

**TRONOX MANAGEMENT PTY LTD**

**CONSERVATION SIGNIFICANCE ASSESSMENT OF  
THREATENED AND PRIORITY FLORA KNOWN  
FROM THE COOLJARLOO AREA**

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**woodmanenvironmentalconsulting**

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## EXECUTIVE SUMMARY

Tronox Limited (Tronox) operate a mineral sands mine located at Cooljarloo, approximately 160 km north of Perth in the Northern Sandplains Region of Western Australia. Mining commenced at Cooljarloo in 1989 at Mullering Farm. Since this time both dry and dredge mining has occurred across the project area and into the Falcon area. Tronox propose to expand their current mining operations to Cooljarloo West, which is located south-west of Falcon and west of the main Cooljarloo operations.

Several baseline flora and vegetation assessments, conservation significant flora surveys and impact assessments have been conducted over the project tenements since 2006 which have identified several conservation significant flora taxa as occurring within the project area. This data has been entered into an in-house database (managed by Tronox in conjunction with Iluka Resources Limited) of conservation significant flora taxa records known from within their lease areas, including the leases at Dongara. Records include ones held by the Department of Environment and Conservation (DEC), as well as consultant information (e.g. records collected on behalf of Tronox by Woodman Environmental and other consultants).

All available data on these taxa was collated and reviewed with the aim of providing information on the known populations of these taxa and to make recommendations on changes to their conservation status.

A total of four Threatened, six Priority One taxa, six Priority Two taxa, 22 Priority 3 taxa and 10 Priority 4 taxa are listed as occurring within the Cooljarloo West area by the Department of Environment and Conservation and Tronox.

The results of the review of known population data for these taxa is summarised below.

Taxa	Current Status	Recommended Status	Comments
<i>Andersonia gracilis</i>	T	T	Further survey required to locate additional populations occurring within secure tenure.
<i>Anigozanthos viridis</i> subsp. <i>terraspectans</i>	T	T	Further survey required to locate additional populations occurring within secure tenure.
<i>Eremophila glabra</i> subsp. <i>chlorella</i>	T	T	Further survey required to locate additional populations occurring within secure tenure
<i>Macarthuria keigheryi</i>	T	T	Further survey required to locate additional populations occurring within secure tenure
<i>Calectasia palustris</i>	P1	P3	>5 populations, some on secure tenure.
<i>Chordifex reseminans</i>	P1	P2	One in National Park
<i>Grevillea thelemanniana</i> subsp. Cooljarloo (B.J. Keighery 28 B)	P1	P1	Few populations, none secure

Taxa	Current Status	Recommended Status	Comments
<i>Lyginia excelsa</i>	P1	P1	Few populations, none secure
<i>Malleostemon</i> sp. Cooljarloo (B. Backhouse s.n. 16/11/88)	P1	P1	Few populations, none secure
<i>Schoenus pennisetis</i>	P1	P3	Approximately 30 populations, several conservation estate
<i>Hypocalymma</i> sp. Cataby (G.J. Keighery 5151)	P2	P2	Further survey is required
<i>Isopogon panduratus</i> subsp. <i>palustris</i>	P2	P3	>5 populations, some on secure tenure.
<i>Onychosepalum microcarpum</i>	P2	P2	Further survey is required
<i>Stenanthemum sublineare</i>	P2	P2	Further survey is required
<i>Stylidium aceratum</i>	P2	P2	Further survey is required
<i>Stylidium hymenocraspedum</i>	P2	P3	>5 populations, some on secure tenure.
<i>Angianthus micropodioides</i>	P3	P3	Further survey is required
<i>Baeckea</i> sp. Moora (R. Bone 1993/1)	P3	P3	Limited number of known populations, fragmented distribution.
<i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444)	P3	P3	Further survey is required
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>	P3	P3	Further survey in conservation estate required for status change
<i>Beaufortia bicolor</i>	P3	P3	Further survey in conservation estate required for status change
<i>Beaufortia eriocephala</i>	P3	P3	Further survey in conservation estate required for status change
<i>Conospermum scaposum</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Desmocladus biformis</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation

<b>Taxa</b>	<b>Current Status</b>	<b>Recommended Status</b>	<b>Comments</b>
<i>Frankenia glomerata</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Goodenia perryi</i>	P3	P3	Further survey is required
<i>Hensmania stoniella</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Hypocalymma serrulatum</i>	P3	P3	Further survey is required
<i>Jacksonia carduacea</i>	P3	P3	Further survey is required
<i>Lasiopetalum lineare</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Lepidobolus densus</i> ms	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Leucopogon</i> sp. Yanchep (M. Hislop 1986)	P3	P3	Very restricted geographic range
<i>Melaleuca clavifolia</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Onychosepalum nodatum</i>	P3	P3	Further survey is required
<i>Platysace ramosissima</i>	P3	P3	Further survey is required
<i>Schoenus griffinianus</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation

<b>Taxa</b>	<b>Current Status</b>	<b>Recommended Status</b>	<b>Comments</b>
<i>Stylidium longitubum</i>	P3	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Banksia platycarpa</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Chordifex chaunocoleus</i>	P4	P4	Further survey is required
<i>Conostephium magnum</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	P4	P4	Further survey is required
<i>Grevillea saccata</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Ornduffia submersa</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Schoenus natans</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation

<b>Taxa</b>	<b>Current Status</b>	<b>Recommended Status</b>	<b>Comments</b>
<i>Thysanotus glaucus</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P4	Removal from Priority flora list	Large geographical range, numerous populations not under imminent threat. Populations on spatially distinct areas of land managed for conservation

## **PROJECT BACKGROUND**

Tronox Limited (Tronox) operates a mineral sands mine located at Cooljarloo, approximately 160 km north of Perth in the Northern Sandplains Region of Western Australia. Mining commenced at Cooljarloo in 1989 at Mullering Farm. Since this time both dry and dredge mining has occurred across the project area and into the Falcon area. Tronox propose to expand their current mining operations to Cooljarloo West, which is located south-west of Falcon and west of the main Cooljarloo operations. The proposal includes the dredge mining of titanium bearing (and other) minerals from the Woolka Road deposits; Woolka, Harrier and Kestral, and all associated supporting activities.

Several baseline flora and vegetation assessments, conservation significant flora surveys and impact assessments have been conducted over the Cooljarloo tenements since 2006 (Woodman Environmental 2006a, 2006b, 2007a, 2007b, 2009a, 2009b, 2009c, 2012, 2013 in prep) which have identified several conservation significant flora taxa as occurring within the project area. This data has been entered into an in-house database (managed by Tronox in conjunction with Iluka Resources Limited) of conservation significant flora taxa records known from within their lease areas. Records include ones held by the Department of Environment and Conservation (DEC) (W.A. Herbarium specimen records and TPFL (Threatened and Priority Flora) database records), as well as consultant information (e.g. records collected on behalf of Tronox by Woodman Environmental and other consultants). The DEC data held in the database is updated regularly.

Tronox have requested Woodman Environmental Consulting Pty Ltd (Woodman Environmental) undertake a review and collation of all available information on the conservation significant flora known from the project area. This information can then be used to determine whether changes to the conservation status of any of these taxa can be recommended to the Department of Environment and Conservation (DEC).

## **METHODOLOGY**

### **DATA SOURCES AND LIMITATIONS**

A range of data sources were utilised to compile all known information on each of the 48 taxa included in this study. The first task was to request searches of databases managed by the DEC. These were the Threatened and Priority Flora (TPFL) and Western Australian Herbarium (WAHERB) databases. The TPFL database contains information submitted to the DEC Species and Communities Branch by department personnel and external parties using the DEC Threatened and Priority Flora report forms and subsequently entered into the database. The WAHERB database contains information on conservation significant taxa only where a specimen has been submitted for inclusion into the herbarium. Not all herbarium specimens have a corresponding report form submitted, and there are also records in TPFL that have not had specimens lodged in the herbarium.

A back log of Threatened and Priority Flora report forms submitted to the DEC has resulted in many forms not currently entered into the TPFL database. A botanist from Woodman Environmental visited the Species and Communities Branch to collate any data from hard copy forms for the taxa included in this study where these had not been entered into the TPFL database. Many of the records (particularly those from the WAHERB) were found to be missing information required to populate the tables in this report. Where possible, these gaps were filled by Woodman Environmental using GIS mapping. However, gaps still exist for Plant Numbers and Known Threats for many of the records as site visits to each of the locations would be required to determine these factors.

All consultant information from all studies carried out in the project area (both Woodman Environmental and other consultants utilised by Tronox) was also collated for this report. The Tronox/Iluka Threatened and Priority Flora database was also scrutinised for any records not already listed in the data tables.

## TAXON DATA TABLES

Data for each taxon has been collated in individual tables under the following headings:

**Data Source:** The original source of the data. Where multiple sources are listed, the record has appeared in multiple search results. DEC denotes the TPFL database or hard copy report forms, while WAHERB denotes a herbarium specimen has been submitted at this location. Where multiple specimens have been submitted from one location, the data has only been listed once in the tables. For data from the Tronox/Iluka database that is not listed anywhere else, if the original source of the data is unknown, the source is listed as the company that supplied the data to the database (Tronox or Iluka). WEC denotes populations recorded by Woodman Environmental Consulting that do not appear under any other source.

**DEC Pop No.:** The number assigned to the population in the TPFL database. If no number is present then the record has not been added to the database.

**Location/Locality:** General location information either supplied by the DEC or calculated by Woodman Environmental based on GPS co-ordinates

**Project:** Where the data was collected by Woodman Environmental, background information on the project is supplied

**Land Tenure:** Tenure of the land on which the location occurs. This data was either supplied by the DEC or determined by Woodman Environmental where possible using the supplied co-ordinates in conjunction with cadastral mapping data from Landgate (Landgate, 2013). Please note the following disclaimer from the DEC that was supplied with the co-ordinates. *The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted with GPS coordinates. Therefore, be aware*

*when using this data in ArcView that some records may not plot to the locality description given with each collection.*

UCL denotes unallocated (vacant) Crown Land

**Date of Survey:** Date of the most recent survey of the location

**No. of Locations or Plants:** Where possible the number of plants at each location is given. However, this information is not available for many of the records. Some records only state number of locations of the taxon within a survey area and this information is listed if available. Where a number is presented with no text it denotes the number of locations not plants.

**Threats:** Threats to the location if supplied by the DEC or the original data source. Threats are not available for many of the locations. A list of threats is given in DEC (2010). Mining tenements are not listed as a threatening process in that document.

## **RECOMMENDATIONS FOR CONSERVATION STATUS CHANGE**

On completion of data collation for each taxon, the data was scrutinised to determine if it satisfied the criteria for the current conservation status of the taxon based on the current definitions (Appendix A, DEC December 2012). For the purpose of this report a population was defined based on the following criteria used by the DEC (DEC, January 2010).

- *plants more than 500 m from a known population are considered to be a new population;*
- *plants within 500 m of a known population are considered to be part of that population;*
- *within a recognised population, plants that occur on different land tenure parcels, or those that have considerable, recognisable separation between them (eg, plants occur on either side of a river, or on close but distinct peaks or outcroppings) are considered to be separate subpopulations.*

Populations are deemed to be on secure tenure if they occur on land defined by the DEC as not under imminent threat of habitat destruction or degradation. This includes national parks, conservation parks, nature reserves, vacant (unallocated) Crown Land, State Forest and Water Reserves. For the purpose of this study, populations of perennial conservation significant taxa located on lands managed for conservation or not under imminent threat were deemed to still be present and self-sustaining regardless of time elapsed since last survey. Annual or short lived species were deemed to be present and self-sustaining if the survey date was within 10 years of preparation of this document.

**Threatened Flora:** Taxa are listed as Threatened if (at time of listing) they are considered to have been adequately surveyed and found to be rare and in danger of extinction. Guidelines for adequate searching are listed in DEC (2011). Taxon can be recommended for removal from the Threatened flora list where they are considered to have been adequately surveyed and found to no longer be under threat of extinction.

**Priority 1 taxa:** If the species exists in less than five populations, none of which are located on secure tenure it is designated as Priority 1 (DEC 2012). If it is known from a small number of populations but at least one is on secure tenure then it is recommended that the conservation status of the taxon be changed to Priority 2. Priority 1 taxa have not been adequately surveyed.

**Priority 2 taxa:** If the species exists in a small number of populations (generally less than 5), at least one of which is located on secure tenure, it meets the criteria for Priority 2 taxa. If the taxon has a small number of populations, none of which are on secure tenure, it is recommended that it be changed to a Priority 1 conservation code. If it has greater than 5 populations, several of which are on secure tenure then it no longer meets the criteria for Priority 2 and it is recommended that the conservation code be changed to Priority 3. Priority 2 taxa have not been adequately surveyed and appear to be under threat from known threatening processes.

**Priority 3 taxa:** If the species exists in greater than five populations, is not under imminent threat (due to populations being large or widespread or protected) but has not been adequately surveyed it meets the criteria for Priority 3 taxa. Priority 3 taxa also have known threatening processes that could affect them. Where the number of populations is five or less it is recommended that it be changed to a Priority 1 or Priority 2 conservation code. If a taxon was found to meet the following criteria it was still considered to be rare but not under imminent threat. It is recommended that the conservation code of these species be changed to Priority 4:

- Taxon has been adequately surveyed
- Taxon has a restricted range (<100km)
- Populations occur in less than three spatially distinct areas of vegetation managed for conservation
- There are no imminent threats to the majority of populations of this taxon

If a Priority 3 taxon was found to meet at least four of the following criteria it has been recommended that it be removed from the Priority Flora list:

- Taxon has been adequately surveyed
- Taxon has a geographic range in excess of 150km
- Total number of known populations is approximately 20 or greater
- Populations occur in a minimum of three spatially distinct areas of vegetation managed for conservation
- Records from some of the populations on conservation estate indicate the populations consist of multiple individuals

**Priority 4 taxa:** If the species falls into one of the following categories it is listed as a Priority 4:

- a) Rare. Taxa 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 taxa are usually represented on conservation lands.

- b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- c) Taxa that have been removed from the list of Threatened taxa during the past five years for reasons other than taxonomy.

If a Priority 4 taxon was found to meet at least four of the following criteria it has been recommended that it be removed from the Priority Flora list:

- Taxon has been adequately surveyed
- Taxon has a geographic range in excess of 150km
- Total number of known populations is approximately 20 or greater
- Populations occur in a minimum of three spatially distinct areas of vegetation managed for conservation
- Records from at least two of the populations on conservation estate indicate the populations consist of multiple individuals

In addition, if a taxon was removed from the list of Threatened flora greater than 10 years prior to this study and additional populations have been recorded since its de-listing, then it was also recommended for removal from the Priority flora list.

## 1. *Andersonia gracilis* DC.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Slender, erect or open straggly shrub growing from 0.1-0.5 m high with white to pink to purple flowers present in September to November.

**Soil preference:** White/grey sand, sandy clay or gravelly loam.

**Distribution:** South West botanical province in the Geraldton sandplain and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Adult plants killed by fire

**Susceptibility to dieback:** Highly susceptible (Papenfus, 1996)

**Conservation Status:** Currently listed as Declared Rare under the *Wildlife Conservation Act* (1950). It is listed as Threatened (Vulnerable) and considered to be facing a high risk of extinction in the wild under the DEC threatened species conservation ranking system (DEC 2012c). Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Department of Sustainability, Environment, Water, Population and Communities (DSEWPC 2012)) this species is also listed as “Endangered”, and is thus specifically protected by Commonwealth legislation.

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Andersonia gracilis* has a known distribution from Gingin to Cooljarloo, a range of approximately 110 km, as well as an isolated occurrence in the Cannington/Kenwick area on the Swan Coastal Plain.

This species is known from 65 records within the DEC Threatened flora database, 18 records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 29 known distinct populations, 13 of which are located within the Tronox Cooljarloo mining tenement north-west of Cataby (Table 1). Records from surveys conducted within the tenement indicate that as many as 35 additional populations may exist within the project area, however the current level of survey is not able to confirm that these are distinct (i.e. no plants occurring between populations), rather than one or several continuous populations.

**Table 1: Known Populations and Distribution Range of *Andersonia gracilis***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1A	South of Wongonderrah Rd, approx. 11km from Brand Hwy. Approx. 25km NW of Cataby.		Conservation Reserve	15/11/1998	100 plants	Dieback, inappropriate fire regime
DEC	1B	South of Wongonderrah Rd, approx. 11km from Brand Hwy. Approx. 25km NW of Cataby.		Shire Road Reserve	15/11/1998	20 plants	Road and firebreak maintenance, inappropriate fire regime
DEC	1C	South of Wongonderrah Rd, approx. 11km from Brand Hwy. Approx. 25km NW of Cataby.		Private Property	15/11/1998	300 plants	Inappropriate fire regime
DEC	1D	South of Wongonderrah Rd, approx. 11km from Brand Hwy. Approx. 25km NW of Cataby.		UCL	15/11/1998		Inappropriate fire regime
DEC, WAHERB	2	Nature Reserve owned University of Western Australia, between Boundary Rd and Brook Rd, Kenwick.		Educational Lands (UWA)	25/01/2008	8	Dieback, weeds
DEC	3	West of Cooljarloo minesite, Cooljarloo.		UCL	22/11/1996		
DEC, WAHERB	4A	South of Wongonderrah Rd, approx. 6km from Brand Hwy. Approx. 25km NW of Cataby.		Shire Road Reserve	22/11/1996		Could not be relocated in Jan 2012
DEC	4B	Shire of Dandaragan, Wongonderrah Rd, approx. 50m S of Road verge, 5.5-6.1km W of intersection with Brand Hwy.		UCL	5/01/2012	46 plants	Inappropriate fire regime, grazing, disease.
DEC	5A	South of Wongonderrah Rd, Approx. 25km NW of Cataby.		Conservation Reserve	3/03/1998	47	
DEC	5B	South of Wongonderrah Rd, Approx. 25km NW of Cataby.		Conservation Reserve	3/03/1998	2	
DEC	6A	Approximately 9km SE of Nambung.		Private Property	15/11/1998	4	
DEC	6B	Approximately 9km SE of Nambung.		Private Property	15/11/1998	21	
DEC	6C	Approximately 9km SE of Nambung.		Private Property	15/11/1998	17	
DEC	7A	South of Wongonderrah Rd, approx. 16km from Brand Hwy. Approx. 30km NW of Cataby.		Shire Road Reserve	15/11/1998		
DEC	7B	Wongonderrah Rd, both sides, ca 5km W of Yermullah Rd		Shire Road Reserve	5/01/2012	~200 plants	Road maintenance, Disease, Erosion, Lack of recruitment, inappropriate fire regime

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	8	East of Reserve A40916, approx. 15km WNW of Cataby.		UCL	15/11/1998	~20,000	Inappropriate fire regime, drought
DEC	9	South-east of Reserve A40916, approx. 15km W of Cataby.		UCL	15/11/1998	350	Inappropriate fire regime, drought
DEC	10A	Tronox Cooljarloo minesite, Cooljarloo.		UCL	18/02/1998	87	Mining, inappropriate fire regime, drought
DEC	10B	Tronox Cooljarloo minesite, Cooljarloo.		UCL	18/02/1998	39	Mining, inappropriate fire regime, drought
DEC	10C	Tronox Cooljarloo minesite, Cooljarloo.		UCL	18/02/1998	75	Mining, inappropriate fire regime, drought
DEC	11	Tronox Cooljarloo minesite, Cooljarloo.		UCL	18/02/1998	4	Mining, inappropriate fire regime, drought
DEC	12	North of Reserve A40916, approx. 15km WNW of Cataby.		UCL	5/03/1998	12	Mining, inappropriate fire regime, drought
DEC	13	West of Tronox Cooljarloo minesite, Cooljarloo.		UCL	5/03/1998	300	Mining, inappropriate fire regime, drought
DEC	14	West of Tronox Cooljarloo minesite, Cooljarloo.		UCL	5/03/1998	21	Mining, inappropriate fire regime, drought
DEC	15	West of Tronox Cooljarloo minesite, Cooljarloo.		UCL	5/03/1998	88	Mining, inappropriate fire regime, drought
DEC	16	West of Tronox Cooljarloo minesite, Cooljarloo.		UCL	5/03/1998	260	Mining, inappropriate fire regime, drought
DEC	17	Tronox Cooljarloo minesite, Cooljarloo.		UCL	10/12/1998	24	Mining, inappropriate fire regime, drought
DEC	18	Approx. 800m West of Brand Hwy, South of Cooljarloo Minesite.		UCL	4/08/1999	12	Mining, inappropriate fire regime, drought
DEC	19	Approx. 350m West of Brand Hwy, near southern end of Cooljarloo Minesite.		UCL	4/08/1999	9	Mining, inappropriate fire regime, drought

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Cooljarloo West project area, 17km north of Cataby.		Mining Lease	2007-2009	20,000+ plants (Estimated 45 pop's in project area)	Mining
DEC, WEC		UCL south of Wongonderrah Rd, ca 20km W of Brand Hwy, NW of Cataby		UCL	16/09/2009-30/10/2009	23	Exploration Drilling
DEC		Lot 8000 Boundary Road, located 1km NE of the intersection of Boundary and Bickley Rds, on the SE side of Boundary Road. Plants occur 100-125m from N firebreak		Private Property	11/11/2009	40 plants	Dieback
DEC, WAHERB		Lot 5436 Red Gully RD, Mindarra. Plant located approx 12km E from junction of Brand Hwy and Red Gully Rd then N onto private property approx 1.2km. Plants occur approx 10 m S of E-W running track.		Private Property	17/12/2009	1 plant	Grazing, Disease.
DEC		Approx 7 km along Woolka Rd, W of Brand Hwy, approx 13km NW of Cataby		Mining Lease	28/09/2011-31/10/2011	261 plants at 8 locations	Mining
WAHERB		Cannington		Unknown	/10/1902		
WAHERB		Cannington		Unknown	22/10/1921		
WAHERB		Cannington		Unknown	1963		
WAHERB		Cannington		Unknown	/10/1991		
WAHERB		12 km W of Gingin - Dongara road on road to Nambung National Park		UCL	29/11/1974		
WAHERB		Strathmore Road Reserve (No. 26248) S of Badgingarra		Shire Road Reserve	5/11/1975		
WAHERB		Corner of Wongonderrah Road and Yerramullah Road		Private Property	15/10/1984		
WAHERB		Ca 3 km W of Brand Highway on Cooljarloo Road AMG 50 JLM 475056 Wedge Island 1:100,000		UCL	6/11/1988		
WAHERB		AMG-Zone 50 346310mE 6618212m N; Wongonderrah Rd, E of Yerramullah Rd, SSE of Cervantes.		UCL	22/11/1992		
WAHERB		1.3 km W of Woolka road off Cooljarloo road W of Brand Highway		Other Shire Reserve	27/10/1993	Abundant	
WAHERB		100 m E of Yerramullah road on Wongonderrah road,		Private Property	22/11/1996	Abundant	
WAHERB		Yule Brook Nature Reserve, junction of 2 fire breaks c. 100 m N of Boundary Road firebreak,		Nature Reserve	29/11/1996	Rare	
WAHERB		Wongonderrah Nature Reserve, Wongonderrah and Yerramullah Roads, ca 11.5 km W of Brand Highway		Nature Reserve	10/1/1997		
WAHERB		Vacant Crown Land on northern end of Tiwest Joint Venture lease area, N of Cataby along Brand Highway		UCL, Mining Lease	14/1/1999	24 plants	

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	4/10/2006	4 plants, common in area	
WEC		18km W of Cataby.	Mullering	UCL	18/10/2005		

Locations of individual populations show the known distribution of *Andersonia gracilis* to be concentrated in the Cooljarloo area, north-west of Cataby, although consideration must be made of the differing levels of intensity of survey in this location. One record from Mindarra, and a recorded observation west of Gingin represent the southern reaches of the species north of Perth, however a number of records note isolated plants of *Andersonia gracilis* occurring in Perth's south-eastern suburbs of Cannington and Kenwick.

Land tenure information for populations of *Andersonia gracilis* shows that only four of the known populations overlie state conservation reserves, with one further population found on private property managed for conservation. The remaining populations are predominantly located on unallocated crown land held within mining tenement, or shire road verge, and thus under threat from mining activity or road maintenance works.

As at 2012, over 40,750 individual plants have been recorded for *Andersonia gracilis*, with an estimated 20,000 of these occurring within the Tronox Cooljarloo mining tenement. It should be noted that some of the records are older than 10 years and the numbers may no longer be accurate. Additional observations describe abundance as common, locally frequent or abundant. The largest described population outside of the Tronox Cooljarloo lease area also occurs on UCL.

## SUMMARY AND RECOMMENDATIONS

*Andersonia gracilis* is currently listed as Threatened under the *Wildlife Conservation Act 1950*, and is considered to be Vulnerable under state classifications (DEC 2012c). At time of nomination as Threatened, each taxon is assigned a ranking based on the IUCN (2001) Red List Categories and Criteria. Taxon can be listed as Critically Endangered, Endangered or Vulnerable. A ranking of Vulnerable is given to species which are facing a high risk of extinction in the wild, either due to rarity or other factors indicating a need for special protection.

Although *Andersonia gracilis* appears to have a number of known populations, some of which are of relatively large size, the majority of these populations are facing threatening processes and cannot therefore be considered secure. These factors suggest that the conservation ranking for *Andersonia gracilis* should remain as Threatened.

## 2. *Anigozanthos viridis* subsp. *terraspectans* Hopper

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous, perennial herb growing to 0.05-0.2 m high. Flowers are green/yellow to green and present in August to September.

**Soil preference:** Grey sand or clay loam in winter-wet depressions.

**Distribution:** South West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Known to occur in heath regenerating after fire or disturbance.

**Susceptibility to dieback:** Unknown

**Conservation Status:** Currently listed as Declared Rare under the *Wildlife Conservation Act* (1950). It is listed as Threatened (Vulnerable) and considered to be facing a high risk of extinction in the wild under the DEC threatened species conservation ranking system (DEC 2012c). Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012) this species is also listed as “Vulnerable”, and is thus specifically protected by Commonwealth legislation.

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and DEC Threatened Flora database (DEFL) records (DEC 2012a) show *Anigozanthos viridis* subsp. *terraspectans* has a known distribution from Boonanarring to north of Cooljarloo, a range of approximately 100 km.

This species is known from 17 records within the DEC Threatened flora database, six records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 17 distinct populations (Table 2).

Recorded observations of *Anigozanthos viridis* subsp. *terraspectans* indicate that its distribution is concentrated in the Cooljarloo area NW of Cataby, with 18 of the records coming from this general location. The remaining populations are scattered between Boonanarring, Regan’s Ford and Cataby.

**Table 2: Known Populations and Distribution Range of *Anigozanthos viridis* subsp. *terraspectans***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	WNW of Cataby, 4 km W of Brand Hwy.		Private Property	13/11/1979		
DEC	2	Leda Nature Reserve (W end), W of Cataby.		Conservation Reserve	22/10/1980		
DEC	3	Just outside W boundary of Leda Nature Reserve, W of Cataby.		UCL	22/10/1980		
DEC	5	NE of corner of Wongonderrah and Yermullah Rds, approx.. 28km ESE of Cervantes.		Private Property	20/09/1989		
DEC	6A	West of Cooljarloo minesite, 15km NW of Cataby.		Shire Road Reserve	19/12/1988		
DEC	6B	Cooljarloo minesite, 15km NW of Cataby.		UCL	15/09/1997		Mining
DEC	7	Approx. 16km W of Cataby.		UCL	15/09/1997		
DEC, WAHERB	8	2.3km W of Brand Hwy, 18km SSE of Regan's Ford.		Private Property	9/10/2002	100-200 plants at 1 location	
DEC	9	Approx. 18km W of Cataby.		UCL	4/10/2006	Scattered	
DEC	10	Approx. 18km W of Cataby.		UCL	4/10/2006	Scattered	
DEC	11	Approx. 18km W of Cataby.		UCL	21/10/2010		
DEC		Swamp SW of Cooljarloo minesite.		Unknown	2000	~20,000 plants	
DEC		SW corner of Tiwest Mining lease M268SA		UCL	11/10/2000	18 plants	Firebreaks, mining
DEC		Cooljarloo West project area, 17km north of Cataby.		Mining Lease	2007-2009	2000+ plants	
DEC		Approx 13 km NW of Cataby Rd and Brand Hwy intersection, Cataby.		UCL	24/10/2011	3 plants	Weeds, Mining and Livestock
DEC		Approx 2.3 km SW of Nammegarra Rd and Brand Hwy intersection, 23km SE of Cataby. Tiwest tenement.		Private Property	4/11/2011	2000+ plants	Weeds, Mining and Livestock
DEC		Approx 7km E of Mimegarra Rd, 12km SW of Cataby.		Private Property	8/11/2011	36 plants	Weeds, Mining and Livestock
WAHERB		8 km WNW of Dandaragan West (Cataby), 5 km W of Brand Highway along track into Emu Lakes		Private Property	13/11/1979		
WAHERB		Leda Nature Reserve (E end), W of Cataby.		Conservation Reserve	22/10/1980	>200 plants at 1 location	
WAHERB		Woolka Road approximately 5 km W junction Cooljarloo Road. AMG 50JLM473056 Wedge Is. 1:100,000		Shire Road Reserve	05/11/1988		Road maintenance
WAHERB		Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	04/10/2006	2	Gas exploration
WEC		Tronox Cooljarloo West Project Area.	Tiwest 9-62 Drill Lines	Mining Lease	21/10/2009	1 plant at 1 location	Mining

Populations of *Anigozanthos viridis* subsp. *terraspectans* are predominantly found within outside of lands managed for conservation, with six of the populations located on private property, seven on unallocated crown land and/or mining tenement and two on shire road verge. A further two populations have been recorded within Leda Nature Reserve and can be considered secure if still extant. The land tenure of the remaining populations is unknown.

The number of individual plants within each population is varied, with population size ranging from a single plant to approximately twenty thousand individuals. The largest population for which abundance is described is located on unknown tenure and therefore cannot be considered secure, however one population within conservation reserve contains more than 200 plants and is one of the larger sized populations recorded for this taxon.

## SUMMARY AND RECOMMENDATIONS

*Anigozanthos viridis* subsp. *terraspectans* is currently listed as Threatened under the DEC threatened species conservation ranking system, and is considered to be Vulnerable under state classifications (DEC 2012b). This ranking applies to species thought to be facing a high risk of extinction in the wild, either due to rarity or other factors indicating a need for special protection.

Distribution of *Anigozanthos viridis* subsp. *terraspectans* is largely restricted to the Cooljarloo area and although a number of populations have been located, only two occur on land managed for conservation. Size of populations is variable, with the largest found on unknown tenure. The current health and extent of several populations is unknown as they were recorded as far back as 1980. Additional survey is required before this taxon can be considered for removal from the Threatened flora list.

### 3. *Eremophila glabra* subsp. *chlorella* (Gand.) Chinnock

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous and densely tufted perennial herb (sedge-like) that grows from 0.1-0.2 m high. Flowers in September to October.

**Soil preference:** Sand, sandy clay, lateritic soils.

**Distribution:** South West botanical province in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Currently listed as Declared Rare under the *Wildlife Conservation Act* (1950). It is listed as Threatened (Critically Endangered) and considered to be facing an extremely high risk of extinction in the wild under the DEC threatened species conservation ranking system (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Eremophila glabra* subsp. *chlorella* has a known distribution from Eneabba to Kenwick, a range of approximately 260 km. This species is known from nine records within the DEC Threatened flora database, eight records within the W.A. Herbarium database (DEC 2012a) and two additional records from Woodman Environmental Consulting. These records currently represent an estimated total of nine distinct populations (Table 3).

Locations of recorded observations indicate that populations of *Eremophila glabra* subsp. *chlorella* are generally scattered throughout its range, with five populations recorded between Eneabba and Mogumber, and five in the Cannington district. One record of this species occurring on mining tenement in Cooljarloo was originally identified as *Eremophila glabra* subsp. *chlorella*, however, subsequent conceptual changes in the taxon have resulted in a nearby collection being re-identified as *Eremophila glabra* subsp. green flowers (E.A. Griffin 5347). The re-identified collection has not been considered in this report, but its reallocation raises concerns regarding the identification of the sample taken from Cooljarloo mining tenement. To clarify this location a specimen has been submitted to the WA Herbarium for identification.

**Table 3: Known Populations and Distribution Range of *Eremophila glabra* subsp. *chlorella***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1A	Franklin St reserve, near junction of Grosse Ave and Lake St, Cannington.		Synergy	14/09/2010		
DEC	1B	Franklin St reserve, near junction of Grosse Ave and Lake St, Cannington.		Private Property	14/09/2010		
DEC	2A	Near Cnr Neames Rd and Bindoon-Moora Rd, 2.3km S of Mogumber.		Conservation of Flora & Fauna	5/07/2007		
DEC	2B	Near Cnr Neames Rd and Bindoon-Moora Rd, 2.3km S of Mogumber.		Main Roads Road Reserve	5/07/2007		Road maintenance
DEC	2C	Near Cnr Neames Rd and Bindoon-Moora Rd, 2.3km S of Mogumber.		Railway Reserve	5/07/2007		
DEC	5A	S side of Rocky Springs Rd, ~700m from Brand Hwy, 10 km S of Eneabba.		Shire Road Reserve	26/04/2012		Road maintenance
DEC	5B	South Eneabba Nature Reserve, ~100m from S side of Rocky Springs Rd, ~700m from Brand Hwy, 10 km S of Eneabba.		Conservation of Flora & Fauna	26/04/2012		
DEC	6	SE of Bickley Rd, opposite Brook Rd, Kenwick.		State Planning Commission	23/09/2007		
DEC	7	Brook Rd, Wattle Grove, approx. 800m from Welshpool Rd East on private property.		Private Property	23/09/2007		
WAHERB		Lower Canning River		Private Property	24/07/1901		
WAHERB		Cannington		Unknown	13/07/1910		
WAHERB		Kenwick		Road Verge	09/06/1972		
WAHERB		Brixton Road, Beckenham		Private Property	21/07/1983	Common	
WAHERB		Opposite railway station and tax office, Cannington,		Building Strata	03/10/1996	Occasional	
WAHERB		Carousel Swamp, Cannington, plants located on Western Power land on lot 43 and lot 0, Lake Street		Western Power Land	27/06/2007	10 plants at 1 location	
WAHERB		Mogumber Nature Reserve, Gingin		Nature Reserve	26/06/2007	>3000 plants at 1 location	
WAHERB		South Eneabba Nature Reserve. Rocky Springs area, immediately S of Rocky Springs Road		Nature Reserve	04/12/2009	>50 plants at 1 location	
WEC		N side of Rocky Springs Rd, ~1.2 km from Brand Hwy, 10 km S of Eneabba. West of South Eneabba Nature Reserve.	Priority 1 Mapping	Private Property	26/10/2006		
*WEC (specimen submitted)		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	06/11/2008		Requires confirmation of identification

Land tenure for populations of *Eremophila glabra* subsp. *chlorella* is predominantly unsecured with six of the populations located on unknown or unsecured habitat such as road verge, crown land and private property. Three populations have thus far been recorded on secure tenure, including Mogumber Nature Reserve and South Eneabba Nature Reserve.

There is limited information on population sizes for *Eremophila glabra* subsp. *chlorella*, however, to date a total of >3,060 individual plants have been recorded from three populations. An additional two locations describe abundance of *Eremophila glabra* subsp. *chlorella* as common and occasional. The numbers of individuals in the remaining populations are unknown.

## SUMMARY AND RECOMMENDATIONS

*Eremophila glabra* subsp. *chlorella* is currently listed as Threatened under the DEC threatened species conservation ranking system, and considered to be Critically Endangered under state classifications (DEC 2012c). This ranking is reserved for species considered to be at extremely high risk of extinction in the wild, and which are either rare or otherwise in need of special protection.

Surveys conducted over in the last ten years have located a number of populations of *Eremophila glabra* subsp. *chlorella*, with a population of large size located within secure tenure at Mogumber Nature Reserve. This species has a wide distribution and is represented within a number of conservation managed lands, although the size of individual populations is generally small or unknown. However, it does not appear to have been adequately surveyed and it is recommended that it remain as Threatened until additional populations on secure tenure are located.

## 4. *Macarthuria keigheryi* Lepschi

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Perennial herb or shrub with either erect or spreading form. Growing to 0.2 - 0.4 m high and 0.3 - 0.6 m wide. Flowers are present from September to December or February to March. Distinguishable due to a dense covering of golden hairs on the stems and leaves, as well as a large number of flowers in the inflorescence.

**Soil preference:** White or grey sands.

**Distribution:** South – West botanical province in the Swan Coastal Plain region.

**Response to fire/ disturbance:** Appears to be a disturbance opportunist, growing in large numbers in disturbed soils.

**Susceptibility to dieback:** Unknown.

**Conservation Status:** Currently listed as Declared Rare under the *Wildlife Conservation Act* (1950). It is listed as Threatened (Endangered) and considered to be facing a very high risk of extinction in the wild under the DEC threatened species conservation ranking system (DEC 2012c). Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012) this species is also listed as “Endangered”, and is thus specifically protected by Commonwealth legislation.

### POPULATION AND DISTRIBUTION

This species is known from 22 records within the DEC Threatened flora database (DEC 2012a), 18 records within the W.A. Herbarium database (DEC 2012a), and five additional records from Woodman Environmental Consulting. Locations recorded indicate the distribution of *Macarthuria keigheryi* stretches between Cooljarloo and Kenwick, a range of approximately 180 km. Known populations are located in several areas within this range, predominantly Cooljarloo, Beermullah, Kewdale and Forrestfield.

These records currently represent an estimated total of 12 distinct populations (Table 4). Of the known populations for this species, three are located within conservation estate in Dundas Nature Reserve and Moore River National Park. Further populations are located on private property, unallocated crown land, mining tenement, road verge, airport lands and other shire reserve. Thus, many of the populations are not situated within secure tenure and therefore affected by threatening processes.

To date, over 2,500 individual plants have been counted from eight populations, although a significant portion of this sum is from a single population of more than 2,000 plants overlying both private property and the Moore River National Park.

**Table 4: Known Populations and Distribution Range of *Macarthuria keigheryi***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations	Threats
DEC	1A	Approximately 1.46 km SW of Cooljarloo, 13.26 km S of Wongonderrah rd and 12.18 km W of Brand Hwy.		UCL	1/12/2006		Road construction, firebreak maintenance
DEC	1B	Approximately 5.17 km SE of Cooljarloo, 16.10 km S of Wongonderrah rd and 10.93 km W of Brand Hwy.		UCL	1/12/2006	124	Mining
DEC, WAHERB	1C	Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	4/10/2006	50+ plants at 1 location	Mining
DEC, WAHERB	1D	Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	3/10/2006		Mining
DEC, WAHERB	1E	Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	4/10/2006		Mining
DEC, WAHERB	1F	Either side of firebreak heading N of Woolka Road at ca. 8.3 km W of Cooljarloo Road (NW of Cataby)		UCL	29/01/2008		Mining
DEC	2	Land between Horrie Miller Dve and Hitchcock Pl, Kewdale.		Unknown	15/01/1995		
DEC	3A	Bushland between Dundas Rd, Roe Hwy and Bedford Crescent, Forrestfield.		Conservation of Flora & Fauna	20/09/2006		Weeds
DEC	3A	Dundas Nature Reserve, E side of Dundas Rd, Forrestfield. Plants scattered through Northern corner of reserve.		Nature Reserve	26/10/2010	12 plants	Recreation, grazing
DEC	3B	Bushland between Dundas Rd, Roe Hwy and Bedford Crescent, Forrestfield.		Nature Reserve	20/09/2006		Weeds
DEC	4	Bushland, Station St, East Cannington.		Department of Planning	28/09/2006		Road construction
DEC	5A	Near corner of Tonkin Hwy and Abernethy Rd.		Airport	1/12/2004		Weeds
DEC	5B	Near Dunreath Dve at S end of Perth Airport runway.		Airport	1/12/2004		Weeds
DEC	5C	Near Talton Crescent. Kewdale.		Airport	25/02/2005	61	Grazing, weeds
DEC, WAHERB	6A	SW corner of Bushland at intersection of McDonnell and Welshpool Road (southern end of bush)		Shire Recreation Reserve	16/09/2002	7 plants at 1 location	Road construction
DEC	6B	Bushland at intersection of McDonnell and Welshpool Road (west of McDonnell Rd).		Shire Recreation Reserve	23/11/2009		Road construction
DEC	6C	Bushland at intersection of McDonnell and Orrong Road (west of McDonnell Rd, north of Orrong Rd).		Shire Recreation Reserve	23/11/2009		Road construction
DEC, WAHERB	8	Falcon mining lease, S of Wongonderrah Road and W of Tiwest Cooljarloo minesite (N mine), Moora District in the Midwest		UCL	30/10/2007	50 plants at 1 location	Mining, grazing

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations	Threats
DEC	9A	Lot 105 Whitfield Springs Rd, Beermullah. Occurs on both sides of Powerline track (running from Whitfield Springs		Private Property	3/09/2010	1089 plants	
DEC	9B	Swan location 13802, Beermullah, Whitfield Springs Rd. Occurs within road reserve on S side of road (near entry gate to Lot 105).		Shire Road Reserve	5/11/2010	11 plants	Road maintenance
DEC	10	Shire reserve off Wharf Street, Queens Park.		Other Shire Reserve	23/11/2009		
DEC		Approx 7km along Woolka Rd, W of Brand Hwy intersection, approx 13km NW of Cataby. Tiwest Cooljarloo tenement.		Mining Lease	27/09/2011	6 plants	Mining
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba: Moore River National Park and area adjacent to Whitfield Springs Rd.	Pinjar – Eneabba Towerbases WP9-48	National Park	/11/2009	1100 plants	Power Line Maintenance
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba: Moore River National Park and area adjacent to Whitfield Springs Rd.	Pinjar – Eneabba Towerbases WP9-48	Private Property	/11/2009	~150 plants	Power Line Maintenance
WAHERB		Kewdale		Private Property	7/09/1976		
WAHERB		Woolka Road, ca 8 km W of junction with Cooljarloo Road, northern side road along fire break		Shire Road Reserve	6/11/1988		Road maintenance
WAHERB		8 km W of Woolka Road from junction with Cooljarloo Road, S side of road on fire-break in disturbed area		Shire Road Reserve	11/09/1991	1 plant at 1 location	Road maintenance
WAHERB		Dundas Road, Forrestfield, S at the entrance to the Fire Training establishment. (System 6 Area M53)		Nature Reserve	28/02/1996	3	
WAHERB		Kenwick,		Nature Reserve	/03/1996	Common in small area	
WAHERB		Queens Park Ecological Area, off Luyer Avenue, East Cannington		Conservation Park	10/10/1996	Rare	
WAHERB		SW corner Perth Airport bushland, Newburn		Private Property	5/11/1998	9 plants at 1 location	
WAHERB		South western area of Perth International Airport		Airport	1/11/2001	2 plants at 1 location	
WAHERB		Perth Airport		Airport	21/08/2002		
WAHERB		Perth Airport		Airport	26/11/2002		
WEC		Tronox Cooljarloo West Project Area.	Tiwest 9-62 Drill Lines	Mining Lease	14/9/2009-30/10/2009	5 plants at 5 locations	Mining

The numbers of individuals in the remaining populations are unknown, however one record describes abundance as Common for a small area. Anecdotal evidence indicates that population 1A is likely to consist of up to 10, 000 plants although a detailed census has not been carried out (DEC 2009).

## **SUMMARY AND RECOMMENDATIONS**

*Macarthuria keigheryi* is currently listed as Threatened (Endangered) under the DEC threatened species conservation ranking system. It is considered to be facing a very high risk of extinction in the wild, either due to rarity or other factors indicating a need for special protection.

*Macarthuria keigheryi* has a number of populations, two of which are located on land managed for conservation in Dundas Nature Reserve and Moore River National Park. The largest populations are both present within the same area, adjacent to Whitfield Springs, one of which is within the National Park. The majority of populations are of small or unknown size and facing threatening processes such as mining.

This species has not been adequately surveyed, and is known only from a few locations within its range. It is recommended that this taxon remain as Threatened. The location of additional populations within the conservation estate would be required for this taxon to be removed from the Threatened flora list.

## 5. *Calectasia palustris* (R.L.Barrett & K.W.Dixon)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Stilt-rooted herb with stems growing to 0.7 metres. Blue flowers present from July to October.

**Soil preference:** White and grey sands, seasonal swamplands.

**Distribution:** South West Western Australia in the Swan Coastal Plain and Geraldton Sandplain regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

*Calectasia palustris* is represented by six records within the DEC Threatened and Priority Flora database (DEC 2012b) and seven records within the WA Herbarium database (2012a). Six occurrences of this species have also recorded by Woodman Environmental Consulting since 2007. Locations recorded show that *Calectasia palustris* has a known distribution extending approximately 130km N-S and 70km E-W between Dongara, Coorow and Cataby.

These records currently represent an estimated total of eight populations (Table 5). In cases where multiple locations were recorded from one survey area, records have been grouped as one population, as the current level of survey does not indicate whether the recorded locations are spatially distinct populations; i.e. no plants present in the vegetation between each location.

Population size is variable for *Calectasia palustris*, with a record of 120 plants representing the largest known population, two populations of approximately 30 plants, one record of a solitary plant and the remaining population sizes unknown (DEC 2012b). Of the known populations for this species all occur in areas of secure tenure, with five on unallocated crown land (one of which is partially overlying non-secure road reserve) and three within National Park or Nature Reserve.

**Table 5: Known Populations and Distribution Range of *Calectasia palustris***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1A	Corner of Wongonderrah Road and Yeeramullah Road, approx.. 30 km ESE of Cervantes		Shire Road Reserve	15/10/1984		Road maintenance
DEC, WAHERB	1B	SW of intersection of Wongonderrah and Yerramullah Roads (SW of Badgingarra)		UCL	4/9/2007	30+ plants	
DEC, WAHERB	2	N side Coorow-Green Head Rd, Pinjarrega Nature Reserve (Reserve 25210), SW of Coorow.		Nature Reserve	8/10/1992		
DEC	3	East of Brand Hwy, approx.. 4 km south of Eneabba		UCL	14/10/2002		
DEC	4	South of Coolimba – Eneabba Rd, approx. 8 km SW of Eneabba		Nature Reserve	14/10/2002		
DEC		Approx. 40 km SE of Dongara		UCL	1/11/2011	1 plant at 1 location	
WAHERB		11.6 km W of Brand Highway on Wongonderrah Road, 25 m past intersection with Yerramullah Road on S side of road, 25 m W of Wongonderrah Nature Reserve,		Shire Road Reserve	30/7/1999	120 plants	
WAHERB		Quadrat 7 of Transect 3 of control plot WTHHT for Environmental Department, Iluka Resources, Badgingarra		National Park	14/10/2002		
WAHERB		SW of intersection of Wongonderrah and Yerramullah Roads (SW of Badgingarra). Plants located south of drain and W of track running S (pop. R.L. Barrett 1307)		UCL	05/11/2007		
WAHERB, WEC		Tiwest Dongara project area, approx. 8km S of Mt Adams Road, approximately 40km south of Dongara	Tiwest Dongara 07-36 Dongara 2007 Plots, 2008 Wetlands	UCL	25/10/2007	2	Mining
WEC		Tiwest Falcon Mining Tenement	Tiwest 8-03 Falcon Plots 2008	Mining Lease	11/3/2008 – 13/3/2008	4	Mining

## SUMMARY AND RECOMMENDATIONS

*Calectasia palustris* is currently listed as Priority 1 under the DEC threatened species conservation ranking system (DEC 2012c). Priority 1 ranking is assigned to taxa which are poorly known, with few recorded populations occurring only in areas not managed for conservation, or areas known to be under immediate threat. *Calectasia palustris* has greater than five known populations, some of which occur within conservation managed lands. Seven of the eight populations are known from habitat not considered under threat for the DEC. It is thus recommended that the conservation ranking for this species be changed to Priority 3.

## 6. *Chordifex reseminans* B.G.Briggs & L.A.S.Johnson

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous, erect, tufted and dioecious herb growing 0.6-0.9 m high. Flowers are present in March to May.

**Soil preference:** Dry sand.

**Distribution:** South West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia and commonly found in drainage lines and depressions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Chordifex reseminans* has a known distribution from Cataby to Eneabba, a range of approximately 120 km.

This species is known from six records within the DEC Threatened flora database, seven records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent a total of only six populations (Table 6). Locations of individual populations indicate the known distribution of *Chordifex reseminans* is generally scattered throughout its range, with two populations recorded from Cooljarloo, one south of Eneabba, two near Cataby and one in the Badgingarra National Park.

The population in Badgingarra National Park is currently the only one known to exist on conservation estate, and information on population size or abundance at this location is not available. The remaining populations are predominantly located on mining tenement and therefore are under threat from mining activities.

There is little data recorded on numbers of individual plants at observed locations for *Chordifex reseminans*. One population record gives a count of 11 individual plants present, and three other observations describe prevalence as Locally Abundant. The numbers of individuals in the remaining populations are unknown.

**Table 6: Known Populations and Distribution Range of *Chordifex reseminans***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Brand Hwy, approx. 1.7 km South of Rocky Springs Rd and 12 km South of Eneabba.		Shire Road Reserve, Mining Lease	6/10/1995	3 locations, Locally abundant	Road maintenance, Mining
DEC, WAHERB	2	Site near southern boundary (eastern end) of Tiwest mining lease, ca 5-8 km N of Cataby		UCL, Mining Lease	23/01/2002		Mining
DEC, WAHERB	3	Site near southern boundary (western end) of Tiwest mining lease, ca 5-8 km N of Cataby		UCL, Mining Lease	23/01/2002		Mining
DEC, WAHERB		Iluka Resources Cataby Tenement, (Cataby Drill Line). Accessed from Brand Hwy ~4km N of the intersection of Brand Hwy and Cataby Rd. E of Hwy on un-named sand track.		UCL, Mining lease	27/10/2008	11 plants	Mining
DEC, WEC		Cooljarloo		Mining Lease	30/10/2008	2 locations	Mining
WAHERB		AMG-Zone 50 353858mE 6638951mN; N boundary of Park, Bibby road, Badgingarra National Park (Reserve 31809), W of Badgingarra.		National Park	07/12/1992		
WEC		18km W of Cataby.	Mullering	UCL	13/07/2006	1	

## SUMMARY AND RECOMMENDATIONS

*Chordifex reseminans* is currently listed as Priority 1 under the DEC threatened species conservation ranking system. This standing is generally applied to poorly known taxa for which there are few recorded observations and populations have not been found on lands managed for conservation.

*Chordifex reseminans* has not been adequately surveyed, and although it is recorded as occurring within the Badgingarra National Park, this population has not been surveyed since 1992. In addition, all but two of the known populations are under threat from mining activity, and none are confirmed as consisting of large numbers of healthy individuals. It is recommended that the status of *Chordifex reseminans* be changed to a Priority 2 taxon as one of the known populations is located on secure conservation tenure.

## 7. *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Open, spreading, shrub to 0.4 m high. Flowers red, present June to November.

**Soil preference:** Sand and sandy clays, in low-lying areas and winter wet flats.

**Distribution:** South West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Killed by fire

**Susceptibility to dieback:** Presumed susceptible based on the high susceptible of other *Grevillea* species

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) indicates *Grevillea thelemanniana* subsp. Cooljarloo is known from a geographic range of approximately 45 km, between southern Cooljarloo and Hill River.

This species is known from only one record within the DEC Threatened flora database and five records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of five populations (Table 7).

With regards to land tenure for the known populations of this species, two occur on unallocated crown land, one on road reserve, one within mining tenement, one on private property and one overlies both private property and conservation estate within Nambung National Park. To date there is no quantitative information on population size, although one record describes abundance for this taxon as locally common.

**Table 7: Known Populations and Distribution Range of *Grevillea thelemanniana* subsp. Cooljarloo**

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Cooljarloo		Mining Lease	4/11/2008	2	Mining
WAHERB		West Munbinea Road at junction Munbinea and Wongonderrah Road		Private Property, National Park	11/06/1988		
WAHERB		N side Woolka Road, approximately 8 km W junction Cooljarloo Road. AMG 50JLM 382040, Wedge Island 1:100,000		UCL	05/11/1988		
WAHERB		21.55 km W along Cantabilling Road from Brand Highway just W of creek crossing		Private Property	22/09/1992		
WAHERB		Site 6, about 10 km SE of The Pinnacles		Road Reserve	27/10/1999		
WAHERB		10 km W of intersection of Coojarloo/Woolka Road, on Woolka Road		UCL	22/09/2006	Locally common	

## SUMMARY AND RECOMMENDATIONS

*Grevillea thelemanniana* subsp. Cooljarloo is currently listed as Priority 1 under the DEC threatened species conservation ranking system. Species classed as Priority 1 are poorly-known taxa typically represented by a small number of recorded observations, and for which there are no known populations considered to be secure.

At this stage there has been limited survey of *Grevillea thelemanniana* subsp. Cooljarloo, and population size is largely unknown. There are no populations confirmed to be on secure tenure, and one is known to be under threat from mining activity. It is therefore recommended that this species remain listed as a Priority 1 taxon.

## 8. *Lyginia excelsa* B.G.Briggs & L.A.S.Johnson

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous, erect, tufted herb with rhizomes on surface. Dioecious, with bright green culms, growing to 0.6 - 1.5 m high. Flowering occurs March to November.

**Soil preference:** Sands. Sandy flats and sandplains.

**Distribution:** South West botanical province in the Geraldton sandplain and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show this little-known species has a restricted distribution between Mullering Road and Bibby Road in Cooljarloo, north-west of Cataby, a distance of approximately 30km.

*Lyginia excelsa* is known from only two records within the DEC Threatened flora database and four records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of four populations (Table 8).

Land tenure for populations of *Lyginia excelsa* is mostly unsecured, with records from within mining tenement, private property, shire reserve and road verge. To date, no populations have been located on conservation managed lands. A quantitative count of individual plants is only given for one record, where ten plants were present at seven points for the location. A further three records from Brand Highway note *Lyginia excelsa* as being Locally Abundant, although plant numbers are not known.

**Table 8: Known Populations and Distribution Range of *Lyginia excelsa***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Near Pinjar-Eneabba transmission line in remnant vegetation on private property, ca 3.5km N of Wongonderrah Rd, 1.5km E of Yermullah Rd, ca 10km W of Brand Hwy, approx 20km SW of Badgingarra.	Pinjar – Eneabba TL WP10-37	Private Property	18/11/2010	10 plants at 7 locations	Power Line Maintenance, Weeds, Livestock.
DEC, WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	7/11/2008	1 location	Mining
WAHERB		Brand Highway, N of Cataby, 0.2 km S of Mullering Road,		Other Shire Reserve	30/09/1995	3 locations, Locally abundant	
WAHERB		Brand Highway 105 km N of Gingin		Main Roads Road Reserve	24/08/2003		

## **SUMMARY AND RECOMMENDATIONS**

*Lyginia excelsa* is currently listed as a Priority 1 taxon under the DEC threatened species conservation ranking system. This ranking is assigned to species with few recorded observations, all from unsecured tenure.

*Lyginia excelsa* has not been adequately surveyed, has a very restricted distribution, and is not represented on land managed for conservation. The currently known populations are generally of small or unknown size, and face threats including mining activity and utility maintenance. Until further survey can locate additional populations of self-sustaining size within conservation estate, this taxon should remain listed as a Priority 1 species.

## 9. *Malleostemon* sp. Cooljarloo (B. Backhouse s.n. 16/11/88)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect shrub, ca 0.4 m high. Flowers are pink, appearing in November.

**Soil preference:** Pale grey sand and brown sandy clay. Low lying areas.

**Distribution:** South West Western Australia in the Geraldton Sandplain and Swan Coastal Plain regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC, 2012a) show that *Malleostemon* sp. Cooljarloo has a known distribution from Cooljarloo to south-east of Mimagarra, a range of approximately 40km. The species is known from five records within the DEC Threatened flora database and five records within the W.A. Herbarium database (DEC, 2012a). These records currently represent an estimated total of six distinct populations (Table 9). These are all located in DEC's Moora district in the Shires of Irwin and Dandaragan.

Locations of individual populations indicate the known distribution of *Malleostemon* sp. Cooljarloo is concentrated in the Cataby area. All of the known populations are located within 20km of the Cataby Roadhouse, three populations to the south in close vicinity to Lake Guraga and three populations north to the west of Brand Highway. Of these known populations, two occur on a Tronox mineral sands mining lease while the remaining populations are located on road verges, privately owned property and other shire reserve.

To date, around 2220 individual plants of this species have been recorded across two of the six known populations (DEC 2012a). Due to the limited population data available, the total number of plants known for this species is uncertain at this time.

**Table 9: Known Populations and Distribution Range of *Malleostemon* sp. Cooljarloo**

Data Source	DEC Pop. No	Location / Locality	Project Name	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	West of Brand Hwy approx. 4 km S intersection Cooljarloo Rd, 1 km Brand Hwy		UCL, Mining Lease	21/10/1990	220 plants at 1 location	Mining
DEC, WAHERB	2	Just East of Namming Lake, ca 1.8 km W of Brand Hwy, 18km NW of Regan's Ford.		Shire Recreation Reserve, Exploration Lease	13/11/2004	2000+ plants at 1 location	
DEC, WAHERB	3A	Just East of Namming Lake, ca 1.3km W of Brand Hwy, 18km NW of Regan's Ford.		Shire Road Reserve	13/11/2004		Road maintenance
DEC	3B	Just East of Namming Lake, ca 1.3km W of Brand Hwy, 18km NW of Regan's Ford.		Private Property	13/11/2004		
DEC, WEC		Cooljarloo	Falcon plots	Mining Lease	12/10/2006		Mining
WAHERB		6-7 km N of Cataby on Brand Highway (gravel pit near farm) then 1 km to west		Private Property	16/11/1988		
WAHERB		AMG-Zone 50 364776mE 6585445m N; Unmade road, E of Lake Guraga, S of Cataby		Shire Road Reserve	01/12/1992		Road maintenance

## SUMMARY AND RECOMMENDATIONS

*Malleostemon* sp. Cooljarloo is currently listed as Priority 1 under the Department of Environment and Conservation's threatened species conservation ranking system. Priority 1 ranking is assigned to taxa with few, poorly known populations which occur on threatened lands.

While *Malleostemon* sp. Cooljarloo has a small number of known populations, none of which are on conservation estate land, as well as a restricted geographic range. In addition the current extent and number of individual plants within three of these populations is unknown. These factors indicate that this taxon should retain a conservation standing of Priority 1 pending further survey.

## 10. *Schoenus pennisetis* S.T.Blake

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A tufted annual with a grass-like or herbaceous (sedge) habit. This species grows to 0.05-0.15 m high. Purple – black flowers are present in August to September.

**Soil preference:** Grey or peaty sand and sandy clay.

**Distribution:** South – West botanical province in the Avon Wheatbelt, Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. Commonly found in swamps and winter – wet depressions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 1 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) shows *Schoenus pennisetis* has a known distribution between Boothendarra and Ruabon, extending inland to Wongan Hills (a range of approximately 410 km).

This species is known from 15 records within the DEC Threatened flora database and 37 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 30 distinct populations (Table 10). Multiple recorded locations from a single survey area have been considered as a single population as the level of survey in these cases is insufficient to distinguish whether the locations are spatially distinct populations (i.e. discrete groups of plants without continuity between).

Locations of individual populations indicate the known distribution of *Schoenus pennisetis* is scattered roughly throughout its range, with observations noted from the regions of Boothendarra, Cataby, Wongan Hills, Forrestfield, Cannington, Jandakot, Armadale, Byford, Busselton and Ruabon.

Seven populations are considered to be on secure tenure in conservation estate, located within Wongonderrah Nature Reserve, Jandakot Nature Reserve, and Bush Forever reserve (site 319). The remaining populations are situated on unallocated crown land, railway reserve, road verge, recreational parkland, private property, shire reserve or mining lease, and are predominantly not secure.

**Table 10: Known Populations and Distribution Range of *Schoenus pennisetis***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1			Baptist Union of WA	27/11/1990		
DEC, WAHERB	2	Track along E boundary of Geoff Brickwood Reserve, 0.9 km SSW of Byford, adjacent to Soldier's road, just N of small creek		Recreation Reserve	27/11/1990		
DEC, WAHERB	3	`Cannington Swamp', Brook road, Wattle Grove		Unknown	9/09/1976		Cleared for residential estate since 1976
DEC, WAHERB	4	N of Williamson Rd, 2 km N of the intersection of Williamson Rd and Claymore Rd, 17 km E of Busselton (adj. to plot Will03).		Unknown	12/11/1993		
DEC, WAHERB	5A	700 m E Ruabon along Ruaborn-Wonnerup Road,		Shire Road Reserve	9/11/2000	Locally abundant	Road maintenance
DEC, WAHERB	5B	700 m E Ruabon along Ruaborn-Wonnerup Road,		Railway Reserve	9/11/2000	Locally abundant	
DEC, WAHERB	6	Bush Forever Site 422, Brixton Street, Kenwick		Recreational Parkland	15/12/2001	1 plant at 1 location	
DEC, WAHERB	7	System 6 area M53 (Bush Forever Site 319), Forrestfield		Nature Reserve	4/11/1994		
DEC, WAHERB	8	Lot 106 Brixton Street, Kenwick (part Bush Forever Site 387)		Recreational Parkland	24/08/1995	Scattered	
DEC, WAHERB		Firebreak S of Wongonderrah Rd, W of Cooljarloo minsite offices. On boundary of Mining tenement.		UCL, Mining Lease	30/10/2007	24 plants at 3 locations	Firebreaks, Mining, vehicle disturbance.
DEC, WAHERB		Lot 504 Field Rd Pinjarra.		Private Property	30/08/2007	~50 plants at 1 location	Land Development
DEC, WAHERB		In heath, S of Wongonderrah Rd, W of Brand Hwy, N of Cataby.		Private Property	12/12/2007	~50 plants at 1 location	Mining
DEC		North of Cataby, in the Cooljarloo area of Wongonderrah and Woolka Rds.		UCL, Private Property	13/11/2007-23/11/2007	~1430 plants at 22 locations	Roadworks, Firebreaks and Mining.
WAHERB		Cannington, near Perth		Bulding Strata	22/08/1947	Common	
WAHERB		Wongan Hills		Private Property	09/08/1949		
WAHERB		5 km from Ruabon, on Wonnerup road		Road Reserve	01/09/1987	Common	Road maintenance
WAHERB		Between Turner road and Mead Street on track past Aged Peoples Home, 500 m SW of Byford		Other Shire Reserve	27/11/1990		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Plot GOOD01 in Reserve 14076. Approx 20m SW of Goodwood Rd, Capel		Road Reserve	05/11/2005		
WAHERB		Quadrat FAIR03 in Fairbridge Farm, off a track from the Fairbridge Rd. Swan Bioplan remnant 429/5-2		Private Property	13/12/2005		
WAHERB		Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	04/10/2006	3 plants at 1 location	
WAHERB		Anstey Road Plot 1, occurs in 10 x 10 m plot located Anstey and Keane dampland, Armadale		Private Property	30/08/2007		
WAHERB		Jandakot Nature Reserve, Greater Perth		Nature Reserve	07/09/2007		
WAHERB		Brixton Street Wetland, Greater Perth		Recreational Parkland	07/09/2007		
WAHERB		900 m S of Wongonderrah Road junction with Yerramullah Road. Firebreak boundary of Wongonderrah Nature Reserve ? Wongonderrah Road runs W off Brand Highway N of Cataby, near Tributary of Mount Jetty Creek		Nature Reserve	02/11/2007	25 plants at 1 location	
WAHERB		In VCL, in what appears to be a constructed drainage line S of Wongonderrah Road, This road runs W off Brand Highway N of Cataby		UCL	03/11/2007	10 plants at 1 location	
WAHERB		Access track ca 1.5 km S of Woolka Road which is an extension of Cooljarloo Road and runs W off Brand Highway N of Cataby		UCL	06/11/2007	10 plants at 1 location	
WAHERB		In VCL, on track parallel and S of Woolka Road. Woolkda Road is an extension of Cooljarloo Road which runs W off Brand Highway N of Cataby		UCL	07/11/2007	10 plants at 1 location	
WAHERB		In a degraded wetland 20 m W of Brand Highway, ca 0.5 km S of Tiwest Cooljarloo mine access Road, N of Cataby		Road Verge	07/11/2007	50 plants at 1 location	
WAHERB		In private property, on access track, ca 3 km S of Woolka Road West (Woolka Road is an extension of Cooljarloo Road, which runs W off Brand Highway N of Cataby)		Private Property	08/11/2007	50 plants at 1 location	
WAHERB		IN VCL, on track S of Wongonderrah Road which runs W off Brand Highway N of Cataby		UCL	08/11/2007	150 plants at 1 location	
WAHERB		In private property (Wedge). On northern boundary track accessed off Woolka Road West, which is an extension of Cooljarloo Road and runs W off Brand Highway N of Cataby		Private Property	13/11/2007	20 plants at 1 location	
WAHERB		Central firebreak/track in private property, S of Woolka Road West, (Woolka Road is an extension of Cooljarloo Road, which runs W off Brand Highway N of Cataby)		Private Property	14/11/2007	16 plants at 1 location	
WAHERB		NE track/firebreak in private property S of Woolkda Road West (Woolka Road is an extension of Cooljarloo Road, which runs W off Brand Highway N of Cataby)		Private Property	14//11/2007	5 plants at 1 location	

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Access track S of Wongonderrah Road (Wongonderrah Road runs W off Brand Highway, N of Cataby)		UCL	15/11/2007	50 plants at 1 location	
WAHERB		Low Heath in Wongonderrah Nature Reserve		Nature Reserve	15/11/2007	150 plants at 1 location	
WAHERB		Scrub in Wongonderrah Nature Reserve		Nature Reserve	15/11/2007	30 plants at 1 location	
WAHERB		Low Heath/Scrub boundary in Wongonderrah Nature Reserve		Nature Reserve	15/11/2007	20 plants at 1 location	
WAHERB		On track S of Wongonderrah Road adjacent to Low Heath		Nature Reserve	15/11/2007	5 plants at 1 location	

To date, over 2,150 individual plants have been counted from locations across seven of the known populations. An additional four population records give a descriptive assessment of abundance, noting occurrence of *Schoenus pennisetis* as Scattered to Common. The numbers of individuals in the remaining populations are unknown.

## SUMMARY AND RECOMMENDATIONS

*Schoenus pennisetis* is currently listed as a Priority 1 taxon under the DEC threatened species conservation ranking system. Taxa within this classification are poorly known, with generally less than five recorded sightings all from lands not considered secure tenure.

*Schoenus pennisetis* has a broad distribution and is known from a number of locations, some within conservation estate. Surveys conducted within the past ten years have located populations not under imminent threat, and whilst population size is generally small or unknown, there are areas of suitable habitat remaining within the range of the species. For these reasons it is suggested that *Schoenus pennisetis* be reclassified as a Priority 3 taxon.

## 11. *Hypocalymma* sp. Cataby (G.J. Keighery 5151)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, spreading shrub, growing 0.5 - 1 m high and to 1 m wide. White flowers present in August.

**Soil preference:** Grey sand.

**Distribution:** South West Western Australia in the Swan Coastal Plain and Geraldton Sandplain regions.

**Response to fire/ disturbance:** Known to occur on disturbed soils

**Susceptibility to dieback:** Presumed susceptible

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

*Hypocalymma* sp. Cataby is represented by nine records within the Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) and nine records within the W.A. Herbarium database (DEC 2012a). Locations recorded show that *Hypocalymma* sp. Cataby has a known distribution of approximately 180km range, extending in a narrow line between Badgingarra and Maida Vale. Recorded observations are concentrated in the Badgingarra district, with eleven of the known occurrences in this region. One occurrence is recorded from the Moore River National Park, and a single record is from Maida Vale east of Perth.

These records currently represent an estimated total of seven populations (Table 11). Land tenure for the known populations is largely unsecured, with four populations occurring (either wholly or in part) within road verge, two on private property and two on other shire reserve. Only one population is known to exist on secure tenure, this being situated in the Moore River National Park.

Information regarding population size is limited for *Hypocalymma* sp. Cataby, with quantitative counts given for only two recorded observations of the species. These records note 71-100 plants at two known populations. A further two populations describe abundance as Occasional and Common. The size of remaining populations is unknown (DEC 2012a).

**Table 11: Known Populations and Distribution Range of *Hypocalymma* sp. Cataby**

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1A	At crossing of Cataby Brook on Brand Highway, both sides of brook on NE and SW sides of Highway.		Road Reserve	30/07/1991	50 + plants at 2 locations	Road maintenance
DEC	1B	Near Cataby Creek Crossing, Brand Hwy.		Private Property	30/07/1991		
DEC	1C	Near Cataby Creek Crossing, Brand Hwy.		Private Property	30/07/1991		
DEC, WAHERB	2	13.5 km N of Regans Ford, along Brand Highway		Road Reserve	6/10/1982		
DEC, WAHERB	3	AMG 50JLM818126 (Lake Dalaroo 1:50,000 sheet), Reserve (12276), between Dandaragan and Moora		Camping Ground, Gravel Pit	11/08/1988		Gravel extraction
DEC, WAHERB	4	Farm, Cataby Road, W of Dandaragan; AMG 50JLM684062 (Dandaragan 1:50,000 sheet)		Private Property	12/09/1988		
DEC, WAHERB	5	AMG-Zone 50 374114mE 6546702mN; SE cnr, Moore River National Park (Reserve 28462), NW of Gingin		Conservation of Flora & Fauna	17/10/1992		
DEC	6	800m N of Koonah Rd intersection along Badgingarra Rd.		Shire Road Reserve	24/08/2003	21-50 plants at 1 location	Road maintenance
DEC, WAHERB	7	Norwood Reserve (Kalamunda Reserve 22502) off Norwood Road, Maida Vale, 3.8 km WNW of Kalamunda		Other Shire Reserve	23/08/2003	Occasional	
WAHERB		N of Perth between Moora and Jurien Bay		Private Property	16/08/1973		
WAHERB		Cataby Creek; 3 km S Cataby; approx. 160 km N Perth; Brand Highway.		Private Property	28/08/1982	Common	

## SUMMARY AND RECOMMENDATIONS

*Hypocalymma* sp. Cataby is currently listed as Priority 2 under the DEC threatened species conservation ranking system. Priority 2 ranking is assigned to taxa which are poorly known, with few recorded populations some of which are not considered to be under immediate threat.

*Hypocalymma* sp. Cataby has a small number of known populations, one of which occurs within conservation estate, however the size of the majority of these populations is unknown. It is therefore recommended that the conservation ranking for this species remain as Priority 2.

## 12. *Isopogon panduratus* subsp. *palustris* Hislop & Rye

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, robust, multi-stemmed shrub to 1.5 m high and 1.5 m wide. Deeply concave glaucous leaves, often glabrous just below flower-heads. Flowers pink, occurring August to November.

**Soil preference:** Sands and sandy soils in winter-wet areas and low-lying flats.

**Distribution:** South West Western Australia in the Swan Coastal Plain and Geraldton Sandplain regions. Restricted to the coastal plain from north-east of Cervantes to north-west of Cataby, where it grows in heathland communities.

**Response to fire/ disturbance:** Threatened by frequent fire

**Susceptibility to dieback:** Presumed susceptible due to high susceptibility of the Proteaceae family

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Isopogon panduratus* subsp. *palustris* has a known distribution from Nambung National Park east of Cooljarloo, to Dandaragan (a range of approximately 50 km).

This species is known from two records within the DEC Threatened flora database and sixteen records within the W.A. Herbarium database (DEC 2012a). It is estimated that these records currently represent a total of 11 populations (Table 12). The Tronox/Iluka joint threatened flora database also contained 63 records of this taxon which were not listed within the DEC or W.A. Herbarium records.

Locations of individual populations indicate the known distribution of *Isopogon panduratus* subsp. *palustris* is largely focused around the Wongonderrah Road area in north-west Cooljarloo. Nine of the known populations are located on land or roads adjacent to Wongonderrah Road, with the remaining populations situated in Nambung National Park to the west and outside Dandaragan to the east.

**Table 12: Known Populations and Distribution Range of *Isopogon panduratus* subsp. *palustris***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Approx 31km WNW of Dandaragan, 8km W of Brand Hwy on Tiwest Cooljarloo minesite		UCL, Mining Lease	19/10/2010		Mulching
DEC, WEC		Approx 29km WNW of Dandaragan, 6km W of Brand Hwy on Tiwest Cooljarloo minesite		UCL, Mining Lease	22/10/2010		Mining
WAHERB		Cataby area		UCL	Unknown		
WAHERB		Strathmore road Reserve (No 26248), S of Badgingarra		Nature Reserve	05/11/1975		Road maintenance
WAHERB		Strathmore road, W of Brand Highway		Nature Reserve	01/01/1976		Road maintenance
WAHERB		10 miles W of North West Coastal Highway on Strathmore road,		Nature Reserve	17/09/1976		Road maintenance
WAHERB		S Wongonderrah Road, approx. 10 km W of Brand Highway [Ca 11 km E of Nambung Homestead] AMG 50JLM 418187 Wedge Island 1:100,000		Nature Reserve	26/11/1988		
WAHERB		Wongonderrah Road, S of Badgingarra, 5.9 km W of Munbinea road		National Park	17/10/1996		
WAHERB		Site 31, 9 km E of turn off from Nambung Homestead on Wongonderrah road, 100 m down track off main road, S to Site 31/32		National Park	30/10/1999		
WAHERB		Wongonderrah Road, 200 m W of Yerramullah Road		Private Property	31/10/2000		
WAHERB		VCL N of Tiwest Joint Venture, N of Cataby		UCL, Mining Lease	12/02/2002		
WAHERB		100 m W of intersection of Wongaderrah Road and Mundinea Road, Nambung National Park		National Park	12/09/2004	Scattered	
WAHERB		ca 16 km N of Cataby on the W side of Brand Highway. In bushland on the north mine area of Tiwest Cooljarloo mineral sands mine		Mining Lease	13/12/2006		
WAHERB		Minbinea Road, 5.8 km N of Nambung Road, SW of Badgingarra		Private Property	15/08/2008	Occasional	
WAHERB		S side Wongonderrah Road, 800 m W of Yerramullah Road, SW of Badgingarra		UCL	15/08/2008	50-70 plants at 1 location	
WAHERB		Wongonderrah Road, 4.2 km W of Yerramullah Road, SW of Badgingarra		Road Reserve	15/08/2008	Scattered	
WAHERB		E side of Yerramullah Road, 1.2 km N of Wongonderrah Road, SW of Badgingarra		Private Property	16/08/2008	Very occasional	
N. EVELEGH		Jurien, south of Hill River	Jurien Project	Mining Lease		305 plants at 6 locations	Mining

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
TRONOX		Cooljarloo	Cooljarloo North West Spring survey	Mining Lease	2009	57	Mining

Land tenure for populations of this species is largely secure. Six observations of *Isopogon panduratus* subsp. *palustris*, likely comprising two distinct populations, have been recorded within mining tenement in Cooljarloo and Jurien, and four populations are situated on conservation tenure within Wongonderrah Nature Reserve, Strathmore Road Reserve and Nambung National Park. The remaining populations are located on unallocated crown land, road reserve or private property.

Limited information on population size has been recorded for *Isopogon panduratus* subsp. *palustris*. The surveys undertaken for Tronox at Jurien recorded 305 plants and one herbarium record gives a quantitative count of up to 70 plants at one location. A further three records describe abundance as Very Occasional, Occasional and Scattered, however, numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Isopogon panduratus* subsp. *palustris* is currently listed as Priority 2 under the DEC threatened species conservation ranking system. Priority 2 ranking is assigned to taxa which are poorly known, with few recorded populations some of which are not considered to be under immediate threat.

This species is represented by eleven populations, the majority of which occur on land considered to secure. Based on the criteria used in this review it is recommended that the conservation status of this taxon be changed to Priority 3 as it has greater than five populations, several of which occur on land managed for conservation.

### 13. *Onychosepalum microcarpum* Meney & Pate

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A rhizomatous, perennial, tufted herb growing 0.07-0.15 m high. Flowers are present August to October.

**Soil preference:** White or yellow sand.

**Distribution:** South – West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. Commonly found within dry heath and low woodland.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Based upon records contained in the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) (DEC 2012a), *Onychosepalum microcarpum* has a known distribution from Red Gully to Badgingarra, a range of approximately 85 km.

This species is known from three records within the DEC Threatened flora database and six records within the W.A. Herbarium database (DEC 2012a), as well as one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of six distinct populations (Table 13). Records indicate that populations of *Onychosepalum microcarpum* are concentrated in the Badgingarra National Park, with five of the ten records from this general area.

Land tenure recorded for observations of this species is mixed. Of the known populations for this species, three occur within Badgingarra National Park however two of these are situated on road verge traversing the park and are therefore under threat from road maintenance. The third of these is considered secure, and a further population existing in Fynes Road Nature Reserve is also considered secure. One population is located in UCL, with the remaining population found on private property.

Information on abundance shows that population size is generally small or unknown for this taxon.

**Table 13: Known Populations and Distribution Range of *Onychosepalum microcarpum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Bibby Rd, N verge, approx. 3.8 km W of Brand Hwy, ca 13 km SSE of Badgingarra, through Badgingarra National Park.		Road Verge adjacent to National Park	6/09/1990	Rare	Road maintenance
DEC, WAHERB	2	Bibby Rd, N verge, approx. 5 km W of Brand Hwy, ca 13 km SSE of Badgingarra, through Badgingarra National Park.		Road Verge adjacent to National Park	6/09/1990	Rare	Road maintenance
DEC, WAHERB	3	Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	7/11/2006		
WAHERB		Badgingarra National Park, just W of Brand Highway near new Townsite, along Dampier to Perth Gas pipeline route		National Park	06/10/1981		
WAHERB		Cataby		Private Property	/09/1990		
WEC		18km W of Cataby.	Empire Mullering	UCL	21/10/2005	7	Oil and gas exploration

## SUMMARY AND RECOMMENDATIONS

*Onychosepalum microcarpum* is currently listed as a Priority 2 taxon under the DEC threatened species conservation ranking system. This classification is given to species which are poorly known, with a small number of recorded observations of which some are on conservation estate and therefore not under imminent threat.

From the records available it appears that *Onychosepalum microcarpum* is consistent with the conservation ranking it is currently assigned and it is therefore recommended that it remain as a Priority 2 species. Further survey is required as the current available information for this taxon is limited.

## 14. *Stenanthemum sublineare* Rye

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** An erect, lignotuberous shrub growing to 0.1 m high with green - cream flowers present in October to December.

**Soil preference:** Sand and sandy loam.

**Distribution:** South – West botanical province in the Esperance Plains and Swan Coastal Plain regions.

**Response to fire/ disturbance:** Resprouts from lignotuber after fire

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) indicates *Stenanthemum sublineare* is known from several widespread locations within the south-west of Western Australia, including Cooljarloo, Lake Pinjar, Bullsbrook, Huntingdale and Many Peaks, a geographic range of approximately 550 km.

This species is known from five records within the DEC Threatened flora database, five records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of eight populations (Table 14).

Land tenure for populations of *Stenanthemum sublineare* is predominantly not secure, with four populations known to be located on private property within plantations. One population is situated on unallocated crown land, and a further population within mining tenement. The remaining population was recorded within state forest, however it was located in an area proposed for a new infiltration plant in 2005, and it is unknown whether this population still exists.

Population sizes for *Stenanthemum sublineare* are generally small, with the majority of quantitative counts consisting of just a single plant. The largest known population is comprised of approximately 200 individuals, is found on remnant bushland within private plantation and is therefore considered to be under threat.

**Table 14: Known Populations and Distribution Range of *Stenanthemum sublineare***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB		Remnant vegetation W boundary of Plantagent Loc 6487 Drawbin Rd. North of Many Peaks. In the Albany Region.		Private Property	9/06/2003	1 plant at 1 location	
DEC		Remnant vegetation S boundary of Plantagent Loc 7476/Site Salopia Downs Tree Farm, Drawbin Rd. North of Many Peaks. In the Albany Region.		Private Property	17/06/2003	1 plant at 1 location	
DEC		Remnant vegetation W boundary of Plantagent Loc 6489/6812, ITC Wimbush Tree Farm, Drawbin Rd. North of Many Peaks. In the Albany Region.		Private Property	29/07/2003	6 plants at 1 location	
DEC		Remnant vegetation W boundary of Plantagent Loc 6485, Aparillia Tree Farm, Hassell Hwy. North of Many Peaks. In the Albany Region.		Private Property	17/07/2003	200+ plants at 1 location	
DEC, WEC		Approx 24km W of Dandaragan, 3km W of Brand Hwy on Tiwest Cooljarloo minesite.		UCL	29/10/2010		
WAHERB		Melaleuca Park, W of Bullsbrook, ca 3 km N of Neaves Road along walk trail		Private Property	27/10/1997	Common in small area	
WAHERB		Melaleuca Park, W of Bullsbrook, ca 3 km N of Neaves Road along walk trail,		Private Property	21/12/1997	Common in small area	
WAHERB		Bush remnant SW of Gay Street and SE of Potter Street, Huntingdale		Private Property	15/10/2003	1 plant at 1 location	
WAHERB		Proposed Neerabup Infiltration site, SE of Lake Pinjar, E of Wanneroo Golf Club, adjacent to Bush Forever site 398		State Forest	17/11/2005	1 plant at 1 location	
WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	7/11/2008		

Two records for a population occurring west of Bullsbrook note abundance as Common within a small area, however there are no numbers given of individuals. Abundance of *Stenanthemum sublineare* in the remaining populations is unknown.

## SUMMARY AND RECOMMENDATIONS

*Stenanthemum sublineare* is currently listed as a Priority 2 taxon under the DEC threatened species conservation ranking system. This classification is attributed to species which are considered poorly known, with few recorded observations some of which are within conservation estate, or species which have not been adequately surveyed and may be under threat.

Although the distribution of *Stenanthemum sublineare* is geographically broad, it is highly fragmented, with the only large population known from tenure not considered secure. At present there are no populations known from conservation managed lands, and populations for which quantitative counts have been recorded thus far are generally comprised of just a single plant. *Stenanthemum sublineare* has not yet been adequately surveyed, and remains a poorly known taxon. It is considered that this species meets the criteria of a Priority 2 taxon, and should remain classified as such until healthy populations are located within secure tenure.

## 15. *Stylidium aceratum* Lowrie & Kenneally

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A fibrous rooted annual with a herbaceous habit growing to 0.05-0.09 m high. Pink / white flowers occur in October to November. The leaves of this species are spatulate.

**Soil preference:** Sandy soils.

**Distribution:** South-West botanical province in the Swan Coastal Plain region. Commonly found in swamp heathland.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) indicates that *Stylidium aceratum* has only been observed in one location, north of Bullsbrook. This species is known from only two records within the W.A. Herbarium database (DEC 2012a), with both records relating to the same location (Table 15). This taxon was also recorded by Woodman Environmental Consulting in 2008 at Cooljarloo, representing a range extension of approximately 150km. A specimen and a flora report form were submitted to J. Wege at the W.A. Herbarium in March 2009 but neither the form nor specimen have been entered into the relevant DEC databases.

There are only two known populations of this species. One is situated within the Bullsbrook Nature Reserve, and is as such considered to be on secure tenure. To date there is no information on population size, and no surveys have been conducted since 1993 to determine if the population is still extant. The other population is located on unallocated crown land near Cataby, within the Tronox Cooljarloo West mining lease. The size and status of this population is also unknown, with only 1 plant noted in 2008.

**Table 15: Known Populations and Distribution Range of *Stylidium aceratum***

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Along Great Northern Highway N of Bullsbrook, 1 km S of Wandena Road (S end) on E side of the highway		Nature Reserve	09/11/1991		
WAHERB		Black Swamp Nature Reserve on Great Northern Highway; 1 km S of Wandena Road, Bullsbrook (S end)		Nature Reserve	03/11/1993		
WEC		Coolarjoo West near Cataby	Tiwest08-19 Structural mapping	UCL	05/11/2008	1	Mining

## SUMMARY AND RECOMMENDATIONS

*Stylidium aceratum* is currently listed as a Priority 2 taxon under the DEC threatened species conservation ranking system. Species classed as Priority 2 are poorly-known taxa typically represented by a small number of recorded observations, some of which are within conservation estate, or species which have not been adequately surveyed and may be under threat.

At this stage there has been no substantial survey of *Stylidium aceratum*, and only two populations have been located to date. Although located on secure tenure within a nature reserve, the size of the Bullsbrook population is unknown. With such a highly restricted distribution, small number of populations, and lack of survey, it is recommended that this taxon remain listed as a Priority 2.

## 16. *Stylidium hymenocraspedum* Wege

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A perennial herb growing to 0.27 - 0.7 m high. The leaves of this species are basally rosetted, spatulate and adpressed to soil surface. Yellow, racemose flowers are present in September to October.

**Soil preference:** Sand, sand over laterite.

**Distribution:** South – West botanical province in the Geraldton Sandplains and Swan Coastal Plain region. Commonly occurring in Heath, Banksia and Eucalyptus low open woodland.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 2 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

*Stylidium hymenocraspedum* is represented by six records within the Department of Environment and Conservation (DEC) Threatened Flora database (DEFL), nine records within the W.A. Herbarium database (DEC 2012a), and three additional records from Woodman Environmental Consulting. Locations recorded show that *Stylidium hymenocraspedum* has a known distribution of approximately 110 km, extending in a narrow line between Eneabba and Cooljarloo. Recorded observations are concentrated in the Badgingarra district, with 33 of the recorded occurrences in this region. The remaining occurrences are from south of Eneabba.

These records currently represent an estimated total of thirteen populations (Table 16). Recorded occurrences from within a single survey area have in some cases been combined as a single population, as the current extent of survey has not determined whether these occurrences represent spatially distinct populations (i.e. discrete groups of plants without continuity between them). Land tenure for the known populations is largely unsecured, with four populations occurring (either wholly or in part) within road verge, four on mining tenement, two on private property and one on shire gravel reserve. Only two populations are known to exist on conservation managed lands, these being situated partially within Badgingarra National Park and South Eneabba Nature Reserve.

**Table 16: Known Populations and Distribution Range of *Stylidium hymenocraspedum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Approx 30kms W of Dandaragan, just N of Woolka Rd.		Mining Lease	17/09/2009	2 locations	Mining
DEC		Approx 6km along Woolka Rd, W of Brand Hwy intersection, approx 13km NW of Cataby. Tiwest Cooljarloo tenement.		Exploration lease	28/09/2011-31/10/2011	273 plants at 3 locations	Mining
DEC, WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	7/11/2008 - 13/11/2008	5	Mining
DEC, WEC		Tronox mining tenement, Cooljarloo.	Mulch Monitoring	Mining Lease	18/11/2010 - 20/10/2010	3	Mining
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba	Pinjar – Eneabba DRF & Priority Flora Surveys WP8-41,WP10-37	Mining Lease and Private Property	9/12/2008 - 19/11/2010	32 plants at 11 locations	Power Line Maintenance
WAHERB		3 miles W of Badgingarra-Eneabba highway, along Cadda Road		Private Property	/10/1971		
WAHERB		2 km N of Mullering Brook Bridge on Gingin-Jurien Bay Road [Brand Highway]		Private Property	/09/1974		
WAHERB		Waddi Road, 2 km E of Brand Highway then N of the road for ca 80 m, Badgingarra		Road Reserve	09/10/2002	20+ plants at 1 location	
WAHERB		Wongonderrah Road, 6.65 km W of Brand Highway then N of the road for ca 30 m, just W of the gravel excavation site, Badgingarra		Gravel Pit	09/10/2002	Scarce	Gravel extraction
WAHERB		Brand Highway, 0.4 km N of Waddi Road, mainly on the E side of road, Badgingarra		Road Reserve	09/10/2002	Scattered	Road maintenance
WAHERB		Brand Highway, 2.2 km N of Waddi Road, mainly on the w side of road, Badgingarra		Road Reserve	09/10/2002	Scattered	Road maintenance
WAHERB		ca 800 m E on Waddi Road from Brand Highway, S of Badgingarra		Road Reserve	25/10/2002	Occasional	
WAHERB		S side of Bibby Road, 7.3 km E of Munbinea Road		Road Reserve	07/10/2003	Scattered	Road maintenance
WAHERB		Badgingarra National Park, 0.5 km N of Waddi Road on Brand Highway, ca 200 m E of road (S of Badgingarra)		National Park	02/12/2007	30+ plants at 1 location	
WEC		Allied Tails Rehabilitation Area, just E of South Eneabba Nature Reserve, South Eneabba	Allied Tails	Private Property and Nature Reserve	2005	2	Mining
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	2006	1	Mining

Information regarding population size is given for a number of populations for *Stylidium hymenocraspedum*, with quantitative counts totalling 355 individual plants from four populations. A further five populations describe abundance as Scarce to Scattered. The size of remaining populations is unknown (DEC 2012b).

## **SUMMARY AND RECOMMENDATIONS**

*Stylidium hymenocraspedum* is currently listed as a Priority 2 taxon under the DEC threatened species conservation ranking system. Priority 2 ranking is assigned to taxa which are poorly known, with few recorded populations some of which are not considered to be under immediate threat.

This species has a modest number of recorded observations, two of which are from conservation managed lands. This taxon does not meet the criteria for Priority 2 and it is recommended that its conservation status be changed to Priority 3. It has been recorded in more than five populations, some of which are on secure tenure.

## 17. *Angianthus micropodioides* Benth.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous, perennial herb growing 0.2-0.4 m high. Flowers are yellow and present in July to October.

**Soil preference:** Grey or yellow sand.

**Distribution:** South West botanical province in the Avon Wheatbelt, Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Occurs in disturbed or burnt areas.

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Angianthus micropodioides* has a known distribution from Beacon in the north-east to Salter Point in the south (a range of approximately 400 km), and extending as far inland as Cunderdin (260km).

This species is known from eight records within the DEC Threatened flora database, 21 records within the W.A. Herbarium database (DEC 2012a) and 18 additional records from Woodman Environmental Consulting. It is estimated that these records currently represent a total of 17 populations (Table 17).

Locations of individual populations indicate the known distribution of *Angianthus micropodioides* is generally scattered throughout its range, with populations occurring adjacent to the Swan River estuary, around salt lakes in the Wheatbelt at the species' eastern extension, and in saline wetlands or depressions in the north of its range.

Land tenure for populations of *Angianthus micropodioides* is largely private property and therefore not secure, with ten populations recorded from this tenure. There are a further two populations on unallocated crown land, three in shire reserve, one on road verge and one in nature reserve. Nineteen observations of *Angianthus micropodioides*, likely comprising a single population, have been recorded within mining tenement in Cooljarloo.

**Table 17: Known Populations and Distribution Range of *Angianthus micropodioides***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Avon district (SW Province) ca. 7.2 km from Bunjil along main road to Latham.		Private Property	13/11/1983		
DEC	2	Mosman Park.		Private Property	25/01/1984		
DEC, WAHERB	3	Alfred Cove; Swan River		Private Property	3/12/1988	Very common	
DEC, WAHERB	4	Canning foreshore at Salters Point ca 10 m S of road, towards Salters Point itself		Shire Reserve	5/01/1994	Common in small area	
DEC, WAHERB	5	5 km from Morawa on road to Perenjori, Avon Botanical District		Main Roads Road Reserve	29/10/1995		
DEC, WAHERB	6	Avon District. 0.5 km N of Pindar		Other Shire Reserve	26/10/1995		
DEC	7	Approx 17km SE of Rothsay, near Lake Moore.		Private Property	26/09/1986		
DEC, WEC		Cataby		Mining Lease	15/04/2009	1	Mining
WAHERB		Banks of Swan River Estuary, Perth		Road Reserve	28/12/1898		
WAHERB		East Perth		Private Property	28/12/1898		
WAHERB		Mortlock River flats, E of Meckering		UCL	22/10/1945		
WAHERB		Mollerin, ca. 43 km N of Koonda		Private Property	02/09/1967		
WAHERB		3 km E of Meckering and ca. 86 ml E of Perth in bed of Mortlock River		Private Property	23/11/1967		
WAHERB		Near Pt. Walter on bank of Swan River		Other Shire Reserve	09/02/1975		
WAHERB		Pt. Walter, Swan River Estuary		Building Strata	25/01/1984		
WAHERB		Salt Lake on Tardun CBC farm, 11 km ENE of Tardun, 6.0 km SE of intersection of Kelly Road and Mindage Spring Road. SAP wetlands site SPS186B		Private Property	26/09/2000		
WAHERB		Saline wetland 58 km ENE of Wongan Hills within Walk Walkin NR C24838. NE side of the wetland in NE corner of reserve near intersection with McTaggart Road. SAP wetlands site SPS156D		Nature Reserve	11/09/2000		
WAHERB		Lake Harvey in UCL 56 km NNE of Koorda, 13.5 km N of intersection of Samphire Road and Bonnie Rock Burakin Road along Samphire Road, in SW corner of lake. SAP wetlands site SPS170C		UCL	12/09/2000		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Mortlock River East flats, 100 m W of N extension of Mussard Road, 1.4 km N of Great Eastern Highway. 5.5 km NW of Cunderdin, Jaspers Property. SAP wetlands site SPS207D		Private Property	02/10/2000		
WAHERB		Site 113B. Salt lake on southern side of McKay Road, ca 5 km E of intersection of McKay Road with the Northam - Pithara Road, N of Ballidu		Private Property	19/11/2008		
WAHERB		Site 125B. Salt lake ca 6.5 km NW of Cunderdin. Lake on right at bottom corner of paddock, 1.4 km S along track on E of paddock fence. Track turnoff 5.4 km along Dennis Road from intersection with Woonwooring Road turnoff to Dennis Road 1.7 km N of inte		Private Property	20/11/2008	2	
WAHERB		Site 125B. Salt lake ca 6.5 km NW of Cunderdin. Lake on right at bottom corner of paddock, 1.4 km S along track on E of paddock fence. Track turnoff 5.4 km along Dennis Road from intersection with Woonwooring Road turnoff to Dennis Road 1.7 km N of inte		Private Property	22/10/2008		
WAHERB		Site 128A. Salt lake ca 10.3 km E of Cunderdin. Site is to W of road, 7.6 km along Rabbit Proof Fence Road NS then E from intersection of Rabbit Proof Fence Road N and Three Mile Gate Road. Three Mile Gate Road intersects with Cunderdin - Wyalkatchem Ro		Private Property	20/11/2008		
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	2005-2006	8	Mining
WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	3/11/2008-4/12/2008	10	Mining

Limited information on population size has been recorded historically for *Angianthus micropodioides*. One record describes abundance as Common within a small area, and another as Very Common, however, numbers of individuals in the remaining populations are unknown.

## SUMMARY AND RECOMMENDATIONS

*Angianthus micropodioides* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

*Angianthus micropodioides* appears to have a wide range and reasonable number of known populations of which some are unlikely to be currently under threat, however, the size of individual populations is generally unknown. In addition, the land tenure of most populations is largely unsecured. Although the species is widespread with large areas of suitable habitat not under imminent threat, there have only been eight recorded observations since 2000, therefore the status and size of the majority of populations is unknown. These factors suggest this species should remain as a Priority 3 until it can be considered to have been adequately surveyed.

## 18. *Baeckea* sp. Moora (R. Bone 1993/1)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Open spreading or spindly shrub growing to 0.5-2 m high. Flowers are white/pink and present in November to December.

**Soil preference:** Gravelly soils.

**Distribution:** South West botanical province in the Avon Wheatbelt, Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Regenerates well after physical disturbance along tracks and verges.

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

*Baeckea* sp. Moora is known from seven records within the DEC Threatened flora database and 17 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 14 distinct populations (Table 18).

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), this species has a restricted distribution from Cataby to Watheroo National Park north of Moora, a range of approximately 80km. Recorded observations of *Baeckea* sp. Moora indicate that populations are generally found within several isolated pockets rather than scattered throughout this range.

Populations of *Baeckea* sp. Moora are predominantly located on unsecured habitat with four found on private property, two on railway reserve, three on road verges and two within gravel pits. Three populations are however found within the Watheroo National Park and thus considered secure, and a further population overlies nature reserve as well as gravel pit and railway reserve.

The majority of records for this species note healthy populations with individual plants numbering in the hundreds or thousands, however, surveys are dated only between 1990 and 2004, with no more recent observations lodged.

**Table 18: Known Populations and Distribution Range of *Baeckea* sp. Moora (R. Bone 1993/1)**

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Cairn Hill, E side of Midlands Rd, ~12km N of Moora.		Private Property	29/11/1999	1000 plants	Gravel extraction
DEC, WAHERB	2	Watheroo National Park. On both sides of Eagle Hill Rd.		National Park	30/11/1999	1000's of plants	
DEC, WAHERB	3	South side of Watheroo Rd, 2km W of Midlands Rd. Population on road verge and on private property, adjacent to gravel pit. Also a few plants on N side of road.		Shire Road Reserve, Private Property	30/11/1999	100's	Road maintenance
DEC, WAHERB	4	French Rd, 3.3 km W from Midlands Rd, N of Watheroo. Private Property.		Private Property	30/11/1999	100's	
DEC		Watheroo National Park eastern extension, common along track through the centre of this extension to the powerlines but only common on Chert ridges at the edges of the track and other disturbed areas.		National Park	3/02/2000	1000+	
DEC		Brand Hwy, Cataby, ca 25km N of Regan's Ford or 1.6km S of Yandin/Mimegarra Rd crossing and for the next 1.4km south.		Gravel scrape, Main Roads Road Reserve, Other Shire Reserve	12/02/2002	1495 plants	Firebreaks, mining, road maintenance, weeds.
DEC		Junction of Mimegarra Rd and Brand Hwy, Cataby. Both sides of Brand Hwy for 350m S and to 100m N of Mimegarra/Yandin crossing, as well as Mimegarra Rd to 500m W of Brand Hwy.		Main Roads Road Reserve, Shire Road Reserve	/02/2002	1637 plants	Firebreaks, road maintenance, weeds.
WAHERB		Gravel pit, 15 km N of Moora		Gravel Pit	15/12/1990	Frequent	Gravel extraction
WAHERB		Private Property, 12.5km at 10degrees from Moora		Private Property	27/11/1990	Common	
WAHERB		AMG-Zone 50 406959mE 6621292m N; Railway land, W of Midlands Rd, S of Coomberdale (N of Moora).		Railway Reserve	/11/1991		
WAHERB		Cairn Hill, 12 km N of Moora on the Midlands Highway, on the edge of a gravel track leading to a Telecom tower, on E side of railway line		Railway Reserve	17/12/1993		
WAHERB		Gravel pit, c. 10-15 km N of Moora		Gravel Pit	25/02/1997	Frequent	Gravel extraction
WAHERB		Site CHN,RFS. Chert ridge CHN, ca 15 km N of Moora		Private Property	26/11/2000		
WAHERB		Site No. CAH002. Cairn Hill Westrail Reserve, approximately 11 km north of Moora on the Midlands Road. The plot is on the slope to the N side of the track from the gravel pits to the radio tower, approx. 500 m east of the Midlands Road.		Railway Reserve	22/10/2000		

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Site No. CAH005. Cairn Hill Westrail Reserve, approximately 11 km north of Moora on the Midlands Road. The plot is on the slope to the N side of the track from the gravel pits to the radio tower, approx. 600 m east of the Midlands Road.		Railway Reserve	23/10/2000		
WAHERB		Site No. CHN006. About 15 km north of Moora. Cairn Hill North is the ridge of Cairn Hill extending north on to Goonderoo farm. The plot is on top of the ridge, approximately 100 m south of CHN005.		Private Property	26/10/2000		
WAHERB		Cairn Hill, 10 km N of Moora		Nature Reserve	27/09/2000		
WAHERB		Watheroo National Park, 2.5 km W of the Midlands Road on Eagle Hill Road		National Park	18/9 /2002	Common in disturbed areas	
WAHERB		Watheroo West Road, 2.1 km from Midlands Road		Private Property	26/11/2003	2 plants at this location, many more upslope	
WAHERB		Cairn Hill, growing alongside track just E of the railway crossing		Nature Reserve	20/12/2004		

To date, a total of over 6000 individuals have been recorded from seven populations, with an additional four locations recording abundance as Common or Frequent and one noting many more plants occurring upslope from the record location. The numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Baeckea* sp. Moora is currently listed as Priority 3 under the DEC threatened species conservation ranking system. This classification is applied to species known from few or widespread locations, where there is sufficient habitat not considered to be under imminent threat, or populations are of large size.

This species has a small number of well-established and reasonably sized populations. Several populations are contained within secure tenure, however, *Baeckea* sp. Moora has a fragmented distribution, and no new populations have been recorded for some years. Therefore, it is recommended that *Baeckea* sp. Moora retain its ranking as a Priority 3 taxon.

## 19. *Baeckea* sp. Perth Region (R.J. Cranfield 444)

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, open and straggly shrub growing to 1.2 m high. Flowers are pink/white and present in January to March.

**Soil preference:** Orange sand, brown loam, white sandy clay.

**Distribution:** South West botanical province in the Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show this species has a known distribution from Boothendarra to Mundijong, a distance of approximately 250km. Its range extends from Lancelin on the coast, inland to Mogumber.

*Baeckea* sp. Perth Region is known from five records within the DEC Threatened flora database, 16 records within the W.A. Herbarium database (DEC 2012a) and 28 additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 12 populations (Table 19).

Observation records of individual populations indicate that *Baeckea* sp. Perth Region was known historically from the Cannington district, with nine records from this region between 1899 and the 1970's, however location details recorded for these specimens are not sufficient to allow them to be considered multiple distinct populations, and no new records have been collected from the area since 1978. More recent survey findings have located the species in relatively large numbers in the Boothendarra and Cooljarloo areas. Single observations have also been made in both Oakford and Mundijong south of Perth.

Land tenure for populations of *Baeckea* sp. Perth Region is predominantly not secure. Three populations have been recorded on private property, three on shire road verge, three on unallocated crown land and one occurs on mining lease. A single population is known to exist partly within conservation estate in the Watheroo National Park and Big Soak Conservation Reserve, whilst land tenure for the Lancelin population is unknown.

**Table 19: Known Populations and Distribution Range of *Baeckea* sp. Perth Region (R.J. Cranfield 444)**

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Brentwood Road, Kenwick		Private Property	24/02/1978		
DEC, WAHERB	2	Abernethy Road, Oakford		Shire Road Reserve	23/03/1981		
DEC	3	10.8 km W of Midlands Rd, Approximately 13.2 km N of Moora		Private Property	15/11/1988		
DEC, WAHERB	4	Mundijong road, 4 km W of Mundijong		Shire Road Reserve	20/01/1992	Locally common	
DEC		Warro seismic survey area, approx NW corner is E374000 N6666000, SE corner is E382000 N6655000.		National Park, Private Property, Conservation Reserve	2010-2011	>5000 plants at ~200 locations	
WAHERB		Cannington, Lower Canning River		Unknown	21/02/1899		
WAHERB		Cannington, Canning Range		Unknown	24/01/1900		
WAHERB		Cannington		Unknown	15/03/1900		
WAHERB		Cannington, Canning Range		Unknown	16/02/1901		
WAHERB		Mogumber, between Perth and Moora on railway		Private Property	03/1901		
WAHERB		Cannington, Lower Canning River		Unknown	08/03/1902		
WAHERB		Cannington, Lower Canning River		Unknown	25/02/1903		
WAHERB		Cannington Swamp		Unknown	02/03/1948		
WAHERB		Cannington		Unknown	02/03/1948		
WAHERB		Lancelin		Unknown	14/01/1970		
WAHERB		10.6 km W of Cooljarloo Road on Woolka Road		UCL	26/06/2004	Common	
WAHERB		Yerramullah Road 9.7 km S of Bibby Road, SW of Badgingarra		Road Reserve	04/01/2005	Scattered	
WAHERB		Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	12/07/2006	Common	Gas exploration
WEC		18km W of Cataby.	Mullering	UCL	/09/2005 – /07/2006	11	Mining
WEC		Tronox Falcon Tenements, Cooljarloo .	Various	Mining Lease	2005-2008	17	Mining

Several collections describe abundance at the location as Common, Locally Common or Scattered. A quantitative count is only given for one record, an area of approximately 9000 hectares where over 5000 plants were noted from several hundred separate locations. Due to the level of survey conducted, the records from this survey area cannot be confirmed as being from multiple spatially distinct populations (i.e. discrete groups of plants without connectivity) and thus have been counted as a single population.

## **SUMMARY AND RECOMMENDATIONS**

*Baeckea* sp. Perth Region is currently listed as Priority 3 under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

Although *Baeckea* sp. Perth Region appears to have a number of known populations, the size of individual populations, as well as security of tenure, is generally unknown. Currently there is only one population known from land managed for conservation and several populations are under threat from mining activity. In addition, some of the known populations (in particular those in the Cannington district) may no longer exist as they have not been resurveyed in the past 20 years or more and land tenure is unknown. It is therefore recommended that this taxon remain a Priority 3 as the current level of information is not sufficient to recommend any changes to conservation status.

## 20. *Banksia dallanneyi* subsp. *pollostata* (A.S.George) A.R.Mast & K.R.Thiele

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Prostrate, spreading, lignotuberous shrub growing to 0.3 m high. Flowers are yellow to orange/golden and present in August and September.

**Soil preference:** Yellow/grey sands, at times over laterite. Flats and lateritic rises

**Distribution:** South West botanical province in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible due to the high susceptibility of other *Banksia* species in the region (Paap *et. al.* 2010)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

This species is known from 13 records within the DEC Threatened flora database (DEC 2012a), 14 records within the W.A. Herbarium database (DEC 2012a), and one additional record from Woodman Environmental Consulting. There are also 5668 plants of this taxon noted as being recorded within the Tronox lease areas at Cooljarloo (Tronox/Iluka database). None of these records have been submitted to the DEC or W.A. Herbarium. Locations recorded indicate the distribution of *Banksia dallanneyi* subsp. *pollostata* encompasses the greater Moora area, stretching between Lancelin and Wongan Hills, extending north to Watheroo National Park (a range of approximately 140 km distance). Known populations are scattered throughout this range.

These records currently represent an estimated total of 17 distinct populations (Table 20). Of the known populations for this species, eight are located within conservation reserves, one on unallocated crown land and one in state forest and are thus considered to be on secure tenure. A further two are noted to occur on private property and one population is found within a camping reserve. The land tenure of the remaining populations is unknown. The records from the Tronox lease areas have been grouped as one population.

Information on population sizes for *Banksia dallanneyi* subsp. *pollostata* is limited, with one record noting abundance as infrequent and another describing the species as widespread in the general area, with up to 50 individuals found at the record location. The numbers of individuals in the remaining populations are unknown.

**Table 20: Known Populations and Distribution Range of *Banksia dallanneyi* subsp. *pollostia***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	5 km W of Moore River on Old Bennie's road		State Forest	5/09/1978		
DEC, WAHERB	2	On Sappers road, 15 km E of KW road (E of Lancelin)		Unknown	17/07/1983		
DEC, WAHERB	3A	Watheroo road, 26.6 km W of Midlands Highway,		National Park	5/08/1986		
DEC, WAHERB	3B	26.65 km W of Midlands Road, on Watheroo (W) road		National Park	2/09/1997	Infrequent	
DEC, WAHERB	4	Reserve 12276 between Dandaragan and Moora AMG 50JLM818126 (Lake Dalaroo 1:50,000 sheet)		Camping Ground	11/08/1988		
DEC, WAHERB	5	W side of Brand Highway, 5 km N of Red Gully road, in Moore River National Park AMG 50JLL788628 Gingin 1:100,000		National Park	11/09/1988		
DEC, WAHERB	6	Just W of Moora cemetery		Unknown	9/08/1993		
DEC	7			National Park	3/09/1994		
DEC, WAHERB	8	S of Marchagee Track, Watheroo National Park		National Park	20/09/1987		
DEC, WAHERB	9	Bundarra Nature Reserve, Gillingarra road,		Conservation of Flora & Fauna	3/09/1994		
DEC, WAHERB	10	Quadrat WMA74. Nilgen Nature Reserve. C 31781. Shire of Gingin. North Western Boundary		Conservation of Flora & Fauna	6/10/1999		
DEC, WEC		Bartlett's Well Nature Reserve.		Nature Reserve	9/08/2007		
DEC		Lot 34 Karakin, Shire of Lancelin, E of KW Rd and S of Sappers Rd. (Approx coords for one of the quadrats is E349627 N6566634.)		Private Property	17/11/2009	>7 locations	Land Development
TRONOX		Lease areas at Cooljarloo	Various	UCL	2002	5668 plants at 32 locations	Mining
WAHERB		Shearers quarters on the property of Mr Barrett-Lennard, 16.6 km N of Wongan - Piawanning Road, Wongan Hills, 194 km NE of Perth		Private Property	09/09/1975		
WAHERB		Mortlock Flora Reserve (N of Wongan - Piawanning Road), Wongan Hills, 194 km NE of Perth		Conservation of Flora	17/07/1976		
WAHERB		25.7 km N of Moora - Dandaragan Road on Prices Road,		Private Property	09/08/1993		
WAHERB		ca 15 km N Regans Ford, west Brand Highway		Private Property	20/12/2006	<50 plants at 1 location, widespread in area	

## SUMMARY AND RECOMMENDATIONS

*Banksia dallanneyi* subsp. *pollostata* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. This conservation ranking is reserved for taxon that are known from several locations not under imminent threat, or few widespread locations where population size is large or there are significant areas of suitable unthreatened habitat remaining.

Although the size of individual populations is generally small or unknown, *Banksia dallanneyi* subsp. *pollostata* appears to have a number of known populations of which half are within conservation managed lands. In addition, despite the moderate geographic range of this species, there is sufficient remaining suitable habitat not currently under imminent threat. This taxon does not currently meet the criteria for Priority 4 or removal from the Priority flora list and it is recommended that it remain as a Priority 3 until further survey is carried out.

## 21. *Beaufortia bicolor* Strid

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Low, compact, intricately branched shrub growing to 0.3 – 1 m high with yellow and red flowers present through November and December.

**Soil preference:** White or grey sand, at times over laterite.

**Distribution:** South West Western Australia in the Avon Wheatbelt, Swan Coastal Plain and Geraldton Sandplain regions

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible based on the high susceptibility of other *Beaufortia* species in the region (Paap *et.al.* 2010)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based upon records contained in the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) (DEC 2012a), *Beaufortia bicolor* has a known distribution from west of Eneabba to Cooljarloo, and east to Moora, a range of approximately 120 km.

This species is known from eight records within the DEC Threatened flora database and 17 records within the W.A. Herbarium database (DEC 2012a), as well as 63 additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 15 distinct populations (Table 21). Records indicate that populations of *Beaufortia bicolor* are concentrated between Cooljarloo and Warradarge, with single records each for the Eneabba and Moora areas.

This taxon has been predominantly recorded on unsecure land tenure. Of the known populations for this species, six occur on private property, two on road verge, three on unallocated crown land, one on mining lease and one on other shire reserve. A single population is recorded on conservation managed land within Coomallo Nature Reserve. The land tenure of the remaining populations is unknown.

Information on abundance shows that over 3,600 individual plants have thus far been recorded from four known populations, with a further four populations describing occurrences of *Beaufortia bicolor* as Rare, Locally frequent, Locally common and Common. Abundance for the remaining populations is unknown.

**Table 21: Known Populations and Distribution Range of *Beaufortia bicolor***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	On Coorow-Green Head road, 0.8 km E of main Perth-Eneabba road		Shire Reserve	27/11/1977		
DEC, WAHERB	2	1 km S of Wongonderrah Road junction on Brand Highway		Main Roads Road Reserve	14/11/1978		Road maintenance
DEC, WAHERB	3	20 km W of Eneabba		Unknown	23/12/1978		
DEC, WAHERB	4	By Brand Highway 2 km S of Badgingarra.		Main Roads Road Reserve	5/12/1982		Road maintenance
DEC	5	Tronox Cooljarloo mining tenement, Cooljarloo, NW of Cataby.		Mining Lease	12/12/1996		Mining
DEC, WAHERB		Hi Vallee property, Coorow shire, Moora district. Extends from just above creek near entry gate along the western firebreak boundary track and along the northern firebreak.		Private Property	15/04/2008	2956 plants	
DEC, WEC		Near Pinjar-Eneabba transmission line in UCL just south of Wongonderrah Rd, just E of Wongonderrah Nature Reserve, ca 10km W of Brand Hwy, approx 20km SW of Badgingarra.		UCL	18/11/2010	10+	Power Line Maintenance
DEC, WEC		Near Pinjar-Eneabba transmission line in large remnant on private property adjacent to Brand Hwy on E side, approx 5km N of junction Banovich Rd, 5km S of Warradarge.		Private Property	10/11/2010	100+	Power Line Maintenance
WAHERB		116 mile peg on Eneabba road [ca 15 km N of Moora on Geraldton Highway]		Private Property	19/11/1968		
WAHERB		49 miles W of Coorow towards Eneabba,		Private Property	24/11/1971		
WAHERB		ca 8 km W of New Badgingarra		Private Property	01/11/1974		
WAHERB		147 mile peg N of Gingin [9 km N of turnoff to Jurien on the Brand Highway]		Private Property	26/11/1975		
WAHERB		5 km S of Coomallo Creek on Brand Highway		UCL	16/12/1976		
WAHERB		Brand Highway		Private Property	14/12/1982		
WAHERB		Breakaway Farm just SW of junction of Brand Highway and Coorow-Green Head road,		Private Property	30/10/1985		
WAHERB		Hi Vallee farm, breakaway N of homestead, Irwin		Private Property	20/11/1986	Locally frequent	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		On large block of remnant vegetation on private farmland (Breakaway, J. & J. Browne) off Green Head - Coorow road, c. 3 km W of Brand Highway		Private Property	09/12/1995	Locally common	
WAHERB		2 km along Jurien East, E of Banovich turnoff, N side of road,		Nature Reserve	11/11/1999	Rare	
WAHERB		Hi Vallee property (D. & J. Williams) Warradarge above NW head of main valley,		Private Property	05/12/1999	Common	
WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	4/11/2008 - 7/11/2008	2	Mining
WEC		Western Power Transmission line between Pinjar and Eneabba	Pinjar – Eneabba TL WP10-37	Private property and UCL	2010	~490 plants at 61 locations	Power Line Maintenance

## SUMMARY AND RECOMMENDATIONS

*Beaufortia bicolor* is currently listed as Priority 3 under the DEC threatened species conservation ranking system (DEC 2012c). This ranking is allocated to taxon that are known from several locations not under imminent threat, or few widespread locations where population size is large or there are significant areas of suitable unthreatened habitat remaining.

*Beaufortia bicolor* appears to have a number of known populations, however, land tenure of these populations is predominantly unsecured. Although some populations are of reasonable size, these may be threatened by mining operations or other activities. It is therefore recommended that a status of Priority 3 should remain for this taxon.

## 22. *Beaufortia eriocephala* W.Fitzg.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, compact shrub growing from 0.3–0.6 metres high with red flowers present from September–November

**Soil preference:** Lateritic sandy soils and slopes

**Distribution:** South West Western Australia in the Avon Wheatbelt, Swan Coastal Plain, Jarrah Forest and Geraldton Sandplain regions

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible based on the high susceptibility of other *Beaufortia* species in the region (Paap *et.al.* 2010)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show that *Beaufortia eriocephala* has a known distribution from Gingin to Eneabba, a range of approximately 195 km.

This species is known from eight records within the DEC Threatened flora database, and fourteen records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 16 populations (Table 22), with five of these populations known from the Gillingarra area and the remaining populations scattered in the areas surrounding Gingin, Moora, Cataby, Eneabba and Dandaragan.

Of all the known populations for this species, eight occur on private property, three on gravel reserve/road verge, two on mining lease and three on secure tenure in Gillingarra Nature Reserve, Fynes Nature Reserve and Tathra National Park. To date, in excess of 1600 individuals have been recorded from six known populations, with an additional two populations containing occasional occurrences of *Beaufortia eriocephala*. Plant numbers for the remaining populations are unknown.

**Table 22: Known Populations and Distribution Range of *Beaufortia eriocephala***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	West side of Bindoon-Moora Rd, ~5km south of the junction with Gillingarra-New Norcia Rd. Along Diggers Hill Gully, between the road and Moore River		Private Property	17/09/1983	Occasional	
DEC, WAHERB	2	Private property between Mutherwandery Rd and Moora-Badgingarra Rd.		Private Property	13/08/1988		
DEC, WAHERB	3	Gillingarra Nature Reserve		Nature Reserve	8/11/1990		
DEC	4	Mogumber-Yarawindah Rd, ~13.5km east of the junction with Brand Highway		Shire Road Reserve	17/12/1992		Road maintenance
DEC, WAHERB	5	8 km E of Brand Highway on S side of Mogumber West Road		Private Property	24/11/1993	200 mature plants over 1 hectare	
DEC	6	Mogumber-Yarawindah Rd, 8km east of the junction with Brand Highway. South road verge		Shire Road Reserve	24/11/1993	200 plants at 1 location	Road maintenance
DEC		"Quins Hill" Shire of Gingin		Private Property	25/10/2004	3	
DEC, WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	13/11/2008	1 location	Mining
WAHERB		Badgingarra		Road Reserve	3/11/1962		
WAHERB		AMG-Zone 50 389457mE 6570616m N; Mogumber West road, W of Mogumber.		Private Property	17/12/1992		
WAHERB		Gravel Reserve E side of Brand Highway at 23.8 km N of Regans Ford & 8 km S of Cataby at entrance to reserve on S side, extending for 300 m E to hill		Gravel Reserve	24/11/1993	1000 plants at 1 location	Gravel extraction
WAHERB		Brand Highway, 5 km S of Cataby		Private Property	10/10/1995	Occasional	
WAHERB		Tathra National Park, Eneabba		National Park	16/11/1995		
WAHERB		Farm on Cataby Road, Dandaragan		Private Property	24/10/2002	1 plant at 1 location	
WAHERB		Gravel reserve 8 km S of Cataby on the eastern side of the Brand Highway		Gravel Reserve	9/12/2002	>100 plants at 1 location	Gravel extraction
WAHERB		Mining lease, Eneabba		Mining Lease	07/10/2004		Mining
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	07/11/2006	>100 plants at 1 location	
WAHERB		Mogumber Farm		Private Property	25/10/2007	6-20 plants at 1 location	

## SUMMARY AND RECOMMENDATIONS

*Beaufortia eriocephala* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. This species is consistent with the Priority 3 ranking as it has known populations which are not under immediate threat.

Although *Beaufortia eriocephala* appears to have a number of known populations, the majority of land tenure of these populations is unsecured. Although some populations contain large numbers of individual species, the land tenure is unsecured and therefore these populations may potentially be destroyed. These factors suggest a conservation standing of Priority 3 should remain. Further survey is required to allow designation as a Priority 4 or removal from the Priority flora list.

## 23. *Conospermum scaposum* Benth.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect shrub growing from 0.2–0.75 metres high with blue flowers present from October-February

**Soil preference:** White-grey sand or sandy clay in low swampy areas and/or road verges

**Distribution:** South West Western Australia in the Avon Wheatbelt, Jarrah Forest, Swan Coastal Plain and Geraldton Sandplain regions

**Response to fire/ disturbance:** Herbarium records indicate species responds positively to fire

**Susceptibility to dieback:** Presumed susceptible (CALM, 1996)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show that *Conospermum scaposum* has a known distribution from Wickepin to 70 km south of Eneabba, a range of approximately 270 km.

This species is known from 25 records within the DEC Threatened flora database, 38 records within the W.A. Herbarium database (DEC 2012a) and six additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 30 populations (Table 23), distributed in the Shires of Wickepin, Narrogin, Cuballing, Beverley, Victoria Plains, Dandaragan and Carnamah.

Locations of individual populations indicate the known distribution of *Conospermum scaposum* is fragmented, with five populations in the Badgingarra area, one in Mogumber (24km west of New Norcia), one at Eneabba and nine near Cataby. No populations are recorded for approximately 190km until York (four recordings), then Pingelly (one) and the Narrogin/Wickepin area (eight).

Of all the populations for this species, five occur on railway reserves, five on mining lease, six on unallocated crown land, three on private property and one on other shire reserve. Six additional populations are located on secure tenure in Wandoo National Park, Wongonderrah Nature Reserve and Toolibin Nature Reserve.

**Table 23: Known Populations and Distribution Range of *Conospermum scaposum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	1.3km W of Woolka Rd off Cooljarloo Rd, W of Brand Hwy		UCL	8/05/1996	13 plants, 5 WAHERB records	Dieback
DEC	2A	4.3 km N along Mundbinea Rd, from Wongonderah Rd, on edge of swamp.		Shire Rd Reserve	6/08/1996	>100 plants	Road maintenance, Dieback
DEC	2B	3.6 km Mundbinea Rd, off Wongonderah Rd, W side of Rd.		Shire Rd Reserve	6/08/1996	110 plants	Road maintenance
DEC, WAHERB	3	Woolka Rd, 8.2km west of Cooljarloo Rd		UCL	19/01/2004	~100 plants	
DEC, WAHERB	4	6.1km w of intersection of Woolka Rd and Cooljarloo Rd, Cataby		Gravel Reserve Rail Reserve MRD	27/11/1996	4	Road maintenance
DEC, WAHERB		Wandoo National Park, Gunapin Forest Block, Qualen Rd, York: 0.2km west of the junction with Kent Rd. The plants grow for up to 300m. This is on the eastern edge of the sandplain at Darkin Swamp		National Park	7/12/2004	432 plants	
DEC, WAHERB		Wandoo National Park, Dobaderry Rd, Beverley: ~5.3km north of Edison Mill Rd then WNW for ~100m		National Park	4/01/2006	7600	
DEC, WAHERB		Wandoo National Park, Sullivan Forest Block, Tribune Rd, Beverley: From the northern end of Tribune Rd head east for 0.8km along the boundary track. Then follow the drainage line south for ~400m to the population		National Park	16/04/2004	500 + 128 seedlings	
DEC, WAHERB		Wandoo National Park, Sullivan Forest Block, Catchment Rd, Beverley:		National Park	21/01/2004	265 plants	
DEC, WAHERB		2.2km E of Toolibin		Rail Reserve	20/11/1996	31 plants	
DEC, WAHERB		1.5km SE of Toolibin, 400m w of original location		Rail Reserve	26/11/1996	1	
DEC		4km SE of Toolibin , Rd verge over pipeline		Shire Rd Reserve and Rail Reserve	26/11/1996	23 plants	Road maintenance
DEC		1km SE of Toolibin , North side of rail verge, south side of rd verge, North of track, south of pipeline		Shire Rd Reserve and Rail Reserve	15/12/1996	153 plants	Road maintenance

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		West of old Toolibin townsite. T junction of Harrismith and North Toolibin Rds.		Nature Reserve	20/09/1999	57 plants	Road maintenance
DEC		South of Wongonderrah Road		Nature Reserve	23/11/1998	500+ plants	
DEC, WEC		Tiwest Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	4/11/2008-7/11/2008	2	Mining
DEC, WEC		32.5km NW of Dandaragan, 10km W of Brand Hwy on Tiwest Mining Lease		UCL, Mining Lease	10/05/2010		Mining
DEC		Approx 20km NNW of Cataby		Mining Lease	10/05/2010	2 plants	Mining
DEC		W of Munbinea Rd, N of Nambung Rd, ~28km SE of Jurien Bay, Tiwest Cooljarloo tenement.		Mining Lease	2/11/2011	38 plants	Mining
DEC		6km along Woolka Rd, W of Brand Hwy intersection, 13km NW of Cataby, Tiwest Cooljarloo tenement.		Mining Lease	26/10/2011	1000+ plants	Mining
WAHERB		Prope [near] Badgingarra		Other Shire Reserve	/12/1962		
WAHERB		3 miles W of Mogumber		Private Property	2/02/1967		
WAHERB		18 km S of Badgingarra		Private Property	30/01/1969		
WAHERB		S side Woolka Road, 5 km W junction Cooljarloo Road.		UCL	6/11/1988		
WAHERB		Cooljarloo Road 8 km W of Brand Highway.		UCL	6/11/1988		
WAHERB		S of Toolibin Siding,		Private Property	2/12/1993		
WAHERB		Railway reserve between Toolibin and Harrismith east of Narrogin, 2.2 km east of Toolibin siding		Railway Reserve	2/11/1994		
WAHERB		Munbinea Road, 2.9 km N of junction with Wongonderrah Road, SW of Badgingarra,		UCL	17/10/1996		
WAHERB		Railway reserve, 11.5 km S of Pingelly		Railway Reserve	17/11/1995		
WAHERB		13.3 km W of Brand Highway on Woolka Road, N of Cataby, Wongonderrah Road, ca. 2.3 km W of Yerramullah Road, (SE of Cervantes)		UCL	22/11/1996		
WAHERB				Road Reserve	09/01/2008		
WEC		Eneabba	Mulch Areas A and B	UCL, Mining Lease	2007	3 plants	Mining
WEC		Cataby	Falcon area Flora and Vegetation Survey	Mining Lease	13/10/2006	3	Mining

As of 2011, over 11,000 individuals have been recorded from 17 known locations, with the numbers of individuals in the remaining populations unknown (DEC 2012a).

## **SUMMARY AND RECOMMENDATIONS**

*Conospermum scaposum* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa which are known from several populations, at least some of which are not believed to be under immediate threat.

*Conospermum scaposum* has large populations on secure tenure in three spatially distinct conservation areas. These populations are not under threat and consist of large numbers of healthy plants and seedlings at the last survey. The taxon has in excess of 20 known populations and a wide geographic range. It is therefore recommended that it be removed from the priority flora list.

## 24. *Desmocladius biformis* B.G.Briggs & L.A.S.Johnson

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous and densely tufted perennial herb (sedge-like) that grows from 0.1-0.2 m high. Flowers in September to October.

**Soil preference:** Sand, sandy clay, lateritic soils.

**Distribution:** South West botanical province in the Avon Wheatbelt, Esperance Plains, Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Desmocladius biformis* has two main geographic areas of known distribution; from Eneabba to Regans Ford (a range of approximately 150 km), and between Cranbrook and Mt Drummond near the state's southern coast (a range of approximately 190 km), with no records falling between these zones.

This species is known from two records within the DEC Threatened flora database and 25 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 19 populations (Table 24).

Locations of individual populations indicate the known distribution of *Desmocladius biformis* is polarised between the northern sandplains and the southern coastal ranges just west of Albany. Records of *Desmocladius biformis* are roughly divided between these two regions, with eight populations occurring in the northern sandplains Eneabba to Regans Ford, and the remaining eleven populations located between Cranbrook and Mt Drummond.

**Table 24: Known Populations and Distribution Range of *Desmocladus biformis***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		South of Rocky Springs Rd, 2.5km W of its intersection with Brand Hwy, Eneabba.		UCL	27/08/2009	<20 plants	
DEC, WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	6/11/2008	1	
WAHERB		S of Stirlings		Private Property	08/1964	2	
WAHERB		ca 20 miles (32 km) SE of Ongerup,		Private Property	13/09/1966	2	
WAHERB		10.5 km W of Chillinup Pool		Private Property	07/06/1974	Very rare	
WAHERB		3 km N of New Badgingarra on Brand Highway, just S of Hill River crossing,		National Park	26/09/1976		
WAHERB		5 km S of New Badgingarra		National Park	09/09/1979	Common	
WAHERB		19 km E of Jerramungup		Private Property	09/10/1984	Rare	
WAHERB		12 km direct N of Wellstead on Chillinup road, 5.3 km SW of Pallinup River at Chillinup		Private Property	11/10/1984	2	
WAHERB		Gnowellen Road, 14.5 km NW of Chillinup Road junction, due E of Ellen Peak (Stirling Range)		National Park	11/10/1984	Abundant	
WAHERB		Chillinup Road, 14.4 km SW of Rams Head		Private Property	11/10/1984	2 locations, Occasional	
WAHERB		31 km W of Mount Drummond,		National Park	17/08/1985	Rare	
WAHERB		8 km NNW of Mount Drummond,		National Park	13/11/1986	Frequent in patches	
WAHERB		W of Eneabba on Leeman Road, ca 5 km from Brand Highway, near Road 8, Indoon,		Nature Reserve	07/09/1990		
WAHERB		Salt River Road, 4.3 km E of junction with Red Gum Pass road E of Cranbrook. Stirling Range National Park. Avon District		National Park	30/08/1998	2 locations, Abundant	
WAHERB		Long term monitoring plot 08VA, 0.5 km along firebreak running SW of Bluff Knoll Road, 0.3 km from Chester Pass Road in Stirling Range National Park, Gazetted Reserve 14732		National Park	24/10/2001		
WAHERB		S side of Marri Heights Road, 1.9 km E of Brand Highway, Darling Scarp, E of Regans Ford,		Road Reserve	17/06/2001	2 locations, Locally common	
WAHERB		Brand Highway 1 km S of Badgingarra		National Park	24/08/2003	Locally common	
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	07/11/2006		
WAHERB		Plot YARA05, Mogumber Public Reserve 8588, shire of Victoria Plains		Shire Reserve landfill site	23/09/2006		

The majority of known populations of *Desmocladius biformis* are found on secure tenure. Three populations are found in the Stirling Range National Park, two are located within the Fitzgerald National Park, three within Badgingarra National Park, one within Lake Logue Nature Reserve and one within Fynes Nature Reserve. These populations are all on conservation estate and therefore not under threat. Of the remaining populations, one population in Cooljarloo is located on mining lease, one at Eneabba is located within unallocated crown land, one on road verge, one on other shire reserve, and six are located on private property.

To date there has only been one quantitative record of population size for this species, with up to 20 plants counted at a site near Eneabba, however, abundance in qualitative terms has been noted for many populations and appears highly variable. Descriptions have included Very Rare, Rare, Occasional, Locally Common, Frequent, Common and Abundant.

## **SUMMARY AND RECOMMENDATIONS**

*Desmocladius biformis* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. This classification is applied to species known from few or widespread locations, where there is sufficient habitat not considered to be under imminent threat, or populations are of large size.

Although population sizes in quantitative terms are not generally known for *Desmocladius biformis*, descriptive assessment suggests that healthy populations are present in both regions of distribution for this species. These include populations on secure tenure. This taxon is not considered to be threatened and has a very wide geographic range and it is recommended that it be removed from the Priority flora list. The location of this taxon in several National Parks and its resistance to dieback indicate that threatening processes to this taxon do not exist.

## 25. *Eryngium pinnatifidum* subsp. *palustre* Keighery ms

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect perennial herb growing from 0.15-0.5 m high. Flowers are white/blue and present from October to November.

**Soil preference:** Clay, sandy clay.

**Distribution:** South West botanical province in the Swan Coastal Plain regions. This species is endemic to Western Australia and commonly found on claypans or seasonally wet flats.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based on examination of records contained in the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), *Eryngium pinnatifidum* subsp. *palustre* has a known geographic distribution from Cervantes to Pinjarra, a range of approximately 270 km.

This species is known from eleven records within the DEC Threatened flora database, 18 records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 16 populations (Table 25).

Locations of individual populations indicate the known distribution of *Eryngium pinnatifidum* subsp. *palustre* is generally scattered throughout its range. There are six populations recorded as occurring on lands managed for conservation. These are located in Bullsbrook Nature Reserve, Carrabungup Nature Reserve, Timaru Nature Reserve, Karnup Road Reserve, Sawpit Gully Conservation Area and the privately owned reserve of Brixton Street Wetlands. Eight populations are known from private property, one from road verge, and a further one occurs on mining tenement. Land tenure is unknown for the remaining population.

**Table 25: Known Populations and Distribution Range of *Eryngium pinnatifidum* subsp. *palustre***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	Jarrahdale north of townsite		Unknown			
DEC, WAHERB	2	Lot 37 Brixton St, Kenwick.		Private Property	30/11/1986	Common	Land Development
WAHERB	3	Bullsbrook Nature Reserve, Pearce		Nature Reserve	19/10/1992	Scattered	
DEC, WAHERB	4	Near S boundary of remnant vegetation on Lowlands property (M103) 8 km WNW of Serpentine (adj. to plot low14).		Private Property	13/09/1992		
DEC, WAHERB	5	5 km S of Gingin		Private Property	03/11/1992	Common	
DEC, WAHERB	7	Carrabungup Nature Reserve, 12 km S of Mandurah (adj. to plot carab-3)		Nature Reserve	11/10/1993		
DEC, WAHERB	8	Tuart Forest, SW Ludlow		Private Property	13/12/1994	Common	
DEC, WAHERB	9	Nature Reserve, S of Airfield Road, Shire of Gingin. About 15m from road verge on S side.		Nature Reserve	3/11/1995		
DEC, WAHERB	10	Sawpit Gully Conservation Area, Sawpit and Maralla Rd, Bullsbrook. Adjacent to the Vines.		Conservation of Flora & Fauna	3/11/1995	Locally common	
DEC, WAHERB	11	Karnup Road Reserve just to SW of intersection with Rapids Road in Karnup Road Bushland (Bush Forever Site 74), Peel Estate, in System 6 Update quadrat punr02		Shire Road Reserve	9/11/1995		
DEC, WAHERB		8km north of Bullsbrook.		Private Property	1/11/1984	Frequent	
DEC		NE portion of Ellenbrook Estate, lots 41 &42		Private Property	4/10/1992	200 plants	Clearing, drainage for development.
DEC		Brixton Street Wetlands, Kenwick		Nature Reserve	20/10/2009		
WAHERB		Serpentine		Private Property	28/10/1983	Common	
WAHERB		Brixton Road, Beckenham		Private Property	28/11/1983		
WAHERB		Brixton Road, Beckenham, 20 km E of Perth		Private Property	08/12/1986	Common	
WAHERB		Brixton Street: Beckenham, 15 km E of Perth		Private Property	29/10/1989	Abundant	
WAHERB		Carrabungup Nature Reserve, part of Austin Bay Nature Reserve, SW of Pinjarra		Nature Reserve	09/10/1995		
WAHERB		Timaru Nature Reserve; Gingin Airfield Road, c. 10 km S Gingin		Nature Reserve	09/11/2003	Uncommon	
WAHERB		Nambung River Crossing, Munbinea Road, 15 km SSE of Cervantes		Private Property	08/09/2004	Locally common	
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Regional	Mining Lease	01/11/2006		

To date, only 200 individual plants have been counted from one population in Ellenbrook. Other records give qualitative descriptions of abundance, with two observations noting prevalence as Uncommon or Scattered, and a further nine describing abundance as Frequent, Abundant, Locally Common or Common. The numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Eryngium pinnatifidum* subsp. *palustre* is currently listed as Priority 3 under the DEC threatened species conservation ranking system (DEC 2012c). Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

The known populations of this species have a large geographical range and consist of multiple locations in areas not currently threatened by any factors (i.e. locations in six conservation estates). The size of the majority of the populations is unknown but its wide range, along with recorded descriptions of abundance, indicate that it is not rare or likely to become rare. For these reasons it is recommended that *Eryngium pinnatifidum* subsp. *palustre* be removed from the Priority Flora List.

## 26. *Frankenia glomerata* Turcz.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Prostrate shrub with pink to white flowers which are present in November.

**Soil preference:** White sand.

**Distribution:** Eremaean and South West botanical province in the Avon Wheatbelt, Coolgardie, Gascoyne, Geraldton Sandplains, Little Sandy Desert and Mallee regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Frankenia glomerata* has a known distribution between Arrino, Katanning and Esperance (a range of approximately 850 km) as well as in the Little Sandy Desert in the mid-west of the state.

This species is known from nine records within the DEC Threatened flora database and 27 records within the W.A. Herbarium database (DEC 2012a). These observations currently represent an estimated total of 22 populations (Table 26).

Locations of individual populations indicate the known distribution of *Frankenia glomerata* is generally concentrated in the south-west of the state, with 15 populations situated between Arrino and Cunderdin, five between Kwyolin and Esperance, and two located in the Little Sandy Desert.

Land tenure for known populations is mostly unsecured, with more than half of recorded occurrences on private property. Four populations are known from unallocated crown land, two on road verge and one on shire parkland. Four populations are within secure tenure in the Yeyening Lakes Nature Reserve and Mortlock Flora Reserve.

**Table 26: Known Populations and Distribution Range of *Frankenia glomerata***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Little Sandy Desert, 30.6 km NE of Kulonoski East Well, 25.8 km NW of Lake Sunshine, 33.1 km SE of Moffetah Well, 6 km WSW of Yanneri Lake		UCL	23/10/1996	Common	
DEC, WAHERB	2	4 km ENE of Blue Hill Station (abandoned), 1.5 km S of boundary of Carnarvon Range proposed Conservation Park in Little Sandy Desert,		UCL	28/08/1999		
DEC, WAHERB	3	12.3 km E of Norseman PO along Eyre Highway. Track off Eyre Highway 10.9 km E of junction with Coolgardie - Esperance Highway. N side of Highway, Coolgardie District,		UCL	9/11/2000	Locally common	
DEC, WAHERB	4	Mortlock River East flats, 100m W of N extension of Mussard Road, 1.4 km N of Great Eastern Highway. 5.5km NW of Cunderdin, Jaspers Property. SAP wetlands site SPS207D		Private Property	6/11/2001	2	
DEC, WAHERB	5	Private property location 384, Coles Road 2.3 km west of intersection with Kwolyin W Road, along slight embankment on second salt lake edge		Private Property	9/11/2006	6-20 plants at 1 location	
DEC	6	~4 km SE of junction of Tomkins Rd and Arrino West Rd, Arrino.		Private Property	28/11/2006		
DEC, WAHERB	7	Shire Reserve 3719, north side of Goomalling - Toodyay Road, plants growing along Mortlock River North ca 300 m NW of Goomalling - Toodyay Road		Shire Parkland	24/01/2007		
DEC, WAHERB	8	Hopkins Road, 0.3 km N of Great Eastern Highway, E verge, W of Cunderdin		Shire Road Reserve	29/11/2007	Common	Road maintenance
DEC	9	Yenyening Lakes Nature Reserve (SE of Brookton, NE of Beverley) in the NE sector of the Reserve		Conservation of Flora & Fauna	10/12/2007		
WAHERB		Northam		Private Property	/1900		
WAHERB		Mortlake Flora Reserve, ca. 2.5 km E of St. Leonards, N of Wongan- Piawaning Road		Conservation of Flora	25/01/1977		
WAHERB		Mortlock River North - Smith Road, 15 km NW of Goomalling		Private Property	29/11/2001	Frequent	
WAHERB		Yenyening Lakes Nature Reserve (SE of Brookton, NE of Beverley) in the NE sector of the Reserve on slope above NW sector of Morrell Pool. Collection site M2		Nature Reserve	12/10/2002		
WAHERB		15.6 km W of Coolgardie Esperance Highway, approximately 126 km N of Esperance town site		UCL	08/02/2002		
WAHERB		Loc. 144 (Harding) S of Mound Spring 17, N of Arrowsmith River; Arrino		Private Property	28/11/2005	4000+ plants at 1 location	
WAHERB		South eastern fringe of Morrell Pool		Nature Reserve	10/12/2007	21-50 plants at 1 location	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Remnant Road, 4.3 km E of Dunkin W Road, N side, Cowcowing Lakes, NW of Cowcowing		Private Property	02/12/2008	20 plants at 1 location	
WAHERB		Site 128A. Salt lake ca 10.3 km E of Cunderdin. Site is to W of road, 7.6 km along Rabbit Proof Fence Road NS then E from intersection of Rabbit Proof Fence Road N and Three Mile Gate Road intersects with Cunderdin - Whyalkatchem Road. Ca 3.4 km N of Cu		Private Property	22/10/2008	2	
WAHERB		Site 125C. Salt lake ca 6.5 km NW of Cunderdin. Lake on right at bottom corner of paddock, 1.4 km S along track on E of paddock fence. Track turnoff 5.4 km along Dennis Road from intersection with Woonwooring Road, turnoff to Dennis Road 1.7 km N of int		Private Property	22/10/2008	2	
WAHERB		Site 127C Adj. Salt lake ca 19.2 km E of Kwoylin. 350 m S from point 600 m W along overgrown track to S of wheat silos and old rail track. Track roughly 2.2 km S of intersection of Ardath Road and Quairiding - Bruce Rock Road		UCL	25/11/2008	3	
WAHERB		Site 106C. Salt lake E of Kondut South Road, 2.9 km SE of intersection of Kondut South Road with Northam - Pithara Road		Private Property	18/11/2008	2	
WAHERB		At Foss Road crossing of the Salt River, S of Bruce Rock		Road Reserve	12/12/2011		
WAHERB		Ewlyamartup, Wallis Road, Katanning		Private Property	30/11/2011	6-20 plants at 1 location	

The largest population located to date, based upon recorded abundance, is located on privately owned property in Arrino, with a count of over 4,000 individual plants. Other quantitative counts given vary between 6 and 50 plants, and four further populations are assessed subjectively with occurrences of *Frankenia glomerata* described as Locally Common, Common or Frequent. The numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Frankenia glomerata* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. *Frankenia glomerata* has a large geographic distribution, and a number of known populations. Although the size of individual populations is generally small or unknown, it is represented on secure tenure in conservation managed lands, and has populations not under imminent threat. It has a very wide geographic range and populations on conservation estate consist of multiple individuals. It is therefore recommended that this taxon be removed from the Priority Flora list.

## 27. *Goodenia perryi* Carolin

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Herb or shrub growing to 0.15-0.3 m high with blue flowers present in October to November.

**Soil preference:** Yellow sand.

**Distribution:** Eremaean and South West botanical province in the Avon Wheatbelt and Yalgoo regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) shows *Goodenia perryi* has a known distribution from Lake Moore to south-west of Badgingarra, and between Bunjil and Ballidu, a range of approximately 250 km.

This species is known from one record within the DEC Threatened flora database and eleven records within the W.A. Herbarium database (DEC 2012a). These records currently represent a total of 10 populations (Table 27).

Locations of individual populations indicate the known distribution of *Goodenia perryi* is very scattered throughout its range, with single populations known from Bunjil, Mollerin, Badgingarra, Lake Moore and Petrudor Rocks Reserve, and two populations each in the Mount Gibson and Kalannie areas. It is, not known if all of the recorded populations of *Goodenia perryi* are extant, as all but one of the populations are known only from single recorded observations, and four of the ten populations were observed prior to 1980.

The majority of known populations of *Goodenia perryi* are located on unsecured tenure. Five populations are located on private property, one in gravel extraction reserve, one on other shire reserve and one in Lake Moore. Two populations occur on tenure considered to be secure, with one located on unallocated crown land, and a single population known from conservation estate within Petrudor Rocks Reserve.

**Table 27: Known Populations and Distribution Range of *Goodenia perryi***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		341304mE, 6622153mN, adjacent to Yermullah Rd. SW of Badgingarra.		Private Property	23/11/1998	500+ plants at 1 location	.
WAHERB		Bunjil		UCL	15/10/1961		
WAHERB		4 mile corner S of Mollerin		Private Property	27/10/1963		
WAHERB		Lake Moore		Waterbody	27/10/1966		
WAHERB		1.3 km S of Ballidu on Wongan Hills Road		Other Shire Reserve	09/11/1977		
WAHERB		20 km SSW of Mount Gibson		Private Property	21/11/1992	Occasional	
WAHERB		11 km NE of old vermin proof fence, Paynes Find Road		Private Property	21/11/1992	Occasional	
WAHERB		Petrudor Rock Reserve, SE of Dalwallinu off main N-S track, ca 500 m S of picnic area,		Nature Reserve	07/11/1999	Locally common	
WAHERB		Within large remnant (ca 200 ha) on the property of Mr D. Ure, Dalwallinu Road, Goodlands, Kalannie North,		Private Property	/09/2000		
WAHERB		Petrudor Rocks Reserve (9423), ca 600 m S of picnic area along access track heading towards Jones Road		Nature Reserve	16/12/2003	15 plants at 1 location	
WAHERB		Gravel pit on W side of Black Road ca 9 km N of intersection with Glamoff road in locality of Goodlands, NE of Kalannie		Gravel Pit		A few plants	Gravel extraction

The few known population sizes for *Goodenia perryi* are varied, with the largest comprised of more than 500 individual plants, near Badgingarra. A few plants are recorded for the population within gravel reserve north-east of Kalannie, and 15 individuals were recorded at Petrudor Rocks Reserve. Two more populations describe abundance as Occasional, and prevalence of the species at other observation sites is unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Goodenia perryi* is currently listed as Priority 3 under the DEC threatened species conservation ranking system (DEC 2012c).

Although *Goodenia perryi* appears to have a number of known populations of which some are unlikely to be currently under threat, the size of individual populations is generally small or unknown. In addition, the land tenure of most populations is unsecured. Only one population has been relocated since first observed. These factors suggest this species should remain a Priority 3 ranking, with further survey required.

## 28. *Hensmania stoniella* Keighery

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A Tufted, stilt-rooted, perennial herb, growing from 0.1–0.2 m high, without rhizomes and with fibrous roots. The leaves are circular in cross-section, 5-10 cm long and 1-1.5 mm in diameter. Yellow to white flowers are present from September to November.

**Soil preference:** White, grey or lateritic sand, often in winter-wet areas

**Distribution:** South West botanical province in the Geraldton Sandplain region

**Response to fire/ disturbance:** Appears to be favoured by soil disturbance on firebreaks, with regeneration of many more plants than in adjacent undisturbed areas (Brown & Patrick 2001)

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show that *Hensmania stoniella* has a known distribution from Dongara to Cataby, extending inland to Watheroo, a range of approximately 260 km.

This species is known from 14 records within the DEC Threatened flora database, 36 records within the W.A. Herbarium database (DEC 2012a) and two additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 41 populations (Table 28).

Locations of individual populations indicate the known distribution of *Hensmania stoniella* to be scattered, although over half of the populations are concentrated between Eneabba and Badgingarra. A single population is located in Dongara, eight are located in the Green Head-Jurien Bay area, two populations in Cervantes, a single population in Coorow and Eneabba and three populations in Watheroo.

**Table 28: Known Populations and Distribution Range of *Hensmania stoniella***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		6.1km s of Greenhill - Coorow T/o along Brand Hwy, E & W sides of Rd.		Main Roads Road Reserve	06/11/1992	6 plants at 1 location	Firebreaks
DEC	2	Road verges, 5km S of turnoff to Eneabba on Brand Hwy		Main Roads Road Reserve	19/11/1992		
DEC, WAHERB	3	N side of Marchagee track E of junction with Willcock Rd and on firebreak of adjacent private uncleared land.		Shire Road Reserve and Private Property	17/08/1993	>30 plants at 1 location	Road maintenance
DEC, WAHERB	4A & B	6.5 km E along Marchagee Track from junction with Carges Rd, N side mainly on E-W firebreak, Pinjarrega NR		Nature Reserve	23/10/1992	>200 plants at 1 location	Firebreaks
DEC, WAHERB	5A & B	SW edge of Mt Leseur NP, 8.1km N of Jurien Bay RD along Cockleshell Gully Rd		Shire Road Reserve, National Park	10/12/1992	10 plants at 1 location	Firebreaks
DEC		Approx 26km E of Eneabba township, 4km S of the Carnamah-Eneabba Rd		Shire Road Reserve	23/10/2008		Power line Maintenance
DEC		20km SSE of Eneabba, NE of Beros Rd, private remnant.		Private Property	13/10/2009	1 plant at 1 location	
DEC, WEC		Near Pinjar-Eneabba transmission line on large remnant area on private property adjacent to Brand Hwy on E side, approx 5km N of junction with Banovich Road, 5km S of Warradarge		Private Property	10/11/2010	5 plants at 1 location	Power line Maintenance
DEC		Warro Gas field seismic survey area, approx NW corner is E374000 N6666000, SE corner is E382000 N6655000.		National Park, Private Property, Conservation Reserve	2010/2011	63 plants at 31 locations	
DEC		1.4km N of Cervantes Rd and Munbinea Rd intersection, 20.1km SE of Jurien Bay on Tiwest Cooljarloo tenement		Mining Lease	10/11/2011	64 plants at 1 location	Mining
DEC, WEC		Tiwest Tenement Cooljarloo/Cataby	Falcon Area Flora and Vegetation	Mining Lease	2005 - 2008	6	Mining
DEC, WAHERB		Hi Vallee Property (D & J Williams). Along NE/SW track W of main valley plus along northern firebreak E of central N/S track, Moora		Private Property	13/12/2007	81 plants at 1 location	
WAHERB		Watheroo, N of Moora		Private Property	04/11/1954		
WAHERB		Jurien Bay, N of Perth		Marine Park	04/11/1962	2	
WAHERB		Boothendarra Creek		Private Property	10/02/1972		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Nambung area; 2 km along Strathmore Rd from Cattalini Rd.		Private Property	28/10/1973		
WAHERB		19 km SW of Coorow on rd to Green Head		Nature Reserve	01/01/1975		
WAHERB		10 km W along Strathmore Rd from Cattalini Rd, Lesueur District.		Road Reserve	10/09/1975	Common	
WAHERB		5 km S of Eneabba		UCL	27/04/1977		
WAHERB		Intersection of Green Head road and Brand Hwy		Road Reserve	24/01/1979	Common	
WAHERB		W of road; opp entrance to gravel pit and Mount Lesueur entrance, Cockleshell Gully Road, at foot of Mount Lesueur		National Park	/07/1979		
WAHERB		100 m E of Munbinea Rd, 1.3 km S of Nambung River floodway.		Road Reserve	10/11/1979		
WAHERB		Badgingarra National Park, just W of New Townsite, on NW Shelf Gas Pipeline		National Park	06/10/1981	Occasional	
WAHERB		SE corner Reserve 31030		Nature Reserve	12/11/1981	Occasional	
WAHERB		3.4 km E of Brand Hwy, along Marchagee Track, E of Jurien Bay		Private Property	15/11/1984	Occasional	
WAHERB		Coalara rd, E of Badgingarra		Other Shire Reserve	18/11/1988		
WAHERB		Corner of Thomkin & Burges Rd, SE of Mt Adams (SE of Dongara).		Private Property	25/10/1992		
WAHERB		Near SW corner of South Eneabba Nature Reserve		Nature Reserve	02/12/1992		
WAHERB		Cadda road, E of Munbinea rd, W of Badgingarra.		Road Reserve	07/12/1992		
WAHERB		Winja Rd, W of Munbinea Rd, NE of Cervantes.		Road Reserve	22/11/1992		
WAHERB		6.1 km S of Green Head turnoff along Brand Hwy		Private Property	10/12/1992	Frequent	
WAHERB		30 km E of Brand Hwy on Coorow Rd		Road Reserve	27/10/1993	Occasional	
WAHERB		Drover Cave National Park, E firebreak		National Park	20/08/1993	Occasional	
WAHERB		Remnant vegetation in farmland off Green Head - Coorow road, 3 km W of Brand Highway,		Private Property	29/10/1995	Locally common	
WAHERB		Big Soak Plain. Along Coorow - Greenhead Rd, 900m S of Chatfield - Clarke Rd		UCL	22/09/1999		
WAHERB		Warradarge, above NW head of main valley		Private Property	05/12/1999	Locally common	
WAHERB		Bibby Rd, Badgingarra: at Hakea Reserve rest stop		Road Reserve	27/10/2002		
WAHERB		Iluca Resources, Eneabba. Pit 85DS		Mining Lease	11/10/2005		Mining
WAHERB		Mining lease; Eneabba		Mining Lease	18/11/2005		Mining
WAHERB		ca 16 km N of Cataby on the W side of Brand Highway. In bushland on the north mine area of Tiwest Cooljarloo mineral sands mine		Mining Lease	13/12/2006		Mining

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Alexander Morrison National Park. On old firebreak running parallel to Tootbardie Road (W side) at ca. 2.8 km S of the Coorow - Greenhead Road		National Park	11/01/2008		
WAHERB		Either side of firebreak heading N of Woolka Road at ca 8.3 km W of Cooljarloo Road, NW of Cataby		UCL	29/01/2008		
WAHERB		Hi Vallee Farm, Tootbardi Road, Jurien		Private Property	30/03/2008	1 plant at 1 location	
WEC, WAHERB		Iluka Resources Eneabba Operations	P2 Survey	Mining Lease	17/10/2007	1	Mining
WEC		Tronox Cooljarloo mining tenement.	Tiwest 9-41 DRF & PLF Monitoring	Mining Lease	14/9/2009-18/09/2009	80 plants at 1 location	
WEC		Tronox mining tenement, Cooljarloo.	Mulch Monitoring	Mining Lease	22/10/2010	1	

Of all the known locations for this species, ten occur on conservation estate in Badgingarra National Park, Pinjarrega Nature Reserve, Leuseur National Park, South Eneabba Nature Reserve, Alexander Morrison National Park, Jurien Bay Marine Park and Drovers Cave National Park. In addition, the Warro Gas Field survey occurred over areas of both private property and Watheroo National Park and it is likely that many of the recorded individuals from this survey were present in the conservation estate. The remaining populations are predominantly located on unsecured land tenure with eleven populations located on road verges, eleven on private property, four on mining lease tenements, one on other shire reserve and three populations on unallocated crown land.

To date, a total of more than 540 individuals have been recorded across the known populations (DEC 2012a). Of these populations, a minimum of 200 plants have been recorded on secure conservation land tenure. An additional population record indicates an 'occasional' occurrence of the species on South Eneabba Nature Reserve. The remaining plant counts have been recorded on unsecured land tenure with an additional four observational records indicating 'occasional/locally common/common' occurrence of the species on a private property and a road verge.

## SUMMARY AND RECOMMENDATIONS

*Hensmania stoniella* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. A Priority 3 ranking is assigned to taxa which are known from several populations, at least some of which are not believed to be under immediate threat.

*Hensmania stoniella* appears to have a high number of known populations, eleven of which are located within eight areas of conservation estate. While the size of many of these populations is not known, this taxon is not under threat, has a wide geographic range and there are no known threatening processes which may cause this taxon to become Threatened. It is therefore recommended that it be removed from the Priority Flora list.

## 29. *Hypocalymma serrulatum* Strid & Keighery

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect shrub that grows from 0.45-1.7 m high with Flowers of white to pink present in April to May.

**Soil preference:** Grey or white sand.

**Distribution:** South West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia and found usually along drainage lines.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) shows *Hypocalymma serrulatum* has a known distribution between Regan's Ford and Badgingarra, a range of approximately 65 km.

This species is known from 11 records within the DEC Threatened flora database, 15 records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 14 distinct populations (Table 29).

Locations of individual populations indicate the known distribution of *Hypocalymma serrulatum* is predominantly concentrated within the Badgingarra National Park, with six of the fourteen populations occurring there. Further populations are distributed in the Cooljarloo, Regan's Ford and Badgingarra areas.

The six populations occurring within Badgingarra National Park are considered to be on secure tenure. The remaining populations are not situated on conservation estate, with locations in unallocated crown land, powerline transmission corridor, road verge, private property or mining lease.

**Table 29: Known Populations and Distribution Range of *Hypocalymma serrulatum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1A	8.1-8.2 km along Cadda Road from Brand Highway wet low lying area at base of low hills extending for distance to the SW		National Park	30/05/1994	1000+ plants at 1 location	
DEC, WAHERB	1B	8.1-8.2 km along Cadda Road from Brand Highway wet low lying area at base of low hills extending for distance to the SW		Shire Road Reserve	30/05/1994		Road maintenance
DEC	2	500m S of Wongonderrah Rd, approx 7km W of Brand Hwy along the powerline track at creek causeway.		UCL	15/05/1994		
DEC, WAHERB	3	SE corner of Badgingarra National Park, 100 metres W along track from Brand Highway, opposite intersection with Waddi Road		National Park	9/01/1992	50+ plants at 1 location	
DEC	4			UCL	14/09/1993		
DEC, WAHERB	5A	4.9 km W along Bibby Road from Brand Hwy, N & S road verges extending into National Park		National Park	18/09/1993	50+ plants at 1 location	
DEC, WAHERB	5B	4.9 km W along Bibby Road from Brand Hwy, N & S road verges extending into National Park		Shire Road Reserve	18/09/1993		
DEC, WEC		Cataby - Eneabba transmission line, 0.75km S up Wongonderrah Rd.	WP10-37	Private Property	4/07/2001		Power line Maintenance
DEC, WEC		Cataby - Eneabba transmission line, 0.6km S up Wongonderrah Rd.	WP10-37	Private Property	4/07/2001		Power line Maintenance
DEC, WEC		Near Pinjar-Eneabba transmission line in UCL just south of Wongonderrah Rd, just E of Wongonderrah Nature Reserve, ca 10km W of Brand Hwy, approx 20km SW of Badgingarra.	Towerbase check	UCL	18/11/2010	~340 plants at 18 locations	Power line Maintenance
WAHERB		85.7 miles Gingin - Jurien Bay road [7.9 km N of Regans Ford on Brand Highway]		Private Property	14/05/1967		
WAHERB		118 mile peg Gingin - Jurien Bay Road [26 km N of Cataby on Brand Highway]		Private Property	22/08/1972		
WAHERB		SE of Hill River crossing and W of main road to Jurien Bay		Nature Reserve	09/05/1974		
WAHERB		Strathmore Road, 3 - 4 miles W of Eneabba Highway		Other Shire Reserve	/08/1975		
WAHERB		9 km ENE of Badgingarra, Badgingarra National Park		National Park	08/04/1982		
WAHERB		Wongonderrah Powerline		Western Power Lands	20/05/1991		Power line Maintenance
WAHERB		Badgingarra		Other Shire Reserve	29/05/1991		

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		AMG-Zone 50 346875mE 6635457mN; N boundary of Park, Bibby road, Badgingarra National Park (Reserve 31809), W of Badgingarra.		National Park	07/12/1992		
WAHERB		10 km S of Badgingarra along Brand Highway		Private Property	29/04/1993		
WAHERB		5.7 km along Wongonderrah road from Brand Highway		Road Reserve	09/07/2005	Very Common	
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots 2008	Mining Lease	13/03/2008	1	

To date, over 1,700 individual plants have been counted from four known populations. An additional population record gives a descriptive assessment of abundance, noting occurrence of *Hypocalymma serrulatum* as Very Common. The numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Hypocalymma serrulatum* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

This species appears to have a number of known populations of which some are unlikely to be currently under threat, however its geographic range is restricted. The current status and size of some populations is unknown although historical observations indicate healthy sized populations of *Hypocalymma serrulatum* were present in Badgingarra National Park in the 1990's. Not enough information is available to recommend any changes to the conservation status of this taxon.

### 30. *Jacksonia carduacea* Meisn.

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Bushy shrub, 0.2-0.5 m high. Yellow and red flowers present in August to December.

**Soil preference:** Grey sand, sandy clay.

**Distribution:** South West Western Australia in the Swan Coastal Plain and Geraldton Sandplain regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible due to the high susceptibility of other *Jacksonia* species (Groves *et.al.* 2013)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), the known distribution of *Jacksonia carduacea* reaches from Cataby to Eganu, a range of approximately 80 km.

This species is known from six records within the DEC Threatened flora database and 24 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 16 distinct populations (Table 30).

Locations of individual populations indicate the distribution of *Jacksonia carduacea* is generally scattered throughout its range. A number of records for this species occur from the Warro Gas seismic survey area, however these have been considered as a single population as the current level of survey has not been sufficient to indicate whether observations are in fact spatially distinct populations (i.e. groups of plants separated without connectivity).

More than half of the known populations of *Jacksonia carduacea* are found on unsecured tenure, with one population occurring in road reserve, and seven located on private property. Of the remaining populations, one occurs on mining tenement and seven are known from secure tenure in Watheroo National Park, Wongonderrah Nature Reserve, Alexander Morrison National Park and un-named conservation reserve 27993.

**Table 30: Known Populations and Distribution Range of *Jacksonia carduacea***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Alexander Morrison National Park, N of Coorow-Green Head Road		National Park	20/10/1987	Occasional	
DEC, WAHERB	2	Road verge Watheroo West Road, NE of Badgingarra. AMG 50JLM760451 (Badgingarra 1:50,000 sheet)		Shire Road Reserve	7/11/1988		Road maintenance
DEC		Corner of Wongonderrah and Yermullah Rds.		Nature Reserve	23/11/1998	220 plants	
DEC		Warro Gas field seismic survey area, approx NW corner is E374000 N6666000, SE corner is E382000 N6655000.		National Park, Private Property, Conservation Reserve	2010/2011	~5850 plants at ~217 locations	Gas exploration
DEC, WEC		Near small wetland in Un-named reserve 27993, adjacent to Mimegarra Rd, approximately 5km SSE of Cataby. Flora recorded from 2.8km W of Brand Hwy.		Flora & Fauna Reserve	15/11/2011	1 plant	Weeds, Powerline maintenance.
DEC, WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots 2008, Falcon Sites	Mining Lease	2005-2008	3 locations	Mining
WAHERB		Coalara Road c. 300 m S of Watheroo West Road		Private Property			
WAHERB		Watheroo		Private Property	04/11/1954	3	
WAHERB		20 miles from Watheroo, Badgingarra Road		Private Property	/09/1962		
WAHERB		Dinner Hill		Private Property	14/12/1962		
WAHERB		30 miles from Coorow on Green Head Road		National Park	29/10/1967		
WAHERB		Watheroo, occidentalem versus. [W of Watheroo]		Private Property	/11/1967		
WAHERB		Inter Watheroo et Dinner Hill. [Between Watheroo and Dinner Hill]		National Park	/08/1968		
WAHERB		Strathmore Road Reserve (No.26248), S of Badgingarra		Private Property	05/11/1975		
WAHERB		7.3 km S of Watheroo West Road on Coalara Road		Private Property	/10/1991		
WAHERB		SW corner Watheroo West Road and Coalara Road		Private Property	/10/1991		
WAHERB		Coalara Road 6.7 km from 1st site, 0.3 km S of Watheroo West Road		Private Property	11/12/1991		
WAHERB		11.1 km N on Coalara Road, 7.6 km S of Watheroo West Road		Private Property	11/12/1991		
WAHERB		45.4 km SW on Coorow - Green Head Road		National Park	12/12/1991		
WAHERB		Corner Yerramullah and Wongonderrah Road		Nature Reserve	12/12/1991		
WAHERB		5.6 km W of Brand - Mudge Road on Coorow - Green Head Road		National Park	05/11/1993		
WAHERB		Brand Highway, 2.15 km S of Yandin Road on E side ca 14 m W of farm boundary fence, Cataby		Private Property	2002	6 plants at 1 location	

To date, over 6000 individual plants have been recorded from five of the known populations, with the largest population size being within the Warro Gas Field survey area where multiple records have been counted as a single population. Land within the Warro Gas Field consists of private property, national park and proposed conservation estate, and it is likely that the majority of individuals of *Jacksonia carduacea* recorded during this survey are situated within conservation estate. Other population counts noted are small, with 1-20 plants recorded at any location.

## **SUMMARY AND RECOMMENDATIONS**

*Jacksonia carduacea* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

There are several known populations recorded for this species, however, the size of these populations is generally small or unknown. Land tenure is also uncertain or unsecured in most cases, whilst the largest known population is under threat from gas exploration and drilling. It is therefore recommended that this taxon remain a Priority 3.

### 31. *Lasiopetalum lineare* Paust

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** An erect, multi-stemmed shrub up to 40 cm tall. The leaves are alternate, narrowly linear in shape, 20-40 mm long, 1-4 mm wide. The flowers are in cymes (group of flowers each on individual branches) with about eight flowers, contracted into loose groups. These flower July to November. The sepals are linear, and lilac in colour, with white stellate hairs on the outside. Some populations, particularly those in the Eneabba area, appear to be intermediate with *Lasiopetalum drummondii*, with leaves shorter and broader than those of *L. lineare* and the flowers slightly larger (Brown & Patrick 2001).

**Soil preference:** Grows in white to grey sand

**Distribution:** South West botanical province in the Geraldton Sandplain and the Swan Coastal Plain

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown, presumed high (Brown & Patrick 2001).

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Lasiopetalum lineare* has a known distribution from Eneabba to Wanneroo, a range of approximately 250 km.

This species is known from 15 records within the DEC Threatened flora database, 23 records within the W.A. Herbarium database (DEC 2012a) and 89 plants from two additional surveys from Woodman Environmental Consulting. These records currently represent an estimated total of 25 populations (Table 31).

Locations of individual populations indicate the known distribution of *Lasiopetalum lineare* to be centralised in the Badgingarra to Eneabba area with 11 of the known populations located here. A smaller group of four populations are located near Cataby. The remaining populations are scattered along between Geraldton and Wanneroo, with individual populations in Gnangara, Wanneroo, Ledge Point, Muchea, Neerabup, Eneabba, Cataby, Jurien Bay, Watheroo, Boothendarra, Green Head and GinGin.

**Table 31: Known Populations and Distribution Range of *Lasiopetalum lineare***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC WAHERB		SE cnr of Alexander Morrison NP, 5.6km W of Brand Mudge Rd, S side of Rd, South Eneabba		National Park	5/1/1992	4 plants	Firebreaks, clearing
DEC, WAHERB		Badgingarra NP, 4.4km N of Waddi Rd on boundary of National Pk (Eastern boundary)		National Park	27/11/1996	2 plants	
DEC		Cataby - Eneabba Transmission Line, approx 3.1km S of Wongonderrah Rd, W side of Brand Hwy, Sth Badgingarra		Private property	23/10/2001		
DEC, WAHERB		Barraca NR No 4070, Gt Nthn Hwy, Muchea, at the cnr of the rsv		Nature Reserve	23/10/2004	3 plants	Firebreaks
DEC		Iluka Resources Eneabba tenement (access track to Phoenix East drill line). Accessed from Brand Hwy intersection with Coolimba/Eneabba Rd; W ~8km, then N ~4.5km, then E ~3km, Then N ~3.7km. All are un-named sand tracks.		UCL, Mining Lease	11/11/2008	9 plants	Vehicles, Mining
DEC		Iluka Resources Eneabba tenement (access track to Phoenix East drill line). Accessed from Brand Hwy intersection with Coolimba/Eneabba Rd; W ~8km, then N ~4.5km, then E ~3km, Then N ~2.4km. All are un-named sand tracks.		UCL, Mining Lease	11/11/2008	12 plants	Vehicles, Mining
DEC		Iluka Resources Eneabba tenement (access track to Phoenix East drill line). Accessed from Brand Hwy intersection with Coolimba/Eneabba Rd; W ~8km, then N ~4.5km, then E ~3km, Then N ~4.5km to drill line track. All are un-named sand tracks. Plants are along the track ~1.9km to E.		UCL, Mining Lease	11/11/2008	1 plant	Vehicles, Mining
DEC, WEC		Approx 33km WNW of Dandaragan, 5km W of Brand Hwy on Tiwest Cooljarloo minesite.		UCL	20/10/2010		
DEC, WEC		Approx 25km WNW of Dandaragan, 3km W of Brand Hwy on Tiwest Cooljarloo minesite.		UCL	18/10/2010		
DEC		Warro Gas field seismic survey area, approx NW corner is E374000 N6666000, SE corner is E382000 N6655000.		National Park, Private Property, Conservation Reserve	2010/2011	3 plants at 3 locations	
DEC		Approx 7km along Woolka Rd, W of Brand Hwy intersection, approx 14km NW of Cataby. Tiwest Cooljarloo tenement.		Mining Lease	18/10/2011	218 plants	Mining
DEC		Approx 6km along Woolka Rdd, W of Brand Hwy intersection, approx 12km NW of Cataby. Tiwest Cooljarloo tenement.		Mining Lease	26/10/2011	144 plants	Mining

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Approx 13.6km W of Brand Hwy, Neerabup.		State Forest	5/09/2011	1 plant	
DEC, WEC		Tronox Cooljarloo mining tenement.	Various	Mining Lease	2008	9 plants at 7 locations	Mining
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba	Pinjar – Eneabba Transmission Line DRF & Priority Flora	UCL and Private Property	19/11/2010	12 plants at 11 locations	Power Line Maintenance
WAHERB		Watheroo W		Private Property	04/11/1954		
WAHERB		5 miles SSE of Yeal Swamp in Wanneroo Forestry Reserve		Forestry Reserve	28/10/1964		
WAHERB		26.5 miles from Watheroo on rd to Jurien Bay		Road Reserve	30/10/1966		Road maintenance
WAHERB		S of Badgingarra, Brand Hwy. [Near Mount Hamersley]		Road Reserve	17/10/1969		Road maintenance
WAHERB		Strathmore Rd, Reserve (No.26248), S of Badgingarra.		Nature Reserve	05/11/1975		
WAHERB		W margin Badgingarra National Park where Bibby Creek meets Rd. (Western boundary)		National Park	14/10/1978	4	
WAHERB		Badgingarra National Park, just W of New Townsite, on North West Shelf Gas Pipeline		National Park	6/10/1981		
WAHERB		Cooljaloo, North of Cataby		Unknown	01/01/1987		
WAHERB		W side of Brand Highway approx 5 km N of junction Red Gully Road AMG 50JLL673658 Gin Gin 1:100,000		Road Reserve	12/10/1988		Road maintenance
WAHERB		AMG-Zone 50 343056mE 6627776m N; Cadda Rd, E of Munbinea Rd, W of Badgingarra		Road Reserve	07/12/1992		Road maintenance
WAHERB		46.5 km W of Midlands Rd on the Marchagee track , Nth Badgingarra		National Park	04/11/1993	2	
WAHERB		1 km W of Chatfield Clarke Road, at 20 km N of Coorow - Green Head Road, property of P. Tomkins		Private property	19/11/1997		
WAHERB		Site MR1, on crest 10.2 km W of Brand Hwy on Orange Springs Rd, Ledge Point		Road Reserve	15/11/1999		Road maintenance
WAHERB		Gnangara Mound, Gnangara		State Forest	03/12/2002		
WAHERB		Badgingarra National Park, 0.5 km N of Waddi Road on Brand Highway, ca. 200 m E of Road (S of Badgingarra)		National Park	20/10/2007		
WAHERB		Wongonderrah Road, ca. 1.5 km E of Yerramullah Road (SE of Cervantes)		Road Reserve	09/01/2008		
WAHERB		On Iluka Resources Eneabba tenement, (Phoenix E drill line).		Mining lease	11/11/2008		Mining

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots/Sites	Mining Lease	2005-2008	9	Mining
WEC		Tronox Cooljarloo mining tenement.	Tiwest 9-41 DRF & PLF Monitoring	Mining Lease	14/9/2009-18/09/2009	80 plants	

Of all the known locations for this species, eight populations are located on conservation managed lands in Barraca Nature Reserve, Badgingarra National Park, Watheroo National Park and Alexander Morrison National Park. Three populations are found within forestry reserves, four on mining tenement and a further nine populations are located on unsecured land tenure including road verge and private property. The land tenure of the remaining population is unknown (DEC 2012a).

The majority of known populations do not have quantitative information recorded. To date, a total of 517 individuals have been recorded across fourteen of the known populations. Of these populations, approximately 13 plants have been recorded on secure tenure.

## SUMMARY AND RECOMMENDATIONS

*Lasiosepalum lineare* is currently listed as Priority 3 under the DEC threatened species conservation ranking system. This taxon appears to have a number of known populations, with seven of these populations located on secure conservation estate within four different conservation areas. However, based on currently available information the population sizes are either very small or unknown.

*Lasiopetalum lineare* has a geographic range in excess of 150km, total number of populations exceed 20, populations occur in more than three spatially distinct areas managed for conservation and records indicate these populations to consist of multiple individuals. It is therefore recommended that this taxon be removed from the Priority flora list.

## 32. *Lepidobolus densus* L.A.S.Johnson & B.G.Briggs ms

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A rhizomatous, caespitose perennial herb (sedge-like), growing to 0.4 m high. Pale chestnut colored flowers are present during September – November.

**Soil preference:** Yellow lateritic sand and lateritic gravel. Dry kwongan.

**Distribution:** Eremaean and South-West botanical province in the Avon Wheatbelt, Esperance Plains, Gascoyne, Geraldton Sandplains, Jarrah Forest and Yalgoo regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown but unlikely to be susceptible

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Lepidobolus densus* has a known distribution from Dirk Hartog Island in the Gascoyne region to Ongerup near the southern coast of the state, a range of approximately 1,100 km.

This species is known from 10 records within the DEC Threatened flora database, 24 records within the W.A. Herbarium database (DEC 2012a) and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 20 distinct populations (Table 32).

Recorded observations of *Lepidobolus densus* indicate that its distribution is concentrated in the region between Cataby and Coorow, with the majority of records from this area. The remaining records are scattered, with two records from near Mingenew, one from Cowcowing to the east, two from near Ballidu, one from Ongerup and four from Dirk Hartog Island.

Populations of *Lepidobolus densus* are found within a mix of secure and unsecure tenure with eight of the populations located on private property, one on mining tenement, one on pastoral lease, one on unallocated crown land and one on other shire reserve. A further eight are located either wholly or in part within conservation estate in Marchagee Nature Reserve, Alexander Morrison National Park and North Wallambin Nature Reserve. The populations within conservation reserve and UCL can be considered secure.

**Table 32: Known Populations and Distribution Range of *Lepidobolus densus***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	1.7 km NW of S boundary of Marchagee Nature Reserve		Conservation of Flora & Fauna	17/10/1991	Occasional	
DEC, WAHERB	2	Marchagee Nature Reserve, 0.9 km N of farm track W of Midlands road		Conservation of Flora & Fauna	3/11/1992	Frequent /Abundant	
DEC, WAHERB	3	Marchagee Nature Reserve, 18 km N of Marchagee on Midlands road		Conservation of Flora & Fauna	3/11/1992	Frequent /Abundant	
DEC	4			National Park	5/11/1992		
DEC, WAHERB	5	Reserve 26687, NW lake, S edge		Conservation of Flora & Fauna	12/01/1995		
DEC, WAHERB	6	Site M2B, 17 km W of Morawa		Private Property	20/08/1997		
DEC, WAHERB	7	Eneabba		Private Property	16/11/2005		
DEC, WAHERB	8	N of Whitnall Point ca 1 km, opposite wetland area		Pastoral Lease	29/08/2006	1000+ plants at 1 location	
DEC		Aviva survey area (E 330428 N 6689618)		Private Property	2008/2009		
DEC, WEC		1 km E of Brand Hwy and 9km N of Eneabba townsite		Private Property	9/11/2009		Mining
WAHERB		Cowcowing		UCL	/09/1904		
WAHERB		Ebbano [Spring]		Private Property	23/09/1904		
WAHERB		6 miles E of Ballidu		Other Shire Reserve	09/09/1947	2	
WAHERB		11.5 km N of Sandy Point Outcamp, Dirk Hartog Island		National Park	05/09/1972	3	
WAHERB		Trayning Reserve		Private Property	05/11/1972		
WAHERB		Cardernarup, ca 15 miles SE of Ongerup		Private Property	05/03/1979		
WAHERB		12 km SSE of Coorow on Geraldton Highway (Midlands Road)		Main Roads Road Reserve	01/10/1984	2	Road Maintenance
WAHERB		18 km N of Marchagee on Midlands Road.		Easement	01/10/1984	Few plants seen	
WAHERB		S boundary of Reserve 23601, 12 km S of Coorow		Nature Reserve	23/10/1992		
WAHERB		20 km NE of Yandanooka on private land		Private Property	/08/1998	Rare	
WAHERB		Marchagee Nature Reserve (Res. 23061) [Near plot WU23]		Nature Reserve	03/10/2000		
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	12/10/2006	1	Mining
WEC		Tronox Falcon Tenements, Cooljarloo North.	2009 Plot Rescore	Mining Lease	12/11/2009	1	Mining

The number of individual plants within each population is varied, with population size ranging from a few plants to more than a thousand individuals. The largest population for which abundance is described is located on property subject to pastoral lease and therefore cannot be considered secure, however records for two populations of *Lepidobolus densus* within Marchagee Nature Reserve describe prevalence as Frequent/Abundant.

## SUMMARY AND RECOMMENDATIONS

*Lepidobolus densus* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. This conservation ranking is reserved for taxon that are known from several locations not under imminent threat, or few widespread locations where population size is large or there are significant areas of suitable unthreatened habitat remaining.

Although the size of individual populations is generally unknown, *Lepidobolus densus* appears to have a number of known populations of which a significant portion are within conservation managed lands. In addition, this species has a large geographic range and there is sufficient remaining suitable habitat not currently under imminent threat. These factors suggest that *Lepidobolus densus* is unlikely to be threatened and should be removed from the Priority Flora List.

### 33. *Leucopogon* sp. Yanchep (M. Hislop 1986)

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect shrub growing 0.15-1 m high and to 0.6 m wide. White / pink flowers present April to June or September.

**Soil preference:** Light grey - yellow sand, brown loam, limestone, laterite or granite. Occurs on coastal plains, breakaways, valley slopes and low hills

**Distribution:** South – West botanical province in the Swan Coastal Plain region.

**Response to fire/ disturbance:** Adult plants killed by fire

**Susceptibility to dieback:** Presumed susceptible based on high susceptibility of this genus (Groves *et.al.* 2013)

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

*Leucopogon* sp. Yanchep is known from one record within the DEC Threatened flora database and 19 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 15 distinct populations (Table 33).

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), this species has a distribution from Clarkson to Cooljarloo, a range of approximately 125 km. Recorded observations of *Leucopogon* sp. Yanchep indicate that populations are generally found within several pockets in the Moore River State Forest and Yanchep National Park, rather than scattered throughout this range. One observation was made in Neerabup National Park, and a single recorded observation is known from Cooljarloo.

Populations of *Leucopogon* sp. Yanchep are predominantly located on secure habitat with all but two populations found within National Park or state forestry reserve. Nine populations are located in Moore River State Forest, one within Neerabup National Park and five populations in Yanchep National Park. The only population known to be currently under threat is that located in Cooljarloo on mining tenement.

Although counts of individual plants from known populations have not been recorded, abundance has been described in subjective terms for a number of locations. Prevalence for most populations is given as between Occasional and Common, indicating that healthy population sizes are present.

**Table 33: Known Populations and Distribution Range of *Leucopogon* sp. Yanchep**

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	5/11/2008	1	Mining
WAHERB		Wannerie [Moore River]		Private Property	25/05/1966		
WAHERB		Moore River State Forest (Site 18), 5 km W of Moore River along Old Bennie's Road		State Forest	05/09/1978		
WAHERB		100 m W of Ziema Road, 6.4 km S of Bennies Road, Moore River State Forest		State Forest	04/11/1979		
WAHERB		100 m E of Ziema road, 1.2 km S of McCormick road		State Forest	04/11/1979		
WAHERB		4 km N of Yanchep turnoff on Wanneroo-Lancelin road. Rubbish tip entrance. Yanchep National Park		National Park	30/08/1979	Occasional	
WAHERB		Neerabup [Lake] National Park; 35 km N of Perth		National Park	30/05/1990	Scattered	
WAHERB		Map.1:25,000 Sheet: Yanchep, Grid Ref. 767108		National Park	29/05/1993	Frequent	
WAHERB		Yanchep National Park, EW track N of Minnies Grotto, Off Bailey Road, ca 200 m E of Wanneroo Road, N of Yanchep,		National Park	16/04/2000	Locally common	
WAHERB		State Forest 65 North		National Park	21/05/2000	Occasional	
WAHERB		State Forest 65 North		State Forest	07/09/2000		
WAHERB		State Forest 65 North		State Forest	11/09/2000		
WAHERB		Moore River State Forest, Garbanup Road 300 m N of Bennies Road, SE of Lancelin,		State Forest	24/06/2001	Locally common	
WAHERB		Moore River State Forest, Yangtse Road, 1.7 km E of Garbanup Road, SE of Lancelin,		State Forest	24/06/2001	Common	
WAHERB		Moore River State Forest, N side of Bennies Road, 8.9 km W of Cowalla Road, SE of Lancelin		State Forest	24/06/2001	Occasional	
WAHERB		E-W track N of Minnie Grotto, Yanchep National Park,		National Park	16/09/2001		
WAHERB		Moore River State Forest, Yangtse Road, 1.7 km E of Garbanup Road, SE of Lancelin,		State Forest	21/10/2001	2 locations, Common	
WAHERB		Moore River State Forest, S of Lancelin, McCormicks Road 4.5 km SE of Lancelin Road		State Forest	28/11/2004	Locally common	
WAHERB		Yanchep National Park, Pigeon Road ca 1.8 km E of Wanneroo Road		National Park	19/05/2005	Locally common	

## **SUMMARY AND RECOMMENDATIONS**

*Leucopogon* sp. Yanchep is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

Despite the majority of populations of this taxon being located on conservation estate, *Leucopogon* sp. Yanchep has a range which is restricted to a small number of locations, with no detailed information on population sizes available. It is therefore recommended that it remain as a Priority 3 taxon. Not enough information is available to allow change to a Priority 4 or removal from the Priority flora list.

## 34. *Melaleuca clavifolia* Craven

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect shrub, growing to 1 m high. Pink – purple flowers present in October to December.

**Soil preference:** White - grey sand, gravel and laterite.

**Distribution:** South – West botanical province in the Swan Coastal Plain and Geraldton Sandplains region. This species is commonly found on flats, slopes and hillsides.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Melaleuca clavifolia* has a known distribution from Gingin to Jurien Bay and east to Boothendarra, a range of approximately 160 km.

This species is known from 24 records within the DEC Threatened flora database, 24 records within the W.A. Herbarium database (DEC 2012a) and 91 additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 40 distinct populations (Table 34).

Locations of individual populations indicate the known distribution of *Melaleuca clavifolia* is generally scattered throughout its range, and the species is represented in conservation managed lands, with five of the known populations occurring on secure tenure within Boonanarring Nature Reserve, Mimegarra Road Conservation Reserve, unnamed reserve 27993, Namming Nature Reserve and Watheroo National Park. The remaining records are from populations located predominantly on mining tenement, with 17 populations known from this tenure, whilst three occur on unallocated crown land, seven on privately owned property, four on road verge, two on other shire reserve, and one on gravel extraction reserve. Land tenure for one population is unknown.

**Table 34: Known Populations and Distribution Range of *Melaleuca clavifolia***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	2.3 km S of Regans Ford on road to Muchea [Brand Highway]		Road Reserve	18/10/1994	Fairly Common	
DEC, WAHERB	2	Roadverge, Watheroo West road, NE of Badgingarra, AMG 50JLM760451 (Badgingarra 1:50,000 sheet)		Shire Road Reserve	7/11/1988		Road maintenance
DEC, WAHERB	3	Adjacent to Badgingarra National Park, S side of Bibby Road, 1.2 km W of Brand Highway,		Gravel Pit	11/12/2001	Common	Gravel extraction
DEC, WAHERB	4	Marchagee Track, 23 km E of Brand Highway		Private Property	11/12/2001	Occasional	
DEC	5	Tronox Cooljarloo tenement, W of Brand Hwy and S of Mullering Rd, 7 km N of Cataby.		UCL, Mining lease	22/01/2002		Mining
DEC	6	Tronox Cooljarloo tenement, W of Brand Hwy and S of Wongonderrah Rd, 7 km N of Cataby		UCL, Mining Lease	22/01/2002		Mining
DEC, WAHERB	7	Remnant vegetation on W side of Brand Highway, 3 km N of Minyolo Creek crossing		Road Reserve	5/12/2002	Scattered	Road maintenance
DEC, WAHERB	8	Small patch of bush between Lone Tree and Tunsey Paddocks. Mount Misery farm, Cataby Road, Dandaragan		Private Property	5/12/2002	50+ plants at 1 location	
DEC, WAHERB	9	Tiwest Pty Ltd Cooljarloo Mineral Sands Mine (retention licence 70/15) c. 25 km S of Badgingarra, accessed by Woolka Road		UCL, Mining Lease	30/11/2004		Mining
DEC, WAHERB	10	Tiwest Pty Ltd, Cooljarloo Mineral Sands Mine (retention licence 70/15) c. 25 km S of Badgingarra, accessed by Woolka Road		UCL, Mining Lease	30/11/2004		Mining
DEC	11	Tronox Cooljarloo tenement, W of Brand Hwy, 7 km N of Cataby.		UCL, Mining Lease	30/05/2006		Cleared for Mining since 2006
DEC	12	Tronox Cooljarloo tenement, W of Brand Hwy, 7 km N of Cataby.		UCL, Mining Lease	13/12/2006		Mining
DEC	13	3.4 km S of Wongonderrah Rd, 20.3 km W of Brand Hwy, Cooljarloo.		UCL, Mining Lease	12/09/2007		Mining
DEC, WEC, WAHERB	14	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	Gingin Plots	Nature Reserve, Exploration Lease	14/11/2007	Common	
DEC, WAHERB	15	S side of Mimegarra Road, ca 7 km W of Brand Highway near Cataby		Shire Road Verge	19/11/2007		
DEC, WEC	16	2.8 km SSE of Wongonderrah Nature Reserve south-western boundary corner, 560 m E of sand track		UCL, Mining Lease	2/12/2008		Mining

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB		Iluka Resources Cataby Tenement, (Cataby Drill Line). Accessed from Brand Hwy ~4km N of the intersection of Brand Hwy and Cataby Rd. E of Hwy on un-named sand track.		UCL, Mining Lease	27/10/2008	51 plants	Mining
DEC		Approx 6km along Woolka Rd, W of Brand Hwy intersection, approx 12km NW of Cataby. Tiwest Cooljarloo tenement.		Mining Lease	31/10/2011	~21,000 plants	Mining
DEC		W of Munbinea Rd, N of Nambung Rd, ~28km SE of Jurien Bay, Tiwest Cooljarloo tenement.		Mining Lease	3/11/2011	281 plants	Mining
DEC		~ 2.3km SW of Nammegarra Rd and Brand Hwy intersection, ~23km SE of Cataby		Mining Lease	4/11/2011	~500 plants	Mining
DEC, WEC		Un-named reserve 27993, adjacent to Mimegarra Rd, approximately 5km SSE of Cataby. Flora recorded from 2.8km W of Brand Hwy.	Native Dog Swamp	Nature Reserve	15/11/2011	4	Weeds, Power line construction.
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba	Pinjar – Eneabba DRF & Priority Flora WP10-37	UCL	19/11/2010	> 6,000 plants at 313 locations	Power line Maintenance
DEC, WAHERB		Approx 15km North of Gingin in the Boonanarring Nature Reserve. ~5km S of Wannamal West Rd.		Nature Reserve	30/11/2011	14 plants at 2 locations	
WAHERB		12 km W of Gingin - Dingara road near boundary of Moore River National Park		Private Property	01/12/1974		
WAHERB		47 km NW of Gingin on Brand highway		Private Property	14/11/1978		
WAHERB		0.6 km W of Brand Highway, 2.5 km N of Caren Caren Brook,		Private Property	10/11/1979		
WAHERB		100 m E of road, Munbinea road, 1.3 km S of Nambung River floodway		Private Property	10/11/1979		
WAHERB		5.2 km W of Brand Highway, along Nammegarra Road, Namming Lake area		Other Shire Reserve	11/11/1979		
WAHERB		41 km from Brand Highway on Green Head - Coorow road travelling towards Coorow,		UCL	29/10/1981		
WAHERB		House Block, Watheroo National Park, W of Coalara road		National Park	26/11/1986	Frequent	
WAHERB		2.3 km S of Regans Ford (Moore River) on Brand Highway, c. 45 km N of Gingin, Darling District,		Private Property	24/10/1990	Locally common	
WAHERB		Site Gca 4B [7A=4B], lower plot, 4 km NE of Cataby		Private Property	27/10/1993		
WAHERB		Bagdingarra village,		Other Shire Reserve	22/10/1994		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Tiwest Pty Ltd Cooljarloo Mineral Sands Mine (retention licence 70/15), South mine, dump 2 rehab, c. 25 km S of Badgingarra, accessed by Woolka Road		Mining lease	29/11/2003		Mining
WAHERB		ca 16 km N of Cataby on the W side of Brand Highway. In bushland on the N mine area of Tiwests Cooljarloo mineral sands mine		Mining Lease	13/12/2006		Mining
HELENA HOLDINGS		Cooljarloo South	Monitoring of 2004 mulch harvesting areas	Mining Lease	22/08/2008	910 plants at 16 locations	
WEC		E of Brand Hwy, N of Aurisch Rd, 18 km NNW of Gingin.	Loop 9	UCL	4/10/2005	1	Gas pipeline construction
WEC		18km W of Cataby.	Mullering	Unknown	18/10/2005	38 plants	
WEC		Tronox tenement, North-west of Cataby	Tiwest 8-52 Drill Lines	UCL, Private Property, Mining Lease	10/11/2008-12/11/2008	385 plants at 49 locations	Mining
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	2005-2008	40	Mining
WEC		Namming Nature Reserve	Regional Wetland Survey	Nature Reserve	29/02/2012	3 (30-40% cover at each location) 10 more locations <30% cover	

Population size for known locations of *Melaleuca clavifolia* is variable, ranging from 50 individuals to over 21,000 plants at one survey location. To date, a total of more than 31,000 individual plants have been recorded from several populations, with an additional seven locations recording Common, Scattered and Frequent occurrences of *Melaleuca clavifolia*. The three observations recorded within Namming Nature Reserve in 2012 recorded percentage covers of 30 to 40% but total plant numbers were not recorded. The numbers of individuals in the remaining populations are unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Melaleuca clavifolia* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system.

*Melaleuca clavifolia* has a reasonable geographical range, and there are significant areas of suitable habitat remaining which are not under imminent threat. Seven populations of this species have been recorded within five different areas of conservation estate land and are considered secure. Based on this data, this taxon does not appear threatened and it is recommended that it be removed from the Priority Flora list.

## 35. *Onychosepalum nodatum* B.G.Briggs & L.A.S.Johnson

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A caespitose, perennial species with a grass-like or herbaceous habit forming small, many-culmed tussocks. Flowers brown, present in October.

**Soil preference:** Sand and sandy clay in low-lying areas.

**Distribution:** South – West botanical province in the Swan Coastal Plain region.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) shows *Onychosepalum nodatum* has a known geographic distribution from north of Cooljarloo to south of Cataby, a range of approximately 40 km.

This species is known from three records within the DEC Threatened flora database and eleven records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of nine populations (Table 35).

Recorded locations of individual populations indicate the known distribution of *Onychosepalum nodatum* is concentrated in the area between Wongonderrah and Cooljarloo Roads in Cooljarloo, with all but one of the known locations for this species falling in this vicinity.

Information regarding land tenure for populations of *Onychosepalum nodatum* indicates that the majority of populations are currently not considered secure. Two populations observed prior to 1980 are found on secure tenure within the Eneminga Nature Reserve and Strathmore Road Nature Reserve. The remaining populations are located on mining tenement, unallocated crown land, private property or road verge.

**Table 35: Known Populations and Distribution Range of *Onychosepalum nodatum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC		Western Power Transmission line between Pinjar and Eneabba in remnant vegetation on private property, ca 3.5km N of Wongonderrah Rd, 1.5km E of Yermullah Rd, ca 10km W of Brand Hwy, approx 20km SW of Badgingarra.	Pinjar – Eneabba DRF & Priority Flora Survey WP10-37	Private Property	17/11/2010	>5 plants	Power Line Maintenance
DEC, WEC		Cooljarloo	Cooljarloo West Mapping	Mining Lease	4/11/2008	14	Mining
DEC, WEC		Approx 32km WNW of Dandaragan, 5km W of Brand Hwy on Tiwest Cooljarloo minesite	Mulch Monitoring	Mining Lease	20/10/2010	1	Mulching, Mining
WAHERB		Eneminga Reserve [Ca 10 km SSW of Cataby]		Nature Reserve	/03/1966		
WAHERB		Strathmore Road Reserve (no. 26248), S of Badgingarra		Nature Reserve	05/11/1975		
WAHERB		N Woolka Road ca 8 km W junction Cooljarloo Road AMG 50JLM382040 Wedge Island 1:100,000		UCL	06/11/1988		
WAHERB		8 km W of Cooljarloo road and Woolka road on Woolka road, AMG 50JLM 382040, Wedge Island 1:100,000		UCL	16/10/1990	Common	
WAHERB		Tiwest, 10 km N of Cataby		Mining Lease	12/12/1995		
WAHERB		10 km N of Cataby		UCL	23/01/1996		
WAHERB		Site 24, 8.5 km E of Nambung Homestead turnoff along Wongonderrah Road, site it 250 m S of the road		UCL	29/10/1999		
WAHERB		Site 34, 10 km E of Nambung Homestead along Wongonderrah road, 1.75 km S of road		UCL	30/10/1999		
WAHERB		ca. 400 m S of Wongonderrah Road at ca. 4 km W of Yerramullah Road (SE of Cervantes)		UCL	20/10/2007		
WAHERB		Wongonderrah Road opposite junction with Yerramullah Road, just W of Wongonderrah Nature Reserve		Road Verge	17/10/2008	2 locations, Locally frequent	

To date there has only been one quantitative record of population size for this species, with upwards of five plants counted at a site north of Wongonderrah Road. Abundance in qualitative terms has been noted for a further two populations, describing prevalence as Common and Locally Frequent respectively, but the size of the remaining populations is unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Onychosepalum nodatum* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. This classification is applied to species known from few or widespread locations, where there is sufficient habitat not considered to be under imminent threat, or populations are of large size.

Although there are a number of recorded observations of *Onychosepalum nodatum*, this species has a very restricted geographic range. Excepting a single record from south of Cataby in 1966, all known populations are located within a 10 km radius of an active minesite, with small or unknown population sizes. The only observations of this species on secure tenure are dated prior to 1980 and may no longer be extant. Based on current knowledge it is recommended that this taxon retain a Priority 3 ranking as it has not been adequately surveyed to allow any change.

### 36. *Platysace ramosissima* (Benth.) C.Norman

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A perennial herb growing to 0.3 m high. White – cream flowers present in October and November.

**Soil preference:** Sandy soils.

**Distribution:** South – West botanical province in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) shows that *Platysace ramosissima* has a known distribution between Eneabba and Bunbury, a range of approximately 400 km.

This species is known from 10 records within the DEC Threatened flora database, 12 records within the W.A. Herbarium database (DEC 2012a), and 18 additional records from Woodman Environmental Consulting. These observations currently represent an estimated total of 17 distinct populations (Table 36).

Locations of recorded observations indicate the known distribution of *Platysace ramosissima* is generally scattered throughout its range. Land tenure for known populations is mixed, with seven populations located on secure tenure within Boonanarring Nature Reserve, Dundas Road Reserve, Drummond Nature Reserve, Bullsbrook Nature Reserve, Yalgorup National Park and Bunbury State Forest. There is also a population within mining lease in South Eneabba Nature Reserve. An additional population is situated on mining tenement at Cooljarloo, three on unallocated crown land, four on private property and a further one at Perth Airport.

**Table 36: Known Populations and Distribution Range of *Platysace ramosissima***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	750 metres WSW (240 deg.) of the W edge of the Duck Pond (a small lake on the W side of Lake Clifton), S of Mandurah		National Park	23/08/1987		
DEC, WAHERB	2	Boonanarring Brook Reserve; 20 km NNE of Gingin		Nature Reserve, Waterbody	28/09/1988	Uncommon	
DEC, WAHERB	3	Nature reserve on Great Northern Highway just north of Rutland Rd on east side along internal fire breaks		Nature Reserve	8/12/1994	Locally common	
DEC, WAHERB	4	Dundas Road Bushland (System 6 Area M53, Bush Forever Site 319). System 6 Update quadrat m 5302, Forrestfield		Conservation Managed Lands	4/11/1994		
DEC	5	Vacant crown land E of Dept of Defence Lancelin training area		UCL	3/11/2000	5 plants at 1 location	Power line Maintenance
DEC, WAHERB	6	Conservation Managed Lands, NW of Bunbury Airport, Bunbury.		Conservation Managed Lands	18/02/1987		
DEC, WAHERB	7	Drummond Nature Reserve, 10 km W of Bolgart,		Nature Reserve	16/01/2000		
DEC, WEC		Recently burnt area of Wongonderrah Rd. E 336690, N 6617483.		UCL	2000/2001	Scattered	
DEC, WAHERB, WEC		Bartlett's Well Nature Reserve.		Nature Reserve	15/11/2007	Scattered	
DEC, WAHERB, WEC		Approx 10km S of Eneabba		Mining Lease on Nature Reserve	21/03/2007	1	Mining
WAHERB		32 mile peg, Great Northern Highway [ca 29 km SSW of Bindoon]		Private Property			
WAHERB		7 miles N of Gingin		Private Property	24/11/1969		
WAHERB		Perth Airport		Airport	13/12/2006	1 plant at 1 location	
WAHERB		Near Munbinea Road		Private Property	31/01/2007		
WEC		E of Brand Hwy, S of Aurisch Rd, 18 km NNW of Gingin.	Loop 9	UCL	4/10/2005		
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	2005-2006	16	
WEC		Bush Remnant, E of Brand Hwy, N of Wannamal West Rd, ~20 km N of Gingin.	Gingin Plots	Private property	9/08/2007		

To date there is little information collected on the size of known populations of this species. Quantitative counts given vary between one and five plants, however a further four populations are assessed subjectively with occurrences of *Platysace ramosissima* described as Locally Common, Scattered or Uncommon.

## **SUMMARY AND RECOMMENDATIONS**

*Platysace ramosissima* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. This classification is applied to species known from several locations not under immediate threat, or few widespread locations where there is sufficient remaining habitat and/or populations are of large size.

Whilst recorded populations of *Platysace ramosissima* are scattered, this species is currently well-represented on conservation estate throughout its range. It has a wide geographic distribution, and has been recently surveyed, however population size is generally small or unknown, and a number of populations have not been reassessed in the past 20 years. For these reasons it is recommended that *Platysace ramosissima* remain listed as a Priority 3 species.

## 37. *Schoenus griffinianus* K.L. Wilson

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Flowering occurs September to October

**Soil preference:** White sand

**Distribution:** South West Western Australia in the Avon wheatbelt, Geraldton Sandplain and the Swan Coastal plain

**Response to fire/ disturbance:** Unknown but common in rehabilitated areas

**Susceptibility to dieback:** Not likely to be susceptible

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the WA Herbarium database (2012a) and DEC Threatened and Priority Flora database records (DEC 2012b) show that *Schoenus griffinianus* has a known distribution from Dongara to Perth, a range of approximately 340 km, and east to Wongan Hills.

The species is known from six records within the DEC Threatened flora database, 29 records within the WA Herbarium database (DEC 2012a), two additional records from the Tronox/Iluka database and 108 additional records from Woodman Environmental Consulting. These records currently represent an estimated 25 populations (Table 37). The records from project specific survey areas (such as the Tronox Dongara tenement) have been grouped as one population, as the current level of survey does not indicate whether the recorded locations are spatially distinct populations; i.e. no plants present in the vegetation between each location.

The recorded locations at Eneabba have been separated into two populations north and south of the townsite. The remnant vegetation north of Eneabba is separated from the southern vegetation by cleared pasture, allowing the designation of two populations. These two populations could not be split further as the current level of survey does not indicate whether the recorded locations are spatially distinct populations.

**Table 37: Known Populations and Distribution Range of *Schoenus griffinianus***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	Wongan Hills Experimental Farm. Off Craig Hill		Department of Agriculture	/10/1984		
DEC, WAHERB	2	Tiwest Cooljarloo South Mine, dump 2 rehab, ~25km south of Badgingarra		Mining Lease	29/11/2004		Mining
DEC	3	Iluka Resources Rehabilitation, Eneabba Operations		Mining Lease	29/11/2005		Mining
DEC	4	Iluka Resources Rehabilitation, Eneabba Operations		Mining Lease	15/11/2005		Mining
DEC		Dundas Nature Reserve, E side of Dundas Rd, Forrestfield.		Nature Reserve	13/10/2010	1 location	Fire breaks and grazing.
DEC, WEC		Pinjar to Eneabba Transmission line - Tower locations PR-127, PR-131, PR-134		National Park	9/11/2010	16 plants at 7 locations	
WAHERB		Stirling Crescent Plot 2. Ca 300 m S of Great Eastern Hwy Bypass and 200 m W of Roe Hwy, Hazelmere in road reserve		Road Reserve	28/09/1977		Road maintenance
WAHERB		Victoria location 10240 8 km SSE of Eneabba		Private Property	24/10/1984	Occasional	
WAHERB		Ca 8 km S of Eneabba			07/11/1984		
WAHERB		S end of RGC Eneabba mine site in undisturbed vegetation near mine access road		Mining Lease	11/10/1985	Occasional	Mining
WAHERB		Extreme SE corner of uncleared section of Wongan Hills Research Station Reserve 18672, ca 4 km N of Wongan Hills townsite on Piawanning-Waddington Road,		Department of Agriculture	19/10/1993		
WAHERB		Iluka Resources, Eneabba		Mining Lease	09/11/1994	Occasional	Mining
WAHERB		S end of RGC Eneabba mine site		Mining Lease	/12/1997		Mining
WAHERB		Wongan Hills Experimental Farm, Reserve 18672, Craig Road, ca 6.5 km by road N of Wongan Hills		Department of Agriculture	29/01/1998		
WAHERB		Iluka Resources, Eneabba. Pit 03BS		Mining Lease	25/09/2000		Mining
WAHERB		c. 4 km ENE of Eneabba on Three Springs Road, Irwin District		Shire Road Reserve	29/11/2004	1 plant	Road maintenance
WAHERB		Iluka Resources Ltd. Rehabilitation, Eneabba operations		Mining Lease	26/10/2005		Mining
WAHERB		Melaleuca Park conservation area, N Cooper Rd, 12 km NE of Wanneroo (plot mela-8).		Conservation Park	08/06/2006	Occasional	
WAHERB		Track, S of Woolka Road (western end), (Woolka Road is an extension of Cooljarloo Road, which runs W off Brand Highway, N of Cataby)		UCL	6/11/2007	1 plant	
WAHERB		On old track, starting at the intersection of Woolkda Road and Cooljarloo Road., N of Cataby		UCL	3/12/2007	2 plants	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		On powerline track, N of Wongonderrah Road, N of Cataby		Private Property	5/12/2007	2 plants	
WAHERB		On track S of Wongonderrah Road, N of Cataby		UCL	6/12/2007	40 plants	
WAHERB		On firebreak and in adjacent vegetation on private property (Topham), 19 km E of Cervantes, 1 km and 1.4 km N of Cervantes Road		Private Property	15/12/2007	30 plants	
WAHERB		Lake Logue, ca 10 km SW of Eneabba		Nature Reserve	01/10/2008		
WAHERB		Woodada Area Drill Lines		UCL	2008	>1500 plants at 56 locations	
HELENA HOLDINGS		Cooljarloo South Mine, 2004 Harvested Area		UCL	2008	23 plants at 2 locations	
WEC		Eneabba, south of townsite	Various	Mining Lease part in Nature Reserve	2006 - 2009	58 plants at 21 locations	Mining
WEC		Eneabba, north of townsite		Mining Lease on private property	01/11/2006	1	Mining
WEC		Tronox Dongara Lease	Various	Mining Lease	2006 to 2011	576 plants at 52 locations	Mining
WEC		Cataby	2001 Rehabilitation Monitoring	Mining Lease	2001 - 2005	33 plants	Mining
WEC		Cataby	Falcon plots	Mining Lease	Nov 2006	1	Mining
WEC		Tronox Cataby West Tenement, near Mimegarra Rd, South-west of Cataby	Tronox 8-52 Drill Lines	Mining Lease	10/11/2008	4 plants at 3 locations	
WEC		Iluka Resources tenement, South Eneabba	Eneabba DRF/PLF Searching 2008	Mining Lease	17/11/2008	1 plant at 1 location	Mining
WEC		Approximately 15km SSE of Eneabba, North East of Beros Road.	Western Power Eneabba-Moonyoonooka Towerbases	Private Property	13/10/2009	2	Grazing, Weeds
WEC		Approx. 30 km W-NW of Dandaragan, 5km west of the Brand Highway on Tronox Cooljarloo minesite	Tronox Mulch Harvesting Impacts	Private Property	20/10/2010 – 21/10/2010	2	
WEC		West of Brand Hwy, NW of Muchea, near Neerabup	Neerabup Pipeline Spring Monitoring	State Forest	07/09/2011	6	
WEC		Iluka Resources tenement, South Eneabba	Iluka 11-52 Gridding	Mining Lease	31/10/2011 – 04/11/2011	44 plants at 18 locations	Mining

Locations of individual populations indicate the distribution of *Schoenus griffinianus* to be concentrated within the Eneabba area, with six of the known populations occurring here. It has a very large geographical range however, with the remaining populations spread between Dongara, Wongan Hills and the north and north eastern suburbs of Perth.

Land tenure for the 25 populations is predominantly mining lease and unallocated crown land, with four populations on conservation estate in South Eneabba Nature Reserve, Moore River National Park or other conservation reserve, and two populations located on an agricultural research station. A further secure population is located in state forest, whilst five populations on private property or road verge are not considered secure. The population present within the Eneabba South Nature Reserve is also covered by mining lease and therefore may be under threat from mining activity.

Over 2,600 individual plants have been observed for this species across all known populations up to 2012, however, numbers of individual plants for populations occurring on secure tenure have not been recorded.

## **SUMMARY AND RECOMMENDATIONS**

*Schoenus griffinianus* is currently listed as a Priority 3 species. Based on the number of known populations (greater than 20), geographic range in excess of 150km and the presence of populations in spatially distinct areas of land managed for conservation it is recommended that *Schoenus griffinianus* be removed from the Priority flora list.

### 38. *Stylidium longitubum* Benth.

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** An erect annual (ephemeral) herb growing to 0.05 - 0.12 m high. Pink flowers are present from October to December.

**Soil preference:** Sandy clay and clay soils.

**Distribution:** South – West botanical province in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. Commonly found in seasonally inundated wetlands.

**Response to fire/ disturbance:** Known to occur in large numbers in recently (6 months) burnt areas.

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 3 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Stylidium longitubum* has a known distribution from Dongara to Busselton, a range of approximately 500 km, and extending inland as far as Talbot.

This species is known from 31 records within the DEC Threatened flora database, 31 records within the W.A. Herbarium database (DEC 2012a) and four additional records from Woodman Environmental Consulting. It is estimated that these records currently represent a total of 37 populations (Table 38).

Recorded observations of *Stylidium longitubum* indicate that populations are generally evenly distributed along a narrow line extending from Dongara to Busselton within approximately 50 km of the coast, with 14 populations scattered between Dongara and Midland, and 22 from Perth to Busselton. A single population has been recorded inland at Talbot, a further 80 km east.

Land tenure for populations of this species is mixed. Eleven known populations of *Stylidium longitubum* occur on secure tenure in nature reserves and conservation areas. One population also occurs in state forest, two on mining tenement, two on shire or recreation reserves, and seven more on other government lands including UCL, airport lands, State Planning Commission land, or lands used for government requirements.

**Table 38: Known Populations and Distribution Range of *Stylidium longitubum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	In a paddock on the W side of Railway Parade, 0.5 km N of Apple Road, Upper Swan		Government Requirements	12/11/1989		
DEC, WAHERB	2	Twin Swamps Wildlife Sanctuary (Reserve No. A 27621) Ellen Brook - Bullsbrook area		Conservation of Fauna	28/12/1971		
DEC, WAHERB	3	J. & R. Martyn Reserve, 13 km N Midland		Nature Reserve	3/10/1988		
DEC, WAHERB	4	Ellenbrook area, west of Vines golf course		Unknown	30/10/1992		Cleared for Residential Estate since 1992
DEC, WAHERB	5	Near Pinjarra industrial area		Recreation Reserve	21/11/2002	Very common	
DEC, WAHERB	6	Lot 350 and adjacent bushland Hampton Road, Pinjarra, in System 6 Update quadrat hamp04		Department of Planning	17/11/1995		
DEC, WAHERB	7	Approx. 0.5 km N of Elliot Road approx 0.5 km E Yangedi Road in System 6 Update quadrat yang01, Subm 219 Yangedi Swamp (Bush Forever Site 77)		Private Property	28/11/1995		
DEC	8A	Searle Rd, Perth Airport		Airport	31/10/2001		Cleared for development since 2001
DEC	8B	Remnant bushland near S end of runway, Perth Airport		Airport	31/10/2001		
DEC	9	Queelup Rd, North Boyalup		Private Property	9/11/2003		
DEC, WAHERB	10	Anstey road, Jandakot		Government Requirements	30/11/1991		
DEC, WAHERB	11	Paganoni block E of Mandurah Rd, 11 km NNE of Mandurah near Serpentine River (adj. to plot paga-2).		Conservation of Flora & Fauna	4/11/1992		
DEC, WAHERB	12	Gingin Airfield Road, 5 km S of Gingin,		Private Property	16/11/1992	Scattered	
DEC, WAHERB	13	Austin Bay Nature Reserve, swale WSW of Grey Rd (plot austb-3).		Conservation of Flora & Fauna	29/10/1993		
DEC, WAHERB	14	Remnant bushland near Hymus Swamp in SW corner of Lowlands property (M105), 11 km WNW of Serpentine (plot hymus05).		Private Property	6/11/1993		
DEC, WAHERB	15	Simmonds Block, Tuart Forest, E of Busselton,		National Park	18/10/1994	Abundant	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	16	SE end off Perry Road, Lake Pinjar Bushland (System 6 Area M8, Bush Forever 382). Lake Pinjar, in System 6 Update quadrat pinj 02		State Planning Commission	10/11/1994		
DEC, WAHERB	17	Kooljenerrup [Kooljerrenup] Nature Reserve, SW of Pinjarra		Nature Reserve	13/11/1995	Very common to Abundant	
DEC	18	Yalgorup National Park		National Park	9/11/1998		
DEC	19	State Forest, Bindoon.		State Forest	9/11/1998		
DEC	20	Wandoo Conservation Reserve, Talbot.		National Park	3/11/1999		
DEC	21	Whiteman Park, off Marshall Rd, Beechboro		State Planning Commission	8/12/2005		
DEC, WAHERB	22	Lake Bambun		Private Property	16/11/1992		
DEC	23	SE of Joint Street in Wellard.		Private Property	17/11/1995		
DEC		Pipeline corridor from old Mandurah Rd near Ravenswood, to N of North Dandalup.		Main Roads Road Reserve and Private Property.	23/11/2006		Pipeline installation.
DEC, WAHERB		Austin Bay Nature Reserve.		Nature Reserve	15/11/2007	100's of plants	Livestock, grazing.
DEC, WAHERB		Pinjarra Nature Reserve, 100m along track into bush area.		Nature Reserve	29/11/2007	1000's of plants	Recreation, weeds, roadworks.
DEC		Shire of Murray, Phillip and Moore Rds, along track.		Other shire reserve, Nature Reserve	29/11/2007	100's of plants	Weeds, Littering.
DEC, WAHERB		Ellen Brook Nature Reserve, Gt Northern Highway, West Swan		Nature Reserve	28/11/2008	Many	
DEC		R40591, Polland St, Pinjarra.		Other Shire Reserve.	17/10/2008	10+ plants	Recreation
DEC		Jarrah Forest in Alcoa Mining lease, 9km NE of North Dandalup town.		Mining Lease	25/11/2009-9/12/2009	3 locations	Mining
WAHERB		121 miles S of Perth on Albany Highway [5 km N of Arthur River]		Private Property			
WAHERB		Midland Junction (Perth)		Road Reserve	/10/1901		
WAHERB		Gillingarra between Moora and Midland		Private Property	13/11/1906		
WAHERB		Yoongarillup on Busselton - Nannup Road		Private Property	26/10/1947		
WAHERB		On Bickley Road near Brentwood Road, Cannington		Private Property	17/11/1967		
WAHERB		Bartram Road, Jandakot		Private Property	22/11/1973		

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Road to Alcoa Refinery, Pinjarra		Private Property	22/10/1976		
WAHERB		Ellis Road, Yalgorup National Park, Mandurah to Bunbury		National Park	02/12/1996	Common to Abundant	
WAHERB		500 m W along Ellis Road from South Coast Highway, S of Lake Clifton		National Park	19/11/1996	Locally frequent	
WAHERB		Pinjarra Industrial Area		Private Property	24/10/2002	Common	
WAHERB		Chandala Nature Reserve		Nature Reserve	21/11/2005	Rare	
WAHERB		2 km N of railway line on track through UCL to Brand Highway, N of Beekeepers Nature Reserve,		UCL	21/09/2007	Localised	
WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	3/11/2008-5/11/2008	4	Mining

A further 13 populations are on tenure not considered secure, with twelve located on private property and one on road verge. Land tenure for the remaining population is unknown.

A number of large populations containing 100 to 1,000 or more plants have been assessed quantitatively in the last five years, with the largest of these located in Pinjarra Nature Reserve. A smaller population of ten plants is also known from Pinjarra. In addition, six populations have been described as having Rare to Abundant occurrences of *Stylidium longitubum*, however the size of the remaining populations is currently unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Stylidium longitubum* is currently listed as a Priority 3 taxon under the DEC threatened species conservation ranking system. Priority 3 ranking is assigned to taxa known from several locations not under imminent threat, or from few widespread locations where either populations are large or there is sufficient suitable habitat remaining that is not imminently threatened.

From the records available, it appears that *Stylidium longitubum* has been adequately surveyed, and is well-represented on secure tenure within conservation estate. Although there is little quantitative information on population sizes, large populations have been surveyed in recent years within several nature reserves. The geographic range for this species is broad, with significant areas of habitat remaining. This taxon does not appear to be under threat and it is therefore recommended that it be removed from the Priority flora list.

### 39. *Anigozanthos humilis* subsp. *chrysanthus* Hopper

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A perennial and rhizomatous herb growing to 0.4 m high. Flowers are uniformly yellow, occurring July to October.

**Soil preference:** Grey or yellow sand.

**Distribution:** South West botanical province in the Geraldton Sandplains, Swan Coastal Plain, Avon Wheatbelt and Jarrah Forest regions.

**Response to fire/ disturbance:** Known to grow in areas of physical disturbance.

**Susceptibility to dieback:** Susceptible (Patrick and Brown, 2001)

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), the known distribution of *Anigozanthos humilis* subsp. *chrysanthus* reaches from Cooljarloo to Gnangara, extending as far inland as Calingiri, a range of over 200 km.

This species is known from 56 records within the DEC Threatened flora database, 49 records within the W.A. Herbarium database (DEC 2012a) and five additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 43 populations (Table 39).

Locations of individual populations indicate the distribution of *Anigozanthos humilis* subsp. *chrysanthus* to be concentrated in the Mogumber area, with only single records from each of Clackline, Gnangara, Calingiri and Wongamine.

Land tenure for known populations of *Anigozanthos humilis* subsp. *chrysanthus* is mixed, with eight populations (or part thereof) occurring on lands managed for conservation, including Mogumber Nature Reserve, Moochamulla Nature Reserve and Lake Wannamal Nature Reserve. There are also six populations known from crown land, one from state forest and one from mining tenement. The remaining populations are not considered secure, with eleven occurring on road or railway reserve and therefore threatened by maintenance activities, one on gravel extraction reserve, and a further nine located on privately owned property.

**Table 39: Known Populations and Distribution Range of *Anigozanthos humilis* subsp. *chrysanthus***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1A	1.3 km N of Neames Road		Railway Reserve	12/08/1991	Abundant	
DEC	1B	W of Bindoon-Moora Rd, approx.. 2 km N of Mogumber		Shire Road Reserve	9/07/1991		Road maintenance
DEC	1C	Off Bindoon-Moora Rd, Approx 1 km S of Mogumber.		Railway Reserve	25/07/2003		
DEC	1D	Off Bindoon-Moora Rd, Approx 1 km S of Mogumber.		Main Roads Road Reserve	25/07/2003		Road maintenance
DEC	1E	N of Neames Rd, 370 m from Bindoon-Moora Rd, 2 km South of Mogumber.		Conservation Reserve	26/07/2003		
DEC, WAHERB	1F	Neave Road, E of NW corner of Mogumber Nature Reserve		Shire Road Reserve	24/11/2003	> 100 plants at 1 location	Road maintenance
DEC, WAHERB	1H	Location 2156, S of Neames Road, Mogumber - 200 m S of NE corner, extending for 200 m S down E boundary of location		Private Property	2/10/1992	82 plants at 1 location	
DEC	1I	500 m W of Bindoon-Moora Rd, 320m S of intersection with Murphy-Gully Rd, 4 km S of Mogumber.		Conservation Reserve	1/11/2000		
DEC	1J	650 m along Neames Rd from Bindoon-Moora Rd, 2 km South of Mogumber.		Private Property	20/10/1992		
DEC	1K	1.1 km W of Bindoon-Moora Rd, 530m S of intersection with Murphy-Gully Rd, 4 km S of Mogumber.		Private Property	1/11/2000		
DEC	1L	1.4 km W of Bindoon-Moora Rd, 1.1 km S of intersection with Murphy-Gully Rd, 4 km S of Mogumber.		Private Property	1/11/2000		
DEC, WAHERB	2	600 m N of Gillingarra on Bindoon-Mogumber Road, 18 km WNW of New Norcia		Main Roads Road Reserve	14/09/1984	15 plants at 1 location	Road maintenance
DEC	3	100m NE of oval on Bindoon-Moora Rd near corner of Mogumber-Yarawindah Rd.		Recreational Area (Racecourse)	2/07/1992		
DEC, WAHERB	4A	280 m E along Mogumber West Road from the SE corner of Moochamulla Nature Reserve and then 30 m directly S		Private Property	2/10/1992	>50 plants at 1 location	
DEC, WAHERB	4B	280 m E along Mogumber West Road from the SE corner of Moochamulla Nature Reserve, S side of the road		Shire Road Reserve	2/10/1992	10 plants at 1 location	Road maintenance
DEC, WAHERB	4C	580 m E along Mogumber West Road from the SE corner of Moochamulla Nature Reserve		Shire Road Reserve	16/10/1992	16 plants at 1 location	Road maintenance
DEC, WAHERB	4D	Mogumber Nature Reserve		Conservation Reserve	15/10/1992		
DEC, WAHERB	5	Wannamal W road Reserve, 380 m W along Wannamal W road from the junct. of Moora road		Shire Road Reserve	2/10/1992	2 plants at 1 location	Road maintenance

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	6A	Wannamal West Road, townsite reserve, Shire of Gingin		Shire Road Reserve	15/10/1992		Road maintenance
DEC, WAHERB	6B	South Wannamal Road, Shire of Gingin		Private Property	15/10/1992		
DEC	7	Approximately 100m south-west of Forrest Rd, 2 km from junction with Goomalling-Toodyay Rd, 5 km SW of Wongamine.		Shire Gravel Pit	19/09/1998		Gravel extraction
DEC	8A	Bindoon-Moora Rd, 350 m north of Sykes Rd.		Railway Reserve	1/09/1976		
DEC	8B	Bindoon-Moora Rd, 1.2 km north of Sykes Rd.		Railway Reserve	1/09/1976		
DEC	9	N side of Mimegarra Rd, 1.65 km W of Brand Hwy, approx.. 5 km S of Cataby.		Shire Road Reserve	8/07/1975		Road maintenance
DEC	10A	W side of Bindoon-Moora Rd, Approx 5.3 km S of Gillingarra.		Railway Reserve	1/09/1976		
DEC	10B	W side of Bindoon-Moora Rd, Approx 5.1 km S of Gillingarra.		Railway Reserve	8/07/1975		
DEC	11	4 km SW of New Norcia.		Private Property	13/10/1999		
DEC, WAHERB	12	AMG 50JLL762775 (Yatheroo 1:50,000 Sheet), corner Gillingarra and Dandaragan Roads		Private Property	11/08/1988		
DEC	13	Cataby Rd, 7.5 km ENE of Cataby.		Other Shire Reserve	13/09/1988		
DEC	14A	North end of Lake Wannamal, 7.5 km N of Wannamal.		Conservation Reserve	1/11/2000		
DEC	14B	North end of Lake Wannamal, 7.5 km N of Wannamal.		Conservation Reserve	1/11/2000		
DEC	14C	West of Lake Wannamal, 7.5 km N of Wannamal.		Conservation Reserve	1/11/2000		
DEC	14D	North-East of Lake Wannamal, 7.5 km N of Wannamal.		Conservation Reserve	1/11/2000		
DEC, WAHERB	15	Moore River State Forest (State Forest 65 North), 1.4 km W of intersection of McCormicks Road and Edward Road, 700m S of Mogumber West Rd, approx.. 7 km E of Brand Hwy, S of Regan's Ford.		State Forest	6/09/2000		
DEC	16A	930m S of Mogumber West Rd, approx.. 7 km E of Brand Hwy, S of Regan's Ford.		UCL	25/10/2004		
DEC	16B	1.6 km S of Mogumber West Rd, approx.. 8 km E of Brand Hwy, S of Regan's Ford.		UCL	25/10/2004		
DEC	17	800m S of Mogumber West Rd, approx.. 9.5 km E of Brand Hwy, S of Regan's Ford		UCL	25/10/2004		
DEC	18	Bush remnant, 1.3 km N of Marrie Heights Rd, Red Gully.		UCL	25/10/2004		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	20	S of Mogumber West Rd, Red Gully.		UCL	25/10/2004		
DEC, WAHERB	21	AMG 50JLM674013 (Dandaragan 1:50,000 Sheet), Water Reserve (11712) between Cataby and Dandaragan		Conservation Reserve	28/06/1988		
DEC, WAHERB	22A	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Occasional	
DEC, WAHERB	22B	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Scattered	
DEC, WAHERB	22C	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Scattered	
DEC, WAHERB	22D	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Scattered	
DEC, WAHERB	23	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Common	
DEC, WAHERB	24	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Scattered	
DEC, WAHERB	25	Property south of Mogumber Nature Reserve.		Conservation Reserve	31/10/2000	Scattered	
DEC, WAHERB	26A	Property south of Mogumber Nature Reserve.		UCL	31/10/2000	Scattered	
DEC, WAHERB	26B	Property south of Mogumber Nature Reserve.		UCL	31/10/2000	Scattered	
DEC, WAHERB	26C	Property south of Mogumber Nature Reserve.		UCL	31/10/2000	Scattered	
DEC, WAHERB	26D	Property south of Mogumber Nature Reserve.		UCL	31/10/2000	Locally Common	
DEC, WAHERB	27	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Very scattered	
DEC, WAHERB	28	Property south of Mogumber Nature Reserve.		Private Property	31/10/2000	Frequent	
DEC		Powderbark Rd, Lower Chittering.		Private Property	7/12/2007		Land development
DEC		Approx 7 km along Woolka Rd, W of Brand Hwy, approx 13km NW of Cataby		Mining Lease	27/09/2011	1 plant	Mining
WAHERB		Mogumber		Private Property	09/11/1897		
WAHERB		Mogumber		Private Property	/10/1898		
WAHERB		Mogumber, between Moora and Bindoon		Private Property	/07/1903		
WAHERB		Mogumber, between Moora and Bindoon		Private Property	27/08/1938		
WAHERB		Mogumber		Private Property	/09/1956		
WAHERB		8-10 miles E of Calingiri, along Wongan Hills road		Shire Road Reserve	04/09/1958		Road maintenance

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Moore River, prope Mogumber [near Mogumber]		Private Property	05/09/1960		
WAHERB		S of Mogumber siding		Private Property	25/09/1965		
WAHERB		Clackline		Shire Road Reserve	/10/1970		
WAHERB		1 km S of Mogumber towards Perth		Private Property	24/08/1975	Common	
WAHERB		1.1 km N of Mogumber towards Moora		Private Property	13/07/1975		
WAHERB		1.4 km N of Mogumber on Bindoon Moora Road, 700 metres N of Moore River Bridge		Shire Road Reserve	16/09/1982		Road maintenance
WAHERB		AMG 50JLM667012 (Dandaragan 1:50,000 sheet) Water Reserve (11712), Cataby road W of Dandaragan		Private Property	11/09/1988		
WAHERB		Mogumber Recreation Reserve, Gazetted Reserve 8588, N side of Reserve on S side of drainage line where track crosses, on W and E side of track, ca *		Recreational Parkland	10/09/1991	2 plants at 1 location	
WAHERB		Mogumber Nature Reserve		Nature Reserve	15/10/1992		
WAHERB		415-650 m S on W boundary fireline from NW corner of Mogumber Nature Reserve No 38649		Nature Reserve	18/08/1992	10 plants at 1 location	
WAHERB		Mogumber Nature Reserve 38649 - situated 500 m E down the southern boundary fireline from the SW corner and 50 m N along N-S fireline		Nature Reserve	16/10/1992	19 plants at 1 location	
WAHERB		Toodyay Shire Reserve - Forrest Road, (W end)		Other Shire Reserve	20/10/1993	73 plants at 1 location	
WAHERB		Mogumber, 37.7 N from turnoff from Bindoon to Moora		Railway Reserve	30/09/2003	> 200 plants at 1 location	
WAHERB		Mogumber reserve track		Road Reserve	15/09/2008		
WAHERB		NW corner of Mogumber Nature Reserve		Nature Reserve	Unknown	Frequent	
WEC		North of Warbrook Rd, Gnangara.	Gnangara 2005	State Forest	16/09/2005	1	
WEC		Approx. 4 km ESE of the Brand Hwy and Midlands Rd junction, Irwin.	Irwin - Rolled DBNGP Loop 9	UCL	7/9/2005	1	
WEC		Adjacent to Brand Hwy, Boonanarring.		UCL	5/10/2005	3	Gas pipeline construction

Historical records predominantly describe abundance in subjective terms varying from Occasional to Abundant, however over 580 individual plants have been recorded from 13 of the known locations, with the largest population size being >200 plants in Mogumber on railway reserve. The estimated total number of plants from known populations was 6200 in 2006 (DEC 2006).

## SUMMARY AND RECOMMENDATIONS

*Anigozanthos humilis* subsp. *chrysanthus* is currently listed as Priority 4 under the DEC threatened species conservation ranking system.

There are a large number of recorded observations of *Anigozanthos humilis* subsp. *chrysanthus* with a number of known populations located within areas managed for conservation, and many more in areas not under imminent threat. Although population sizes and status for a number of populations are unknown, this taxon is widely distributed, has a number of recent records and large areas of suitable unthreatened habitat. It is therefore recommended that this species be removed from the priority flora list.

This taxon was listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) but was removed in 2006 based on advice from the Department of Environment and Conservation. Its conservation status in Western Australia was changed from Declared Rare to Priority 4 in 2003.

## 40. *Banksia platycarpa* (A.S.George) A.R.Mast & K.R.Thiele

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, columnar and non-lignotuberous shrub growing to 0.2-1 m high. Flowers are cream to yellow to orange and present in May to August.

**Soil preference:** White, grey/brown sand, often with gravel & over laterite.

**Distribution:** South West botanical province in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Presumed susceptible due to the high susceptibility of other *Banksia* species in the region (Paap *et. al.* 2010)

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Banksia platycarpa* has a known distribution from Eneabba to Gingin and east to Carnamah, a range of approximately 200 km.

This species is known from 26 records within the DEC Threatened flora database, 45 records within the W.A. Herbarium database (DEC 2012a) and 15 additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 48 distinct populations (Table 40).

Locations of individual populations indicate the known distribution of *Banksia platycarpa* is generally scattered throughout its range, and the species is well represented in conservation managed lands, with 19 of the known populations occurring on secure tenure within nature reserves or national parks. A further ten populations are situated in road reserve, three on unallocated crown land, two on mining tenement and thirteen are located on private property. The land tenure of the remaining population is unknown.

Population size for known locations of *Banksia platycarpa* is variable, ranging from a single individual to groups of several thousand plants. Large populations can be found within Boonanarring Nature Reserve and Fynes Road Nature Reserve south of Regan's Ford.

**Table 40: Known Populations and Distribution Range of *Banksia platycarpa***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	SE corner of Marchagee Track and Coalara (Willcocks) intersection adjacent to Watheroo National Park		Shire Road Verge, National Park	08/10/1991	5+ plants	
DEC, WAHERB	2	Alexander Morrison National Park, SW corner, 500 m NE along firebreak from intersection with track in from Tootbardee Road at edge of firebreak		National Park	14/08/1991	1 plant	Firebreaks
DEC, WAHERB	3	200 m S of intersection of Koojan Pool Road with Boundary Road, on E road verge		Shire Road Reserve	12/12/1990	1 plant	Road maintenance
DEC, WAHERB	4	Alexander Morrison National Park, 3.5 km west along track from Tootbardie Road on southwestern section		National Park	07/11/1991	4 plants	Firebreaks
DEC	5	Alexander Morrison National Park, SW corner, 500m NE along firebreak from intersection with track in from Tootbardie Rd at edge of firebreak.		National Park	14/08/1991	1 plant	Firebreaks
DEC, WAHERB	7A	3.8 km W along Marchagee Track from junction with Coalara Road, N & S sides of road & for 50 m N from road		UCL	29/04/1992	50+ plants	
DEC, WAHERB	7B	Site of Rangers House, W side of Watheroo National Park		National Park	29/04/1992	5 plants	
DEC	9	Watheroo National Park, E side of Coalara Rd at 600m S of park boundary on W side. Population is 2.3km E of road beside track.		National Park	20/11/1992	5+ plants	
DEC	10	Watheroo National Park, 50m E of inner firebreak at 3.35km S of intersection of Marchagee track and Coalara Rd.		National Park	19/11/1992	5+ plants	
DEC	11	Approx 200m N of Marchagee track, at 7.1km from intersection with Coalara Rd.		UCL	19/11/1992	2 plants	
DEC, WAHERB	12	Junction of Barbeston road and Capitella road on SE corner, road verge		Shire Road Reserve	12/12/1990	1 plant	Road maintenance
DEC, WAHERB		SW corner of Watheroo National Park, W of Watheroo		National Park	06/10/1971		
DEC, WAHERB		Badgingarra,		Other Shire Reserve	21/07/1978		
DEC, WAHERB		NE corner of Alexander Morrison National Park		National Park	02/01/1979		
DEC, WAHERB		2 km W along Cadda Road, S side, N margin of Badgingarra National Park		National Park	06/01/1992	1 plant at 1 location	
DEC, WAHERB		1 km W of Chatfield Clarke Road, at 20 km N of Coorow - Green Head Rd, property of P. Tomkins		Private Property	19/11/1997	50+ plants	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB		Badgingarra National Park		National Park	10/02/1997	A few scattered plants.	
DEC, WAHERB		Boonanarring Nature Reserve, c. 4.75 km S of Wannamal West Road on E boundary track, then 0.7 km along track to the W, then walk c. 200 m NNE. Gingin Shire (Map/Site Ref: Mindarra 2035-1)		Nature Reserve	31/10/2001	1000+ plants at 1 location	
DEC, WAHERB		Fynes Road NRE [Nature Reserve], Mogumber West Road, Gingin, W of boundary track in SE corner of reserve		Nature Reserve	29/01/2006	500 plants at 1 location	
DEC		Fynes Rd Nature Reserve, Gingin. Extending >1km N and >1km E from SW corner of reserve.		Nature Reserve	16/02/2006	2000+ plants at 1 location	
DEC		Gindalbie Metals transmission line area.		Unknown	2007/2008	1 location	Transmission line construction
DEC		Brand Hwy SLK 199.3-205.20, NE of Jurien, E of Leeman.		Main Roads Road Reserve.	12/12/2008	Scattered	Road expansion.
DEC, WEC		Approx 30km WNW of Dandaragan, 5km W of Brand Hwy on Tiwest Cooljarloo minesite.		Mining Lease	19/10/2010	4 locations	Mulching
DEC, WEC		Approx 29km WNW of Dandaragan, 6km W of Brand Hwy on Tiwest Cooljarloo minesite.		UCL	18/10/2010	7	Mulching
DEC		Warro Gas field seismic survey area, approx NW corner is E374000 N6666000, SE corner is E382000 N6655000.		National Park, Private Property, Conservation Reserve	2010-2011	29,040 plants at ~1170 locations	Gas exploration
DEC		~2km NW of Cairn Rd and Munbinea Rd intersection (in bushland W of Spring Hill Rd). !16km ESE of Jurien Bay. Tiwest tenement.		Mining Lease	9/11/2011	34 plants at 1 location	Mining
DEC, WAHERB		~20km N of Gingin located in remnant vegetation on private property. Approx 5km N of Wannamal West Rd and Boonanarring Nature Reserve.		Private Property	24/11/2011	23 plants at 1 location	Disease
WAHERB		Dinner Hill		Private Property	08/1962		
WAHERB		Between Mogumber town and mission		Private Property	25/09/1965		
WAHERB		10 miles W of Winchester, on Eneabba road, W of Carnamah		Private Property	24/08/1965		
WAHERB		Mogumber Mission - 10 miles W of Mogumber township		Private Property	10/06/1966		
WAHERB		6 miles W of North West Coastal Highway on Strathmore Road		Private Property	17/09/1976		
WAHERB		31.4 km (by road) W of Winchester,		Shire Road Reserve	23/03/1979		
WAHERB		Eneabba - Carnamah Road, 3.5 km W of Clarke Road		Shire Road Reserve	03/08/1983		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Marchagee track, 1 km E of Dewar Road		Private Property	02/08/1983		
WAHERB		Eneabba - Carnamah Road, 0.5 km E of Clarke Road		Private Property	03/08/1983		
WAHERB		4.9 km W of Mogumber township, on Regans Ford road,		Private Property	04/01/1984		
WAHERB		Junction of Coorow - Green Head road and Tootbardie road		Shire Road Reserve	05/08/1986		Road maintenance
WAHERB		Corner of Beekeeper Road and First North Road		Shire Road Reserve	06/08/1986		Road maintenance
WAHERB		Coalara Road, 1.1 km N of Watheroo West Road		Shire Road Reserve	05/08/1986		Road maintenance
WAHERB		24 km E of Eneabba on E boundary Tathra National Park, 3 km S on Road 36		National Park	17/09/1987		
WAHERB		Alexander Morrison National Park, Old Coorow - Green Head Road, 400 m E of intersection with western inner N-S firebreak		National Park	06/08/1992	1 plant at 1 location	
WAHERB		8.4 km E of Dewars Road on Marchagee-Coomallo track		Shire Road Reserve	27/07/1994	Locally abundant	
WAHERB		4.3 km on Willis Road, S of Wilmott Road		Shire Road Reserve	27/07/1994	100+ plants at 1 location	
WAHERB		Tathra National Park, Eneabba-Carnamah Road junction with Willis Road		National Park	27/07/1994	50+ plants at 1 location	
WAHERB		14.7 km N along Brand Highway from Badgingarra; W side of highway		Shire Road Reserve	13/10/1996		
WAHERB		Quadrat WMA53. Watheroo National Park. A 24491. Shire of Dandaragan. Western extension of WNP		National Park	24/09/1999		
WAHERB		ca 16 km N of Cataby on the W side of Brand Highway. In bushland on the north mine area of Tiwest Cooljarloo mineral sands mine		Mining Lease	13/12/2006		
WAHERB		Empire Oil Mullering project area, accessed by Woolka Road, approx. 10 km N of Cataby		UCL	10/07/2006	Common	Gas exploration
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	07/11/2006	25 plants at 2 locations	
WAHERB		Near Munbinea Road		Private Property	31/01/2007		
WAHERB		Ca 1.5 km N of Carnamah - Eneabba Road		Private Property	31/10/2007		
WEC		Tronox Tenements, Cooljarloo	Various	Mining Lease	2008-2009	15	

Over 29,000 plants have also been located near Boothendarra in the Warro gas field survey area. These plants were recorded from more than 1100 locations within the approximately 9000 hectare project area with many located within the Watheroo National Park, however the data available is not sufficient to determine whether these are spatially distinct populations (i.e. no plants present in the vegetation between each location), therefore these plants have been counted as a single population.

To date, a total of more than 32,800 individual plants have been recorded from 20 populations, with an additional four locations recording Common, Scattered and Locally Abundant occurrences of *Banksia platycarpa*. The numbers of individuals in the remaining populations are unknown.

## SUMMARY AND RECOMMENDATIONS

*Banksia platycarpa* is currently listed as Priority 4 under the DEC threatened species conservation ranking system. This ranking is applied to species which can be considered rare, near threatened or otherwise in need of monitoring.

*Banksia platycarpa* has been adequately surveyed. It has a relatively large geographical range, and there are significant areas of suitable habitat remaining which are not under imminent threat. A third of the known populations for this species are found on lands managed for conservation and therefore can be considered secure, with populations of large size located in multiple nature reserves. The DEC records show that a significant portion of the known locations of *Banksia platycarpa* have been surveyed, or resurveyed, within the last 15 years, including substantial populations on secure tenure. For these reasons it is recommended that this taxon be removed from the Priority Flora List as it does not appear to be rare, near threatened or in need of monitoring.

41. *Chordifex chaunocoleus* (F.Muell.) B.G.Briggs & L.A.S.Johnson

## INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Rhizomatous and an erect perennial herb growing 0.15-0.5 m high. Flowers are brown and present in September.

**Soil preference:** Grey, siliceous or peaty sand, well to poorly drained.

**Distribution:** South West botanical province in the Avon Wheatbelt, Geraldton Sandplains and Jarrah Forest regions. This species is endemic to Western Australia and commonly found in drainage lines and depressions.

**Response to fire/ disturbance:** Known to inhabit disturbed sandy areas on road verges.

**Susceptibility to dieback:** Presumed not susceptible

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

## POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Chordifex chaunocoleus* has a known distribution from Badgingarra to Clackline, a range of approximately 200 km.

This species is known from 17 records within the DEC Threatened flora database, 23 records within the W.A. Herbarium database (DEC 2012a) and two additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 10 distinct populations (Table 41).

Locations of individual records indicate the known distribution of *Chordifex chaunocoleus* is focused in several small areas, with multiple sub-populations located in Badgingarra National Park, as well as in south-west Toodyay. The remaining records are collected from Cooljarloo and Clackline.

Populations of *Chordifex chaunocoleus* are found on a mixture of land tenure, with two populations existing on road verges, two on mining tenure and three on privately owned property. There are also three populations which are known to occur at least in part within Badgingarra National Park or Clackline Nature Reserve.

**Table 41: Known Populations and Distribution Range of *Chordifex chaunocoleus***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1A	Drummondi Dve, SW of Toodyay.		Shire Road Reserve	10/05/2000	93 plants at 1 location	
DEC	1B	Drummondi Dve, SW of Toodyay.		Private Property	5/01/1999		
DEC	1C	Sandplain Rd, SW of Toodyay.		Shire Road Reserve	20/03/2002		
DEC	1D	Sandplain Rd, SW of Toodyay.		Shire Road Reserve	20/03/2002		
DEC	1E	Drummondi Dve, SW of Toodyay.		Shire Road Reserve	28/10/1995		
DEC	1F	Drummondi Dve, SW of Toodyay.		Shire Road Reserve	28/10/1995		
DEC	1G	Drummondi Dve, SW of Toodyay.		Private Property	28/10/1995		
DEC, WAHERB	2A	11.1-11.2 km W along Cadda Road from Brand Highway, N & S sides, dip between low hills		Shire Road Reserve	30/05/1994	1000+ plants at 1 location	
DEC	2B	Near N boundary of Badgingarra National Park		National Park	30/05/1994		
DEC	2C	Near N boundary of Badgingarra National Park		Private Property	30/05/1994		
DEC, WAHERB	3A	8.1 km W along Cadda Road from Brand Highway, wet low-lying area at base of low hills extending		Shire Road Reserve	30/05/1994	10,000+ plants at 1 location	
DEC, WAHERB	3B	Cadda Road, 7.9 km W of Brand Highway, northern boundary of Badgingarra National Park (Population 3)		National Park	1/11/2002	1000's of plants at 1 location	
DEC	3C	9.3 km W along Cadda Road from Brand Highway		Private Property	30/05/1994		
DEC	4	Northern portion of Clackline Nature Reserve, 3.5km NW of Clackline.		Conservation of Flora & Fauna	12/07/2000		
DEC	5	Tronox Cooljarloo Mining tenement, Cooljarloo, 18 NW of Cataby.		UCL	4/04/1996		
DEC	6	E of Sandplain Rd, SW of Toodyay.		Private Property	30/11/2003		
DEC		Approx 7km along Woolka Rdd, W of Brand Hwy intersection, approx 13km NW of Cataby.		Mining Lease	27/09/2011	3 plants	Mining
WAHERB		Clackline Transect AB		Road Reserve	28/04/1950		
WAHERB		1 mile NW Clackline,		Private Property	28/04/1950		
WAHERB		Majestic Heights, Drummondi Road, Toodyay		Private Property	26/08/1990		
WAHERB		8 km (+/-0.2 km) W along Cadda road from Brand Highway turnoff c. 3 km N of Badgingarra, northern boundary of park, Badgingarra National Park		National Park	08/09/1990	2 locations, Locally abundant	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Ca 8 km SW of Toodyay; junction of Drummondi Road and Adenanthos Road, Darling district		Private Property	09/09/1990	2 locations, Locally frequent	
WAHERB		AMG-Zone 50 346875mE 6635457mN; N boundary of Park, Bibby road, Badgingarra National Park (Reserve 31809), W of Badgingarra.		National Park	07/12/1992		
WAHERB		Badgingarra National Park, 8.1 km W of Brand Highway adjacent to Cadda Road in buffer		National Park	07/1994	Locally abundant	
WAHERB		10 km N of Cataby		UCL	02/04/1996		
WAHERB		Sandplain Road, Toodyay: population starts 0.62 km N of Toodyay Road and continues N on both sides of the road for 380 m,		Shire Road Reserve	16/05/2000	2	
WAHERB		Sandplain Road, Toodyay, population starts 1.5 km N of Toodyay Road and continues N on both sides of the road for 500 m to Smokebush Way,		Shire Road Reserve	16/05/2000	2	
WAHERB		Transversing the western portion of Clackline Nature Reserve from north to south,		Nature Reserve	09/07/2000	2	
WAHERB		Adenanthos Road at Stirlingia Drive, SW of Toodyay		Private Property	30/11/2003	2 locations, Locally abundant	
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Regional Plots	Mining Lease	01/11/2006	2	

Counts of individual plants show that there are relatively large communities of *Chordifex chaunocoleus* present at the boundary of Badgingarra National Park, with more than 12,000 individuals estimated from two populations observed here. There are also qualitative assessments of abundance given for seven other records, listing occurrence as Locally Frequent or Locally Abundant.

## **SUMMARY AND RECOMMENDATIONS**

*Chordifex chaunocoleus* is currently listed as Priority 4 under the DEC threatened species conservation ranking system.

Although *Chordifex chaunocoleus* appears to have a number of known populations of which some are unlikely to be currently under threat, it has a very fragmented distribution with known populations restricted to only four small locations. This species can therefore be considered rare, and should existing populations be lost *Chordifex chaunocoleus* may become threatened. These factors suggest this species should remain ranked as a Priority 4 taxon.

## 42. *Conostephium magnum* Cranfield

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, compact, many-stemmed shrub growing to 2 metres high with pink or purple flowers present from July-September

**Soil preference:** White-grey sands (sometimes associated with laterite gravels) in open woodlands on sand dunes and disturbed roadside, or in swamplands and drainage channels

**Distribution:** South West Western Australia in the Swan Coastal Plain and Geraldton Sandplain regions

**Response to fire/ disturbance:** Unknown but has been recorded in mulched areas and along firebreaks

**Susceptibility to dieback:** Presumed susceptible due to high susceptibility of the Epacridaceae family

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show that *Conostephium magnum* has a known distribution from Gingin to Eneabba, a range of approximately 200 km.

This species is known from eight records within the DEC Threatened flora database, 24 records within the W.A. Herbarium database (DEC 2012a) and three additional records from Woodman Environmental Consulting. There were also six plants located during monitoring of the recovery of vegetation post-mulch harvesting at Cooljarloo. These records currently represent an estimated total of 23 populations (Table 42).

Locations of individual populations indicate the known distribution of *Conostephium magnum* is scattered along its range, with populations split roughly between Eneabba, Warradarge, Badgingarra and Cataby, and a single population found near Gingin. Of all the known populations for this species, four occur on private property, two on unallocated crown land, three on mining lease, one on road verge and one in other shire reserve. Eleven more are located on secure tenure in an unnamed Conservation Park, Badgingarra National Park, South Eneabba Nature Reserve, Coomallo Nature Reserve and Minyulo Nature Reserve. The land tenure of the remaining population is unknown (DEC 2012a).

**Table 42: Known Populations and Distribution Range of *Conostephium magnum***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB		Conservation Park 41986 on Brand Highway, N of Cataby		Nature Reserve	27/11/1996	750 plants	
DEC, WEC		Cooljarloo		Mining Lease	6/11/2008		Mining
DEC, WEC		South Eneabba Nature Reserve, a few km W of Brand Hwy.	2009 Plot Rescore	Nature Reserve	18/11/2009	20	
DEC, WEC		1.5km E of Brand Hwy, South Eneabba		Private Property	10/11/2009	2	Mining
DEC, WEC		Near Pinjar-Eneabba transmission line in UCL adjacent to Tiwest Cooljarloo Minesite, a few km N of main mine entrance road, ca 1km W of Brand Hwy and 15km N of Cataby.		UCL	17/11/2010	242 plants at 48 locations	Power line Maintenance
DEC		6km along Woolka Rd, (~3km to the South), W of Brand Hwy intersection, 13km NW of Cataby, Tiwest Cooljarloo tenement.		Mining Lease	26/10/2011	1200 plants	Mining
WAHERB		Breera Road, S of Gingin		Unknown	7/08/1970		
WAHERB		Badgingarra National Park, W margin, where Bibby Creek meets road		National Park	14/10/1978		
WAHERB		10.6 km N of Cataby Road House, track off to the W side		Private Property	10/09/1981	Scattered	
WAHERB		Brand Highway, 11.2 km S of Eneabba turnoff		Nature Reserve	29/08/1985	Occasional	
WAHERB		Brand Highway, 17.8 km N of intersection of Brand Highway and Coorow - Greenhead road		Nature Reserve	9/09/1985	Occasional.	
WAHERB		Just W of Brand Highway on Cantabilling Road, 8.4 km N of Badgingarra,		Private Property	14/08/1986	Occasional.	
WAHERB		4 km S along Yerramullah Road, margin of Badgingarra National Park		National Park	15/08/1986		
WAHERB		Brand Highway, W side, 100 m N of intersection with Boothendara road		Private Property	14/08/1991	1 plant	
WAHERB		6.5 km W of Brand Highway along track opposite Marchagee Track – Coomallo NR		Nature Reserve	2/07/1992	Frequent	
WAHERB		Brand Highway at 50 m N of Wongonderrah Road – Badgingarra NP		National Park	5/08/1992	2 plants	
WAHERB		SE corner of intersection of Brand Highway and Waddi Rd, S of Badgingarra		Private property	28/09/1992		
WAHERB		6.5 km S of Eneabba		Shire Road Reserve	31/08/1993		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Edge of firebreak W side of Brand Highway, 500 m N of road into Cooljarloo Mine		Conservation Park	13/09/1993	>5 plants	
WAHERB		2 km E of Catamouri Hill		Other Shire Reserve	18/06/1996	Occasional.	
WAHERB		Cataby		Mining Lease	3/09/1996		Mining
WAHERB		Site 2, Mullering Brook, 750 m WNW of Cooljarloo Well, W of Brand Highway		UCL	26/10/1999		
WAHERB		100 m W from The View driveway, S side of Mullering Road, Minyulo Reserve		Nature Reserve	25/07/2003	20 plants	
WAHERB		18.6 km S of Jurien - Cervantes Road on Brand Highway		Private Property	8/08/2005		
WAHERB, DEC		ca 10 km S of Eneabba		Mining Lease	14/03/2007		Mining
WAHERB		High Hill corner of Badgingarra National Park, on internal firebreak ca 150 m W of corner		National Park	26/07/2008		
WEC		Eneabba	2001 Flora and Vegetation survey	Mining Lease	2001	3	Mining
HELENA HOLDINGS		Cooljarloo South Mine	Harvested area 2004	UCL	22/08/2008	6 plants at 3 locations	Mining

To date, in excess of 2300 individuals have been recorded from nine known populations (DEC 2012a), with 797 of the individuals recorded located on secure tenure. The size of the populations within Badgingarra National Park is unknown and the population notes from the Coomallo Nature Reserve population lists the plants as frequent. An additional five populations recorded occasional and scattered occurrences of *Conostephium magnum*, with population numbers for the remaining locations unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Conostephium magnum* is currently listed as Priority 4 under the DEC threatened species conservation ranking system. Priority 4 taxa are defined as species that are rare, near threatened or in need of monitoring.

*Constephium magnum* has a wide geographic range and populations within multiple conservation areas. It is not under threat and is not likely to become threatened if present circumstances change. The taxon does not meet the criteria for Priority 4 taxa and it is therefore recommended that this taxon be removed from the Priority Flora list.

### 43. *Eucalyptus macrocarpa* subsp. *elachantha* Brooker & Hopper

#### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** A spreading or sprawling mallee growing from 0.8–4 m high, with smooth grey bark over salmon-pink bark. Red to pink flowers are present from August to December.

**Soil preference:** White or grey sand over laterite.

**Distribution:** South West botanical province in the Geraldton sandplain and Swan Coastal Plain regions. This species is endemic to Western Australia (Brooker and Kleinig 2001).

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Moderately susceptible (Paap *et al.* 2010)

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

#### POPULATION AND DISTRIBUTION

Examination of the WA Herbarium database (2012a) and DEC Threatened and Priority Flora database records (DEC 2012b) show *Eucalyptus macrocarpa* subsp. *elachantha* has a known distribution from Dongara to south-east of Cataby, a range of approximately 200 km.

This species is known from 27 records within the DEC Threatened and Priority Flora database (DEC 2012b), 48 records within the WA Herbarium database (2012a), 208 additional records from the Tronox/Iluka database and 135 additional records from Woodman Environmental Consulting. These records currently represent a total of 54 populations (Table 43). In cases where multiple locations were recorded from one project specific survey area, records have been grouped as one population, as the current level of survey does not indicate whether the recorded locations are spatially distinct populations; i.e. no plants present in the vegetation between each location.

Locations of individual populations indicate the known distribution of *Eucalyptus macrocarpa* subsp. *elachantha* is generally scattered throughout its range, including 21 populations recorded between Regans Ford and Cataby; and 11 between Green Head and Badgingarra. The remaining populations are distributed in Three Springs, Eneabba and Dongara.

**Table 43: Known Populations and Distribution Range of *Eucalyptus macrocarpa* subsp. *elachantha***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Erindoon Rd, Eneabba Sth Rd 12km N of junction with Coorow - Greenhead Rd.		Shire Road Reserve	24/01/1979	Occasional	
DEC WAHERB	2	5.5km SW of Mt Adams, 31km SE of Dongara		Vacant Crown Land	15/11/1979	1 plant	
DEC, WAHERB	3	Burma Rd at 17.3km NW of the junction with Heaton Rd.		Road verge	9/09/1980		Road maintenance
DEC, WAHERB	4	N verge of Kangaroo Rd at 12.2km E the junction with N Rd (Wilton Well RD)		Shire Road Reserve	10/09/1980	1 plant	Road maintenance
DEC, WAHERB	5	Brand Hwy, 3km SE of Cataby (or 2km N of the junction with Mimegarra Rd)		MRD Road Reserve	5/12/1982		Road maintenance
DEC, WAHERB	6	Brand Hwy at 3.8km SE of the junction with Mimegarra Rd		MRD Road Reserve	5/06/1984		Road maintenance
DEC, WAHERB	7A	Brand Hwy at 3km S of the junction with Mimegarra and Yandin Rd		MRD Road Reserve	5/06/1984		Road maintenance
DEC	7B	Brand Hwy at 3.5km SSE of the junction with Mimegarra and Yandin Rd		MRD Road Reserve	29/11/1996	15 plants	Roadworks
DEC, WAHERB	8	Intersection of Mimegarra Rd, Yandin Rd and Brand Hwy. 5km SE of Cataby		MRD Road Reserve	5/06/1984	33 plants	Road maintenance
DEC, WAHERB	9	Mt Adams Rd, S of the junction with Yandanooka West Rd		Shire Road Reserve	4/02/1985		Road maintenance
DEC, WAHERB	10	North West Rd (Moora Badgingarra Rd), SE Badgingarra		Shire Road Reserve	10/06/1986		Road maintenance
DEC, WAHERB	11	4.3km W of Brand Hwy along the N-S track. NW of Warradarge Hill.		Private Property	7/08/1988		
DEC, WAHERB	12	Lovegrove Rd, W of the junction with Sundalara Rd		Private property	23/11/1989	20 plants	
DEC, WAHERB	13	15.1km SSE of Mt Adams Rd along the natural gas pipeline track.		UCL	1/09/1993	Occasional	
DEC	14	Cooljarloo. 7km N of Cooljarloo Rd ca 3.5km W of Brand Hwy.		UCL	2/04/1996	1	Mining
DEC	15	S verge Allanooka Springs Rd East 9km E of junction with Burma Rd		Shire Road Reserve	18/05/1994	4 plants	Road maintenance
DEC, WAHERB	16A	Verge of Wongonderah Rd at 4.8km W of the junction with Brand Hwy		MRD Road Reserve	27/11/1996	25 plants	Grazing
DEC	16B	Verge of Wongonderah Rd at 4.8km W of the junction with Brand Hwy		Private property	27/11/1996	Occasional	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	17	Verge of Cooljarloo Rd, at 2.9km W from the junction with Brand Hwy		Shire Road Reserve	4/02/2004	1	Mining, road maintenance
DEC		Proposed Rsv, approx 3.75km NE of junction of Mt Adams RD and Tonkins Rd		UCL	30/09/1998	6 plants	
DEC		East end Mimegarra Rd, near Brand Hwy, sth Cataby		Road Reserve	16/01/2000	29 plants	Road maintenance
DEC		Cnr of Brand Hwy, Mimegarra Rd and Yandan Rd, S of Cataby		MRD Road Reserve	20/11/2000	~30 plants	
DEC		North West Rd 3.3km SE of Badgingarra Rd turnoff towards Dandaragan, S side of Rd		MRD Road Reserve	24/09/2003	1	Road maintenance, weeds
DEC		Private Property on 1st Nth Rd, 5km from Eneabba - Three Springs Rd		Private property	11/10/2003	25 plants	
DEC		Approx 20km SE Dongara, NW of Yardanogo NR		Private property	15/11/2006		Mining, grazing
DEC, WAHERB, WEC		Eneabba, south of townsite	Various	Mining Lease	2001-2007	76 plants at 10 locations	Mining
DEC		Westnet Gas pipeline Loop 7 Stage 5B expansion between Correy Rd and Midlands Rd approx. 21 km E of Dongara.		Mining Lease	24/06/2009	2 plants at 1 location	Mining
DEC		VCL near junction of Natta and Tomkins Rd, approx. 40km SE of Dongara		UCL	28/09/2011	20 plants	
DEC		Approx. 40 km SE of Dongara		UCL	18/11/2011 - 6/12/2011	>100 plants at 2 locations	
WAHERB		Upper reaches of the Hill River		Private Property	24/08/1948		
WAHERB		7 miles NNE of Badgingarra		Private Property	18/10/1966	Uncommon	
WAHERB		New Geraldton Rd, 7 miles N of the Watheroo - Jurien Bay crossroad		Private Property	2/09/1966		
WAHERB		4 miles SW of Mount Lesueur		Private Property	23/07/1969		
WAHERB		48 miles (77.2 km) NNW of Gingin		Private Property	2/09/1970	Uncommon	
WAHERB		22 km SSW of Eneabba, 23 km ENE of Green Head		Lease – Type 3	13/11/1979	33 plants at 2 locations	
WAHERB		30 km SSW of Mingenew, 14 km SE of Mount Adams		UCL	10/09/1980	105 plants	
WAHERB		30 km E of Eneabba		Private Property	/08/1982		
WAHERB		16 km SW of Dandaragan, 5 km SE of Cataby		Private Property	11/08/1983		
WAHERB		3.8 km S of Jurien Bay turnoff on Brand Highway, 63 km N of Cataby Creek		Road Reserve	5/06/1984		Road maintenance
WAHERB		Tootbardi Road, 9.8 km from T-junction with Brand Highway, 40 km SSE of Eneabba		Private Property	20/05/1986	Scattered	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		4.5 km S of Cataby		Road Reserve	27/11/1996	Occasional	
WAHERB		75.5 km N of Gingin on Brand Highway, Irwin		Road Reserve	14/09/1997	Common	
WAHERB		Avon District. 200 m N of Yandin Lookout turnoff on Brand Highway		Private Property	6/10/1997	Small, isolated population	
WAHERB		W side Mitchell Road, 28 km SSE of Mingenew,		Private Property	7/11/1998	Locally common	
WAHERB		N of Iluka Resources, Eneabba		UCL	23/03/2000		
WAHERB		3.5 km E along North West Road from Winjardie Road [SE of Badgingarra]		Private Property	21/11/2000		
WAHERB		Regans Ford. 120 km N Perth, corner of Yandin Lookout Road and Brand Highway		Private Property	1/10/2002		
WAHERB		Private Property on First North Rd, approx. 5km from Eneabba-Three Springs Rd.		Private Property	16/11/2002		
WAHERB		2.35 km W on Cooljarloo Road from Brand Highway, 10 m S of road, Cataby		Road Reserve	13/08/2003	1	
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	7/11/2006	2 plants	
MATTISKE		South-east of Cataby		Private Property	2002	21 plants at 2 locations	
TRONOX		Cooljarloo – Moora region		Road Reserve	2002	401 plants at 13 locations	Road maintenance
TRONOX		Badgingarra National Park		National Park	2002	7 plants	
TRONOX		Mullering Road, 1.4km east of Brand Highway		C-Class reserve 27216	2002	129	
WESTERN BOTANICAL		Allied Tails Rehabilitation	Rehabilitation monitoring	Rehabilitation	2008	253 plants at 190 locations	
WEC		Tronox Management Pty Ltd Mining Lease, Dongara	Tronox Dongara Mapping	UCL	2007	1	Mining
WEC		Approx. 0-4 km south of Eneabba	Eneabba DRF/PLF Searching 2008	Nature Reserve	2008	50	Mining
WEC		North-east of Eneabba	Western Power Eneabba - Moonyoonooka	Private property	Jul and Sept 2008	1	
WEC		South Eneabba	Iluka Mulch Impact Study	UCL	2009	2	Mining

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WEC		20-25 km SSE of Mingenew.	Yandanooka Borefields	Road Reserve	2010	3	Road maintenance, Weeds
WEC		South Eneabba	Iluka Gridding	UCL and private property	1/11/2011 – 4/11/2011	68	Mining

Land tenure for populations of *Eucalyptus macrocarpa* subsp. *elachantha* is predominantly unsecured with 38 of the 54 populations located on road verge and private property. There are nine populations located on crown lands, one on unspecified lease hold, two on mining lease and one within a mining rehabilitation area. Four populations are located on conservation estate within Fynes Nature Reserve, Badgingarra National Park, Reserve 27216 and Eneabba South Nature Reserve. However, the population within Eneabba South Nature Reserve is within the Iluka Resources mining tenement and is under threat from clearing.

Up to 2012, approximately 1288 individuals have been recorded from 19 populations, with an additional ten locations recording common, locally common, uncommon, occasional and scattered occurrences of *Eucalyptus macrocarpa* subsp. *elachantha*. The numbers of individuals in the remaining populations are unknown.

## SUMMARY AND RECOMMENDATIONS

*Eucalyptus macrocarpa* subsp. *elachantha* is currently listed as Priority 4 under the DEC threatened species conservation ranking system (DEC 2012c).

Although *Eucalyptus macrocarpa* subsp. *elachantha* appears to have a number of known populations of which some are not currently under threat, the size of individual populations is generally small or unknown. In addition, the land tenure of most populations is largely unsecured, and the populations recorded at Iluka Resources Eneabba may no longer exist as this is an active mine site. Based on these factors it is recommended that this species remain as a Priority 4.

#### 44. *Grevillea saccata* Benth.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Diffuse scrambling or trailing shrub growing from 0.25-0.5 m high and 1-2 m wide. Flowers are red and are present in April or June to November.

**Soil preference:** Yellow or brown sand, often with lateritic gravel.

**Distribution:** South West botanical province in the Geraldton Sandplains and Swan Coastal Plain regions. This species is endemic to Western Australia.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Susceptible (Groves *et.al*, 2013)

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), *Grevillea saccata* has a typical distribution between Jurien Bay, Boonanarring and Watheroo, a range of approximately 150 km. Populations are found to be scattered throughout this range, however there is also a single recorded occurrence of *Grevillea saccata* in Bannister, south of Perth.

This species is known from 53 records within the DEC Threatened flora database and 60 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 37 distinct populations (Table 44).

Records of individual populations indicate *Grevillea saccata* is well-represented on lands managed for conservation, with eight populations (or part thereof) located in Nature Reserve or other conservation reserves, as well as one in state forest. Fifteen populations are situated on road verges throughout the known range of this species, and are thus not considered on secure tenure. A further fourteen are also considered unsecured as they are found upon privately owned property, and the remaining populations are situated on gravel extraction reserve, camping ground or mining tenement.

**Table 44: Known Populations and Distribution Range of *Grevillea saccata***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	N side of Boothendarra Rd, just E of McKays Rd, Boothendarra.		Shire Road Reserve	13/08/1991		
DEC, WAHERB	2	Watheroo Road 3.6 km E of junction with McKays Road		Shire Road Reserve	29/04/1992		
DEC	3	E of Brand Hwy, 0.45km S of intersection with Watheroo Rd, N of Badgingarra.		Main Roads Road Reserve	15/08/1991		
DEC	4	S of Watheroo Rd, 550m E of Dewar's Rd, Boothendarra.		Shire Road Reserve	13/08/1991		
DEC, WAHERB	5A	Boonanarring Nature Reserve		Conservation of Flora & Fauna	17/09/1986		
DEC, WAHERB	5B	Boonanarring Nature Reserve, 100m N of NW corner of private property.		Conservation of Flora & Fauna	25/11/2002		
DEC, WAHERB	5C	Boonanarring Nature Reserve		Conservation of Flora & Fauna	28/07/1992		
DEC, WAHERB	5D	Boonanarring Nature Reserve		Conservation of Flora & Fauna	2/07/1992		
DEC, WAHERB	5E	Boonanarring Nature Reserve		Private Property	12/08/1989		
DEC, WAHERB	5F	Boonanarring Nature Reserve		Conservation of Flora & Fauna	28/07/1987		
DEC, WAHERB	5G	Boonanarring Nature Reserve		Conservation of Flora & Fauna	8/07/1992		
DEC, WAHERB	5H	Boonanarring Nature Reserve		Conservation of Flora & Fauna	8/07/1992	5 plants at 1 location	
DEC, WAHERB	5I	Boonanarring Brook (proposed N.R.) 8 km S of Wannamal W Road on western fenceline,		Conservation of Flora & Fauna	13/08/1986	Occasional	
DEC, WAHERB	5J	Boonanarring Nature Reserve		Conservation of Flora & Fauna	2/07/1992		
DEC	5K	Boonanarring Nature Reserve		Nature Reserve	30/06/1993		
DEC, WAHERB	5L	Boonanarring Nature Reserve		Nature Reserve	15/07/1993	24 plants at 1 location	
DEC, WAHERB	5M	Boonanarring Nature Reserve		Nature Reserve	16/07/1993	47 plants at 1 location	
DEC	6	W of Badgingarra Rd, 1.85km N of Waddi Rd, approx.. 21 km SE of Badgingarra.		Shire Road Reserve	13/08/1991		
DEC	7	Just off Walyering Rd, approx. 7.8 km directly East of the corner of Brand Hwy and Mullering Rd.		Conservation of Flora & Fauna	13/08/1991		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	8	Brand Hwy, approximately 3.15 km SE of the junction with Marchagee Track, Hill River.		Main Roads Road Reserve	14/08/1991		
DEC	9	320 m NE of Brand Hwy, approx.. 6.5 km N along Brand Hwy from Cataby.		Camping Ground	30/07/1991		
DEC	10A	West side of Brand Hwy, 0.7 km NW of Boothendarra Rd, Hill River.		Main Roads Road Reserve	14/08/1991		
DEC	10B	Along Brand Hwy on E side, 160 m N of new Boothendarra Rd entrance.		Main Roads Road Reserve	6/10/1991		
DEC	11	Badgingarra Rd, approximately 4.6 km S of the intersection with North West Rd, Badgingarra.		Shire Road Reserve	13/08/1991		
DEC, WAHERB	12	Roadverge W side of Brand Highway, S side of Mullering Brook, between brook and farm track		Main Roads Road Reserve	1/08/1991	5 plants at 1 location	
DEC	13	Watheroo National Park, 5.6 km from Marchagee Track, in Western central section of the park.		Nature Reserve	30/07/1991		
DEC	14A	E of Brand Hwy, 0.85km N of intersection with Cowalla Rd, N of Badgingarra.		Main Roads Road Reserve	15/08/1991		
DEC	14B	~180 m E of Brand Hwy, 0.85km N of intersection with Cowalla Rd, N of Badgingarra.		Conservation of Flora & Fauna	15/08/1991		
DEC	15	Just South of the boundary of Badgingarra Ag Research station scientific reserve.		Shire Road Reserve	6/08/1991		
DEC	16	W of Koonah Rd, approx. 2.5km W from Badgingarra Rd, 17 km SE of Badgingarra.		Private Property	18/08/1991		
DEC	17	Approximately 9.72 km NE of Cooljarloo and 1.38 km W of Brand Hwy.		UCL, Mining Lease	15/08/1991		
DEC	18	NE of Brand Hwy, 0.7 km SE of the junction with Marchagee Track, Hill River.		Main Roads Road Reserve	14/08/1991		
DEC	19	W side of Brand Hwy, 13.7 km N of Badgingara.		Main Roads Road Reserve	8/08/1990		
DEC, WAHERB	20	Minyulo Road, verges 8.7 km N of Moora-Caro Road & 460 m W of Minyulo Brook crossing at Minyulo Reserve, for 120 m E, on N & S road verges		Shire Road Reserve	27/08/1992	20+ plants at 1 location	
DEC	21A	Approximately 9.90 km NE of Cooljarloo and 1.10 km W of Brand Hwy.		Conservation Park	14/09/1993		
DEC	21B	Approximately 9.90 km NE of Cooljarloo and 1.10 km W of Brand Hwy.		Conservation Park	14/09/1993		
DEC	21C	Approximately 9.44 km NE of Cooljarloo and 2.04 km W of Brand Hwy.		UCL	15/09/1993		
DEC	21D	Approximately 10.27 km NE of Cooljarloo and 1 km W of Brand Hwy.		Conservation Park	16/09/1993		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	21E	Approximately 9.64 km NE of Cooljarloo and 1.42 km W of Brand Hwy.		UCL	14/09/1993		
DEC	21F	Approximately 9.98 km NE of Cooljarloo and 1.39 km W of Brand Hwy.		UCL	14/09/1993		
DEC	21G	Approximately 10.39 km NE of Cooljarloo and 0.80 km W of Brand Hwy.		Gravel Pit	16/09/1993		Gravel extraction
DEC	22	Approximately 9.38 km NE of Cooljarloo, 6.7 km W of Wongonderrah rd and 2.89 km W of Brand Hwy.		Conservation Park	15/09/1993		
DEC	23			Shire Road Reserve	19/08/1993		Road maintenance
DEC, WAHERB	24	2.7 km S of Hill River		Private Property	12/10/1979		
DEC, WAHERB	25	AMG 50JLM825225 Lake Dalaroo 1;50,000 sheet) farm N of North West Road, W of Moora		Private Property	13/09/1988	Uncommon	
DEC, WAHERB	26	Boonanarring Hills VCL, 500 metres N of NW corner of Loc 3869.		Conservation of Flora & Fauna	2/07/1990	8 plants at 1 location	
DEC	27	In state forest, 2 km S of North Bannister - Wandering Rd, 5 km from Albany Hwy junction, North Bannister.		State Forest	11/06/1993	84 plants at 1 location	
DEC, WAHERB		Road verge at 5.8km on Boundary Rd from intersection with Koojan West Rd. Hilltop.		Private Property	29/11/1999	1 plant	Road maintenance
DEC, WAHERB		Boonanarring Nature Reserve, Boonanarring Rd, 4.2km E of Brand Highway then 4.05km N, then trek 1km E to eastern edge of large heathland.		Nature Reserve	23/07/2001	630+ plants	
DEC, WAHERB		Boonanarring Nature Reserve, Boonanarring Rd, 4.2km E of Brand Highway.		Nature Reserve	20/08/2001	100+ plants	
DEC		500m N of the present Boothendarra Rd and Brand Highway intersection.		Other Crown Reserve	10/10/2003		Road expansion.
DEC, WAHERB		15km N of Gingin in the Boonanarring Nature Reserve near W Boundary, approx 5km S of Wannamal West Rd, located on S facing steep slope of large hill near track.		Nature Reserve	29/11/2011	4 plants	Frequent fire
WAHERB		Mingaden Plains, near Dandaragan		Private Property	11/09/1932		
WAHERB		Jurien Bay road [Near Jurien]		Private Property	29/08/1938		
WAHERB		Between Dandaragan and Jurien Bay		Private Property	29/06/1938		
WAHERB		Dandaragan (9 miles N from)		Private Property	23/08/1948		
WAHERB		Hill River		Private Property	24/08/1948		
WAHERB		9 miles N from Dandaragan		Private Property	23/08/1948		
WAHERB		Hill River		Private Property	14/09/1960		
WAHERB		3 miles N of Badgingarra		Private Property	19/06/1961		
WAHERB		Prope [near] Dandaragan		Private Property	17/07/1962		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		8 miles W of Moora		Private Property	01/09/1965		
WAHERB		16 km S of Badgingarra, which is ca 175 km N of Perth		Private Property	02/11/1965		
WAHERB		New Geraldton road, 2 miles N of the Watheroo - Jurien Bay crossroad		Private Property	02/09/1966		
WAHERB		Jurien Bay		Marine Park	/09/1966		
WAHERB		1 mile W of Dinner Hill		Private Property	26/08/1969		
WAHERB		Badgingarra		Other Shire Reserve	17/09/1969		
WAHERB		Badgingarra, which is ca 130 km S of Mingenew		Private Property	17/09/1969		
WAHERB		1 mile W of Dinner Hill		Private Property	26/08/1969		
WAHERB		Near Coomaloo Creek		Private Property	03/08 1976		
WAHERB		18 km from Dandaragan on road to Badgingarra		Private Property	10/06/1976		
WAHERB		136 - 137 mile peg Badgingarra [ca 14 km N of Badgingarra on Brand Highway]		Private Property	15/08/1976		
WAHERB		18 km from Dandaragan on road to Badgingarra		Private Property	10/06/1976		
WAHERB		8 km N of Cataby		Private Property	25/08/1979		
WAHERB		9 km NNE of Badgingarra, 0.3 km E of McKay Road on Boothendarra Road		Private Property	16/09/1982	5 plants at 1 location	
WAHERB		10 km N of Mungedar turnoff on Badgingarra Road [Ca 5 km S of Badgingarra]		Private Property	31/08/1984	Common	
WAHERB		Boonanarring Nature Reserve, N of Gingin.		Nature Reserve	18/09/1986		
WAHERB		AMG 50JLM80044 (Lake Dalaroo 1:50,000 Sheet), Jam Hills Res (25254) W of Moora		Private Property	27/06/1988		
WAHERB		7.6 km south of Jurien Bay turnoff on Brand Highway, 500 m N of Boothendarra Road		Private Property	22/09/1988	5 plants at 1 location	
WAHERB		Jam Hill Reserve Gazetted Reserve No. 25251, 1.8 km SW along Lupin Valley Rd and 300 m W of track to Lupin Valley Farm		Nature Reserve	01/08/1991	11 plants at 1 location	
WAHERB		400 m E of junction of McKays Road, with Boothendarra road, N verge		Private Property	27/08/1991		
WAHERB		Boonanarring Nature Reserve 41805, 530 m N along Rserve W bdy fireline from NW corner Loc. 3869, 4.6 km E on fireline both side of track		Nature Reserve	26/06/1992	76 plants at 1 location	
WAHERB		100 m N from NW corner of Loc 4372 to SW corner, Boonanarring Nature Reserve No 41805		Nature Reserve	24/07/1992	1800 plants at 1 location	
WAHERB		350 m NE along track running from SEC powerline track at 3.8 km N from road to Mine from Brand Hwy		Private Property	15/09/1993	1 plant at 1 location	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		NW side of track at 390 m NE of intsec. with E-W running track at 400 m E of itsec. with SEC powerline track 2.3 km N of rd to mine from Brand H		UCL	15/09/1993	4 plants at 1 location	
WAHERB		W of Population no. 4, see mud map, at E end of track, marked with tape		UCL	15/09/1993	16 plants at 1 location	
WAHERB		W side of track, 250 m S of intsect. with E-W running track, 800 m W of Brand Hwy & 1.6 km N of road from Brand Hwy to mine		Private Property	16/09/1993	2 plants at 1 location	
WAHERB		C. 2.5 km N of road west to mine from Brand Highway & c. 1.4 km west of Brand Hwy		UCL	14/09/1993	4 plants at 1 location	
WAHERB		Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve		Nature Reserve	13/09/1993		
WAHERB		Ca 12 km E on Marchagee Track off Brand Highway, between McKays Road and Brand Highway		Private Property	08/08/1996	1 plant at 1 location	
WAHERB		1 km W Winjardie Road and Watheroo West Road intersection		Other Shire Reserve	06/08/1996	10+ plants at 1 location	
WAHERB		700 m E of Winjardie Road on Watheroo Road, W of Watheroo		Shire Road Reserve	06/11/2007		

To date, a total of over 3,880 individual plants have been counted from eleven populations of *Grevillea saccata*. A number of large populations have been recorded within Boonanarring Nature Reserve, with three populations each containing over 600 individual plants. The majority of records for this species show smaller numbers of plants present at each location, typically between 1 and 50 individuals, and three records note abundance as being Uncommon, Occasional and Common.

## **SUMMARY AND RECOMMENDATIONS**

*Grevillea saccata* is currently listed as Priority 4 under the DEC threatened species conservation ranking system. This ranking is assigned to flora considered either rare, near threatened or otherwise in need of monitoring. This taxon was removed from the Declared Rare Flora list in 1994.

This species has been adequately surveyed, with a particularly large number of recorded observations made between 1984 and 1993. *Grevillea saccata* has many populations, some of large size, and is well-represented on secure tenure within Boonanarring Nature Reserve and Watheroo National Park. It has a reasonable geographic range, with significant areas of suitable habitat remaining. For these reasons it is recommended that this species be removed from the Priority Flora List.

## 45. *Ornduffia submersa* (Aston) Tippery & Les

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Tuberos, perennial, emergent aquatic herb. Height to 1 m, leaves and flowers float on water surface. Flowers white, occurring August to November.

**Soil preference:** Aquatic systems over clay or sandy clay soils. Seasonally inundated claypans.

**Distribution:** South – West botanical province in the Avon Wheatbelt, Esperance Plains, Jarrah Forest, Swan Coastal Plain and Warren regions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based on examination of records contained in the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) and hardcopy records (DEC 2012a), *Ornduffia submersa* has a known geographic distribution from Lake Wannamal to Albany, and as far inland as York, a range of approximately 480 km.

This species is known from 37 records within the DEC Threatened flora database and 48 records within the W.A. Herbarium database (DEC 2012a). These records currently represent an estimated total of 50 distinct populations (Table 45).

Locations of individual records indicate that *Ornduffia submersa* is generally found in seasonal and permanent water systems scattered throughout its range. This species is well-represented on secure tenure, with 23 populations recorded as on lands managed for conservation. These include populations within Fish Road Nature Reserve, Mundaring State Forest, Wandoo Conservation Reserve, Stirling Range National Park, Austin Bay Nature Reserve, Bokerup Swamp, Pardelup Nature Reserve, Kulunilup Nature Reserve, Carrabungup Nature Reserve, Lake Muir Nature Reserve and Wamballup Nature Reserve. Twelve populations are known from private property, eight from road verges and drains, one on State Housing Commission land, one in railway reserve, one on Ministry land, one at Perth Airport and a further two occur on shire recreation reserves.

**Table 45: Known Populations and Distribution Range of *Ornduffia submersa***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	50 m NW off Anstey Rd verge, 300 m NE of Keane Rd, Forrestdale.		Private Property	27/09/1989		
DEC, WAHERB	2	Sullivan Block, "Browns Swamp", Mundaring State Forest [Near Darkin Swamp]		State Forest	12/09/1988	Abundant	
DEC	3	Former Eaton Water Treatment Plant, Australind Bypass, Picton.		Minister for Water & Resources	15/02/1985		
DEC, WAHERB	4	On Muirs Highway, 65 km E of Manjimup		Private Property, Pastoral Lease	25/09/1984	Common	
DEC, WAHERB	5	Intersection Youngs Siding Road and South Coast Highway, 36 km W of Albany		Main Roads Road Verge	1/10/1984	Abundant	Road maintenance
DEC, WAHERB	6	Fish Road Nature Reserve, 13 km SSE of Busselton		Conservation of Flora & Fauna, Drain	27/08/1985	Very Common	
DEC	7	Off Cookworthy Rd, Abbey, SW of Busselton.		Private Property	15/06/1985		
DEC	8	Roe Hwy, near Brixton St overpass, Beckenham.		State Housing Commission	11/10/1990		
DEC	9	Wandoo conservation Reserve, Talbot.		State Forest	30/09/1989		Now Conservation Reserve
DEC, WAHERB	10A	37 km W of Albany on South Western Highway		Main Roads Road Verge	10/09/1987	Common	Road maintenance
DEC, WAHERB	10B	37 km W of Albany on South Western Highway		Private Property	10/09/1987	Common	
DEC, WAHERB	11A	N end of block bounded by Brixton Street, Wanaping Road and Park road, Kenwick		Private Property	12/09/1990	Frequent	Cleared for residential estate since 1990
DEC	11B	N end of block bounded by Brixton Street, Wanaping Road and Park road, Kenwick		Private Property	11/10/1990		Cleared for residential estate since 1990
DEC	13	Forrestdale Lake Reserve, Forrestdale.		Shire Recreation Reserve	5/11/1990	6 plants	
DEC, WAHERB	14	SW boundary, Stirling Range, Young River, c. 2 km E Red Gum Pass road		National Park	25/10/1991	Uncommon	
DEC, WAHERB	15	10 km S of Boyup Brook		Main Roads Road Verge	5/11/1991	Common	Road maintenance

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	16	2 km N of Waroona		Drain	9/09/1992	Very Common	
DEC, WAHERB	17	"Aboriginal Bindjareb Park" - is located 100 m S along fenceline from the NW corner of this property and then 125 m at 135 degrees down scrub - rolled access fireline to population on the S side		Private Property	10/11/1993	10 plants	
DEC, WAHERB	18	Bokerup swamp, on Wingebellup road E of Manjimup		Conservation Commission, Waterbody	26/11/1993	50+ plants	
DEC, WAHERB	19	Lane Pool Conservation Reserve, Palmer		Recreation Reserve	9/09/1994	3000+ plants	
DEC	20	Austin Bay Nature Reserve, South Yunderup.		Nature Reserve	15/10/1992		
DEC	21	Austin Bay Nature Reserve, South Yunderup.		Nature Reserve	15/10/1992		
DEC	22A	Railway Rd verge, 1 km SW of junction with Boyanup West Rd, Boyanup.		Shire Road Verge	30/08/1988		Road maintenance
DEC	22B	Railway reserve, 1 km SW of junction with Boyanup West Rd, Boyanup.		Railway Reserve	30/08/1988		
DEC	23	Mundaring State Forest, Talbot.		Conservation Commission	20/09/1995		
DEC	24A	2.3 km S of Boyup Brook Rd, 12 SW of Moodiarrup.		Conservation of Flora & Fauna	3/10/1997		
DEC	24B	2.3 km S of Boyup Brook Rd, 12 SW of Moodiarrup		Private Property	3/10/1997		
DEC, WAHERB	25	West of Bussell Hwy, Ludlow.		National Park	15/09/1994		
DEC		PP adjoining Lake Wannamal NR 9838 Proposed Nature Reserve, 250m SSW along W firebreak of Block 5, site 52.		Private Property	9/11/1999	2 clumps	Firebreaks, Drought, Salinity
DEC, WAHERB		Fishermans Rd, 1.2km E of intersection with Bussell Hwy.		Shire Road Reserve	28/09/2000	20 plants	Increased Nutrient levels.
DEC		Pardelup Nature Reserve, NE corner adjacent to old pine plantation in Melaleuca soak. S side of road.		Nature Reserve	15/10/2004	1000 plants	Inappropriate fire regime.
DEC, WAHERB		Austin Bay between Yunderup townsite and Austin Bay Nature Reserve (between Mandurah and Pinjarra).		Private Property	10/11/2006	1 plant	Weeds, salinity.
DEC		Church property South of Wambullup Nature Reserve.		Private Property	22/07/2008	>20 plants	Salinity
DEC		Sheepwash forest block, entry off the Denmark/Mt Barker Rd, and is approx 2.3km N of the Blue Lake Rd turn-off. Follow fenceline S for approx 1km to old bridge, cross bridge and head 200m along track. Plants are about 50m from track on E side.		National Park	27/08/2009	57 plants	Disturbance from vehicles and firewood collection.

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		Approx 20 km W of Mt Barker. Melaleuca swamp in Pardelup Block north of Simpson Rd.		State Forest	3/10/2011	2000+ plants	Livestock, drought.
DEC		Pardelup State Forest approx 200m W of the SE corner of PP518 along Boundary Rd.		State Forest	4/10/2011		Grazing, Weeds, Drought.
DEC		Randell Rd Reserve. Old track in SE corner		Nature Reserve	21/09/2011	1 plant	Disturbance, Drought, Small population size.
WAHERB		Austin Bay Nature Reserve, Mandurah		Nature Reserve			
WAHERB		Boyanup		Private Property	09/09/1951		
WAHERB		Boyanup		Private Property	16/09/1953		
WAHERB		Boyanup		Private Property	16/09/1953		
WAHERB		Yoongarillup, S of Busselton		Private Property	14/09/1955		
WAHERB		Near Busselton		Private Property	/09/1962		
WAHERB		Near Busselton		Private Property	/09/1962		
WAHERB		Brixton St., Beckenham, 15 km E of Perth		Easement	17/11/1989	Rare	
WAHERB		Armadale Golf Course, SW corner, c. 80 m S of 7th fairway at point 75-80 m from 7th tee off		Golf Course	05/11/1990		
WAHERB		Brixton street, Kenwick - between Alton street and railway		Nature Reserve	12/09/1990		
WAHERB		N of Anstey road - Kearne road junction, Forrestdale, E side of transmission line		Private Property	25/10/1990		
WAHERB		23 km NW of Mt Barker, Wamballup Nature Reserve, Plot 5166 and also Plot 5167,		Nature Reserve	10/08/1993		
WAHERB		Austin Bay Nature Reserve, seasonal wetland WSW of Grey Road (plot austb-1).		Nature Reserve	09/09/1993		
WAHERB		2.9 km West of Cowerup Road on Muir Highway,		Road Reserve	24/08/1994	150 plants	
WAHERB		Plot 5167, Wamballup Nature Reserve, 400 m N of Wamballup Road, (western end),		Nature Reserve	11/10/1994		
WAHERB		Kangaroo Road, 4.1 km East of Collis Road,		State Forest	14/09/1994	Scattered	
WAHERB		200m East of old bridge on Frankland River, Muir Highway,		Road Reserve	11/10/1994	Common	
WAHERB		Kulunilup Nature Reserve, Wingebellup Road, 700 m E of Unicup Road		Nature Reserve	27/09/1994	2000+ plants	
WAHERB		Sumpland on the NE corner of bushland block. S of Munday Swamp in the grounds of Perth Airport (adjacent to site A). (Bush Forever Site 386)		Airport	24/08/1995		
WAHERB		Carrabungup Nature Reserve, part of Austin Bay Nature Reserve, SW of Pinjarra		Nature Reserve	09/10/1995	Occasional	
WAHERB		Lake Muir Nature Reserve, E boundary		Nature Reserve	24/10/1997		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Kululinup [Kulunilup] Nature Reserve, on E boundary		Nature Reserve	26/10/1997	Very common	
WAHERB		Melaleuca Swamp on N side of Tucker's Road, 16.5 km ESE of Frankland, 1.3 km ESE of intersection of Pooracup Road and Tucker's Road. SAP wetlands site SPS113B		Private Property	13/11/1999		
WAHERB		Small claypan on river flats, 22 km NE of Frankland at Boyacup Bridge, just E of the intersection of Boyacup Rd & Gordon River. SAP wetlands site SPS111A		Private Property	13/11/1999		
WAHERB		On S side of Wandoorra Road, 5 km NW of Boyup Brook Cranbrook Road, Wandoorra Nature Reserve, c. 20 km ENE of Tonebridge [Plot-UN16]		Nature Reserve	20/10/1999		
WAHERB		Sheepwash Forest Block, 25 km NNE of Denmark		National Park	29/09/2000	Locally abundant	
WAHERB		Rocky Gully, 200 m S of Turpin Road,		Private Property	01/11/2000	Locally abundant	
WAHERB		Wamballup Nature Reserve		Nature Reserve	02/08/2002	Locally frequent	
WAHERB		Little Darkin Swamp, Warrigal Road, York		National Park	03/10/2002		
WAHERB		Road reserve N side of South Coast Highway, E of Hay River		Road Reserve	07/11/2003	Uncommon	
WAHERB		St Johns Brook, N of Barrabup Pool, NW Nannup		State Forest	15/11/2003	Common	
WAHERB		Bush Forever Site 342, Swan District		Conservation Reserve	22/09/2004		
WAHERB		6 km N of Mallawillup Road on Poorraracup Road, WNW of Rocky Gully		Road Reserve	26/09/2009		

To date, over 8,300 individual plants have been counted from twelve populations. Other records give qualitative descriptions of abundance, with 14 observations noting prevalence as Common, Abundant or Very Common, and a further five describing abundance as Rare to Uncommon. Prevalence of *Ornduffia submersa* for the remaining populations is unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Ornduffia submersa* is currently listed as a Priority 4 taxon under the DEC threatened species conservation ranking system. This ranking is assigned to flora considered either rare, near threatened or otherwise in need of monitoring.

This species has been adequately surveyed, with a substantial number of recorded observations across the south-west of the state. It has a large number of populations, of which a significant proportion occurs on secure tenure. Healthy populations comprised of several thousand individuals have been located within conservation estate as recently as 2011. In addition to this, the geographic range of *Ornduffia submersa* is broad, and records indicate that this species has persisted throughout its range for over 60 years despite periods of drought and environmental fluctuations. It is therefore recommended that this species be removed from the Priority Flora list.

## 46. *Schoenus natans* (F.Muell.) Benth.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** An aquatic annual with a grass-like or herbaceous (sedge) habit. This species grows to 0.3 m high. Brown flowers are present in October.

**Soil preference:** Seasonal wetlands over clay or sandy clay, winter-wet claypans.

**Distribution:** South – West botanical province in the Avon Wheatbelt, Jarrah Forest, Swan Coastal Plain and Warren regions. Commonly found in winter – wet depressions.

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Not susceptible

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), *Schoenus natans* has a known distribution between Cooljarloo and Lake Muir, and east as far as Talbot (a range of approximately 470 km). Populations are found to be scattered throughout this range, with records from the regions of Cataby, Bindoon, Lake Wannamal, York, Cannington, Waroona, Austin Bay, Collie, Ludlow and Lake Muir.

This species is known from 20 records within the DEC Threatened flora database, 52 records within the W.A. Herbarium database (DEC 2012a), and one additional record from Woodman Environmental Consulting. These records currently represent an estimated total of 41 distinct populations (Table 46).

Records of individual populations indicate *Schoenus natans* is well-represented on lands managed for conservation, with 19 populations (or part thereof) located in Nature Reserve or other conservation reserves, as well as five in state forest. Eleven populations are situated on private property throughout the known range of this species, and are thus not considered on secure tenure. A further five are also considered unsecured, found upon either public utility or storm drains, camping grounds or mining tenement. One additional population is situated on unknown tenure.

**Table 46: Known Populations and Distribution Range of *Schoenus natans***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1A	Off South Western Hwy, 4 km N of Waroona		Railway Reserve	16/09/1992		
DEC	1B	Off South Western Hwy, 4 km N of Waroona		Conservation Park	16/09/1992		
DEC	1C	Off South Western Hwy, 4 km N of Waroona		Main Roads Road Reserve	16/09/1992		
DEC	2A	Pinjarra-Williams Rd, N of Burnside Rd, 1.5km SE of Meelon.		Protection of Flora	15/06/1994		
DEC	2B	Pinjarra-Williams Rd, N of Burnside Rd, 1.5km SE of Meelon.		Railway Reserve	15/10/1993		
DEC, WAHERB	3	Reserve A23172 on Harvey River (plot c58-02)		Camping Ground	2/09/1993	Common	
DEC	4	Austin Bay Nature Reserve, between Mandurah and Pinjarra		Conservation of Flora & Fauna	16/03/1994		
DEC, WAHERB	5	Lake Muckenburra Reserve 25431 (east of Gingin) west of firebreak directly south of lake (adj plot muck02),		Public Utility	27/10/1993	Uncommon	
DEC	7	State forest 11km E of Bindoon		State Forest	15/11/1990		
DEC	8	State forest 15 km SE of Bindoon		State Forest	16/11/1990		
DEC	10	W of Bussell Hwy, 3 km SW of Ludlow.		State Forest	15/12/1994		
DEC, WAHERB		PP adjoining Lake Wannamal NR 9838 Proposed Nature Reserve, 250m SSW along W firebreak of Block 5, site 52. Seasonal lake on the E side of the firebreak.		Private Property	9/11/1999	8000 plants at 1 location	Firebreaks, Drought, Salinity
DEC, WAHERB		PP loc 2858: W 980m along access road from the Bindoon Moora Rd then 80m N to the population which is on the NE corner of wetland, adjoining freshwater dam.		Private Property	5/11/1999	1000+ plants at 1 location	Dam maintenance, salinity.
DEC		PP adjoining Lake Wannamal NR 9838 Proposed NR. Large lake in the centre of block 5.		Private Property	11/11/1999	4000 plants at 1 location	Firebreaks, drought, salinity
DEC		PP adjoining Lake Wannamal NR 9838 Proposed NR. Approx 200m from the SW corner of Block 6 in a NE direction along the powerline track.		Private Property	11/11/1999	1000+ plants at 1 location	Firebreaks, drought, salinity
DEC, WAHERB		PP adjoining Lake Wannamal NR 9838 Proposed NR. Large lake in the E half of Block 7.		Private Property	11/11/1999	15,000+ plants at 1 location	Firebreaks, drought, salinity
DEC, WAHERB		PP adjoining Lake Wannamal NR 9838 Proposed NR. Large lake in the NW corner of Block 9.		Private Property	11/11/1999	10,000+ plants at 1 location	Firebreaks, drought, salinity

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC		Just past the 1km mark heading E from Cooks Rd, there is a track heading S. 200m down that track on the W side in a huge claypan.		Conservation Park	19/10/2005	1000's of plants at 1 location	Recreation (trail bikes)
DEC		Austin Bay between Yunderup townsite and Austin Bay Nature Reserve (between Mandurah and Pinjarra).		Private Property	10/11/2006	>1000 plants at 1 location	Weeds, salinity.
DEC		Dept of Water estate 2.5km E of intersection of Wingabellup Rd and Southfield Rd. 100m S of southern boundary of Chariup Block.		Water Reserve	16/10/2008		Weeds, drought, salinity.
WAHERB		2 km N of Waroona CTCR 53		Private Property	09/09/1992	Abundant	
WAHERB		Drainage reserve 31439 (part of C53) between South West Highway and McNeil road, 1.5 km N of Waroona (plot Ward 03)		Drain	16/09/1992	Common	
WAHERB		Meelon Nature Reserve SE Pinjarra (plot meelon01)		Nature Reserve	02/09/1993	Common	
WAHERB		Austin Bay Nature Reserve, N and SE of track across large wetland SE Grey Rd. (plot austb01)		Nature Reserve	09/09/1993	Very common	
WAHERB		Austin Bay Nature Reserve, N and SE of track across large wetland SE Grey Rd. (plot austb01)		Nature Reserve	29/10/1993	Very common	
WAHERB		Tuart Forest, NW of Ludlow		Private Property	15/09/1994	Abundant	
WAHERB		Dobaderry Swamp, Beverley Shire		National Park	12/10/1995	15,000+ plants at 1 location	
WAHERB		"Browns Swamp", 3.5 km N along Tribune Road from the junction of Catchment Road, Beverley Shire		National Park	12/10/1995	10,000+ plants at 1 location	
WAHERB		Little Darkin Swamp, Wandoo Conservation Park		Conservation Park	16/10/1995	5,000+ plants at 1 location	
WAHERB		Talbot State Forest Block, York Shire		State Forest	16/10/1995	10,000+ plants at 1 location	
WAHERB		Lane Poole Reserve, Collie		Nature Reserve	24/10/1995 - 25/10/1995	9,570+ plants at 3 locations	
WAHERB		Stinkwood Brook Dam, Trees State Forest Block		State Forest	27/10/1995	100+ plants at 1 location	
WAHERB		Bootine Road, 25 km NNW of Gingin,		Unknown	24/11/1996		
WAHERB		Kululinup [Kulunilup] Nature Reserve		Nature Reserve	22/10/1997	2	
WAHERB		Cowerup Nature Reserve, in road and adjacent, on Cowerup Road near western boundary,		Nature Reserve	23/10/1997	Abundant	
WAHERB		Lake Muir Nature Reserve,		Nature Reserve	23/10/1997 - 24/10/1997	5	
WAHERB		Noobijup Nature Reserve, near W boundary, ca 700 m S of Noobijup Road,		Nature Reserve	26/10/1997	Abundant	
WAHERB		Bokerup Nature Reserve,		Nature Reserve	26/10/1997	Abundant	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Kululinup [Kulunilup] Nature Reserve,		Nature Reserve	26/10/1997	6	
WAHERB		Muir Highway, Muir Nature Reserve,		Nature Reserve	27/10/1997	Locally common	
WAHERB		Unicup Nature Reserve,		Nature Reserve	28/10/1997	Locally common	
WAHERB		On edge of wetland in NE corner of junction of Old Plains and Mount Roads, Drummond Nature Reserve, c. 26 km SSW of Calingiri. [Plot - JB18]		Nature Reserve	16/09/1998		
WAHERB		On the N boundary of the reserve, c. 1 km E of Cook Road, Julimar Conservation Park, c. 38 km SW of Calingiri. [Plot - JB20]		Conservation Park	16/09/1999		
WAHERB		Ngopitchup Swamp, 23km SE of Kojonup, 2km SW of intersection of Nookanellup Rd & Ngopitchup Rd, on E side of waterbody. SAP wetlands site SPS102A		Private Property	23/10/1999		
WAHERB		On Central track, Gingilup Swamps Nature Reserve		Nature Reserve	03/12/2002	Abundant	
WAHERB		Carousel Swamp, Cannington, c. 300 m S of railway station		Private Property	04/10/2004	Very Common	
WAHERB		Brixton Street Wetlands		Conservation Reserve	07/10/2004	Rare, 1 plant at 1 location	
WAHERB		Ellenbrook Nature Reserve		Nature Reserve	07/10/2004	Common	
WAHERB		Beaufort River Water Reserve, 200 m N Bridge, Beaufort River, Kojonup to Arthur River		Nature Reserve	09/10/2004	Uncommon	
WAHERB		Site 032B. Seasonal wetland in nature reserve on corner of Old Plains Road and Mount Road, ca 10 km SW of Bolgart		Nature Reserve	06/10/2008		
WAHERB		Swan Location 14036 off Bindoon - Moora Road, ca. 6 km N of junction with Mogumber Road West. Currently UCL, to be added to Wannamal Lakes Nature Reserve (Reserve 9838).		Nature Reserve	20/10/2009	Common	
WAHERB		Site 041A. Dobaderry Swamp, ca 0.2 km N of track, 1.1 km from intersection of track with Dobaderry Road. Track is 3.9 km N of intersection of Dobaderry Road and Dale West Road		Private Property	29/10/2008	2	
WEC		Tronox Cooljarloo mining tenement.	Cooljarloo West Mapping	Mining Lease	7/11/2008	1	Mining

To date, a total of over 90,670 individual plants have been counted from 14 populations of *Schoenus natans*. A number of large populations have been recorded, with three populations each containing over 5,000 individual plants being found within conservation managed lands in Wandoo Conservation Park, Talbot State Forest and Lane Pool Reserve. Abundance for a further twelve populations is noted as being Locally Common to Abundant, whilst three gave prevalence of *Schoenus natans* as Rare or Uncommon. For the remaining populations, the number of individual plants is unknown.

## **SUMMARY AND RECOMMENDATIONS**

*Schoenus natans* is currently listed as a Priority 4 taxon under the DEC threatened species conservation ranking system. This ranking is assigned to flora considered either rare, near threatened or otherwise in need of monitoring.

*Schoenus natans* has a broad geographic range and has been adequately surveyed. There are a substantial number of known populations, many of which are of large size. A significant portion of the known populations are situated within secure tenure on lands managed for conservation. This taxon does not appear to be under threat or rare and it is recommended that it be removed from the Priority Flora List.

## 47. *Thysanotus glaucus* Endl.

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Caespitose, glaucescent, perennial, herb growing from 0.1-0.2 m high with purple flowers present from October-March.

**Soil preference:** White, grey or yellow sand and sandy gravel

**Distribution:** South West botanical province in the Esperance Plains, Geraldton Sandplains, Jarrah Forest, Mallee and Swan Coastal Plain regions

**Response to fire/ disturbance:** Unknown

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a) show *Thysanotus glaucus* has a known distribution from Dongara to Augusta and as far east as Ravensthorpe, a range of approximately 620km.

This species is known from 12 records within the DEC Threatened flora database, 21 records within the W.A. Herbarium database (DEC 2012a) and five additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 24 populations (Table 47).

Locations of individual populations indicate the known distribution of *Thysanotus glaucus* is extremely fragmented throughout its range, with two populations recorded at Ravensthorpe and Lake King; then no further recordings until just north of Augusta (one population) and then the larger Busselton area (six populations). The closest population to these is not until Perth, where only one location was recorded. From Perth to Dongara population recordings are scattered at Regans Ford (two), Red Gully (one), Cooljarloo - Dandaragan (three), Cervantes (one), Jurien Bay-Green Head (four), Eneabba (one) and Dongara (one).

**Table 47: Known populations and distribution range of *Thysanotus glaucus***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC	1	Coomallo Nature Reserve, Jurien Rd, W of Nylagarda Road		Nature Reserve	20/10/1970		
DEC	2	Brand Hwy, South Yandin Rd		Main Roads Reserve	24/11/1971		Road maintenance
DEC	3	Dandaragan Rd, to the east of Yatheroo Brook		Shire Road Reserve	18/11/1973		Road maintenance
DEC, WAHERB	4	24km E of Lake King along Lake King Norseman Rd		Shire Road Reserve	21/10/1975	Common	Road maintenance
DEC, WAHERB	5	Lesueur National Park. 20 m n of Mount Peron trigg. NE of Jurien.		National Park	17/10/1984		
DEC, WAHERB	6	Rubbish depot on Walsall Rd, 1km W of junction with Jalbarragup Rd		Shire Waste Depot	13/01/1986	Common	
DEC, WAHERB	7	Munbinea Rd, Nambung. 200m S of Bibby Creek Crossing		UCL	26/11/1988		
DEC, WAHERB	8	Yardanogo Nature Reserve, Mount Adams Road		Nature Reserve	12/10/1989		
DEC, WAHERB	9	SW Corner of Yelverton Forest Block, Blythe Rd, 1.7km S of junction with Yelverton Rd		Forestry reserve	8/11/1989	Common	
DEC, WAHERB	10	SE Cnr of Talbot Rd Rsv. Junction of Talbot and O'Connor Rds, Wexcombe		Shire Recreation	9/12/1990		
DEC, WAHERB	11	Capel NR, E of Hutton Rd and S of Bussell Hwy, 3.5 km SW of Capel		Nature Reserve	12/11/1993		
DEC, WEC		Cooljarloo		Mining Lease	27/10/2008		Mining
WAHERB		W of West Mount Barren, Fitzgerald River National Park		National Park	10/12/1951		
WAHERB		2.5 miles N of Forrestdale along Nicholson Road		Private Property	29/02/1960		
WAHERB		2.9 miles Cannington side of Taylor's Crossing, Forrestfield		National Park	5/03/1960		
WAHERB		Brockman Highway		Unknown	22/12/1963		
WAHERB		Acton Park, East Busselton		Private Property	22/12/1966		
WAHERB		Yarrangillup Road, Busselton		Private Property	2/02/1967		
WAHERB		Jurien East Road - 10 km W of Herschel Range		Private Property	20/10/1970		
WAHERB		24 km N of Regans Ford on Brand Highway		Private Property	24/11/1971		
WAHERB		Regans Ford, Dandaragan road, 15 miles N of Regans Ford		Private Property	18/11/1973		

<b>Data Source</b>	<b>DEC Pop. No</b>	<b>Location/Locality</b>	<b>Project</b>	<b>Land Tenure</b>	<b>Date of survey</b>	<b>No. of locations or plants</b>	<b>Threats</b>
WAHERB		Remnant vegetation on farm, 2 km S of Brand Highway and Coorow - Greenhead road		Private Property	15/12/1996	Common.	
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	07/11/2006		
WEC		Tiwest Cooljarloo/Cataby	Falcon Regional Plots	UCL	2/11/2006	2	Mining
WEC		Iluka Resources Eneabba Operations	P2 plots	Mining Lease	18/10/2007	1	Mining
WEC		Tronox mining tenement, Cooljarloo.	Mulch Monitoring	Mining Lease	21/10/2010	2	Mining

Land tenure for populations of *Thysanotus glaucus* is predominantly unsecured with seven populations located on private property and six found on either road verge, shire reserve or unknown tenure. A single population is recorded from unallocated crown lands whilst two are located on mining tenement. Seven populations are considered to be secure, located in Nature Reserves (Coomallo, Yardanogo, Fynes Road and Capel) and Lesueur and Fitzgerald River National Parks.

To date, none of the known populations have recorded population numbers, with four populations listing the plants as being common.

## **SUMMARY AND RECOMMENDATIONS**

*Thysanotus glaucus* is currently listed as Priority 4 under the DEC threatened species conservation ranking system.

From the records available, it appears that *Thysanotus glaucus* has a wide geographic range in excess of 150km, and is well-represented on secure tenure within conservation estate. . It has significant areas of habitat remaining, with greater than 20 populations distributed throughout its known range. This taxon does not appear to be under threat and it is therefore recommended that it be removed from the Priority flora list.

## 48. *Verticordia lindleyi* Schauer subsp. *lindleyi*

### INTRODUCTION AND BIOLOGY SUMMARY

**Description:** Erect, branching shrub growing to 0.2 - 0.75 m high. Pink flowers present in May or November to December or January.

**Soil preference:** Sand or sandy clay.

**Distribution:** South – West botanical province in the Avon Wheatbelt, Jarrah Forest and Swan Coastal Plain region. Commonly found in winter-wet depressions.

**Response to fire/ disturbance:** Known to grow following disturbance in sand.

**Susceptibility to dieback:** Unknown

**Conservation Status:** Priority 4 (DEC 2012c). At present this taxon is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DSEWPC 2012).

### POPULATION AND DISTRIBUTION

Based on examination of the W.A. Herbarium database and Department of Environment and Conservation (DEC) Threatened Flora database (DEFL) records (DEC 2012a), *Verticordia lindleyi* subsp. *lindleyi* has a known distribution from Eneabba and Serpentine, extending east to Mogumber, a range of approximately 200km by 80km.

This species is known from 58 records within the DEC Threatened flora database, 73 records within the W.A. Herbarium database (DEC 2012a) and seven additional records from Woodman Environmental Consulting. These records currently represent an estimated total of 61 distinct populations (Table 48).

Recorded locations of *Verticordia lindleyi* subsp. *lindleyi* indicate the species is scattered throughout its range, with concentrations in the Gingin, Kewdale and Serpentine areas. A number of populations are located on secure tenure, with thirteen of the known populations located on conservation managed lands including Boonanarring Nature Reserve, Mimegarra Road Conservation Reserve, Moore River National Park, Brixton Street Wetlands, Fynes Nature Reserve, Bartlett's Well Nature Reserve, and Whiteman Park. The majority of records however are from populations located on unknown or unsecured tenure, predominantly private property, road verge, and shire reserves. Land tenure for three of the recorded populations is currently unknown.

**Table 48: Known Populations and Distribution Range of *Verticordia lindleyi* subsp. *lindleyi***

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	1	Brand Hwy, 1.6 km NW of Bootline Rd, near White Lake, ca 13 km NW of Gingin.		Main Roads Road Reserve	26/12/1975		Road maintenance
DEC, WAHERB	2	440 m NW of intersection of Orton and Kargotich Rds in Oakford.		Unknown	23/03/1981		
DEC, WAHERB	3	Approx. 850 m SW of junction of Red Gully and Mogumber Rds, 4 km W of Mogumber.		Shire Road Reserve	16/12/1981		Road maintenance
DEC, WAHERB	4	Approx. 150 m N of Beermullah Rd, 0.7 km W of Pin Rd, Beermullah		Shire Reserve	11/12/1982		
DEC, WAHERB	5A	Moore River National Park - located 3.56 km W along the Park's southern boundary fireline from Brand Highway		National Park	21/03/1994	5000+ plants at 1 location	
DEC, WAHERB	5B	Moore River National Park - situated 3.85 km W along the Park's southern boundary from Brand Highway		National Park	25/03/1994	3000+ plants at 1 location	
DEC	6	S of Coonabidgee Rd, Near NE boundary corner of Yeal Nature Reserve, Coonabidgee (E of Gingin)		Private Property	23/03/1986		
DEC	7	Near N boundary of Yeal Nature Reserve, Muckenburra (E of Gingin)		Unknown	20/04/1986		
DEC	8A	N of Coonabidgee Rd, Near NE boundary corner of Yeal Nature Reserve, Coonabidgee (E of Gingin)		Conservation of Flora & Fauna	20/04/1986		
DEC	8B	N of Coonabidgee Rd, Near NE boundary corner of Yeal Nature Reserve, Coonabidgee (E of Gingin)		Private Property	17/05/1990		
DEC, WAHERB	9	Wetland just north of Mimegarra Rd, SW of Cataby.		Conservation of Flora & Fauna	18/02/1987		
DEC, WAHERB	10	Just SE of junction of Karnup and Punrak Rds, Serpentine.		Shire Road Reserve	27/12/1988		Road maintenance
DEC	11A	Land adjacent to Chisholm Crescent, SW of Tonkin and Roe Hwy intersection, Kewdale Industrial area.		Main Roads Road Reserve	4/03/1990		Road maintenance
DEC	11B	Land adjacent to Chisholm Crescent, SW of Tonkin and Roe Hwy intersection, Kewdale Industrial area.		Shire Road Reserve	4/03/1990		Road maintenance
DEC	11C	Land adjacent to railway line, SW of Tonkin and Roe Hwy intersection, Kewdale Industrial area.		Main Roads Road Reserve	4/03/1990		Road maintenance
DEC	11D	E of Roe Hwy and Ferguson Ct intersection, Kewdale Industrial area.		Main Roads Road Reserve	11/06/1991		Apparently cleared for industrial development since 1991
DEC	11E	NW of Tonkin and Roe Hwy intersection		State Planning Commission	4/04/1990		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	11F	Junction Roe and Tonkin Highway, both side of Roe Highway		Main Roads Road Reserve	4/04/1990		Road maintenance
DEC	11G	NW of Tonkin and Roe Hwy intersection		Private Property	4/04/1990		Apparently cleared for industrial development since 1990
DEC, WAHERB	12	S of Nicholson road opposite junction with High road, Langford		State Planning Commission, Recreational Parkland	13/03/1990	Frequent	
DEC, WAHERB	13	c. 1 km along Tonkin Highway N from Welshpool road on both side of Highway		Shire Recreation Reserve	21/03/1990	Frequent	
DEC, WAHERB	14	UWA Botany Dept. Reserve, Kenwick, SE Brook road, mainly W of the Banksia woodland ridge		Educational Purposes (UWA)	13/03/1990	Abundant	
DEC, WAHERB	15	1.4 km N along Brentwood road from junction with Bickley road, Kenwick, bush area on W side of Bentley road		Private Property	31/03/1990	Occasional	
DEC, WAHERB	16	Southern River, 0.8 km SW along Passmore road from Holmes road, walk 200 m W keeping N of trotting track		Private Property	11/05/1990	40 plants at 1 location	
DEC, WAHERB	17	Southern River immediately E of German Shepherd Dog Training Ground on Passmore Street, W end		Private Property	11/05/1990	12 plants at 1 location	
DEC, WAHERB	18	E side of Wanaping road - Brixton street junction, near school and private property		Private Property	20/09/1990		
DEC	19	Bushland off Skeet Rd, Forrestdale.		Private Property	30/11/1991	Scattered, Uncommon	
DEC	20	Land between Bickley Rd and Brixton St, Kenwick.		Private Property	25/05/1990		
DEC	21	E of Bindoon-Moora Rd and N of West Point Rd, 3.3 km NNE of Wannamal.		Shire Road Reserve	7/02/1991		Road maintenance
DEC	22	Bushland W of Racetrack, Liddlelow Rd, Bangup Lake, south of Jandakot.		Shire Recreation Reserve	15/06/1991		
DEC, WAHERB	23A	Moore River Nature Reserve No. 41830 and P.P. Loc. No. 5399 - Site a is located 180 m W along Reserve southern boundary from the SW corner of Loc 6864		Conservation of Flora & Fauna, Nature Reserve	7/04/1994	2500+ plants at 1 location	
DEC, WAHERB	23B	Moore River Nature Reserve No. 41830 and P.P. Loc. No. 5399 -, Site b is a further 120 m W from the SW corner of Site a		Private Property	7/04/1994	150+ plants at 1 location	
DEC	23C	Moore River Nature Reserve		Conservation of Flora & Fauna	7/04/1994		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WAHERB	24	Moore River Nature Reserve No. 41830 - situated 3.22 km W along Reserve southern boundary from the SW corner of Loc. 6864		Conservation of Flora & Fauna	7/04/1994	400+ plants at 1 location	
DEC, WAHERB	25	Karnup Road Reserve just to SW of intersection with Rapids Road in Karnup Road Bushland (Bush Forever Site 74), Peel Estate, in System 6 Update quadrat punr03		Shire Road Reserve	9/11/1995		Road maintenance
DEC	26	Perth Airport, E of N end of runway.		Airport	7/12/1994		
DEC, WAHERB	27	NE corner of Barracea Reserve, Muchea		Conservation of Flora & Fauna	16/01/1996	Abundant	
DEC, WAHERB	28	Near Hartfield Country Club and Tonkin Highway, Forrestfield		Main Roads Road Reserve	17/03/1997		Road maintenance
DEC		Cullalla Rd, Chittering/Gingin Boundary. Plants scattered in roadside patches from 2.0km to 4.1km N of Barn Rd.		Shire Road Reserve	25/03/2002	433 plants	Road maintenance
DEC, WAHERB		Wannamal South rd, Gingin. 2A 0.5km S of Wannamal West Rd, 2B 3.1km S of Wannamal West Rd, 2C at the junction of Wannamal South Rd and Cullalla Rd.		Shire Road Reserve	25/03/2002	234 plants	Road maintenance
DEC		Perth Airport Bushland. Southern most corner near junction of Abernethy Rd and Tonkin Hwy.		Crown Land	25/11/2002	1 plant	Road maintenance
DEC		Water Corporation Serpentine trunk to Canning trunk water main, near Holmes Rd (Holmes Road Reserve), Huntingdale		Shire Road Reserve	8/01/2004	1 location	Road maintenance
DEC		Holmes Rd, heading E, in Southern River near water pipeline		Unknown	12/05/2004		
DEC		Lot 1001 Wright Rd, near Carey College, Balanup and Ranford Rds, Forrestdale.		Private Property	1/01/2005	1 location	
DEC		South of Neaves Rd, East Wanneroo. Chain of wetlands in area.		Private Property	8/06/2005	20 plants	Land Development
DEC		Pipeline corridor from old Mandurah Rd near Ravenswood, to N of North Dandalup.		Unknown	23/11/2006		Pipeline installation
DEC		Canning River East Branch, Brookton Hwy, Armadale. From Brookton Hwy 8km SE of Kinsella Rd trek 1.3km SSW of Canning Plot 4.		Water Reserve	18/12/2006	500+ plants	
DEC, WAHERB		Hartfield Park, Reserve 17098-3894, Tonkin Highway, Wattle Grove, SW of highway and NE of Maamba Road		Recreational Reserve	23/02/2006	1000+ plants at 1 location	
DEC, WEC		Bartlett's Well Nature Reserve.		Nature Reserve	7/06/2007		
DEC, WEC, WAHERB		Boonanarring Nature Reserve, S of Wannamal Rd, in NW corner of reserve.		Nature Reserve	28/08/2007	Uncommon	
DEC, WEC		Boonanarring NR and Bartletts Well NR		Nature Reserve	15/11/2007	3 locations	

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
DEC, WEC, WAHERB		South side of Mimegarra Rd, approx 7km W of Brand Hwy, near Cataby.		UCL, Shire Road Reserve	19/11/2007		Mining
DEC, WAHERB		Brixton Street Wetlands, Kenwick		Nature Reserve	27/11/2007	Uncommon	
DEC		Darkin Rd, 0.65km from Kornes Rd junction, in Mundaring shire.		State Forest	18/09/2009		Land development
DEC		Approx 7km along Woolka Rd, W of Brand Hwy intersection, Approx 14km NW of Cataby in Tiwest Cooljarloo tenement.		Exploration Lease	19/10/2011	2 plants	Mining
DEC, WAHERB		~20km N of Gingin located in E-W firebreak on private property. Approx 5km N of Wannamal West Rd and Boonanarring Nature Reserve.		Private Property	18/11/2011	5 plants	Firebreaks
DEC		Undeveloped road reserve (Skeet Rd) approx 1km SW of Ranford Rd, Harrisdale.		Exploration lease	24/11/2011	1 plant	
DEC		Tronox mining tenement, Cooljarloo.	Mulch Monitoring	Mining Lease	20/10/2010	3	
DEC		Western Power Transmission line between Cataby and Eneabba	Pinjar-Eneabba transmission line DRF & Priority Flora WP10-37	UCL	19/11/2010	156 plants at 26 locations	Power line Maintenance
WAHERB		Lower Canning River		Private Property	02/01/1899		
WAHERB		Lower Canning River, Cannington		Building Strata	03/01/1900		
WAHERB		Guildford		Private Property	/11/1901		
WAHERB		Swan District		Road Reserve	/12/1900		
WAHERB		Lower Canning River, Cannington		Building Strata	26/12/1901		
WAHERB		Mogumber		Private Property	13/01/1921		
WAHERB		Cannington		Building Strata	06/12/1924		
WAHERB		Cannington Swamp [Wattle Grove]		Private Property	02/03/1948		
WAHERB		15 miles W of Gingin		Private Property	15/12/1953		
WAHERB		Gillingarra, Muchea		Road Reserve	/12/1959		
WAHERB		29 miles N Regans Ford		Private Property	14/12/1967		
WAHERB		Forrestdale, ca 15 miles SSE of Perth		Private Property	07/11/1969		
WAHERB		9 miles N of Gingin		Private Property	24/11/1969		
WAHERB		61 mile peg on Gingin Rd [14km N of Gingin on the Brand Hwy]		Main Roads Road Reserve	26/11/1975		
WAHERB		Hardy Road, Kewdale		Private Property	26/05/1978		
WAHERB		Hardy Road, Kewdale		Private Property	26/05/1978		
WAHERB		Maida Vale		Road Reserve	14/12/1979		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		W of Mogumber		Private Property	30/05/1982		
WAHERB		Kewdale		Private Property	04/12/1982		
WAHERB		W of Mogumber		Private Property	04/01/1984		
WAHERB		Moore River National Park, 2 km NW along 9 Mile Swamp road		National Park	01/02/1986		
WAHERB		Location No. 3590 Sandringham Road, Gingin		Private Property	23/03/1986		
WAHERB		Location No. 3471 Sandringham Road, Gingin		Private Property	20/04/1986		
WAHERB		Eldorado Road, Gingin		Private Property	20/04/1986		
WAHERB		Location No. 3590 Sandringham Road, Gingin		Private Property	20/04/1986	Few plants	
WAHERB		Between Hardy road and Tonkin Highway, E from junction with Dundas road, continues to Tonkin and Roe Highway intersection		Private Property	13/03/1990		
WAHERB		Anstey Road, Jandakot		Other Shire Reserve	30/11/1991		
WAHERB		System 6 Area M52, Perth Airport Bushland (Bush Forever Site 386), E side in security fenced Airport land, in System 6 Update quadrat perth05		Airport	20/10/1994		
WAHERB		SE area of State Forest 12, W of Coolyoolup Road (adjacent to System 6 Update quadrat sf 1201)		State Forest	20/10/1995		
WAHERB		Saunders Street (W end), Aboriginal Community, Henley Brook		Private Property	10/12/1996	Occasional	
WAHERB		RAAF Caversham Base		Private Property	18/12/1998		
WAHERB		RAAF Caversham Base		Private Property	18/12/1998		
WAHERB		Site 11, RAAF Caversham Base		Private Property	21/12/1998		
WAHERB		Site 1, approx. 1 km W of Cooljarloo Well, 500 m S of Mullering Brook, W of Brand Highway		Private Property	26/10/1999		
WAHERB		Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 3.4 km E of Brand Highway then head S for 2.1 km along the western boundary track		Nature Reserve	22/01/2002		
WAHERB		Perth Airport		Airport	20/08/2002		
WAHERB		Perth Airport		Airport	22/08/2002		
WAHERB		Water Corporation Serpentine trunk to Canning Trunk water main, near Holmes Road, Huntingdale (Holmes Road Reserve)		Water Corporation	08/01/2003		
WAHERB		Southern River, Gosnells		Private Property	20/09/2005		
WAHERB		Whiteman Park		Conservation of Flora & Fauna	09/02/2006		
WAHERB		Whiteman Park		Conservation of Flora & Fauna	09/02/2006		

Data Source	DEC Pop. No	Location/Locality	Project	Land Tenure	Date of survey	No. of locations or plants	Threats
WAHERB		Tonkin Highway, near intersection with Roe Highway, Welshpool		Main Roads Road Reserve	23/05/2006	1000+ plants at 1 location	
WAHERB		Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road		Nature Reserve	07/11/2006		
WAHERB		Perth Airport region		Airport	21/02/2007	21-50 plants at 1 location	
WAHERB		Perth Airport region		Airport	21/02/2007		
WAHERB		Perth Airport		Airport	05/09/2007		
WAHERB		Abernethy Plot 1 in Bush Forever site, ca 150 m W of Hopkinson Road and 10 m S of Abernethy Road, Oakford		Conservation of Flora & Fauna	15/11/2007	Occasional	
WEC		18km W of Cataby.	Mullering	UCL	/09/2005	2	
WEC		Tronox Falcon Tenements, Cooljarloo North.	Falcon Plots	Mining Lease	/10/2006	4	
WEC		Tronox Cooljarloo mining tenement.	Tiwest 9-41 DRF & PLF Monitoring	Mining Lease	14/9/2009-18/09/2009	80 plants	

Population size for known occurrences of *Verticordia lindleyi* subsp. *lindleyi* is variable, ranging from a few individuals to over 8000 plants for one population. A total of more than 14,600 individual plants have been recorded from eighteen populations, with an additional eight records noting Occasional to Abundant occurrences of *Verticordia lindleyi* subsp. *lindleyi*. The numbers of individuals in the remaining populations are unknown. To date, the largest known populations of this species are found in the Moore River National Park. Surveys conducted in 1994 found groups of between 400 and 5000 individuals at each of four locations within the park. Other large populations of 400 to 1000 plants have been located in Wattle Grove, Welshpool and Gingin.

## **SUMMARY AND RECOMMENDATIONS**

*Verticordia lindleyi* subsp. *lindleyi* is currently listed as a Priority 4 taxon under the DEC threatened species conservation ranking system. This ranking is assigned to flora considered either rare, near threatened or otherwise in need of monitoring.

This species has been adequately surveyed, and a number of large populations have been located, many within conservation estate. Populations are distributed throughout its geographic range, and large areas of habitat do not appear to be under imminent threat. It therefore meets the criteria used in this review for removal from the Priority Flora List.

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