins. Plants are dioecious. Flowers are white in colour, small, hairy and streaked with violet inside. The fruit is a nearly globular capsule, 3-4 mm long, 2.5-4 mm wide, with 3-5 seeds. Seeds are 2 mm long and 1 mm wide. An aroma of tobacco emanates from Charles Gardner's 75-year-old collection; however this has not been evident from freshly collected material.

Habitat requirements: The species is thought to be geographically restricted with just two plants found in highly degraded areas on the same reserve in the Bruce Rock area. Due to habitat degradation, little is known about its habitat requirements. Mr. Rob Buehrig (former CALM Technical Officer) compiled a report in 1997 which hypothesized that the species may have been more common in areas of prime agricultural soil and that extensive clearing in the Bruce Rock area may have taken most of its habitat.

Habitat critical to the survival of the species, and important populations: Habitat critical to the survival of the species includes the area of occupancy of important populations; areas of similar habitat surrounding important populations provide potential habitat for natural range extension and are necessary to provide habitat for pollinators; the local catchment of the surface and possibly ground waters that maintain the habitat of the species; and additional occurrences of similar habitat that may contain the species or be suitable sites for future translocations.

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

Benefits to other species/ecological communities: Recovery actions implemented to improve the

quality or security of the habitat of *Symonanthus bancroftii* will also improve the status of remnant vegetation in which it is located.

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is not listed under the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES). In addition, it is not listed under any other specific international treaty and this Interim Recovery Plan (IRP) does not affect Australia's obligations under these 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. The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of these populations. However, not all significant sites are listed on the Register. Implementation of recovery actions under this plan will include consideration of the role and interests of indigenous communities in the region.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as all known populations occur on crown reserves.

Affected interests: Stakeholders potentially affected by the implementation of this plan include the Shire of Bruce Rock, as managers of the area containing Population 1a and West Net Rail as managers of the land containing Population 1b.

Evaluation of the plans performance: CALM will evaluate the performance of this IRP in conjunction with the Narrogin District Threatened Flora Recovery Team. 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 owners and land mangers have been notified of the threatened nature of this species and its location.
2. Plants have been fenced in both translocated and wild populations.
3. Declared Rare Flora markers have been erected at Populations 1a and 1b to prevent accidental destruction.
4. Regular monitoring of all plants is being undertaken.
5. Areas adjacent to Population 1a were sprayed with smoked water in an attempt to germinate soil-stored seed.
6. Botanic Gardens and Parks Authority (BGPA) staff have used tissue culturing techniques to produce clones of the male (Sb1) and female (Sb2) plant. Artificial cross-pollination has enabled them to also produce a second female clone (Sb3). All cloned plants have been, and will be, used in the translocation of the species. Staff from the BGPA have also developed appropriate techniques for cryostorage of shoot tips.
7. Translocation of propagated specimens is taking place annually to boost artificial populations and develop appropriate establishment and 'hardening off' techniques. Watering of translocated plants is conducted over the summer period.
8. Joint CALM/community surveys have been conducted over the known distribution range and in other areas of suitable habitat, particularly in sites that have been recently burnt or disturbed.

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

Recovery Criteria
Criteria for success: The following criteria are to be met over the five year term of this plan.

1. The number of individuals within populations and/or the number of populations have stabilized and/or increased and translocated populations have produced a viable soil seed bank large enough to create a self-sustaining population. **NOTE**: Failure of seeds to germinate *in situ* may be due to environmental conditions (e.g. lack of stimuli such as fire, smoke and/or weathering - scarification of seed) and such issues as seed viability must be addressed satisfactorily before an accurate criterion for successes can be achieved.
2. There is an increase in the knowledge of the biology and ecology of *Symonanthus bancroftii* that improves the probability of survival and aids in future management of the species.
3. Sufficient genetic material for the long-term survival of the species is stored at BGPA or TFSC.
4. All populations are protected from threatening processes (e.g. human activity), as defined in this document.

Success in the longer term, (> 5 years,) requires an improved knowledge of the plant life cycle and soil seed bank dynamics in order to assess population viability.

Criteria for failure: One of the following occurs over the period of the plan's adoption under the EPBC Act:

1. The number of individuals within populations and/or the number of populations have decreased and no observable seed set has occurred in translocated populations or seed produced is not viable. **NOTE**: Failure of seeds to germinate *in situ* may be due to environmental conditions (e.g. lack of stimuli such as fire, smoke and/or weathering - scarification of seed) and such issues as seed viability and germability must be addressed satisfactorily before a true and accurate criterion for failure can be achieved.
2. There is no increase in the knowledge of the biology and ecology of *Symonanthus bancroftii* that can foreseeably improve the survival or aid in future management of the species.
3. Sufficient genetic material is not adequately stored at BGPA or TFSC.
4. Populations are impacted by ongoing threatening processes, (e.g. human activity,) as defined in this document.

Recovery actions

1. Coordinate recovery actions
2. Map total habitat
3. Continue the propagation and translocation program
4. Obtain biological and ecological information
5. Collect seed, cuttings and cryostorage material
6. Promote awareness
7. Conduct further surveys
8. Monitor populations
9. Seek ways and means of improving the security of populations
10. Maintain fences and DRF markers
11. Liaise with relevant land managers and landowners
12. Undertake weed control
13. Develop and implement a fire management strategy
14. Review the IRP and assess the need for further recovery actions

1. BACKGROUND

History

The genus *Symonanthus* was named in honour of David Symon of the Waite Agricultural Research Institute in Adelaide for his work on Australian flora. This work included significant contributions to the understanding of the biology and taxonomy of the Solanaceae (Mueller and Haegi 1981). The name is derived from a combination of David Symon's name and the Greek *anthos,* a flower. There are two *Symonanthus* species known the rarest of which is *Symonanthus bancroftii*. The specific epithet *bancroftii* was named in honour of Dr. Joseph Bancroft (1836-1894), a Brisbane pharmacologist who studied the physiological properties of the related genus *Duboisia* (Leigh *et al.* 1984).

M. Heal made the first collection of *Symonanthus bancroftii* in 1892. In 1922 a collection was made from the Bendering area by C.A. Gardner and in 1932 and 1945 collections were made by E.T. Bailey from near Bruce Rock and Muntadgin respectively. It is from Bailey's collections that the plant was given the common name Bailey's symonanthus. Robyn Campbell and Kim Kershaw made the most recent collections from near Ardath (one male and one female plant) in 1997-98. Until the female plant died in 2000 from an unknown cause (probably senescence), these were the only wild plants known. No additional plants have been located since and just one mature plant is currently known from the wild. Historically, the species has been found nine times over a range of 80 km.

A Translocation Proposal was developed in 2001 with the aim of supplementing the natural Ardath population and creating a new population at Nangeen. However, due to a severe drought in 2002 and 2003, very few seedlings survived the translocation process. In 2004, members of the Narrogin District Threatened Flora Recovery Team (NDTFRT) in conjunction with staff from the Botanic Gardens and Parks Authority (BGPA) planted approximately 276 seedlings at the Ardath translocation site.

Surveys have continued throughout the area but have failed to locate additional populations in the wild.

Description

Symonanthus bancroftii is a low, many-stemmed herbaceous undershrub to 25 cm. Its stalkless, egg-shaped to narrow, more or less spreading leaves are 5-17 mm long and up to 3 mm wide. They are hairy, somewhat warty and rolled over at the margins. Plants are dioecious. Flowers are white in colour, small, hairy and streaked with violet inside. The fruit is a nearly globular capsule, 3-4 mm long, 2.5-4 mm wide, with 3-5 seeds. Seeds are 2 mm long and 1 mm wide. An aroma of tobacco emanates from Charles Gardner's 75-year-old collection; however this has not been evident from freshly collected material (Durell and Buehrig 2001).

Distribution and habitat

Historically, *Symonanthus bancroftii* has been found over a range of 80 km between Bruce Rock, Muntadgin, Ardath and Bendering. However it is currently known only from the Ardath area where just one naturally occurring plant survives.

The plant grows in an area of disturbed shallow granitic soil, which is prone to hard setting. Rob Buehrig (1997) suggests that *Symonanthus bancroftii* may prefer a residual/colluvial soil derived from granitic rocks. Beyond this the clues as to its typical habitat are conflicting. The plant may naturally grow immediately adjacent to granite outcrops or may grow close to drainage lines lower down in the landscape.

The remnant vegetation at the known site is woodland consisting of *Eucalyptus erythronema* subsp. *erythronema*, *Eucalyptus salmonophloia*, *Eucalyptus sheathiana* and *Eucalyptus salubris* over dwarf scrub of *Acacia orbifolia*.

Summary of population land vesting, purpose and tenure

Pop. No. & Location	CALM District	Shire	Vesting	Purpose	Tenure
1a. South of Bruce Rock	Narrogin	Bruce Rock	Shire of Bruce Rock	Water and Parkland	Non-CALM Act
1b. South of Bruce Rock	Narrogin	Bruce Rock	West Net Rail	Rail Reserve	Non-CALM Act
2t South of Bruce Rock	Narrogin	Bruce Rock	Shire of Bruce Rock	Water, Parkland and Recreation	Non-CALM Act
3t. North of Bruce Rock	Narrogin	Bruce Rock	Conservation Commission	Conservation of Flora and Fauna	Nature Reserve

t = translocated populations.

Biology and ecology

There are two species in genus *Symonanthus*, *S. aromaticus* and *S. bancroftii*. Because of the limited collections and just one known surviving plant, little is known about the biology of *S. bancroftii*. However, as the most recent discoveries were located in disturbed sites it is presumed to be a disturbance opportunist. *Symonanthus aromaticus* occurs in the Eastern Wheatbelt and Goldfields and is commonly seen in the season following fire (Durell and Buehrig 2001).

It is presumed that *Symonanthus bancroftii* is insect pollinated as a range of insects have been observed on flowering plants. In July 1998, Kim Kershaw collected a native bee that had been visiting the female plant of *S. bancroftii*. Dr. Terry Houston[1] subsequently identified it as *Nomia gracilipes*, a member of the Halictidae family. A further indicator that *S. bancroftii* is insect pollinated is the small tubular corolla of the flower.

Preliminary observations of translocated plants indicate that male plants flower earlier and more prolifically than female plants, and that male plants appear to be three times more likely to die within six months of translocation than the female plants (Bunn 2003).

Threats

Symonanthus bancroftii was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in October 1996 and ranked as Critically Endangered (CR) in November 1997. It currently meets IUCN 2000 Red List Criteria A1c and D based on a suspected population reduction of 90% over the last three generations due to a decline in area and quality of habitat and a population size of less than 50 mature individuals. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). The species was formerly known from two mature plants (one male and one female) approximately 500 metres apart. However, the female plant died in 2000. The main threats to the survival of the adult plants are:

- **Fragmentation of habitat** due to land clearing for agricultural purposes.

- **Poor knowledge of the biology and ecology of the species** due to the limited number of extant plants (1) in the wild and the relatively small areas of remaining habitat.

- **Lack of genetic diversity and small population size** may be a significant threat to the species. Inbreeding depression may have affected reproductive traits such as flower, fruit and seed production, seed viability and seedling growth. Of more immediate concern (if there is no soil seed bank) is the lack of extant plants. It is highly likely that the last remaining natural plant will die in the next few years. Small populations are more likely to be threatened by chance demographic or environmental events. Lack of genetic diversity may become a more important issue over the longer-term.

- **Lack of recruitment.** No natural recruitment of *Symonanthus bancroftii* has been observed. Although little is known of its reproductive biology and ecology it is possible that the small population size (and lack of obvious recruitment) is quite normal in the absence of disturbance. The long-term survival of the species will, however, depend on the presence of a viable soil seed bank that is able to persist between disturbance events. Adult plants may naturally senesce a few years after disturbance (fire), while the next event that stimulates regeneration may not occur for decades.

[1] Curator of Insects, Western Australian Museum

- **Inappropriate fire regimes** may adversely affect the viability of populations. Although fire almost certainly kills adult plants it is likely that soil-stored seed requires fire to stimulate germination and the current lack of recruitment is due to the absence of recent fire. Such fires should be occasional as overly frequent fire could lead to local extinction if they occur before young plants reach maturity and provide a substantial amount of seed for storage in the soil.

- **Road, rail and firebreak maintenance** may threaten both plants and habitat. Threats include grading, herbicide spraying and dumping of road material. These disturbance events may also encourage weed invasion.

- **Grazing** by rabbits and/or kangaroos has the potential to impact both the natural plant and translocated plants. In addition, disturbance of soil by rabbit warren construction and increased nutrient levels from their droppings may encourage weeds. Grazing may have an impact on the establishment of *Symonanthus bancroftii* seedlings thus limiting natural recruitment. Grazing by domestic stock is a minor threat to plants.

- **Weed invasion** is a minor threat to the species. Small reserves such as that where *Symonanthus bancroftii* occurs are particularly susceptible to edge effects (Lynch 1987, Saunders *et al*. 1987, Taylor 1987) that enhance opportunities for weed invasion and establishment. Weeds of particular concern are wild turnip (*Brassica tournefortii*), wild oats (*Avena fatua*), capeweed (*Arctotheca calendula*) and cape tulip (*Homeria flaccida*).

- **Drought** is a possible threat to the long-term survival of the species. Successive years of poor rainfall are likely to result in the death of mature plants and little or no recruitment. However, it is possible that the seed of *Symonanthus bancroftii* is long-lived and if this were the case and sufficient seed is stored in the ground drought will have less of an effect.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. South of Bruce Rock	Shire reserve	1997 1 2004 1	Moderate	Drought, grazing, roadworks, dumping of road material, inappropriate fire, senescence, lack of recruitment.
1b. South of Bruce Rock	West Net Rail reserve	1998 1 2000 0 2004 0	Extinct	Drought, railway maintenance, herbicide spraying, firebreak maintenance, grazing, weed invasion, inappropriate fire, lack of recruitment.
2t. South of Bruce Rock	Shire reserve	2002 59 2003 50 2004 2 (276)	Poor	Drought, weed invasion, drought, soil compaction, poor water penetration, grazing.
3t. North of Bruce Rock	Class "A" Nature Reserve	2002 301 2003 7 2004 2	Poor	Drought, soil compaction, poor water penetration, grazing.

( ) = seedlings, t = translocated populations.
Populations in **bold text** are considered to be Important Populations

Guide for decision-makers

Section 1 provides details of current and possible future threats. Proposed developments and on-ground works (clearing, firebreaks etc) in the immediate vicinity of habitat critical to the survival of *Symonanthus bancroftii* will require assessment. Works should not be approved unless the proponents can demonstrate that they will have no significant impact on the species, its habitat or potential habitat, or the local surface or ground water hydrology.

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

Habitat critical to the survival of the species includes the area of occupancy of important populations; areas of similar habitat surrounding important populations provide potential habitat for natural range extension and are necessary to provide habitat for pollinators; the local catchment of the surface and possibly ground waters that maintain the habitat of the species; and additional occurrences of similar habitat that may contain the species or be suitable sites for future translocations. Although it should be recognized that since the current populations are found over such a small area and previous reports on its distribution are vague, the critical habitat for *S. bancroftii* is relatively unknown and needs further research. Therefore adjacent uncleared vegetation and additional occurrences of its habitat are potential areas for the species and provide opportunities for reintroduction or re-invasion.

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

Benefits to other species/ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Symonanthus bancroftii* populations will improve the status of the remnant vegetation in which the populations are located.

International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The species is not listed under the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES). In addition, the species is not listed under any other specific international treaty and this Interim Recovery Plan (IRP) does not affect Australia's obligations under these international agreements.

Role and interests of indigenous people

No indigenous communities interested or involved in the land affected by this plan have been identified. The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of populations. However, not all significant sites are listed on the Register. Implementation of recovery actions under this plan will include consideration of the role and interests of indigenous communities in the region.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as all known populations occur on crown reserves.

Affected interests

Stakeholders potentially affected by the implementation of this plan include the Shire of Bruce Rock, as managers of the area containing Population 1a and West Net Rail as managers of the land containing Population 1b.

Evaluation of the Plan's Performance

CALM will evaluate the performance of this IRP in conjunction with the Narrogin District Threatened Flora Recovery Team. 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.

2. RECOVERY OBJECTIVE AND CRITERIA

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

Recovery Criteria

Criteria for success: The following criteria are to be met over the five year term of this plan.

1. The number of individuals within populations and/or the number of populations have stabilized and/or increased and translocated populations have produced a viable soil seed bank large enough to create a self-sustaining population. **NOTE**: Failure of seeds to germinate *in situ* may be due to environmental conditions (e.g. lack of stimuli such as fire, smoke and/or weathering - scarification of seed) and such issues as seed viability and germability must be addressed satisfactorily before an accurate criterion for successes can be achieved.
2. There is an increase in the knowledge of the biology and ecology of *Symonanthus bancroftii* that improves the probability of survival and aids in future management of the species.
3. Sufficient genetic material for the long-term survival of the species is stored at BGPA or TFSC.
4. All populations are protected from threatening processes, (e.g. human activity,) as defined in this document.

Success in the longer term, (> 5 years,) requires an improved knowledge of the plant life cycle and soil seed bank dynamics in order to assess population viability.

Criteria for failure: One of the following occurs over the period of the plan's five year term:

1. The number of individuals within populations and/or the number of populations have decreased and no observable seed set has occurred in translocated populations or seed produced is not viable. **NOTE**: Failure of seeds to germinate *in situ* may be due to environmental conditions (e.g. lack of stimuli such as fire, smoke and/or weathering - scarification of seed) and such issues as seed viability must be addressed satisfactorily before a true and accurate criterion for failure can be achieved.
2. There is no increase in the knowledge of the biology and ecology of *Symonanthus bancroftii* that can foreseeably improve the survival or aid in future management of the species.
3. Sufficient genetic material for the long-term survival of the species is not adequately stored at BGPA or TFSC.
4. Populations are impacted by ongoing threatening processes, (e.g. human activity,) as defined in this document.

3. RECOVERY ACTIONS

Existing recovery actions

The Shire of Bruce Rock, West Net Rail and adjacent land managers have been formally notified of the species and shown its location.

Members of the Bruce Rock Land Conservation District Committee are monitoring the plants monthly during the flowering period and every two months over the remainder of the year.

Declared Rare Flora markers are in place at Population 1b. Note: Population 1a does not require markers as it is away from the road and site 2 is monitored for possible seedlings even though the single known plant previously found there is dead.

Population 1a is fenced with Ringlock and Population 1b with rabbit netting.

Areas near population 1a were sprayed with smoked water in an attempt to stimulate germination of soil-stored seed. No seedlings have appeared to date.

Prior to 1997, Mr. R. M. Buehrig conducted numerous unsuccessful surveys throughout the historical range of the species. Mr Buehrig also studied soil samples from historical sites to try and establish the preferred soil type. CALM staff and community volunteers conducted further surveys in 1997, 1998, 2000 and 2001. The Bruce Rock Land Conservation District Committee coordinated these surveys with funding from the Gordon Reid Foundation and the Threatened Species Network Community Grants Scheme (delivered through the TSN, a joint program of the Natural Heritage Trust and the World Wide Fund for Nature Australia). No new populations of *Symonanthus bancroftii* were found.

Staff from the BGPA has collected cutting material from male and female plants and, using tissue culture techniques, has propagated plants for translocations. In 2002 a translocation proposal was developed for the species. The aim of the proposal was to establish new populations of *Symonanthus bancroftii* on two crown

reserves (Ardath and Nangeen) in the Bruce Rock area using plants grown from seed and clonal material. Prior to planting, translocation sites were fenced and baited to lower rabbit numbers.

In June 2002, 130 plants were translocated into the Ardath site and approximately 450 plants into Nangeen. The sex ratio (female:male) of the plants was around 2:1 at both sites. Each plant was numbered, irrigated and monitored. In May 2003 another 119 plants were added to the Ardath site and 57 to the Nangeen site. The poor rainfall in the Bruce Rock area in 2003 affected survival rates at both sites, hence survival was very low (less than 1%). Watering of translocated plants has since occurred twice a week at the Ardath site and less frequently (approx. fortnightly) at the Nangeen site over the summer period. Plants receive 4 litres via a gravity fed watering system over a 2 hour period. Just 2 plants at Ardath and 2 plants at Nangeen survived over the summer of 2003. These plants are now hand-watered.

In June 2004 some 277 propagated plants were translocated to the Ardath site. The site was ripped two weeks prior to the planting session to increase the seedling survival rate. The BGPA also has a quantity of seed stored that has been harvested from plants propagated in the facility. Staff are working on cryostorage of shoot tips. Plants will continue to be propagated for annual plantings.

The recovery team sought a change of land vesting and purpose of Reserve 12985 (Ardath) from Water and Parkland vested in the Shire of Bruce Rock to Conservation of Flora and fauna vested in the National Parks and Nature Conservation Authority (NPNCA). However, the Shire of Bruce Rock did not wish to change the vesting at that time.

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

Future recovery actions

It should be noted that CALM Narrogin District is listed as the responsible authority. This refers largely to implementing recovery actions coordinated by the NDTFRT. Where recovery actions are implemented on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing lower priorities if funding is available and other opportunities arise.

1. Coordinate recovery actions

The NDTFRT coordinate recovery actions for *Symonanthus bancroftii* and will include information on progress in its annual report to CALM's Corporate Executive and relevant funding bodies.

Action: Coordinate recovery actions
Responsibility: The NDTFRT
Cost: $1,000 per year

2. Map total habitat

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

Action: Map total habitat
Responsibility: CALM (Narrogin District, SCB) through the NDTFRT
Cost: $4,000 in the first year

3. Continue the propagation and translocation program

Propagating plants on a regular basis and conducting smaller 2-3 year supplementary translocation programs instead of large "one-off" plantings may be the most effective restocking process. The next planting session will require ripping of the soil at the Ardath site prior to planting seedlings to see if this improves water retention and growth of the plants. Translocations will continue to be coordinated by the NDTFRT. Information on the translocation of threatened species in the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*.

Action: Continue the translocation program
Responsibility: CALM (Science Division, Narrogin District), the Bruce Rock Landcare District Committee (BRLCDC) and BGPA through the NDTFRT
Cost: $11,500 in the first and second years, $9,500 in the third year and $6,500 in the fourth and fifth years

4. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Symonanthus bancroftii* will provide a scientific basis for the management of the species in the wild and will be used in the development of a revised Recovery Plan should one be deemed necessary. Several parts of this action will be included in monitoring (See Action 8) and include:

1. The study of seed dispersal and soil seed bank dynamics including its size, seed viability, germination stimulants (smoke, physical disturbance, rainfall), rates of seed accumulation and seed predation.
2. The effects of competition and grazing on seedling survivorship.
3. The study of root formation, relationships between species for water and the water retention levels in disturbed versus undisturbed land.
4. The study of the species' reproductive ecology including mating systems and pollination biology.
5. The study of population genetic structure and levels of genetic diversity.
6. An analysis of population viability to assist in the development of future management and recovery actions, including translocation.

Given the limited material potentially available for research into *Symonanthus bancroftii*, consideration should be given to using *Symonanthus aromaticus* to investigate key ecological and biological traits, assuming it has a similar ecology. Commence and continue 1, 2, 3, 4 and 5 as a high priority. Commence 6 over time if resources permit.

Actions: Obtain biological and ecological information
Responsibility: CALM (Threatened Flora Seed Centre (TFSC), Science Division), BGPA through the NDTFRT
Cost: $25,000 per year

5. Collect seed, cuttings and cryostorage material

Given the immediate threat to the species in the wild, *ex-situ* collections of seed, cuttings and cryostorage material need to be maintained to minimise the risk of extinction. Consideration should be given to holding material in a variety of forms, including seed storage, living collections and cryostorage of shoot tips. These collections should aim to sample and preserve the maximum range of genetic diversity possible (which should be determined by an appropriate molecular technique such as genetic fingerprinting if feasible). The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process.

Actions: Collect seed, cuttings and cryostorage material
Responsibility: CALM (Narrogin District), Threatened Flora Seed Centre (TFSC) and BGPA through the NDTFRT
Cost: $1,500 in first year, $500 per year thereafter

6. Promote awareness

An A4 sized information sheet, that provides a description of the species and information about threats and recovery actions, has been developed for *Symonanthus bancroftii*. It is hoped that the poster will result in the discovery of new populations. A publicity campaign will increase local community awareness of this Critically Endangered species. Publicity may be in the form of exposure in the local print or electronic media, or production of a poster for display in venues of high exposure. Formal links with local naturalist groups and interested individuals should also be encouraged. To minimise the risk of accidental or deliberate destruction, it is recommended that the exact location of *Symonanthus bancroftii* be kept from the general public. Such information should, however, be given to relevant landowners, Shire staff and government authorities.

Action: Promote awareness
Responsibility: CALM (Narrogin District, Strategic Development and Corporate Affairs Division, Species and Communities Branch (SCB) and the BRLCDC through the NDTFRT
Cost: $500 in the first, second and third years

7. Conduct further surveys

Further surveys by CALM staff with assistance from local naturalists, Wildflower Society members and other volunteers will be conducted during the species flowering period (June to early September). Surveys will be conducted over three years and will include sites close to where past collections have been made. Surveys will be conducted at the same time as monitoring to reduce costs. Opportunistic surveys throughout the Wheatbelt and Goldfields Regions will continue focusing on similar habitat and recently burnt or disturbed sites.

Action: Conduct further surveys
Responsibility: CALM (Narrogin District) and BRLCDC through the NDTFRT
Cost: $2,400 per year

8. Monitor populations

A demographic monitoring program will be implemented to measure key population and threat processes for all populations (See also Action 4). Monitoring will include

- Population demography, including an annual census.
- Condition of associated habitat.
- An evaluation of threatening processes.
- An evaluation of planting configuration, watering system effectiveness and suitable plant sex ratios.
- An evaluation of the success between sites and between clones and seedlings.
- Bud, flower and seed production and viability.

Monitoring will coincide with the flowering period of *Symonanthus bancroftii*, seed production (fruit ripening) and likely periods of seedling recruitment and mortality. This may require 2 to 3 visits per year. A Rare Flora Report Form will be completed for each visit.

Action: Monitor populations
Responsibility: CALM (Narrogin District), the BRLCDC through the NDTFRT
Cost: $1,800 per year

9. Seek ways of improving the security of populations

One way of improving the security of populations and their habitat is through a change in vesting and purpose of Reserve 12985 from Water and Parkland to Conservation of Flora and fauna.

Action: Seek ways of improving the security of populations.
Responsibility: CALM (Narrogin District) and the BRLCDC through the NDTFRT
Cost: $200 in year 1

10. Maintain fences and DRF markers

Maintain fences and DRF markers at Populations 1a and 1b.

Action: Maintain fences and DRF markers
Responsibility: CALM (Narrogin District) and the BRLCDC through the NDTFRT
Cost: $300 per year

11. Liaise with relevant land managers and landowners

Staff from CALM and members of the BRLCDC will continue to liaise with land managers and adjacent landowners to ensure that populations are not accidentally damaged or destroyed. The approval and assistance of land managers will be sought to implement recovery actions. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Symonanthus bancroftii*.

Action: Liaise with relevant land managers and landowners
Responsibility: CALM (Narrogin District), the BRLCDC, West Net Rail, Shire of Bruce Rock and adjacent landowners through the NDTFRT
Cost: $500 per year

12. Undertake weed control

Weeds may be a threat to Populations 1a and 1b. Manual weeding will be done to maintain a 5 m weed free area around existing plants. This will be done with minimum soil disturbance to avoid damage to possible seedlings.

Action: Undertake weed control
Responsibility: CALM (Narrogin District), the BRLCDC, West Net Rail, Shire of Bruce Rock through the NDTFRT
Cost: $1,200 per year

13. Develop and implement a fire management strategy

It is likely that this species requires occasional fire to stimulate recruitment from soil-stored seed, but frequent fires during the flowering and seeding phase may be detrimental to its long-term survival. Fire also promotes the introduction and proliferation of weed species. A fire management strategy will be developed which will aim to prevent inappropriate fire from occurring in the area of the population.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Narrogin District) and the BRLCDC through the NDTFRT
Cost: $1,500 in year 1, and $900 per year thereafter

14. Review the IRP and assess the need for further recovery actions

If *Symonanthus bancroftii* is still ranked Critically Endangered at the end of the fourth year of the five-year term of this IRP, the plan will be reviewed and the need for further recovery actions assessed.

Action: Review the IRP and assess the need for further recovery actions
Responsibility: CALM (Narrogin District, SCB) through the NDTFRT
Cost: $15,700 in the fifth year

4. TERM OF PLAN

This Interim Recovery Plan will operate from May 2006 to April 2011 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 a review of this IRP will be assessed and a plan prepared if necessary.

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6. TAXONOMIC DESCRIPTION

Mueller, F. and Haegi, L. (1981). *Teleopea 2: Symonanthus bancroftii*.

Symonanthus bancroftii is a small spreading undershrub, 15-25 cm high and with many sticky, moderately sparsely hairy ascending herbaceous branches arising from or near a perennial thickened stem base. *Leaves* are more or less spreading, stalkless, ovate to linear, 5-17 mm long and 1-3 mm wide, the edges rolled under, hairy and somewhat warty. *Flowers* are small, white streaked with violet inside, unisexual and borne singly on short hairy peduncles at the end of the branchlets with the male and female flowers on separate plants. Individual flowers are bell-shaped with a tubular corolla 5-6 mm long widening into 5 very short (1.5-2.0 mm long) round lobes and densely hairy on the outside. The shortly tubular calyx is hairy on the outside 2-2.5 mm long and 5 bluntly pointed teeth. The male flowers have 5 stamens to 4.5 mm long and an ovary lacking ovules, a developed stigma and often-entire style. Female flowers have 5 short stamens that are infertile, the rest of the flower being developed normally. *Fruit* is an almost globular capsule 3-4 mm long and 2.5-4 mm wide, borne on a downward curving peduncle and containing 3-5 seeds which are about 2 mm long and 1 mm wide.