INTERIM RECOVERY PLAN NO. 7

SMALL FLOWERED CONOSTYLIS (*CONOSTYLIS MICRANTHA*) INTERIM RECOVERY PLAN

1996-1999

by

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos 44 and 50. IRPs are designed to run for three years only and will be replaced by full Recovery Plans where required.

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

CALM is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This IRP was approved by the Director of Nature Conservation on 7 May 1997. Approved IRPs are subject to modification as dictated by new findings, changes in status of the taxon or ecological community and the completion of recovery actions. 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 March, 1997.

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SUMMARY

Small Flowered Conostylis, *Conostylis micrantha* Family: HAEMODORACEAE

Flowering period: July-August

CALM Region: Midwest **CALM District:** Geraldton **Shire:** Irwin

Current status: Declared as Rare Flora in September 1987, ranked as Critically Endangered in September 1995

Recovery team: Geraldton District Threatened Flora Recovery Team

Illustrations and/or further information: S.J. Patrick & A.P. Brown *Declared Rare and Poorly Known Flora in the Moora District* (draft 1997); S.D. Hopper Haemodoraceae, *Flora of Australia* (1987); S.D. Hopper *et al. Western Australia's Endangered Flora* (1991).

Conostylis micrantha is a small tufted perennial herb to 30 cm in diameter with yellow-cream flowers that turn to a brick red colour with age. It occurs over a range of c. 15 km to the north-east of Dongara growing in low heath on white-grey sandy soils.

The first known collection of *C. micrantha*, housed at the Western Australian Herbarium, was made in 1961 by R. D. Royce. *C. micrantha* was known from 122 plants in six populations, but during surveys in 1995 plants were not found at two of these sites and a total of just 65 plants were recorded.

The main cause of the threatened status of *C. micrantha* is thought to be the loss of suitable habitat due to wide scale clearing for agriculture. The ongoing threat to the survival of the species in the wild is the continued decline in the condition of the remaining habitat, caused by weed invasion and soil disturbance from rabbits and road works. The aim of this Interim Recovery Plan is to abate identified threats and maintain viable *in situ* populations of *Conostylis micrantha* in order to preserve the wild genetic stock of the species. To achieve this aim the following essential and desirable recovery actions are prescribed:

Recovery actions:

Essential	Desirable
1. Install Declared Rare Flora markers	1. Preserve genetic diversity of the species
2. Implement weed control	2. Fence populations 2 and 6
3. Develop a fire management plan	3. Conduct further surveys
4. Monitor populations	4. Information dissemination
	5. Conduct research
	6. Survey for translocation sites if deemed necessary

Conostylis micrantha

Susan J. Patrick

Distribution of *Conostylis micrantha*
Not available

1. BACKGROUND

1.1 History, taxonomy and status

Conostylis micrantha is a small, tufted perennial herb to 30 cm in diameter with yellow-cream flowers that turn a brick red colour with age. The leaves are terete, with a few simple, spreading, white hairs on the lower margins. The species is related to *C. teretifolia*, which is common in the northern heaths from Moore River north to Arrowsmith River. *C. micrantha* differs from *C. teretifolia* in having longer leaf hairs that are confined to the base, an earlier flowering time and smaller flowers (the smallest in the genus) which are arranged in a bifurcate, flattened, many flowered head (not in a few-flowered simple head).

A full taxonomic description is provided by Hopper *et. al*. (1987) in Appendix 1.

The genus *Conostylis* contains 45 species, all of which are endemic to the south-west of Western Australia. A number of species are grown as ornamentals and *C. micrantha* has the potential to be of horticultural significance.

The first known collection of *C. micrantha*, housed at the Western Australian Herbarium, was made in 1961 by R. D. Royce. Since that time six populations have been discovered, with the most recent discovery (Population 6) made by S. Patrick and A. Brown in 1992. All six populations were surveyed in 1995 by E. Holland, and 65 plants were recorded in total, with no plants recorded from populations 4 and 5. Prior to 1995, 122 plants were recorded.

Due to small population sizes, restricted habitat (narrow road and rail reserves) and continuing decline in habitat quality, *C. micrantha* was declared as Rare Flora on 25 September 1987 and ranked as Critically Endangered in September 1995.

1.2 Distribution and habitat

All populations occur on narrow road or railway reserves in fragmented, remnant heath vegetation. *C. micrantha* is found over a range of c. 15 km to the area north-east of Dongara, where it grows in white or grey sand in low heath. Associated species include *Allocasuarina humilis, Hakea trifurcata, Hibbertia hypericoides, Dryandra fraseri* and *Hakea erinacea*. A full list of associated species is included in Appendix 2.

Table 1: Summary of population information

Pop no & location	Land status	No of plants	Condition	Threats
1. East of Dongara	Shire Road Reserve	1988, 40+ 1995, 48	Moderate	Weeds, road works, inappropriate fire
2. East of Dongara	Shire Road Reserve	1988, 50+ 1995, 7	Poor	Weeds, rabbits, inappropriate fire
3. East of Dongara	Shire Road Reserve	1988, 40+ 1995, 4	Poor	Weeds, rabbits, inappropriate fire
4. East of Dongara	Shire Road Reserve and Railway Reserve	1988, 15+ 1995, 0	Poor	Weeds, inappropriate fire
5. East of Dongara	Shire Road Reserve	1988, 2 1995, 0	Moderate	Weeds, inappropriate fire
6. East of Dongara	Shire Road Reserve	1992, 9 1995, 6	Moderate	Weeds, rabbits, inappropriate fire

1.3 Biology and ecology

The response of *C. micrantha* to fire is unknown, however, it is predicted that, like other species of *Conostylis*, it will regenerate from subterranean regenerative buds emerging from horizontal rhizomes (Gill 1981) and soil stored seed will germinate following summer fire.

The genus *Conostylis* is comprised of a mixture of insect and bird pollinated species, however, little is known about the pollination of *C. micrantha*.

1.4 Threatening processes

1.4.1 Causes of the Critically Endangered status of this species

Clearing for agriculture around the Irwin River area began approximately 140 years ago when the town of Dongara was first established. Subsequent wide scale clearing has resulted in a loss of most areas of suitable habitat for *C. micrantha*.

All six known populations are restricted to narrow road and rail reserves, with high perimeter to area ratios. This results in virtually the whole corridor being subjected to edge effects from management of the adjacent land (Lynch 1987; Saunders *et al.* 1987; Taylor 1987). Effects include increased wind speed, increased fertiliser runoff, modified hydrology and altered disturbance regimes, including fire. The fragmentation of the corridors, combined with edge effects, subjects the vegetation to high levels of stress and periodic acute disturbances. The condition of the habitat of *C. micrantha* has declined since the species was first discovered and will continue to decline unless recovery actions are applied.

1.4.2 Threats to the ongoing survival of this species in the wild

- **Weed invasion** is evident in all populations, almost certainly as a result of edge effects such as increased nutrient levels (fertiliser runoff, rabbit droppings) and soil disturbance (rabbits, earthworks). Introduced weedy species respond more favourably to a combination of nutrient addition and soil disturbance (Hobbs and Atkins 1988). *C. micrantha* is both directly and indirectly affected by weeds due to:

    - direct competition, inhibiting the growth of *Conostylis micrantha* and displacing the species where it once grew.
    - a decrease in the diversity of the habitat of *Conostylis micrantha*.
    - an alteration in nutrient cycling.
    - a change in soil acidity.
    - an increased fire hazard due to easy ignition, high fuel loads produced annually, and the formation of a continuous fuel bed permitting a fire to spread quickly (Hussey and Wallace 1993).

- **Rabbits** (*Oryctolagus cuniculus*) have caused major disturbance in populations 2 and 3 and some disturbance at Population 6. Warren construction, increased nutrient levels from their droppings, introduction of weeds and grazing are all having an impact on the habitat.

- **Inappropriate fire regimes** during the reproductive phase of *C. micrantha.* (ie. flowering, pollination, seed growth and seed dispersal) may result in low/nil seedling recruitment. High fire frequency may also lead to the degradation of the habitat of *C. micrantha* due to a depletion of soil seed banks and a temporary increase in the availability of nutrients for weed establishment (Panetta and Hopkins 1991). Appropriate irregular summer fire may be an important part of the life cycle of this species and be necessary for regeneration.

1.5 Conservation status

Most populations of *C. micrantha* occur on narrow Shire road reserves, with one found on equally narrow Westrail rail reserve. No populations are known to occur on a conservation reserve.

1.6 Strategy for recovery

The following essential strategies will be implemented:

1. Control the most threatening factors currently affecting *C. micrantha* as outlined at 3.2.
2. Protect *C. micrantha* from possible future threats (eg further clearing), by appropriate management practices (see 3.2.1, 3.2.3).

The following desirable strategies will be implemented if resources permit:

1. Preserve genetic material of *C. micrantha* by including it in cryostorage and/or *ex situ* cultivation (see 3.3.1).
2. Enhance plant numbers (eg by removal of a limiting factor or direct interference with propagation and translocation techniques (see 3.3.2, 3.3.6 and CALM Policy Statement No 29 *Translocation of Threatened Flora and Fauna*).
3. Ensure that relevant land managers and CALM personnel are aware of the presence of *C. micrantha*, and the need to protect it (eg by notification and roadside markers) and ensure that all are familiar with the threatening processes identified in these guidelines (see 3.3.3).
4. Research the biology, ecology and management of *C. micrantha* (see 3.3.5).

2. RECOVERY OBJECTIVE AND CRITERIA

2.1 Objective

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

2.2 Criteria

2.2.1 Criteria for success

Recovery will be deemed a success if threatening processes identified within this IRP have been reduced or removed within the three year period.

2.2.2 Criteria for failure

The recovery process will have been unsuccessful if threats identified have not abated within the three year period of this IRP or there has been a substantial decrease in the number of mature plants.

3. RECOVERY ACTIONS

3.1 Existing recovery actions

Cuttings were collected from *C. micrantha* in 1993, 1994 and 1995 by staff from Kings Park and Botanic Garden (KPBG). In August 1995 KPBG had 16 plants growing in their nursery, 10 of which were still in the propagation house. Several of these plants have since been planted out into the Rare and Endangered Garden at KPBG, while the remainder are still in pots. The rooting success rates of the cuttings taken from two populations in 1993 were 18% and 10%.

The Shire of Irwin and Westrail have been informed of the presence of *C. micrantha* on their lands. Declared Rare Flora (DRF) markers were installed at populations 1-3 and 6 in July 1993. Westrail markers are present at population 4.

The Geraldton District Threatened Flora Recovery Team (GDTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive.

3.2 Essential recovery actions

3.2.1 Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are not currently in place for population 5. It is essential that markers are installed at this site as soon as possible to help ensure accidental destruction does not occur.

Action:	Install two DRF markers on Population 5
Responsibility:	CALM (Geraldton District, Western Australian Threatened Species and Communities Unit (WATSCU))
Cost:	$150

3.2.2 Implement weed control

All populations are affected by the invasion of wild oats, [*]*Avena fatua* (cape weed), **Arctotheca calendula*, and other introduced annual grass species. Weed control with the use of herbicides and hand pulling is recommended for these areas. The tolerance of native plant species to herbicides at *C. micrantha* sites is unknown and it is recommended that weed control programs are undertaken in conjunction with research (see 3.3.4). The aim of weed control is to maintain the pre-invasion condition of the habitat (prevention), control or arrest ongoing weed invasion (intervention) and reverse the degraded condition of the habitat where applicable (rehabilitation) (Panetta and Hopkins 1991. A weed control program is required and will involve:

1. Accurately mapping the boundaries of the populations.
2. Selection of an appropriate herbicide or other method of weed control after determining which weeds are present.
3. Controlling invasive weeds internal to the boundary by hand removal and spot spraying around individual *C. micrantha* plants when weeds first emerge.
4. Scheduling to include weed spraying of other Declared Rare Flora populations requiring weed control within the Geraldton District.

[*] asterisk designates an introduced (non-native) species

All roadside populations are vested in the Shire of Irwin. A weed control program will be developed in consultation with the Shire Council.

Action:	Implement weed control
Responsibility:	CALM (Geraldton District, CALM Science and Information Division (SID), WATSCU), Shire of Irwin
Cost:	$2500 pa. for 1997, 1998

3.2.3 Develop a fire management plan

Little is known about the effects of fire on this species (see 1.3). It is likely that the species requires occasional hot summer fire (December- April) for recruitment from soil stored seed (see 1.3) but frequent fires during the flowering and seeding phase (July-October) may be detrimental to the long term survival of the species (see 1.4.2).

Fires also promote the introduction of introduced weed species. Until weed control has been achieved, the vigour of the native vegetation has improved and the fire response of *C. micrantha* has been determined, fire should be prevented from occurring in the populations (see 1.4.2). It is recommended that a fire management plan for the areas of each population be developed in consultation with relevant authorities and land managers.

Action:	Develop a fire management plan
Responsibility:	CALM (Geraldton District, WATSCU), relevant authorities and land managers
Cost:	$450

3.2.4 Monitor populations

Monitoring of factors such as weed encroachment, habitat degradation, population stability (expanding or declining), pollination activity, seed production, recruitment and longevity is prescribed.

Populations should be inspected annually as a requirement under CALM's Policy Statements, No. 9 *Conservation of Threatened Flora in the Wild* and No 28 *Reporting Monitoring and Re-evaluation of Ecosystems and Ecosystem Management*. See also 3.3.5 *Development of a Quadrat/Transect Based Monitoring System For Threatened Plant Species.*

Action:	Monitor populations
Responsibility:	CALM (Geraldton District, WATSCU)
Cost:	$450 pa.

3.3 Desirable recovery actions

3.3.1 Preserve genetic diversity of the species

Germplasm collections should be given a high priority if the extinction of populations of *C. micrantha* is considered a high probability through disease, its limited distribution or low number of plants. If this is deemed to be the case, recovery of the species is likely to need *ex situ* conservation techniques.

Genetic diversity conservation of the species should be incorporated into the research component (see 3.3.5) and should include collection of seed from all populations, ensuring an adequate representation of genetic diversity.

If it is not possible to collect adequate quantities of viable seed, other more costly germplasm storage methodologies may need to be investigated. These can involve living collections from cutting or other source material, or storage of tissue culture material. If resources are limited these techniques will need to be carefully prioritised in relation to *in situ* conservation. This will be coordinated by the GDTFRT.

It is also important that the size and viability of the soil seed bank is determined and research undertaken to develop techniques for stimulating germination of soil stored seed. Care, however, should be taken as these processes inherently carry a significant risk of depletion of seed bank reserves.

Action:	Collect seed and/or other genetic material from all populations

Responsibility:	GDTFRT, CALM (Threatened Flora Seed Centre (TFSC), Geraldton District, WATSCU), KPBG
Cost:	$1600

3.3.2 Exclusion Fencing

In consultation with the Shire of Irwin it is recommended that populations 2 and 6 be fenced to protect them from rabbits. For both populations, the road reserve is over 40m wide.

Action:	Fence populations 2 and 6
Responsibility:	CALM (Geraldton District, WATSCU)
Cost:	$2300

3.3.3 Conduct further surveys

C. micrantha has been extensively surveyed for by CALM staff in recent years. However, it is recommended that populations 4 and 5 be resurveyed in 1997 (plants were not found at these sites in 1995 and 1996). Further surveying for the species in areas of suitable habitats, perhaps with the aid of volunteers from the local community, wildflower societies and naturalist clubs, should be undertaken on a systematic basis during its flowering period (July and August). These should be supervised by CALM staff.

Action:	Conduct further surveys
Responsibility:	CALM (Geraldton District)
Cost:	$900

3.3.4 Information dissemination

To promote an awareness of *C. micrantha* among relevant CALM and Shire staff, the production of posters and dashboard stickers is recommended. Dashboard stickers should illustrate a DRF marker and provide a contact telephone number if one is encountered. Posters should illustrate and provide descriptive information on the subspecies.

The importance of biodiversity conservation and the preservation of critically endangered species need to be promoted to the general public, however, it is recommended that the exact location *C. micrantha* remain confidential. Awareness can be encouraged throughout the community by a publicity campaign using the local print and electronic media and by setting up poster displays in venues of high exposure. Formal links with local naturalist groups and interested individuals should also be encouraged. Such activities may lead to the discovery of new populations of the species.

Action:	Produce posters and dashboard stickers, implement a publicity campaign
Responsibility:	CALM (Corporate Relations Division, Geraldton District, WATSCU)
Cost:	$500 first year, $1500 second year

3.3.5 Conduct research

Research designed to increase understanding of the biology of the species will provide a scientific base for management of *C. micrantha* in the wild. Research should include:

1. The response of *C. micrantha* and its habitat to herbicide treatments.
2. The effect of weeds on recruitment and establishment of *C. micrantha*.
3. Pollinator activity within populations of *C. micrantha*.
4. Investigation of factors determining level of flower and fruit abortion.
5. Quantification of level of invertebrate grazing or removal of seed.
6. The size and viability of the soil seed bank.
7. The seed germination requirements of *C. micrantha*.
8. The role of disturbance in regeneration.
9. Response of *C. micrantha* and its habitat to fire.
10. Longevity of plants, and time taken to reach maturity.
11. The extent of genetic variation within and between populations (essential knowledge if new populations are to be established).
12. The establishment of a monitoring system. Specific protocols for rare flora will be outlined in a future CALM discussion paper *Development of a Quadrat/Transect Based Monitoring System For Threatened Plant Species* (D. Coates, P. Pigott and A. Brown in prep).

Action:	Conduct research
Responsibility:	CALM (SID, Geraldton District, WATSCU)
Cost:	$1000 first year, $2000 second year

3.3.6 Translocation

Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No 29. Surveying potential habitat for possible future translocation sites is recommended within the scope of IRPs, with actual translocation addressed in full Recovery Plans where necessary. Translocations should be coordinated by the GDTFRT. All translocation proposals require endorsement by the Director of Nature Conservation.

Action:	Survey potential habitats for translocation
Responsibility:	GDTFRT, CALM (Geraldton District, WATSCU)
Cost:	See Section 3.3.3

Table 2: Summary of recovery actions

Recovery Actions	Population	Priority	Responsibility	Completion date
Essential				
Install DRF markers	5	High	CALM (Geraldton District, WATSCU)	February 1996
Implement weed control	All	High	CALM (Geraldton District, SID, WATSCU), Shire of Irwin	April 1996, ongoing
Fire management plan	All	High	CALM (Geraldton District, WATSCU), relevant authorities and land managers	April 1996, ongoing
Monitor populations	All	High	CALM (Geraldton District, WATSCU)	July 1996, ongoing
Desirable				
Preserve genetic diversity of the species	All	Moderate	GDTFRT, CALM (TFSC, Geraldton District, WATSCU), KPBG	July-August 1996, ongoing
Exclusion fencing	3 &/or 5	Moderate	CALM (Geraldton District, WATSCU)	April 1996
Conduct further surveys		Moderate	CALM (Geraldton District)	July- August 1996, 1997, 1998
Information dissemination		Moderate	CALM (Corporate Relations Division, Geraldton District, WATSCU)	March 1996, ongoing
Conduct research	All	Moderate	CALM (SID, Geraldton District, WATSCU)	July 1996, ongoing
Translocation	-	Low	GDTFRT, CALM (Geraldton District, WATSCU)	ongoing

3.4 Costs

Table 3: Summary of costs for each recovery action

Recovery Action	1996			1997		1998	
	CALM	EA	KPBG	CALM	EA	CALM	EA
Essential							
Install DRF markers	150						
Implement weed control	1000	1500		1000	1500		
Develop a fire management plan	200	250					
Monitor populations	200	250		200	250	200	250
Sub-total	**$1550**	**$2000**		**$1200**	**$1750**	**$200**	**$250**
Desirable							
Preserve genetic diversity of the species		500	1100				
Exclusion fencing	1800	500					
Conduct further surveys	400	500					

Information dissemination	500			1500		
Conduct research Translocation	1000			2000		
Sub-total	**$3700**	**$1500**	**$1100**	**$3500**		
Totals	**Year 1: $9850**			**Year 2: $6450**		**Year 3: $450**

EA Environment Australia (formerly ANCA)

Total of all costs $16 750

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Appendix One: Taxonomic description

Hopper, S. D., Purdie, R. W., George, A.S. and Patrick, S. J. (1987). *Haemodoraceae*, Flora of Australia **45**,57 and 92-94.

26. Conostylis micrantha Hopper, Fl. Australia 45: 461 (1987)

T: 3 km SSE of Mt Horner, 8.5 km N along Tabletop Rd, from the Midlands Rd, W.A.., 29o09'S, 115o06'E, 20 Aug. 1982, *S.D. Hopper* 2468; holo: PERTH; iso: AD, CANB, K, MEL, NSW.

Tufts to 30 cm diam. Leaves terete, 13-24 cm long, 0.7-1.2 mm diam., glabrous except lower margins, green; hairs few, 3-9 mm long, spreading, flexuose, white, flattened at base, with minute marginal serrations. Inflorescence a shortly bifurcate many-flowered flattened head; scape 5-13 cm long, with a median scarious hirsute bract 3-8 mm long. Perianth 5-7.5 mm long, finely tomentose, pale yellowish cream ageing to brick-red; lobes 2.5-4.5 mm long, cream inside, golden yellow towards base. Stamens uniseriate; anthers 1-1.7 mm long, somewhat longer than filaments. Style 3-4 mm long. Fig. 40B-D.

Confined to sandplain uplands N of the Irwin R., W.A. Grows in heath. Flowers July-Aug. Map 95.

W.A.: 16.4 km N of Irwin on road to Northern Gully, *S.D. Hopper 460* (PERTH); 7.3 km W of Strawberry, *S.D. Hopper 461* (PERTH); c. 20 km NW of Strawberry on road to Northern Gully and The Casuarinas, *R.J. Hnatiuk 760300* (PERTH); Mingenew district, *R.D. Royce 6446* (PERTH); Burma Rd, *A.C. Burns 6* (PERTH).

Allied to *C. teretifolia*, but leaf hairs longer and confined to the base, flowers earlier, and has smaller flowers (the smallest in the genus) arranged in a shortly bifurcate many-flowered flattened head similar to species of *Phlebocarya*.

Appendix Two: Associated species

ZAMIACEAE
Macrozamia riedlei

POACEAE
**Avena fatua*
**Briza maxima*
**Eragrostis curvula*

CYPERACEAE
Lepidosperma sp.
Mesomelaena pseudostygia

RESTIONACEAE
Ecdeiocolea monostachya

DASYPOGONACEAE
Calectasia cyanea

PHORMIACEAE
Dianella divaricata

HAEMODORACEAE
Anigozanthos humilis
Conostylis androstemma
Conostylis candicans
Conostylis dielsii subsp. *teres*
Conostylis ? robusta
Conostylis teretiuscula

ORCHIDACEAE
Caladenia deformis

CASUARINACEAE
Allocasuarina humilis
Allocasuarina lehmanniana
Allocasuarina sp.

PROTEACEAE
Banksia attenuata
Banksia menziesii
Banksia sphaerocarpa
Conospermum stoechadis
Dryandra carduacea
Dryandra fraseri
Dryandra sessilis
Grevillea sp.
Hakea sp.
Hakea costata
Hakea erinacea
Hakea trifurcata
Petrophile macrostachya
Synaphea sp

LORANTHACEAE
Nuytsia floribunda

DROSERACEAE
Drosera sp.

MIMOSACEAE
Acacia sp.
Acacia stenoptera
Chorizema sp.

PAPLIONACEAE
Gompholobium viscidium

MYRTACEAE
Calytrix strigosa
Eremaea beaufortiodies
?Pericalymma sp.

EUPHORBIACEAE
Stachystemon sp.

DILLENACEAE
Hibbertia hypericoides

GOODENIACEAE
Dampiera sp.
Lechenaultia lineroides
Scaveola sp.

ANTHERICACEAE
?Agrostocrinum scabrum

LAURACEAE
Cassytha sp.

*Introduced species