

# Flora Survey: Albany Heritage Park Trail Network



Report prepared for  
City of Albany  
December 2017

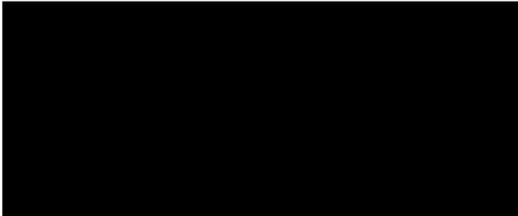


**Assessment for:**

City of Albany  
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## REPORT CONTENTS

<b>1</b>	<b>SUMMARY</b> .....	<b>5</b>
<b>2</b>	<b>INTRODUCTION</b> .....	<b>6</b>
2.1	<i>Background</i> .....	6
<b>3</b>	<b>METHODS</b> .....	<b>7</b>
3.1	<i>Desktop Assessment</i> .....	7
3.2	<i>Vegetation Assessment</i> .....	7
3.3	<i>Targeted Threatened and Priority Flora Search</i> .....	7
3.4	<i>Legislation and Conservation Significance</i> .....	7
<b>4</b>	<b>RESULTS &amp; DISCUSSION</b> .....	<b>9</b>
4.1	<i>Vegetation</i> .....	9
4.2	<i>Flora</i> .....	13
4.3	<i>Likelihood of Occurrence Assessment</i> .....	17
4.4	<i>Weeds</i> .....	21
<b>5</b>	<b>SURVEY TIMING &amp; LIMITATIONS</b> .....	<b>22</b>
<b>6</b>	<b>REFERENCES</b> .....	<b>23</b>
<b>7</b>	<b>APPENDIX A - Conservation Status Definitions</b> .....	<b>24</b>
<b>8</b>	<b>APPENDIX B - Vegetation and Flora Maps</b> .....	<b>25</b>
<b>9</b>	<b>APPENDIX C - Plant Taxa Inventory</b> .....	<b>29</b>

## FIGURES, TABLES AND PLATES

Figure 1.	Survey Area location in Albany, on the south coast of Western Australia. ....	6
Table 1.	Extent (hectares) of native vegetation formations within the Survey Area. ....	9
Plate 1.	Gastrolobium/Hakea Shrubland: .....	10
Plate 2.	Eucalyptus/Corymbia Woodland: .....	11
Plate 3.	Granite Shrubland and Herbland: .....	12
Plate 4.	(a) Ron Herberle indicating several emergent plants of <i>Caladenia harringtoniae</i> on Mt Clarence. Photo taken by Professor Steve Hopper in the afternoon, 30 <sup>th</sup> September, 1983. (b) Species of <i>Borya</i> , <i>Hakea</i> , <i>Dodonaea</i> and <i>Lepidosperma</i> on sheet granite on the North-West face of Mt Clarence were determined as critical habitat for <i>Caladenia harringtoniae</i> . ....	13
Plate 5.	A population of <i>Caladenia harringtoniae</i> discovered in spring 2017 from Big Grove, Albany. Approximately 6 km from the Mt Clarence. Two individuals were flowering during the field visitation period of the Survey Area. ....	14
Plate 6.	<i>Stylidium falcatum</i> (P1) .....	15
Plate 7.	<i>Spyridium spadiceum</i> (P4) .....	15
Plate 8.	<i>Thysanotus isantherus</i> (P4) .....	16
Plate 9.	<i>Melaleuca ringens</i> (P4) .....	17

**Table 2. Likelihood of occurrence of conservation significant species recorded in the vicinity of the Survey Area (<10 km). Records are derived from Threatened and Priority flora dataset obtained from the Department of Biodiversity, Conservation and Attractions or the taxon is not recorded, but has the potential to occur according to the Protected Matters Search Tool (PMST) (Department of the Environment and Energy [DotEE] 2017a)).**..... 17

**Plate 10. (a) Milkwort, (b) Pink Ragwort, (c) Chinese Trumpet Flower and (d) Japanese honeysuckle.**.....21

**Figure 2. Climate statistics for 12 months prior to the assessment compared with historical averages (all years available) from the nearest weather station (Albany 9500) (BOM 2017). Total rainfall in 12 months prior to the survey was 850 mm compared to the historic average of 925 mm.**.....22

# 1 SUMMARY

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- The City of Albany is proposing to construct mountain bike trails within the Albany Heritage Park. To inform the environmental planning, Southern Ecology was engaged to undertake a targeted flora survey of approximately 15 hectares that encompassed a 30m wide corridor around 8050m of proposed and existing trails.
- A total of 292 vascular plant species from 67 families (including 50 weeds) were recorded opportunistically from the Survey Area.
- Approximately 0.5 hectares of critical habitat for one Threatened flora (*Caladenia harringtoniae* (VN)) was recorded.
- Four Priority flora (*Stylidium falcatum* (P1), *Spyridium spadiceum* (P4), *Thysanotus isantherus* (P4) and *Melaleuca ringens* (P4)) were recorded from within and adjacent to the Survey Area.
- Several vegetation communities have previously been mapped in the Albany Heritage Park; none are considered Priority or Threatened Ecological Communities. However, granite outcrops are considered conservation significant due to their restricted distribution, high number of conservation significant taxa and their ability to act as climatic refugia.
- One weed species is considered a Weed of National Significance (*Asparagus asparagoides*) and several others are locally problematic.
- A desktop assessment identified 58 conservation significant taxa in the vicinity, that included five Threatened and 17 Priority flora possible or likely to occur within the Survey Area. Survey limitations were identified for five of these taxa that may have prevented their detection during the field assessment.

## 2 INTRODUCTION

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### 2.1 Background

The Albany Heritage Park (AHP) encompasses the summits of Mount Clarence and Mount Adelaide, two prominent granite hills adjacent to the town centre of Albany, Western Australia (Figure 1). The AHP comprises 257 hectares (ha) of native vegetation interspersed with outcropping granite. The AHP is popular in the local community for its natural, cultural and recreational values and is managed by the City of Albany (CoA) under the 'City Mounts Management Plan 2006' (City of Albany [CoA] 2006). The CoA is proposing to construct mountain bike trails within the Albany Heritage Park under Stage 1 of the Albany Heritage Park (AHP) Trail Network. Southern Ecology was engaged to undertake an assessment of the flora and vegetation to inform the environmental planning of the AHP Trail Network. The Survey Area was comprised of a total of 15.54 hectares that encompassed a 30m wide corridor surrounding a total of 8050m of proposed and existing trails.

The AHP occurs within the Jarrah Forest Interim Biogeographic Regionalisation of Australia (IBRA) Region (Department of the Environment [DoE] 2014). The soil-landscapes (Department of Agriculture and Food Western Australia [DAFWA] 2014) are mapped as:

- Gardner sandy Phase described as "Leached sands and podzols; mallee-heath".
- Gardner granite Phase described as "Granite outcrop".

Flora surveys within the AHP have previously been undertaken by the Albany Wildflower Society and for an existing 840m demonstration trail (Bio Diverse Solutions 2016). Broad scale pre-European vegetation mapping (Shepherd *et al.* 2002) describes the AHP as a Forest of *Eucalyptus marginata/Corymbia calophylla* (Association: Albany\_3) or Rock (Association: Albany\_128) and detailed vegetation mapping has been undertaken more recently in the Albany Regional Vegetation Survey (Sandiford and Barrett 2010).

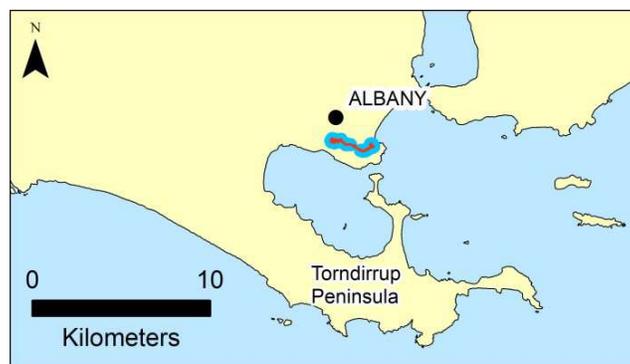


Figure 1. Survey Area location in Albany, on the south coast of Western Australia.

### 3 METHODS

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The assessment was conducted by Damien Rathbone (SL 011605), an ecologist with over 14 years of experience in southern Western Australia. Field assistance was provided by Keith Smith, who holds over 25 years of specific expertise in taxa from the Orchidaceae. All components of the assessment were conducted in accordance with targeted flora surveys in the “Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment” (Environmental Protection Agency [EPA] 2016). Location information for all significant flora and weeds were identified using a handheld GPS (Garmin 64).

#### 3.1 Desktop Assessment

A desktop assessment of known or potential conservation significant flora within a 10km radius around the Survey Area was undertaken using the following sources:

- Protected Matters Search Tool (PMST) (Department of the Environment and Energy [DotEE] 2017a) to identify potential Threatened flora and vegetation.
- Threatened and Priority flora records obtained from the Department of Biodiversity, Conservation and Attractions [DBCA] Threatened and Priority Flora database and the Western Australian Herbarium.
- Priority Ecological Community (PEC) and Threatened Ecological Community (TEC) mapping obtained from the Species and Communities Branch, DBCA.

#### 3.2 Vegetation Assessment

A comprehensive assessment (using quadrats) of the vegetation communities was not undertaken due to the adequacy of existing regional vegetation mapping by Sandiford and Barrett (2010). The vegetation was described more generally at the level of floristic formation, according to the National Vegetation Information System (Executive Steering Committee for Australian Vegetation Information [ESCAVI] 2003).

#### 3.3 Targeted Threatened and Priority Flora Search

A targeted search for potential Threatened and Priority flora identified from the desktop assessment was conducted across the Survey Area. The search was conducted in the appropriate season to detect most of the Threatened or Priority species considered possible or likely to occur. The assessment area was initially surveyed via a meandering traverse to identify vegetation types and condition. Where vegetation types were identified as potential habitat for Threatened or Priority flora, an intensive grid of suitably spaced transects was surveyed. Population census and site information of Threatened or Priority flora was recorded in accordance with the Threatened & Priority Flora (TPFL) Database Manual (Department of Environment and Conservation [DEC] 2010). Population size was determined by either direct counts, or by estimation of plant density using transects or suitably sized quadrats.

#### 3.4 Legislation and Conservation Significance

Flora, fauna and vegetation can be considered as conservation significant under Federal or State legislation or through listing by State Government Authorities. These are explained below with the definitions of conservation status relevant to the different Acts is tabulated in Appendix A.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Federal Government and provides protection to Threatened flora, fauna or vegetation communities that are recognised as Matters of National Environmental Significance (MNES). Impacts to MNES require approval from the Federal Minister for the Environment.

State Government legislation includes the *Wildlife Conservation Act 1950* (WC Act), which recognises flora, fauna and vegetation that is Threatened (state level only) or in need of special protection within Western Australia. The recently proclaimed *Biodiversity Conservation Act 2016* (BC Act) will supersede the WC Act. The DBCA also maintains a list of Priority flora, fauna and ecological communities that warrant monitoring or protection.

The *Environmental Protection Act 1986* (EP Act) provides regulations for clearing of vegetation or habitats through ten clearing principles (Schedule Five of the EP Act) relevant to the biological and environmental aspects of native vegetation. The EP Act also recognises Environmentally Sensitive Areas (ESA) that have specific values such as threatened species, certain conservation estate and wetlands.

Other State level measures of conservation significance other than statutory listing include association with restricted habitats, range extensions, relictual characteristics, potentially novel taxa and naturally occurring hybrids. Conservation targets also exist for the protection of certain vegetation above thresholds of pre-European extent (EPA 2016).

## 4 RESULTS & DISCUSSION

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### 4.1 Vegetation

The vegetation of the AHP has previously been mapped by Sandiford and Barrett (2010) and should be referred to for comprehensive representation. The vegetation in the Survey Area is described here as three broad floristic formations, which distinguish important habitats for Threatened and Priority Flora. The vegetation from the Survey Area is not concordant with any current PEC or TEC. However, granite outcrops and surrounding shrublands and herblands are considered conservation significant due to their restricted distribution, high number of conservation significant taxa and their ability to act as climatic refugia.

The vegetation in the Survey Area is predominantly in excellent condition. A small area on the North-West slope of Mt Clarence was burnt in 2014, otherwise most of the area is dense and long unburnt. Several woody weeds have encroached into the forest and woodland areas. Existing foot/bike trails have impacted the shallow soil granite margins and promoted the invasion of weeds. *Phytophthora dieback* is widespread over the AHP. However, due to the complex hydrology of the granite slopes, many small pockets remain uninfested.

Table 1. Extent (hectares) of native vegetation formations within the Survey Area.

Vegetation Formation	Area (hectares)
<i>Eucalyptus/Corymbia</i> Forest	6.60
<i>Gastrolobium/Hakea</i> Shrubland	7.16
Granite Shrubland and Herbland	1.39
Cleared	0.42
Total:	15.55



**Plate 1. Gastrolobium/Hakea Shrubland:** Tall closed shrublands dominated by *Gastrolobium bilobum*, *Hakea elliptica* with occasional mallee eucalypts occurred on the upper slopes and summits of Mt Clarence on dark-brown sandy loam soils, with granite often outcropping as large boulders. This community generally had low species richness, with the exception of recently burnt pockets on Mt Clarence. Concordant with *Gastrolobium bilobum/Hakea elliptica* Granite Shrublands (unit 23) from Sandiford and Barrett (2010); it is not concordant with any PEC or TEC. It has close affinities to the Kwongkan Shrubland TEC due to the high cover of Proteaceous shrub, but occurs outside the southeast coastal floristic province (DotE 2014). *Stylidium falcatum* (P1) and *Spyridium spadiceum* (P4) were present in this formation.

Lifeform	% Cover	Dominant taxa
Trees < 10m	<10%	<i>Eucalyptus marginata</i> , <i>Eucalyptus comuta</i> , <i>Eucalyptus megacomuta</i> .
Shrubs > 2m	30-70%	<i>Gastrolobium bilobum</i> , <i>Hakea elliptica</i> , <i>Xanthorrhoea platyphylla</i> , <i>Hakea drupacea</i> .
Shrubs 1-2m	<10%	<i>Leucopogon obovatus</i> subsp. <i>revolutus</i> , <i>Leucopogon assimilis</i> , <i>Hibbertia furfuracea</i> , <i>Ricinocarpus glaucus</i> , <i>Hovea elliptica</i> .
Shrubs <1m	<10%	<i>Tremandra stelligera</i> , <i>Hibbertia cunninghamii</i> .
Sedges/Grasses	<10%	<i>Tetrarrhena laevis</i> , <i>Lepidosperma gracile</i> , <i>Lepidosperma tenue</i> .



**Plate 2. Eucalyptus/Corymbia Woodland:** Woodland or forest of *Eucalyptus marginata* and *Corymbia calophylla* occurred on lower slopes of Mt Clarence and Mt Adelaide on grey sandy soils; granite outcropping is rare. Concordant with Marri/Jarrah Coastal Hills Forest (Unit 23) and Marri/Jarrah Forest/Peppermint Woodland (Unit 10) from Sandiford and Barrett (2010). *Stylidium falcatum* (P1) was found rarely within this formation.

Lifeform	% Cover	Dominant taxa
Trees 10-30m	30-70%	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> .
Shrubs > 2m	<10%	<i>Banksia formosa</i> , <i>Bossiaea linophylla</i> , <i>Agonis theiformis</i> , <i>Spyridium globulosum</i> .
Shrubs 1-2m	10-30%	<i>Leucopogon obovatus</i> subpp. <i>obovatus</i> , <i>Leucopogon verticillatus</i> , <i>Xanthorrhoea platyphylla</i> .
Shrubs <1m	10-30%	<i>Tetralochea affinis</i> , <i>Hibbertia cunninghamii</i> .
Sedges	30-70%	<i>Lepidosperma gracile</i> , <i>Lepidosperma squamatum</i> , <i>Anarthria prolifera</i> , <i>Tetraria octandra</i> .



**Plate 3. Granite Shrubland and Herbland:** Open shrubland and herbland occurred on the fringe of granite sheets on mid to upper slopes of Mt Clarence and Mt Adelaide. Associated with shallow sand or clay soils and specific hydrological conditions from run-off. Sandiford and Barrett (2010) recognised two mapping units within this broad floristic formation; *Taxandria marginata* Granite Shrubland (Unit 24) and *Acacia sulcata/Leucopogon assimilis* (Unit 25). They noted these units to be floristically complex and to warrant further investigation. The regional scale of the mapping units also did not discriminate the herbland component in this formation. This formation represented critical habitat for *Caladenia harringtoniae* (T) and *Thysanotus isantherus* (P4) was a common component.

Lifeform	% Cover	Dominant taxa
Shrubs 1-2m	<10%	<i>Taxandria marginata</i> , <i>Dodonaea ceratocarpa</i> , <i>Hakea drupacea</i> , <i>Anthocercis viscosa</i> , <i>Leucopogon assimilis</i> .
Shrubs <1m	10-30%	<i>Acacia sulcata</i> , <i>Andersonia sprengeioides</i> , <i>Verticordia plumosa</i> , <i>Hibbertia diamesogenos</i> , <i>Hibbertia microphylla</i> .
Sedges	<10%	<i>Lepidosperma hopperi</i> , <i>Lepidosperma tenue</i> .
Herbs	<10%	<i>Borya nitida</i> , <i>Stypandra glauca</i> , <i>Cheilanthes austrotenuifolia</i> .

## 4.2 Flora

A total of 292 vascular plant species from 67 families (including 50 weeds) were recorded opportunistically from the Survey Area (Appendix C). This exceeds the species diversity previously known from the AHP, according to vouchers with the Western Australian Herbarium (approximately 244 taxa within the AHP, Appendix C).

Four Priority flora and critical habitat for one Threatened flora were recorded from within and adjacent to the Survey Area. These are discussed below and are mapped in Appendix B.

*Caladenia harringtoniae* is a Threatened taxon previously recorded from the Survey Area. It is an orchid with an underground tuber that sometimes produces leaves and flowers from October to November and is typically more prolific after summer fire (DEWHA 2008). It has a restricted distribution between Albany and Nannup, occurring in swamps, creek lines and granite seepages. It is listed as vulnerable under the EPBC Act.

Several individuals of *Caladenia harringtoniae* were previously observed and vouchered (Western Australian Herbarium Accession 00260355) on the 28<sup>th</sup> September, 1983 at an approximate location within or very close to the Survey Area on the “NNW slope of Mt Clarence. 200m above pine forest. ca 400m SE of jnc of Watkins & Serpentine Rds”. Photographs at the location indicate the associated habitat was a granite sheet seepage area (Plate 4a).

The distinctive habitat and topographic description of the previous occurrence of *Caladenia harringtoniae* was used to define and map approximately 0.5 hectares of critical habitat within the Survey Area (Plate 4b). An additional 8.5 hectares of potential habitat was mapped, including other shrublands associated with granite. Other Eucalyptus/Corymbia Forest within the Survey area is considered unlikely to be suitable habitat.

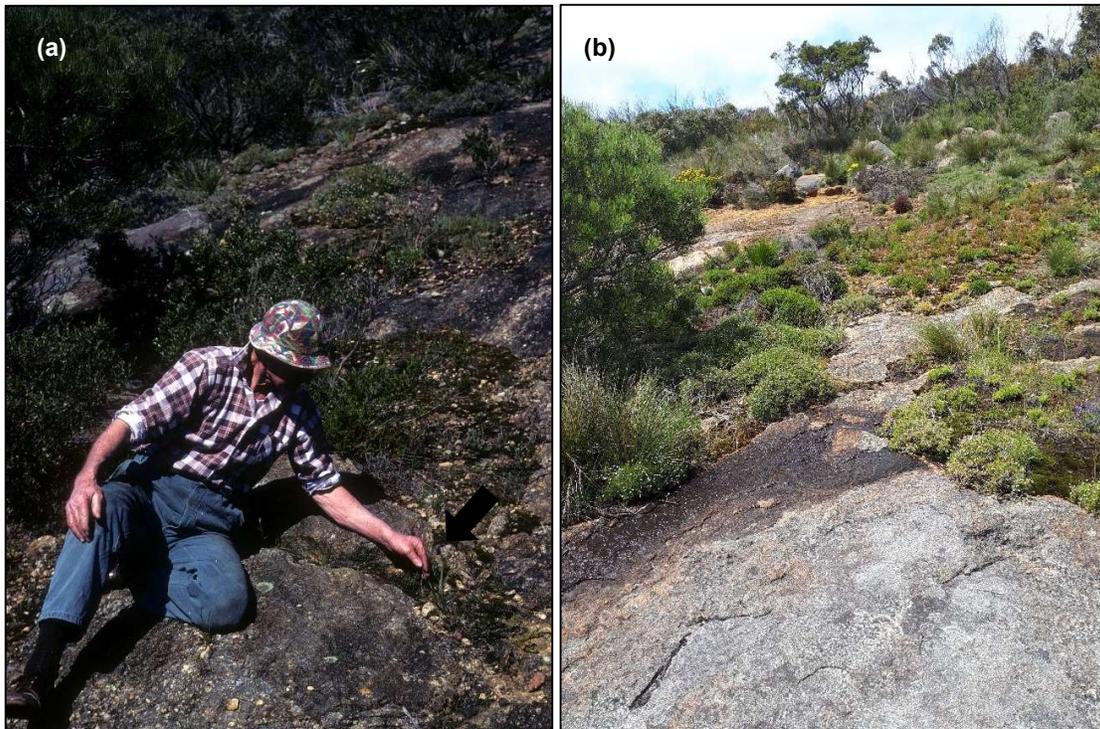


Plate 4. (a) Ron Herberle indicating several emergent plants of *Caladenia harringtoniae* on Mt Clarence. Photo taken by Professor Steve Hopper in the afternoon, 30<sup>th</sup> September, 1983. (b) Species of *Borya*, *Hakea*, *Dodonaea* and *Lepidosperma* on sheet granite on the North-West face of Mt Clarence were determined as critical habitat for *Caladenia harringtoniae*.

Field assessment of the Survey Area and surrounding exposed granite was undertaken over multiple days in early October and no emergent individuals were detected. The timing of the field visitation was verified as appropriate, as a nearby (6km), recently discovered population of *Caladenia harringtoniae* population was observed to be flowering during the survey period (Plate 5). The failure to detect *Caladenia harringtoniae* in a single survey season does not exclude its presence from the Survey Area or its potential to emerge in future years, particularly after fire.



Plate 5. A population of *Caladenia harringtoniae* discovered in spring 2017 from Big Grove, Albany. Approximately 6 km from the Mt Clarence. Two individuals were flowering during the field visitation period of the Survey Area.

*Stylidium falcatum* is a Priority 1 taxon with a narrow geographic range between Mt Melville and Mt Taylor, in the vicinity of Albany (Plate 6). It is associated with coastal granite outcrops and surrounding hillslopes.

Within the Survey Area it was relatively abundant on the northern slopes of Mt Clarence, particularly in recently burnt areas of Gastrolobium/Hakea Shrubland. An additional occurrence was recorded on the lower slope of Mt Adelaide. Approximately 90 individuals in total were recorded within the Survey Area.

Scattered occurrences of *S. falcatum* at low population densities within long unburnt Shrubland and Eucalyptus/Corymbia Forest, suggest that populations of this taxon may fluctuate significantly in relation to fire history. Therefore, sites with currently low plant numbers may experience an increase after fire.



Plate 6. *Styloidium falcatum* (P1)



Plate 7. *Spyridium spadiceum* (P4)

*Spyridium spadiceum* is a Priority 4 taxon known from a limited number of populations in coastal reserves in the vicinity of Albany and a disjunct population in the Porongurups (Plate 7). It is associated with granite or limestone outcrops and has been noted to be particularly abundant after fire.

In the Survey Area the species was relatively abundant in *Gastrolobium*/*Hakea* Shrubland and Granite Shrublands on the slopes of Mt Clarence, either in canopy openings adjacent to large granite boulders or on the margins of recently burnt granite sheets. Approximately 520 individuals were recorded within the Survey Area.



Plate 8. *Thysanotus isantherus* (P4)

*Thysanotus isantherus* is a Priority 4 taxon known from several coastal granite outcrops between Betty's Beach and Walpole and a disjunct occurrence near Cape Leeuwin (Plate 8). It is most commonly associated with shallow soil herblands on the margin of granite sheets. It is inconspicuous due to its small size (<15 cm) and few dull pink flowers and its leaves that wither to an underground tuber during dry periods.

In the Survey Area it was relatively abundant in moss beds amongst Granite Shrubland and Herbland on both Mt Clarence and Mt Adelaide. Approximately 380 individuals were recorded within the Survey Area.

*Melaleuca ringens* is a Priority 4 taxon known from multiple coastal limestone headlands and inlets between Albany and Walpole (Plate 9). Dozens of plants were recorded adjacent to the Survey Area on Marine Drive, near Ellen Cove. It is often used for revegetation and ornamental purposes, which may be the origin of this population.



Plate 9. *Melaleuca ringens* (P4)

### 4.3 Likelihood of Occurrence Assessment

The desktop assessment identified 58 conservation significant taxa are known, or may occur in the vicinity of the Survey Area. A likelihood of occurrence was determined using reported habitat information in herbarium voucher labels, published descriptions, distribution records and knowledge from the author (Table 2).

Of the species identified from the desktop analysis and that were not recorded during the survey, five Threatened and 17 Priority flora are considered possible or likely to occur due to the presence of suitable habitat within the Survey Area. Survey limitations were identified for five of these taxa that may have prevented their detection during the field assessment. Two annual orchids (*Drakaea micrantha* (T) and *Thelymitra variegata* (P2)) and two inconspicuous herbaceous species (*Laxmannia jamesii* (P4) and *Drosera fimbriata* (P4)) may have finished flowering at the time of the survey. One shrub (*Synaphea preissii* (P3)) may have been overlooked if not flowering and due to the similar appearance of other congeners.

**Table 2. Likelihood of occurrence of conservation significant species recorded in the vicinity of the Survey Area (<10 km). Records are derived from Threatened and Priority flora dataset obtained from the Department of Biodiversity, Conservation and Attractions or the taxon is not recorded, but has the potential to occur according to the Protected Matters Search Tool (PMST) (Department of the Environment and Energy [DotEE] 2017a).**

Status, Taxon [FAMILY]	No. of Records	Description, Habitat & Distribution	Likelihood of Occurrence
T <i>Banksia brownii</i> [Proteaceae]	6	Bushy, non-lignotuberous shrub or tree (small), 1-6 m high. Flowers cream & brown/orange-red, Mar to Jul. Sand over laterite, gravel, loam over granite. In gullies.	Possible. Suitable habitat present, but conspicuous shrub unlikely to be overlooked.
T <i>Banksia goodii</i> [Proteaceae]	2	Lignotuberous, prostrate shrub, ca 0.2 m high. Flowers orange-brown-red, May or Nov. White or grey sand over laterite.	Unlikely. Limited suitable habitat present.
T <i>Banksia verticillata</i> [Proteaceae]	5	Non-lignotuberous shrub or tree (rarely), 1.3-6 m high. Flowers yellow-orange, Jan to Apr. Sandy loam. On or beside granite outcrops.	Possible. Suitable habitat present, but conspicuous shrub unlikely to be overlooked.

Status, Taxon [FAMILY]	No. of Records	Description, Habitat & Distribution	Likelihood of Occurrence
T <i>Caladenia harringtoniae</i> [Orchidaceae]	1	Tuberous, perennial, herb, 0.2-0.4 m high. Flowers pink, Oct to Nov. Sandy loam. Winter-wet flats, margins of lakes, creeklines, granite outcrops.	Present (see results)
T <i>Calectasia cyanea</i> [Dasyopogonaceae]	1	Rhizomatous, clump forming, woody perennial, herb, 0.1-0.6 m high, to 0.3 m wide. Flowers blue/purple, Jun to Oct. White, grey or yellow sand, gravel.	Unlikely. Typically associated with coastal sand hills.
T <i>Chordifex abortivus</i> [Restionaceae]	0	Rhizomatous, erect perennial, herb, to 0.5 m high. Flowers brown, Sep to Oct. Sand. Low rises & undulating areas.	Possible. Taxon occurs in a wide variety of habitats so could potentially occur.
T <i>Conostylis misera</i> [Haemodoraceae]	1	Rhizomatous, tufted perennial, grass-like or herb, 0.05-0.18 m high. Flowers yellow, Oct to Nov. White or grey sand, sandy loam. Winter-wet flats.	Unlikely. No lowland wetland habitat present.
T <i>Darwinia collina</i> [Myrtaceae]	0	Erect shrub, 0.3-1.2 m high. Flowers yellow, Sep to Nov. Peaty sand. Rocky quartzite slopes.	Unlikely. Quartzite endemic.
T <i>Darwinia oxylepis</i> [Myrtaceae]	0	Upright, dense shrub, 0.6-1.5 m high. Flowers red, Aug to Nov. Stony, peaty sand. Rocky gullies.	Unlikely. Quartzite endemic.
T <i>Diuris drummondii</i> [Orchidaceae]	0	Tuberous, perennial, herb, 0.5-1.05 m high. Flowers yellow, Nov to Dec or Jan. Low-lying depressions, swamps.	Unlikely.
T <i>Drakaea micrantha</i> [Orchidaceae]	0	Tuberous, perennial, herb, 0.15-0.3 m high. Flowers red & yellow, Sep to Oct. White-grey sand.	Possible. (Season dependent)
T <i>Isopogon uncinatus</i> [Proteaceae]	3	Tufted spreading or prostrate, non-lignotuberous shrub, 0.05-0.4 m high. Flowers yellow/cream, Oct to Nov. Loam or sand on granite, peaty sand. Swampy depressions, hillslopes.	Possible.
T <i>Kennedia glabrata</i> [Fabaceae]	0	Prostrate shrub, 0.05-0.5 m high, to 5 m wide. Flowers red, Aug to Nov. Soil pockets, sandy soils. Granite outcrops.	Possible.
T <i>Microtis globula</i> [Orchidaceae]	0	Tuberous, perennial, herb, 0.18-0.35 m high. Flowers yellow-green, Dec or Jan. Peaty soils. Winter-wet swamps.	Unlikely No lowland wetland habitat present.
T <i>Sphenotoma drummondii</i> [Ericaceae]	0	Tufted shrub, 0.15-0.5 m high. Flowers white, Sep to Dec. Stony or shallow soils over granite or quartzite. Steep rocky slopes, crevices of rocks.	Unlikely.
T <i>Verticordia fimbriolepis</i> subsp. <i>australis</i> [Malvaceae]	0	Slender shrub, 0.2-0.4 m high. Flowers pink, Oct to Dec. Shallow sand, clay loam. Granite outcrops.	Unlikely.
X <i>Acacia prismifolia</i> [Fabaceae]	0	Shrub, 0.15-0.5 m high. Rocky slopes.	Unlikely.
P1 <i>Caladenia evanescens</i> [Orchidaceae]	1	Tuberous, perennial, herb, 0.15-0.2 m high. Flowers green-cream-yellow, Nov. Sand. Consolidated sand dunes.	Unlikely.
P1 <i>Coleanthera coelophylla</i> [Ericaceae]	1	Erect shrub, 0.3-0.6 m high. Flowers pink/white, Sep to Nov. Gravelly sandy soils.	Possible.
P1 <i>Stylidium falcatum</i> [Stylidiaceae]	9	Perennial, herb, 0.15-0.35(-0.6) m high. Flowers white, Oct to Nov. Sand, gravelly clay loam. Plains, lateritic ridges.	Present.
P1 <i>Thomasia multiflora</i> [Malvaceae]	2	Spreading shrub, 0.3-1 m high, to 2 m wide. Flowers pink-purple, Sep to Oct. Black sand. Seasonally wet areas, granite outcrops.	Possible.
P1 <i>Thomasia purpurea</i> x <i>solanacea</i> [Malvaceae]	2	Shrub, 0.5-0.8 m high. Flowers pink-purple, Nov to Dec or Jan. Grey sand over limestone. Creek sides.	Unlikely.
P2 <i>Agrostocrinum scabrum</i> subsp. <i>littorale</i> [Heremacallidaceae]	1	Rhizomatous, perennial, herb, to 0.15 m high. Flowers blue, Oct to Nov. Shallow granite loams. Coastal slopes.	Unlikely.
P2 <i>Conospermum spectabile</i> [Proteaceae]	1	Erect, compact shrub, 0.5-0.8 m high. Flowers white & blue, Oct to Nov. Sandy soils.	Unlikely.
P2 <i>Gyrostemon thesioides</i> [Gyrostemonaceae]	4	Straggling, decumbent shrub, to 0.7 m high. Flowers red-orange-yellow/yellow-green, Nov. Sand over limestone. Consolidated coastal dunes.	Unlikely.
P2 <i>Isopogon buxifolius</i> var. <i>buxifolius</i> [Proteaceae]	2	Upright shrub, 0.45-1 m high. Flowers pink-cream, Jul to Dec. Grey sand. Swampy areas.	Unlikely.
P2 <i>Leucopogon bracteolaris</i> [Ericaceae]	2	Shrub, 0.25-1 m high. Flowers white, Feb or May or Jul or Oct. Stony sand, gravelly loam.	Possible.
P2 <i>Leucopogon cymbiformis</i> [Ericaceae]	1	Dense, erect or spreading shrub, 0.1-0.6(-0.8) m high. Flowers white, Jul to Nov or Feb to Mar. White/grey or yellow sand, lateritic gravelly soils. Sandplains, wet flats, foothills.	Possible.

Status, Taxon [FAMILY]	No. of Records	Description, Habitat & Distribution	Likelihood of Occurrence
P2 <i>Stylidium articulatum</i> [Stylidiaceae]	2	Rosetted perennial, herb, 0.15-0.25 m high, Leaves erect to spreading, oblanceolate, 3-8 cm long, 5-14 mm wide, apex subacute to acute, glabrous. Scape glandular in upper half. Inflorescence paniculate. Flowers pink, Nov to Dec. Sandy loam, granite. Hills, coastal heath.	Possible.
P2 <i>Thelymitra variegata</i> [Orchidaceae]	4	Tuberous, perennial, herb, 0.1-0.35 m high. Flowers orange & red & purple & pink, Jun to Sep. Sandy clay, sand, laterite.	Possible.
P3 <i>Acacia ataxiphylla</i> subsp. <i>ataxiphylla</i> [Fabaceae]	2	Prostrate, sprawling shrub, 0.15-0.5 m high, to 1 m wide. Flowers yellow, Nov to Dec or Jan. Gravelly clay loam, white/grey sand. Flats, roadsides.	Possible.
P3 <i>Andersonia auriculata</i> [Ericaceae]	1	Erect or spreading shrub, 0.1-0.3(-0.5) m high. Flowers white & blue, Apr to Oct. Grey or peaty sand, often over laterite. Swampy areas, granite outcrops.	Possible.
P3 <i>Andersonia setifolia</i> [Ericaceae]	1	Decumbent to erect, cushion-forming shrub, 0.05-0.15 m high. Flowers red/white, Jun to Oct. Sandy & gravelly soils. Hillslopes & breakaways.	Possible.
P3 <i>Boronia crassipes</i> [Rutaceae]	8	Erect, spindly shrub, 0.5-2 m high. Flowers red-pink, Aug to Sep. Sand, peaty sand. Winter-wet swamps, creeklines.	Unlikely. No lowland wetland habitat present.
P3 <i>Chorizema carinatum</i> [Fabaceae]	1	Erect or spreading shrub, 0.1-0.6 m high. Flowers yellow, Oct to Dec. Sand, sandy clay.	Unlikely.
P3 <i>Juncus meianthus</i> [Juncaceae]	1	Tufted perennial, herb, 0.05-0.2 m high, to 0.4 m wide. Flowers brown, Nov to Dec or Jan. Black sand, sandy clay. Creeks, seepage areas.	Possible. No lowland wetland habitat present, some granite seepages.
P3 <i>Leucopogon alternifolius</i> [Ericaceae]	3	Erect or semi-erect, scrambling shrub, 0.1-1(-2) m high. Flowers white/white-pink, Aug to Dec. Grey/white sand. Swampy areas, seasonally wet areas.	Unlikely. No lowland wetland habitat present.
P3 <i>Leucopogon interruptus</i> [Ericaceae]	1	Spreading shrub, to 2 m high. Grey sand over granite.	Possible.
P3 <i>Poa billardierei</i> [Poaceae]	2	Tussock grass to 0.5 m. Foredunes, drift sands.	Unlikely. Occurs in coastal sands.
P3 <i>Synphea preissii</i> [Proteaceae]	5	Erect, low shrub, 0.15-0.4 m high. Flowers yellow, Jul to Nov. Sand, gravelly loam.	Likely. Occurs on coastal granites. Could be overlooked if in low numbers or if infertile.
P3 <i>Verticordia endlicheriana</i> var. <i>angustifolia</i> [Myrtaceae]	1	Erect shrub, 0.3-0.5 m high. Flowers yellow, Oct to Nov. Sandy clay. Granite outcrops.	Possible. Known from granites west of Survey Area..
P4 <i>Adenanthos x cunninghamii</i> [Proteaceae]	7	Erect open shrub, 1-3 m high. Flowers red/pink-red, Mar or Sep to Oct. Grey sand. Coastal dunes & sandplains.	Unlikely. Occurs in coastal sands.
P4 <i>Banksia serra</i> [Proteaceae]	8	Erect, slender, non-lignotuberous shrub, 1-4(-7) m high. Flowers yellow/cream-green, Jul to Sep. Gravel, sand or clay loam over laterite. Hillslopes.	Possible. Typically associated laterite. Limited habitat in Survey Area.
P4 <i>Corybas limpidus</i> [Orchidaceae]	1	Tuberous, perennial, dwarf herb, 0.01 m high. Flowers red & green, Aug to Sep. Sand. Coastal dunes.	Unlikely. Occurs in coastal sands.
P4 <i>Drosera fimbriata</i> [Droseraceae]	1	Erect tuberous, perennial, herb, 0.05-0.15 m high. Flowers white, Sep to Oct. White sand, granite.	Possible. Potential habitat present. Potentially overlooked if finished flowering, likely to flower before survey period.
P4 <i>Gahnia sclerioides</i> [Cyperaceae]		Lax, slender rhizomatous, perennial, grass-like or herb (sedge), 0.3-0.9 m high. Loam, sandy soils. Moist shaded situations.	Unlikely.
P4 <i>Gonocarpus pusillus</i> [Haloragaceae]	1	Prostrate annual, herb, 0.05-1.2 m high. Flowers green/yellow-red, Nov to Dec. Grey sandy clay. Winter-wet swamps.	Unlikely.
P4 <i>Laxmannia jamesii</i> [Asparagaceae]	4	Tufted, stilt-rooted perennial, herb, 0.05-0.2 m high. Flowers red & white, May to Jul. Grey sand. Winter-wet locations.	Possible.
P4 <i>Lepidium pseudotasmaticum</i> [Brassicaceae]	1	Erect annual or biennial, herb, 0.2-0.4(-1) m high. Flowers white-green, Feb or Dec. Loam, sand.	Possible.
P4 <i>Lysinema lasianthum</i> [Ericaceae]	4	Spindly shrub, 0.25-0.7 m high. Flowers white-cream, Jul to Nov. Swamps, seasonally wet areas.	Unlikely. No lowland wetland habitat present.
P4 <i>Microtis pulchella</i> [Orchidaceae]	1	Tuberous, perennial, herb, 0.12-0.25 m high. Flowers white, Nov to Dec or Jan. Peaty sand. Winter-wet swamps.	Unlikely. No lowland wetland habitat present.
P4 <i>Microtis quadrata</i> [Orchidaceae]	1	Erect herb with tuber, 0.4 m high. Greenish flowers. Grey sandy clay. Wet areas.	Unlikely. No lowland wetland habitat present.

Status, Taxon [FAMILY]	No. of Records	Description, Habitat & Distribution	Likelihood of Occurrence
P4 <i>Myosotis australis</i> [Boraginaceae]	1	Erect or procumbent annual, herb, up to 0.3 m high. Flowers white/blue, Aug to Nov. Grey sand over limestone.	Unlikely. No limestone present.
P4 <i>Spyridium spadicum</i> [Rhamnaceae]	4	Erect slender or weak semi-prostrate shrub, 0.15-3 m high. Flowers white, Aug to Dec or Jan to Feb or Apr. Sand or gravelly loam. Granitic hills.	Present.
P4 <i>Thomasia quercifolia</i> [Malvaceae]	8	Shrub to 1 m high. Pink purple flowers in Apr, Aug, Oct, Nov or Dec. Karri loam or grey coastal sand.	Unlikely. Occurs in coastal sands or limestone.
P4 <i>Thomasia solanacea</i> [Malvaceae]	1	Erect shrub, 0.5-3 m high. Flowers blue-purple-pink, Sep to Dec. Alluvium, sand over limestone, rocky loam. Coastal areas.	Unlikely. Occurs in coastal sands.
P4 <i>Thomasia</i> sp. Toolbrunup (G.J. Keighery 9895) [Malvaceae]	1	Erect shrub, 0.7-3 m high. Flowers pink, Sep to Nov. Peaty acid sand over quartzite, shallow loam over schist or siltstones. Steep slopes, gullies near summits, creeklines.	Unlikely. Record from early 1900's
P4 <i>Thysanotus isantherus</i> [Asparagaceae]	8	Caespitose perennial, herb (with tuberous roots), to 0.15 m high. Flowers purple, Nov to Dec. Granite.	Present.

## 4.4 Weeds

Of the 50 weed species recorded, one is considered nationally significance (Bridal Creeper, *Asparagus asparagoides*, DoEE 2017b) and several others are locally problematic and were mapped within the Survey Area (Appendix B). Pink Ragwort (*Senecio glastifolius*) and Milkwort (*Polygala myrtifolia*) were particularly abundant and readily invading undisturbed vegetation. Japanese honeysuckle (*Lonicera japonica*) and Chinese Trumpet Flower (*Campsis* sp.) occurred in isolated infestations where prompt eradication would be effective.



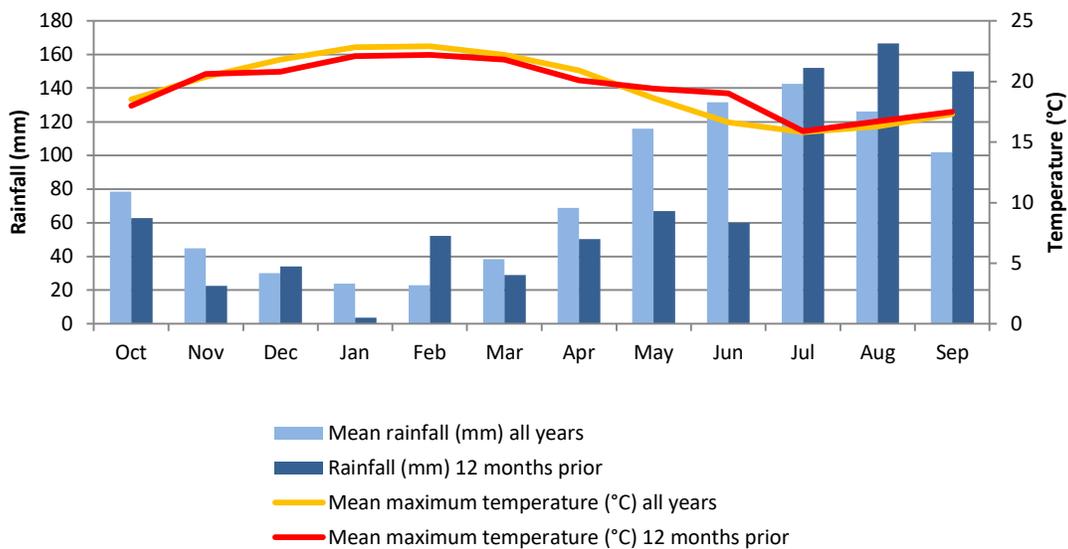
Plate 10. (a) Milkwort, (b) Pink Ragwort, (c) Chinese Trumpet Flower and (d) Japanese Honeysuckle.

## 5 SURVEY TIMING & LIMITATIONS

The assessment was conducted on the 4<sup>th</sup>, 5<sup>th</sup>, 10<sup>th</sup> and 12<sup>th</sup> of October 2017. Climatic characteristics of the site and the seasonal conditions preceding the field work may have affected the emergence of annual species and the flowering of perennial species. The Survey Area occurs within a high rainfall zone and the assessment was conducted after sufficient winter rainfall (Figure 2). Consequently, soil moisture conditions were not considered as a limitation for the emergence and flowering of Threatened or Priority species within the Survey Area.

Two native taxa were not identified to species level due to the absence of reproductive material. No unidentified taxa are considered likely to be Threatened or Priority taxa identified in the desktop assessment.

The information provided within this report is accurate and correct to the best of the author's knowledge. However, no liability is accepted for loss, damage or injury arising from its use. Plant populations can fluctuate over time, particularly after disturbance events such as fire and drought. Consequently, all mapping, vegetation descriptions and population estimates within this report should not be considered accurate indefinitely.



**Figure 2.** Climate statistics for 12 months prior to the assessment compared with historical averages (all years available) from the nearest weather station (Albany 9500) (BOM 2017). Total rainfall in 12 months prior to the survey was 850 mm compared to the historic average of 925 mm.

## 6 REFERENCES

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## 7 APPENDIX A - Conservation Status Definitions

**Table A1. Acts used in environmental impact assessment.**

<i>Environment Protection and Biodiversity Conservation [EPBC] Act 1999</i>	<a href="https://www.legislation.gov.au/Details/C2016C00777">https://www.legislation.gov.au/Details/C2016C00777</a>
<i>Wildlife Conservation [WC] Act 1950</i>	<a href="https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a908.html">https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a908.html</a>
<i>Environmental Protection [EP] Act 1986</i>	<a href="https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a252.html">https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a252.html</a>
<i>Biodiversity Conservation [BC] Act 2016</i>	<a href="https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a147120.html">https://www.slp.wa.gov.au/legislation/statutes.nsf/law_a147120.html</a>

**Table A2. The categories for flora and fauna listed as Threatened or specially protected. Taxa can be recognised as Threatened (T) or Conservation Dependent under Federal (EPBC) and / or State (WC / BC) Acts.**

Threat category	Definition
Threatened - Critically Endangered (T-CR)	Considered to be facing an extremely high risk of extinction in the wild
Threatened – Endangered (T-EN)	Considered to be facing a very high risk of extinction in the wild
Threatened – Vulnerable (T-VN)	Considered to be facing a high risk of extinction in the wild
Threatened - Presumed extinct (T-EX)	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Conservation dependant (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened
Migratory birds protected under international agreement (IA)	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation

**Table A3. Flora or fauna that are potentially threatened but do not meet the survey criteria or are otherwise data deficient are listed under Priority categories.**

Category	Description
Priority One (P1)	Known from few locations (generally <5), small populations and/or occurring on land with insecure tenure
Priority Two (P2)	Known from few locations (generally <5), small populations with some occurring on land with secure tenure
Priority Three (P3)	Known from several locations with habitat not under imminent threat
Priority Four (P4)	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy

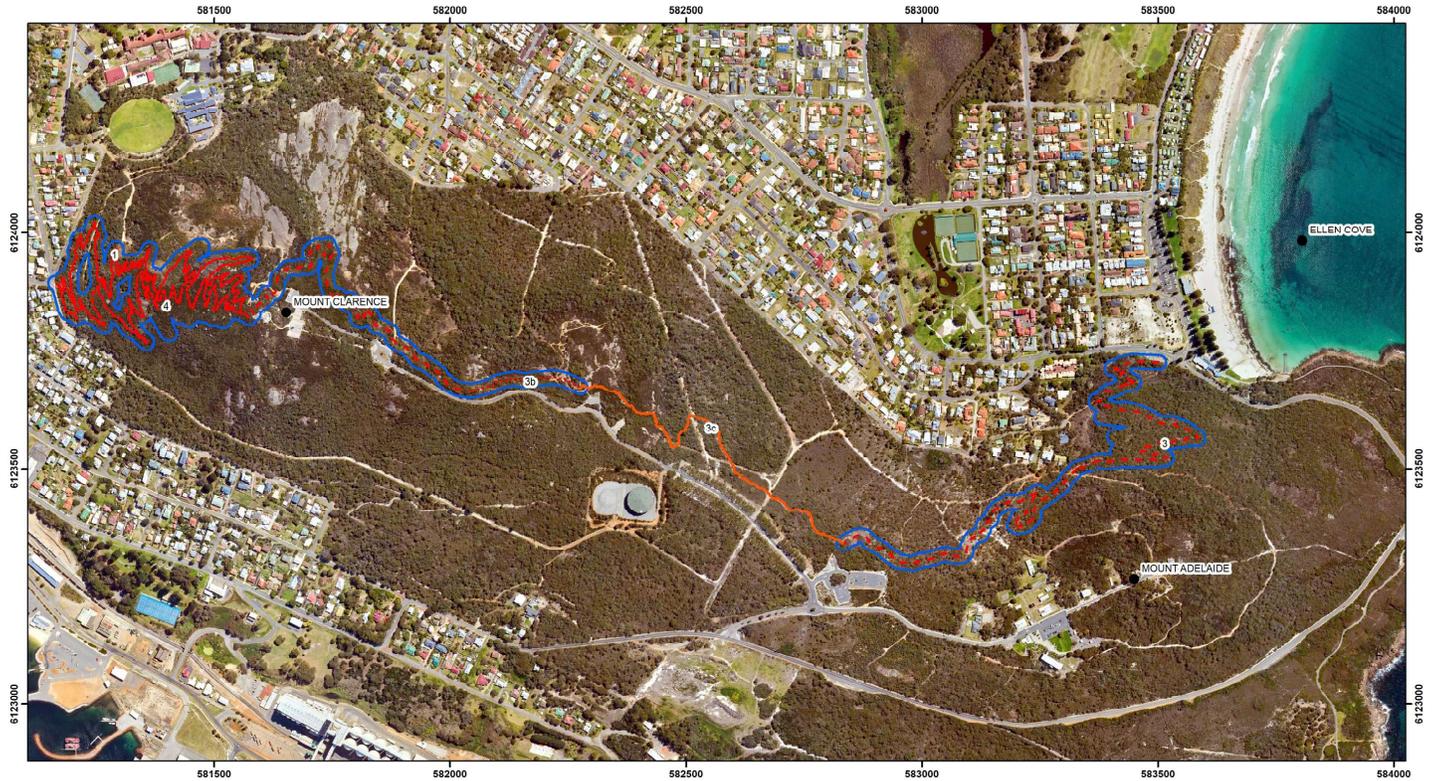
**Table A4. Categories for ecological communities listed as Threatened (TEC). Communities can be recognised as Threatened under Federal (EPBC) and / or State (WC / BC) Acts.**

Category	Description
Presumed totally destroyed (PU)	Adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	Adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
Endangered (EN)	Adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
Vulnerable (VU)	Adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future.

**Table A5. The categories for ecological communities listed as Priority (PEC).**

Category	Brief description
Priority One (P1)	Known from very few occurrences with a very restricted distribution (generally $\leq 5$ occurrences or a total area of $\leq 100$ ha) and are currently under threat
Priority Two (P2)	Known from few occurrences with a restricted distribution (generally $\leq 10$ occurrences or a total area of $\leq 200$ ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years)
Priority Three (P3)	Known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:  (ii) known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;  (iii) made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc
Priority Four (P4)	Adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list. These communities require regular monitoring
Priority Five (P5)	Conservation dependant ecological communities. Not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years

## 8 APPENDIX B - Vegetation and Flora Maps



**Map 1: Proposed Trail Alignments and Flora Survey Area, Albany Heritage Park Trail Network**

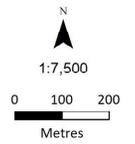
Map produced by Damien Rathbone on 15/12/2017.  
 Report Reference: Flora Survey: Albany Heritage Park Trail Network  
 Map Projection: Transverse Mercator Horizontal Datum GDA 1994 Grid: MGA Zone 50 Map Size: A3

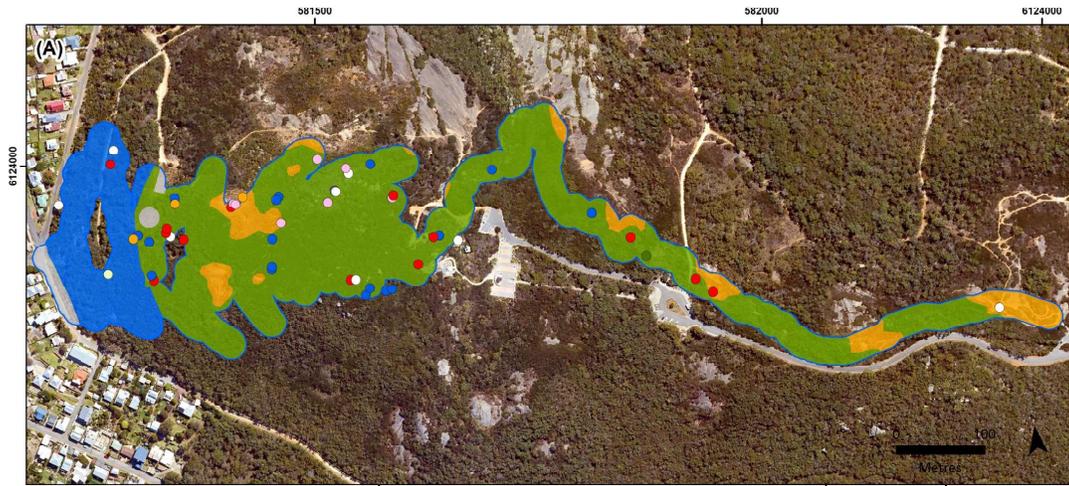
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**Trail Alignments**

- 1 - Proposed 2400m
- - - 2 - Proposed 3200m
- ..... 3b - Upgraded 250m
- 3c - Existing 900m
- - - 4 - Proposed 2100m

Survey Area





**Map 2A&B: Vegetation Formations and Weeds, Albany Heritage Park Trail Network.**

Map produced by Damien Rathbone on 15/12/2017.  
 Report Reference: Flora Survey: Albany Heritage Park Trail Network.  
 Map Projection: Transverse Mercator Horizontal Datum: GDA 1984  
 Grid: MGA Zone 50. Map Size: A3

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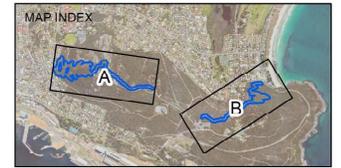
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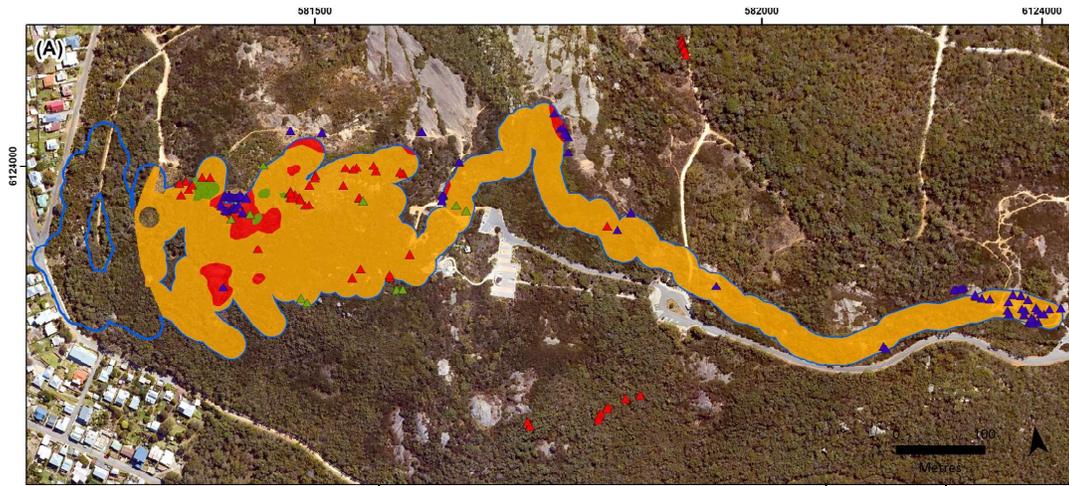
**Vegetation Formations**

- Gastrolobium/Hakea Shrubland
- Granite Shrubland and Herbland
- Eucalyptus/Corymbia Forest
- Cleared

**Weeds**

- Agapanthus
- Blue Periwinkle
- Bridal Creeper
- Bugle Lily
- Dolicos
- Japanese Honeysuckle
- Kangaroo Thorn
- Milkwort
- Pampas Grass
- Pink Ragwort
- Sweet Pittosporum
- Sydney Wattle
- Victorian Teatree





**Map 3A&B: Conservation Significant Flora, Albany Heritage Park Trail Network.**

Map produced by Damien Rathbone on 15/12/2017.  
 Report Reference: Flora Survey: Albany Heritage Park Trail Network (SE1706).  
 Map Projection: Transverse Mercator Horizontal Datum: GDA 1984  
 Grid: MGA Zone 50. Map Size: A3

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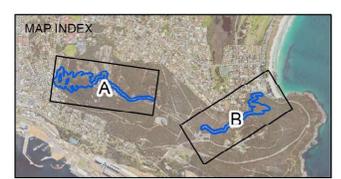
**Conservation Significant Flora**

**Points**

- ▲ *Stylidium falcatum* (P1)
- ▲ *Spyridium spadiceum* (P4)
- ▲ *Melaleuca ringens* (P4)
- ▲ *Thysanotus isantherus* (P4)

**Polygons**

- *Caladenia harringtoniae* (T) Critical Habitat
- *Caladenia harringtoniae* (T) Potential Habitat
- *Spyridium spadiceum* (P4)



## 9 APPENDIX C - Plant Taxa Inventory

Vascular plant taxa recorded in the Survey Area (Southern Ecology) compared to the Western Australian Herbarium vouchers from the AHP. Voucher records were spatially selected from the AHP (including a 100m buffer) in an ARCGIS environment. Plant nomenclature and status according WAH (1998-). \*denotes weed taxon.

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
Agapanthaceae	* <i>Agapanthus praecox</i>		x
Anarthriaceae	<i>Anarthria gracilis</i>		x
	<i>Anarthria prolifera</i>	x	x
	<i>Anarthria scabra</i>	x	x
	<i>Lyginia barbata</i>		x
Apiaceae	<i>Actinotus glomeratus</i>	x	x
	<i>Daucus glochidiatus</i>		x
	<i>Platysace filiformis</i>	x	x
	<i>Platysace pendula</i>		x
	<i>Xanthosia candida</i>	x	x
	<i>Xanthosia huegelii</i>	x	x
	<i>Xanthosia rotundifolia</i>	x	x
	<i>Xanthosia singuliflora</i>		x
Apocynaceae	* <i>Vinca major</i>		x
Araliaceae	<i>Hydrocotyle alata</i>	x	
	<i>Hydrocotyle callicarpa</i>		x
	<i>Trachymene pilosa</i>	x	x
Asparagaceae	* <i>Asparagus asparagoides</i> (WONS)		x
	<i>Chamaescilla corymbosa</i>	x	x
	<i>Laxmannia minor</i>	x	x
	<i>Lomandra integra</i>	x	
	<i>Lomandra nigricans</i>	x	x
	<i>Lomandra pauciflora</i>	x	x
	<i>Lomandra purpurea</i>		x
	<i>Lomandra sericea</i>		x
	<i>Thysanotus gracilis</i>	x	
	<i>Thysanotus isantherus</i> (P4)	x	x
	<i>Thysanotus multiflorus</i>		x
	<i>Thysanotus pauciflorus</i>	x	x
Aspleniaceae	<i>Asplenium flabellifolium</i>	x	
Asteraceae	* <i>Arctotheca calendula</i>		x
	* <i>Conyza bonariensis</i>		x
	* <i>Cotula turbinata</i>		x
	* <i>Gamochoeta calviceps</i>		x

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>		X
	<i>Olearia axillaris</i>	X	X
	<i>Olearia</i> sp. <i>Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)	X	
	<i>Pithocarpa pulchella</i> var. <i>melanostigma</i>	X	X
	<i>Pithocarpa ramosa</i>	X	
	<i>Pseudognaphalium luteoalbum</i>		X
	* <i>Senecio glastifolius</i>		X
	<i>Senecio glomeratus</i>		X
	* <i>Sonchus asper</i>		X
	* <i>Sonchus oleraceus</i>		X
	* <i>Ursinia anthemoides</i>		X
Bignoniaceae			
	<i>Campsis</i> sp.		X
Boryaceae			
	<i>Borya nitida</i>	X	X
Brassicaceae			
	* <i>Cardamine hirsuta</i>		X
Campanulaceae			
	<i>Isotoma hypocrateriformis</i>	X	X
	<i>Lobelia anceps</i>		X
	<i>Lobelia rhombifolia</i>		X
Caprifoliaceae			
	* <i>Lonicera japonica</i>		X
Caryophyllaceae			
	* <i>Petrothagia dubia</i>		X
	* <i>Sagina apetala</i>		X
	* <i>Silene gallica</i> var. <i>quinquevulnera</i>		X
Casuarinaceae			
	<i>Allocasuarina fraseriana</i>		X
	<i>Allocasuarina humilis</i>		X
	<i>Allocasuarina lehmanniana</i> subsp. <i>lehmanniana</i>	X	X
Celastraceae			
	<i>Stackhousia pubescens</i>	X	
	<i>Tripterococcus brunonis</i>	X	
Centrolepidaceae			
	<i>Aphelia brizula</i>		X
	<i>Centrolepis drummondiana</i>		X
	<i>Centrolepis mutica</i>		X
	<i>Centrolepis pilosa</i>		X
	<i>Centrolepis polygyna</i>		X
Colchicaceae			
	<i>Burchardia congesta</i>	X	X
	<i>Wurmbea dioica</i>	X	
Cupressaceae			
	<i>Callitris preissii</i> (planted)		X
Cyperaceae			
	<i>Cyathochaeta avenacea</i>		X
	<i>Cyathochaeta equitans</i>	X	X
	* <i>Cyperus congestus</i>		X
	<i>Evandra aristata</i>	X	

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Ficinia nodosa</i>	X	X
	<i>Isolepis cernua</i>		X
	<i>Isolepis marginata</i>	X	
	<i>Lepidosperma gladiatum</i>		X
	<i>Lepidosperma gracile</i>	X	X
	<i>Lepidosperma hopperi</i>		X
	<i>Lepidosperma squamatum</i>		X
	<i>Lepidosperma striatum</i>		X
	<i>Lepidosperma tenue</i>		X
	<i>Mesomelaena graciliceps</i>		X
	<i>Mesomelaena tetragona</i>		X
	<i>Schoenus acuminatus</i>		X
	<i>Schoenus breviculmis</i>		X
	<i>Schoenus curvifolius</i>		X
	<i>Schoenus nanus</i>		X
	<i>Schoenus odontocarpus</i>		X
	<i>Schoenus subbarbatus</i>		X
	<i>Schoenus subfascicularis</i>		X
	<i>Schoenus sublateralis</i>	X	
	<i>Tetragia octandra</i>		X
	<i>Tetragia</i> sp. Jarrah Forest (R. Davis 7391)		X
	<i>Tricostularia exsul</i>	X	
Dasygongonaceae			
	<i>Dasygongon bromeliifolius</i>	X	X
	<i>Kingia australis</i>	X	X
Dilleniaceae			
	<i>Hibbertia acerosa</i>	X	
	<i>Hibbertia cuneiformis</i>	X	
	<i>Hibbertia cunninghamii</i>	X	X
	<i>Hibbertia diamesogenos</i>		X
	<i>Hibbertia furfuracea</i>	X	X
	<i>Hibbertia microphylla</i>		X
Droseraceae			
	<i>Drosera erythrogyna</i>	X	
	<i>Drosera erythrorhiza</i>	X	X
	<i>Drosera glanduligera</i>	X	X
	<i>Drosera menziesii</i> subsp. <i>penicillaris</i>	X	
	<i>Drosera pallida</i>	X	X
Elaeocarpaceae			
	<i>Tetratea affinis</i>		X
	<i>Tetratea setigera</i>	X	
	<i>Tremandra diffusa</i>	X	X
	<i>Tremandra stelligera</i>	X	X
Ericaceae			
	<i>Andersonia caerulea</i> subsp. <i>caerulea</i>	X	X
	<i>Andersonia depressa</i>	X	
	<i>Andersonia simplex</i>		X
	<i>Andersonia sprengeloides</i>	X	X
	<i>Astroloma baxteri</i>	X	
	<i>Astroloma ciliatum</i>	X	

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Astroloma pallidum</i>	x	x
	<i>Leucopogon assimilis</i>		x
	<i>Leucopogon australis</i>	x	
	<i>Leucopogon bracteolaris</i> (P2)	x	
	<i>Leucopogon conostephioides</i>		x
	<i>Leucopogon glabellus</i>	x	
	<i>Leucopogon hirsutus</i>	x	
	<i>Leucopogon obovatus</i> subsp. <i>revolutus</i>	x	
	<i>Leucopogon oxycedrus</i>	x	x
	<i>Leucopogon pendulus</i>	x	x
	<i>Leucopogon propinquus</i>	x	x
	<i>Leucopogon rubricaulis</i>	x	
	<i>Leucopogon</i> sp. Coujinup (M.A. Burgman 1085)	x	
	<i>Leucopogon verticillatus</i>	x	x
	<i>Lysinema ciliatum</i>		x
	<i>Lysinema pentapetalum</i>	x	
	<i>Needhamiella pumilio</i>	x	
	<i>Sphenotoma capitata</i>	x	x
	<i>Sphenotoma gracilis</i>	x	
Euphorbiaceae	<i>Amperea ericoides</i>	x	x
	<i>Ricinocarpus glaucus</i>	x	x
Fabaceae	<i>Acacia alata</i> var. <i>alata</i>	x	x
	<i>Acacia browniana</i> var. <i>browniana</i>	x	x
	<i>Acacia crassiuscula</i>	x	x
	<i>Acacia cyclops</i>		x
	<i>Acacia littorea</i>	x	
	<i>Acacia longifolia</i>		x
	* <i>Acacia myrtifolia</i>	x	x
	* <i>Acacia paradoxa</i>		x
	<i>Acacia pulchella</i> var. <i>pulchella</i>	x	x
	<i>Acacia robiniae</i>	x	
	<i>Acacia sulcata</i> var. <i>sulcata</i>	x	x
	<i>Acacia tetragonocarpa</i>	x	x
	<i>Aotus intermedia</i>	x	
	<i>Bossiaea linophylla</i>	x	x
	<i>Bossiaea praetermissa</i>		x
	<i>Bossiaea ornata</i>		x
	<i>Bossiaea rufa</i>	x	
	<i>Callistachys lanceolata</i>	x	x
	<i>Callistachys</i> sp. south-coast variant (M. Carter 180)		x
	* <i>Chamaecytisus palmensis</i>		x
	<i>Chorizema diversifolium</i>	x	
	<i>Chorizema glycinifolium</i>	x	
	<i>Chorizema nanum</i>	x	
	<i>Chorizema rhombeum</i>	x	x
	<i>Daviesia flexuosa</i>	x	
	* <i>Dipogon lignosus</i>		x
	<i>Eutaxia myrtifolia</i>	x	

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Gastrolobium bilobum</i>	x	x
	<i>Gompholobium capitatum</i>	x	x
	<i>Gompholobium confertum</i>	x	
	<i>Gompholobium knightianum</i>	x	x
	<i>Gompholobium marginatum</i>	x	x
	<i>Gompholobium polymorphum</i>	x	
	<i>Gompholobium preissii</i>		x
	<i>Gompholobium scabrum</i>	x	
	<i>Gompholobium tomentosum</i>	x	
	<i>Hardenbergia comptoniana</i>	x	x
	<i>Hovea chorizemifolia</i>	x	x
	<i>Hovea elliptica</i>	x	x
	<i>Hovea trisperma</i>		x
	<i>Jacksonia horrida</i>	x	
	<i>Kennedia coccinea</i>	x	x
	* <i>Lathyrus latifolius</i>		x
	<i>Latrobea genistoides</i>	x	
	<i>Phyllota barbata</i>	x	
	* <i>Psoralea pinnata</i>		x
	<i>Pultenaea reticulata</i>	x	
	<i>Sphaerolobium alatum</i>	x	x
	<i>Sphaerolobium drummondii</i>	x	
	<i>Sphaerolobium grandiflorum</i>	x	x
	<i>Sphaerolobium medium</i>		x
	<i>Sphaerolobium nudiflorum</i>	x	
Gentianaceae			
	* <i>Centaurium erythraea</i>		x
Geraniaceae			
	* <i>Pelargonium capitatum</i>		x
Goodeniaceae			
	<i>Dampiera alata</i>	x	
	<i>Dampiera leptoclada</i>	x	x
	<i>Dampiera pedunculata</i>	x	x
	<i>Goodenia coerulea</i>	x	
	<i>Scaevola nitida</i>	x	
	<i>Scaevola striata</i> var. <i>striata</i>	x	x
Haemodoraceae			
	<i>Anigozanthos flavidus</i>	x	x
	<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	x	x
	<i>Conostylis candicans</i>	x	
	<i>Conostylis setigera</i> subsp. <i>setigera</i>	x	x
	<i>Haemodorum laxum</i>		x
	<i>Haemodorum simplex</i>		x
	<i>Haemodorum spicatum</i>	x	x
	<i>Phlebocarya ciliata</i>		x
	<i>Tribonanthes australis</i>	x	x
Haloragaceae			
	<i>Gonocarpus diffusus</i>	x	
Hemerocallidaceae			
	<i>Agrostocrinum hirsutum</i>		x

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Caesia occidentalis</i>	X	X
	<i>Johnsonia acaulis</i>		X
	<i>Johnsonia lupulina</i>	X	
	<i>Stypandra glauca</i>	X	X
Iridaceae			
	* <i>Freesia alba</i>		X
	* <i>Gladiolus undulatus</i>		X
	<i>Patersonia limbata</i>		X
	<i>Patersonia occidentalis</i> var. <i>occidentalis</i>	X	
	<i>Patersonia pygmaea</i>		X
	<i>Patersonia umbrosa</i> var. <i>umbrosa</i>		X
	* <i>Romulea rosea</i>		X
	* <i>Watsonia meriana</i> var. <i>bulbillifera</i>		X
Juncaceae			
	<i>Juncus pallidus</i>		X
Lentibulariaceae			
	<i>Utricularia multifida</i>	X	X
	<i>Utricularia tenella</i>	X	
Lindsaeaceae			
	<i>Lindsaea linearis</i>	X	X
Loganiaceae			
	<i>Logania buxifolia</i>		X
	<i>Logania serpyllifolia</i> subsp. <i>serpyllifolia</i>	X	
	<i>Logania vaginalis</i>	X	
	<i>Phyllangium paradoxum</i>		X
Loranthaceae			
	<i>Nuytsia floribunda</i>		X
Malvaceae			
	<i>Commersonia cygnorum</i>		X
	<i>Commersonia parviflora</i>	X	
	<i>Thomasia discolor</i>	X	X
	<i>Thomasia ?foliosa</i>		X
Myrtaceae			
	<i>Agonis flexuosa</i>	X	X
	<i>Agonis theiformis</i>	X	X
	<i>Astartea glomerulosa</i>	X	
	<i>Astartea pulchella</i>	X	
	<i>Callistemon glaucus</i>	X	
	<i>Calytrix leschenaultii</i>	X	
	<i>Calytrix</i> sp. Esperance (M.A. Burgman 4268A)	X	X
	<i>Corymbia calophylla</i>	X	X
	<i>Darwinia diosmoides</i>	X	
	<i>Darwinia vestita</i>	X	X
	<i>Eucalyptus cornuta</i>	X	X
	<i>Eucalyptus marginata</i>		X
	<i>Eucalyptus megacarpa</i>	X	X
	<i>Eucalyptus staeri</i>	X	X
	<i>Hypocalymma strictum</i>	X	
	* <i>Leptospermum laevigatum</i>		X
	<i>Melaleuca diosmifolia</i> (planted)		X

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Melaleuca pentagona</i>	X	
	<i>Melaleuca preissiana</i>	X	
	<i>Melaleuca ringens</i> (?planted) (P3)		X
	<i>Melaleuca thymoides</i>	X	X
	<i>Pericalymma ellipticum</i>	X	X
	<i>Pericalymma spongiocaula</i>	X	
	<i>Taxandria marginata</i>	X	X
	<i>Taxandria parviceps</i>	X	X
	<i>Verticordia plumosa</i> var. <i>plumosa</i>	X	X
Oilacaceae			
	<i>Oilax phyllanthi</i>	X	X
Orchidaceae			
	<i>Caladenia flava</i>		X
	<i>Caladenia harringtoniae</i>	X	
	<i>Caladenia pectinata</i>		X
	<i>Cryptostylis ovata</i>		X
	<i>Cyrtostylis huegelii</i>		X
	* <i>Disa bracteata</i>		X
	<i>Diuris corymbosa</i>	X	
	<i>Diuris longifolia</i>		X
	<i>Diuris setacea</i>	X	
	<i>Eriochilus dilatatus</i> subsp. <i>dilatatus</i>	X	
	<i>Eriochilus tenuis</i>	X	
	<i>Lyperanthus serratus</i>		X
	<i>Microtis atrata</i>	X	
	<i>Microtis familiaris</i>	X	
	<i>Microtis media</i> subsp. <i>media</i>	X	X
	<i>Prasophyllum elatum</i>		X
	<i>Prasophyllum parvifolium</i>	X	X
	<i>Pterostylis vittata</i>		X
	<i>Thelymitra antennifera</i>		X
	<i>Thelymitra crinita</i>		X
	<i>Thelymitra flexuosa</i>		X
	<i>Thelymitra fuscolutea</i>	X	
	<i>Thelymitra granitora</i>		X
	<i>Thelymitra macrophylla</i>		X
	<i>Thelymitra</i> sp. (either <i>benthamiana</i> or <i>fuscolutea</i> )		X
	<i>Thelymitra vulgaris</i>		X
Orobanchaceae			
	* <i>Parentucellia latifolia</i>		X
	* <i>Parentucellia viscosa</i>		X
Oxalidaceae			
	* <i>Oxalis incarnata</i>		X
	* <i>Oxalis pes-caprae</i>		X
Phyllanthaceae			
	<i>Phyllanthus calycinus</i>	X	
	<i>Poranthera microphylla</i>	X	X
Philydraceae			
	<i>Philydrella pygmaea</i>		X

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
Pittosporaceae			
	<i>Billardiera floribunda</i>	x	
	<i>Billardiera fusiformis</i>	x	x
	<i>Billardiera laxiflora</i>	x	
	<i>Billardiera variifolia</i>	x	x
	<i>Marianthus candidus</i>	x	
	* <i>Pittosporum undulatum</i>		x
Plantaginaceae			
	<i>Plantago hispida</i>		x
	* <i>Plantago lanceolata</i>		x
Poaceae			
	<i>Amphipogon amphipogonoides</i>		x
	<i>Amphipogon debilis</i>	x	x
	<i>Amphipogon laguroides</i> subsp. <i>laguroides</i>	x	
	<i>Amphipogon strictus</i>	x	
	* <i>Anthoxanthum odoratum</i>		x
	<i>Austrostipa</i> sp.		x
	* <i>Avena barbata</i>		x
	* <i>Briza maxima</i>		x
	* <i>Briza minor</i>		x
	* <i>Cenchrus clandestinus</i>		x
	* <i>Cortaderia selloana</i>		x
	* <i>Ehrharta calycina</i>		x
	<i>Microlaena stipoides</i>		x
	<i>Neurachne alopecuroidea</i>	x	x
	<i>Poa porphyroclados</i>		x
	<i>Rytidosperma caespitosum</i>		
	* <i>Sporobolus africanus</i>		x
	* <i>Stenotaphrum secundatum</i>		x
	<i>Tetrarrhena laevis</i>		x
Polygalaceae			
	<i>Comesperma virgatum</i>	x	x
	<i>Comesperma volubile</i>		x
	* <i>Polygala myrtifolia</i>		x
Polygonaceae			
	<i>Muehlenbeckia adpressa</i>		x
Proteaceae			
	<i>Adenanthos cuneatus</i>	x	
	<i>Adenanthos obovatus</i>	x	x
	<i>Adenanthos sericeus</i> subsp. <i>sericeus</i>	x	
	<i>Banksia armata</i> var. <i>armata</i>	x	x
	<i>Banksia coccinea</i>		x
	<i>Banksia formosa</i>	x	x
	<i>Banksia grandis</i>	x	
	<i>Banksia ilicifolia</i>	x	
	<i>Banksia mucronulata</i>		x
	<i>Banksia nivea</i>	x	
	<i>Conospermum capitatum</i>	x	
	<i>Conospermum petiolare</i>	x	
	<i>Conospermum teretifolium</i>	x	

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
	<i>Grevillea pulchella</i> subsp. <i>pulchella</i>	x	x
	<i>Hakea ceratophylla</i>	x	x
	<i>Hakea drupacea</i>	x	x
	<i>Hakea elliptica</i>	x	x
	<i>Hakea ferruginea</i>	x	x
	<i>Hakea florida</i>	x	x
	<i>Hakea prostrata</i>		x
	<i>Hakea ruscifolia</i>	x	x
	<i>Hakea trifurcata</i>	x	x
	<i>Hakea undulata</i>	x	x
	<i>Isopogon attenuatus</i>	x	
	<i>Isopogon longifolius</i>	x	
	<i>Isopogon polycephalus</i>		x
	<i>Persoonia graminea</i>	x	
	<i>Persoonia longifolia</i>	x	x
	<i>Persoonia teretifolia</i>	x	
	<i>Petrophile acicularis</i>	x	
	<i>Petrophile diversifolia</i>		x
	<i>Petrophile rigida</i>	x	
	<i>Stirlingia tenuifolia</i>	x	x
	<i>Synaphea gracillima</i>	x	x
	<i>Synaphea obtusata</i>		x
	<i>Synaphea preissii</i> (P3)	x	
Pteridaceae			
	<i>Cheilanthes austrotenuifolia</i>		x
Ranunculaceae			
	<i>Clematis pubescens</i>	x	x
Restionaceae			
	<i>Desmocladus fasciculatus</i>	x	x
	<i>Desmocladus flexuosus</i>		x
	<i>Hypolaena exsulca</i>	x	
	<i>Hypolaena fastigiata</i>		x
	<i>Lepyrodia hermaphrodita</i>	x	x
	<i>Loxocarya cinerea</i>	x	
	<i>Tremulina tremula</i>	x	
Rhamnaceae			
	<i>Spyridium globulosum</i>	x	x
	<i>Spyridium majoranifolium</i>	x	x
	<i>Spyridium spadicum</i> (P4)	x	x
Rosaceae			
	* <i>Cotoneaster pannosus</i>		x
Rubiaceae			
	* <i>Galium murale</i>		x
	<i>Opercularia hispidula</i>		x
Rutaceae			
	<i>Boronia crenulata</i>	x	x
	<i>Boronia spathulata</i>	x	x
	<i>Boronia subsessilis</i>	x	x
Santalaceae			
	<i>Leptomeria squarrulosa</i>	x	x

FAMILY	TAXON	WA HERBARIUM	SOUTHERN ECOLOGY
Sapindaceae	<i>Dodonaea ceratocarpa</i>	x	x
Solanaceae	<i>Anthocercis viscosa</i> subsp. <i>viscosa</i>	x	x
	* <i>Solanum nigrum</i>		x
Stylidiaceae	<i>Levenhookia pusilla</i>	x	x
	<i>Stylidium caespitosum</i>		x
	<i>Stylidium calcaratum</i>	x	
	<i>Stylidium crassifolium</i>	x	x
	<i>Stylidium despectum</i>	x	
	<i>Stylidium diversifolium</i>	x	x
	<i>Stylidium falcatum</i> (P1)	x	x
	<i>Stylidium junceum</i>	x	
	<i>Stylidium perpusillum</i>	x	x
	<i>Stylidium repens</i>	x	x
	<i>Stylidium schoenoides</i>	x	x
	<i>Stylidium spathulatum</i>	x	x
	<i>Stylidium squamosotuberosum</i>	x	
	<i>Stylidium thryonides</i>	x	
Thymelaeaceae	<i>Pimelea imbricata</i> var. <i>imbricata</i>	x	x
	<i>Pimelea longiflora</i> subsp. <i>longiflora</i>	x	
	<i>Pimelea rosea</i> subsp. <i>rosea</i>	x	x
Xanthorrhoeaceae	<i>Xanthorrhoea platyphylla</i>		x
	<i>Xanthorrhoea preissii</i>	x	
Xyridaceae	<i>Xyris lanata</i>	x	