The Minister approved this conservation advice and included this species in the Endangered category, effective from 15/02/2018

Conservation Advice

Diplolaena andrewsii

Summary of assessment

Conservation status

Diplolaena andrewsii has been found to be eligible for listing in the Endangered category, as outlined in the attached assessment.

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided by Western Australia as part of the Common Assessment Method process, to systematically review species that are inconsistently listed under the EPBC Act and relevant state/territory legislation or lists.

More information on the Common Assessment Method is available at: http://www.environment.gov.au/biodiversity/threatened/cam

The information in this assessment has been compiled by the relevant state/territory government. In adopting this assessment under the EPBC Act, this document forms the Approved Conservation Advice for this species as required under s266B of the EPBC Act.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 31 business days between 23 February 2017 and 10 April 2017. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Recovery plan

A recovery plan for this species under the EPBC Act is not recommended, because the Approved Conservation Advice provides sufficient direction to implement priority actions and mitigate against key threats. The relevant state/territory may decide to develop a plan under its equivalent legislation.

Recommendations

(i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Endangered category:

Diplolaena andrewsii

(ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

6 June 2017

Nomination summary *(to be completed by nominator)*

Current conservation status				
Scientific name:	*Diplolaena andrewsii*			
Common name:	native wild rose			
Family name:	Rutaceae	Fauna ☐	Flora ☒	
Nomination for:	Listing ☒	Change of status ☐	Delisting ☐	
1. *Is the species currently on any conservation list, either in a State or Territory, Australia or Internationally?* 2. *Is it present in an Australian jurisdiction, but not listed?*		*Provide details of the occurrence and listing status for each jurisdiction in the following table*		

Jurisdiction	**State / Territory in which the species occurs**	**Date listed or assessed (or N/A)**	**Listing category i.e. critically endangered or 'none'**	**Listing criteria i.e. B1ab(iii)+2ab(iii)**
International (IUCN Red List)				
National (EPBC Act)				
State / Territory	1. WA (WC Act 1950)	7/4/2009	Vulnerable	D1+D2
	2. WA (WC Act 1950)	2016	Endangered	B1ab(iii)+2ab(iii)
	3.			

Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:	
• this assessment meets the standard of evidence required by the Common Assessment Method to document the eligibility of the species under the IUCN criteria;	Yes ☒ No ☐
Comments:	
• surveys of the species were adequate to inform the assessment;	Yes ☒ No ☐
Comments:	Targeted, opportunistic and general vegetation surveys have been conducted between 1990 and 2013. Precise counts of population size have been taken at most of the subpopulations. Over 87 hours of opportunistic survey for the species has been conducted between August 2005 and January 2006. Further targeted surveys of the properties surrounding the known subpopulations of the species have been conducted but no new subpopulations have been located. A large area of the Darling Scarp was also surveyed for other DRF species, but no new subpopulations of *D. andrewsii* were located.
• the conclusion of the assessment remains current and that any further information that may have become available since the assessment was completed supports or is consistent with the conclusion of the assessment.	Yes ☒ No ☐
Comments:	The species was nominated and accepted for listing by the WA TSSC at the April 2009 meeting. Since then, an Interim Recovery Plan has been drafted and further surveys/monitoring programs have been conducted. Habitat degradation has been noted at sites due to weed invasion, road,

	track, powerline and firebreak maintenance, altered fire regimes, feral pig activity and mining. This ongoing decline has resulted in a re-assessment as Endangered.

Nominated national conservation status: category and criteria

Presumed extinct (EX) ☐ Critically endangered (CR) ☐ Endangered (EN) ☒ Vulnerable (VU) ☐

None (least concern) ☐ Data Deficient ☐ Conservation Dependent ☐

What are the IUCN Red List criteria that support the recommended conservation status category?	**Endangered B1ab(iii)+2ab(iii)**

Eligibility against the IUCN Red List criteria (A, B, C, D and E)

*Provide justification for the nominated conservation status; is the species eligible or ineligible for listing against the five criteria. For **delisting**, provide details for why the species no longer meets the requirements of the current conservation status.*

A.	Population size reduction (evidence of decline)	• There is not enough survey data to determine any population trends. • Insufficient information to assess
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	• (B1) EOO is 17 km^2 • (B2) AOO is 8 km^2 (using 2kmx2km grid). • (a) It is known from two locations that are 17km apart. It does not meet severely fragmented under IUCN as the largest subpopulation (<50% of mature individuals) is found in a large national park which is not fragmented vegetation. • (b) At locations where the species is known to exist, the (iii) extent and quality of available habitat is in decline due to the impact of weeds, fire, recreation activities, feral pigs and maintenance activities. • **Meets: Endangered B1ab(iii)+2ab(iii)**
C.	Small population size and decline (population size, distribution and evidence of decline)	• The number of mature individuals is estimated to be 619 from surveys undertaken to 2013. • (C1 C2) There is not enough survey data to determine any population trends, despite observed decline in habitat condition. • C2(a)(i) The number of mature individuals in each subpopulation is <250 (largest 73). • **Does not meet criterion**
D.	Very small or restricted population (population size)	• (D1) Number of mature individuals is estimated to be 619 from surveys undertaken to 2013. • (D2) Area of occupancy is 0.04 km^2 based on mapping of population area or 24 km^2 based on 2kmx2km grid. • The species is only known from 2 locations. • **Meets criteria for Vulnerable D1**
E.	Quantitative analysis	• No information to assess

	(statistical probability of extinction)	

Summary of assessment information

EOO	17 km^2	AOO	8 km^2 (IUCN 2kmx2km grid) 0.04 km^2 (population area calculations)	Generation length	Unknown

No. locations	2	Severely fragmented	Yes ☐ No ☒ Unknown ☐
No. subpopulations	4	No. mature individuals	619 (based on most recent survey date)

Percentage global population within Australia	100%
Percentage population decline over 10 years or 3 generations	Unknown

Threats *(detail how the species is being impacted)*

Threat *(describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)*	Extent *(give details of impact on whole species or specific subpopulations)*	Impact *(what is the level of threat to the conservation of the species)*
Habitat degradation due to weed invasion. • Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species. • A range of weed species were recorded at John Forrest National Park by Bettink (2011). The two main invasive species are watsonia (*Watsonia meriana var. bulbillifera, W. borbonica*) and freesia (*Freesia alba x leichtlinii*). Present and future	Entire	Severe
Road, track and firebreak maintenance • Grading, chemical spraying, construction of drainage channels and mowing of roadside vegetation reduce the health and number of plants. • Maintenance activities also encourage weed invasion Present and future	Gidgegannup subpopulations	Severe
Powerline maintenance • Trampling and other disturbances may directly damage plants and encourage weed invasion. Present and future	Gidgegannup subpopulations	Moderate
Altered fire regimes (affecting recruitment)	Entire	Moderate to Severe

• Frequent fires do not allow the species enough time to reach maturity and set seed if the interval between fires is too short. Conversely, results from the recent weed control trial suggest that, if the period between fires is too long, adult plants may senesce (Brown and Bourke 2014). • Some portions of the John Forrest National Park subpopulation were subject to a wildfire in 2003/04 with good regeneration observed in 2006. However, in a recent visit to those subpopulations plant numbers had decreased significantly. Past, present and future		
Recreational activities • The Upper Swan subpopulations are located near access tracks for areas used for camping. There are risks of trampling or clearing from walkers, 4WD vehicles and users dumping rubbish. • Portions of the John Forrest National Park subpopulation are near popular walking trails and therefore at risk of being damaged. Past, present and future	Entire	Moderate
Feral pig activity • Feral pigs have been recorded damaging threatened flora and their habitat by digging large areas of soil in search of food. Digging results in understorey vegetation degradation but also appears to be promoting seedling recruitment of *Diplolaena andrewsii*. • Pigs also have the potential to introduce weed seeds and nutrients, and soil disturbance encourages establishment of weeds. Past and present	Observed in a Gidgegannup subpopulation	Severe
Future mining operations • Mineral extraction leases 70/3003 and 70/3283 cover the site of a Gidgegannup subpopulation and if implemented, have the potential to severely impact the species. Future	Gidgegannup subpopulation	Severe

Management and Recovery	
Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?	Yes ☒ No ☐
List all relevant recovery or management plans (including draft, in-preparation, out-of-date, national and State/Territory recovery plans, recovery plans for other species or ecological communities, or other management plans that may benefit or be relevant to the nominated species).	

- Department of Parks and Wildlife (2015). *Interim Recovery Plan No 353*: *Native Wild Rose (Diplolaena andrewsii) Interim Recovery Plan 2015–2020.* Perth, Western Australia: Department of Parks and Wildlife.
- Department of Conservation and Land Management (1994). *John Forrest National Park Management Plan 1994-2004. Management Plan No. 26.* Available from: https://www.dpaw.wa.gov.au/parks/management-plans

List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.

- Land managers have been notified of the location and threatened status of the species.
- A Parks and Wildlife research associate conducted over 87 hours of opportunistic survey for the species between August 2005 and January 2006.
- A weed management plan was prepared by the Department of Parks and Wildlife Swan Region in 2011 using funds obtained through the State NRM program.
- Seeds from the John Forrest National Park subpopulation were collected in November 2008 and stored at the Department of Parks and Wildlife Threatened Flora Seed Centre.
- Active weed spraying programs have been undertaken by the City of Swan and landowners at the Gidgegannup subpopulations.
- A weed control trial was undertaken at some areas of the John Forrest National Park subpopulation from 2011 to 2014.
- The Botanic Garden Parks Authority (BGPA) have six *Diplolaena andrewsii* plants in their conservation garden and seven grafted plants in their nursery.

List further recommended management or research actions, if any, that would benefit the conservation of the species.

- Monitor populations with a focus on monitoring grazing (kangaroos), pig activity (if necessary), weed invasion, habitat degradation, hydrology, population stability, pollinator activity, seed production, recruitment, and longevity.
- Undertake fire regeneration trials in conjunction with weed control to determine effective means of germinating soil stored seed in the wild.
- Implement actions listed in weed management plan including liaising with land managers to control weeds and mapping and controlling priority weeds (watsonia, freesia and cape tulip).
- Install DRF markers on road verges of the Gidgegannup subpopulations to reduce the risk of accidental damage during road maintenance.
- Manage and monitor recreational/visitor impacts. If required, prevent access by installing barriers (large logs, bollards and fencing) and raise awareness by installing signs indicating the significance of the area.
- Develop and implement a fire management strategy, with recommendations on fire frequency, intensity and seasonality of prescribed burns, and the need, method of construction and maintenance of firebreaks. Monitor the impacts of fire using permanent quadrats.
- Collect and store seed, with a focus on preserving the maximum range of diversity.
- Undertake further surveys of potentially suitable habitat.
- Ensure long-term protection of habitat (e.g. aim to have land containing the species placed within a reserve or otherwise protected through a conservation covenant).
- Research the biology and ecology of the species including: identifying pollinators and habitat requirements, seed viability, conditions necessary for natural germination, response to threats/disturbances, longevity of plants and other biological features.
- Liaise with land managers and Aboriginal communities to ensure that the species and its habitat is not accidentally damaged or destroyed.

- Map habitat critical to the survival of *Diplolaena andrewsii*.
- Promote awareness in the wider community.

Nomination prepared by:	
Contact details:	
Date submitted:	7 July 2016
If the nomination has been refereed or reviewed by experts, please provide their names and contact details:	
Stefan De Haan and Vanessa Clarke (Department of Parks and Wildlife) and Fred & Jean Hort (WA Herbarium)	

Summary of subpopulation information *(detailed information to be provided in the relevant sections of the form)*						
Location *(include coordinates)*	Land tenure	Survey information: Date of survey and No. mature individuals	AOO	Site / habitat Condition	Threats *(note if past, present or future)*	Specific management actions
Gidgegannup, ENE of Upper Swan	Shire reserve (Purpose: recreation)	1a. 2013: 0 individuals		Degraded	Recreational activities (past, present and future) Weed invasion (present and future) Road maintenance activities (future)	Manage recreational activities and protect habitat as required Weed control Liaise with land manager to reduce threats Install DRF markers
Gidgegannup, ENE of Upper Swan	Private Property	1b. 2013: 36 individuals	6,000 m^2	Good to Very good	Weed invasion Firebreak maintenance (future) Feral pig activity (past and present) Mining (future)	Weed control Develop fire management plan Liaise with land manager to reduce threats
		1c. 2013: 36 individuals	5,000 m^2			
		1e. 2006: 30 individuals (partial survey/estimate)				
Gidgegannup, ENE of Upper Swan	Shire road reserve	1d. 2013: 27 individuals (estimate)	20 m^2	Good	Road maintenance (future) Weed invasion (present and future)	Install DRF markers Liaise with land manager to reduce threats Weed control
		1f. 2013: 24 individuals	100 m^2			
John Forrest National Park, NE of Swan View	National Park	2a. 2010: 51 individuals		Good to excellent, with degraded patches	Weed invasion (past, present and future) Recreational activities (past, present and future)	Weed control Manage recreational activities and protect habitat as required
		2b. 2006: 118 individuals	1,500 m^2			
		2c. 2011: 6 individuals	250 m^2			
		2d. 2012: 11 individuals	25 m^2			

		2e. 2010: 12 individuals (estimate)	22,500 m^2		Altered fire regimes (present and future) Fire (past, present and future)	Develop fire management plan
		2f. 2010: 127 individuals				
		2g. 2010: 54 individuals				
		2h. 2011: 1 individual				
		2i. 2012: 13 individuals				
		3. 2013: 73 individuals				

Department of Environment and Conservation

Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2009 (updated 2016).

To fill out this form you must refer to the Guidelines. Incomplete forms may result in delays in assessment, or rejection of the nomination.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. To mark boxes with a **cross** ☒: on the **View** menu, point to **Toolbars**, and then click **Forms**. Click **Protect Form**, then check the box. Unlock the form by clicking and you will then be able to type text in the white table cells.

Note, this application form applies to both flora and fauna species, and hence some questions or options may not be applicable to the nominated species – for these questions, type "N/A".

SECTION 1. NOMINATION			
1.1. Nomination information			
Flora ☒	**Fauna** ☐	**Nomination for: Addition** ☒	**Change of category** ☐ **Delisting** ☐
1.2. Scientific Name **This name will be used to identify the species on all official documentation. Use the approved name used by the Western Australian Museum or Herbarium. If this is not possible, use unpublished names or numbers of voucher specimens.**			
Diplolaena andrewsii Ostenf.			
1.3. Common Name **If the species has a generally accepted common name, please show it here. This name will be used on all official documentation.**			
The species has no generally accepted common name, however it is sometimes referred to as a native 'wild rose'.			
1.4. Current Conservation Status. If none, type 'None'.			
International IUCN Red List Category and Criteria applicable to the highest rank category only e.g. Vulnerable (B1ab(iv);D(1))	None		
National EPBC Act 1999 Category	None		
State of WA Wildlife Conservation Notice Schedule	Declared Rare Flora (Schedule 3)		
State of WA IUCN Category	Vulnerable D1+D2		
State of WA Priority			
Is the species listed as 'Threatened' in any other Australian State or Territory? If Yes, list these States and/or Territories and the status for each.			

No ☒ Yes ☐

Does the species have specific protection (e.g. listed on an annex or appendix) under any other legislation, inter-governmental or international arrangements e.g. CITES? If Yes, please provide details.

No ☒ Yes ☐

1.5. Nominated Conservation Status. Type one category for each of the fields. If none, write 'None'.

International IUCN Red List Category and Criteria applicable to the highest rank category only e.g. Vulnerable (B1ab(iv);D(1))	
National EPBC Act 1999	Endangered B1ab(iii) and B2ab(iii)
State of WA Wildlife Conservation Notice Schedule	Declared Rare Flora (Schedule 2)
State of WA IUCN Category	Endangered B1ab(iii) and B2ab(iii)
State of WA Priority	None

1.6. Reasons for the Nomination.
Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Categories and Criteria where appropriate.

- *D. andrewsii* is only known from two locations which are severely fragmented (Refer to Section 4.1). [Note, not considered severely fragmented under IUCN guidelines (2016)]
- The extent of occurrence is approximately 17km^2, and the area of occupancy 0.04km^2.
- At the locations where *D. andrewsii* occurs the extent and quality of available habitat is in decline.

SECTION 2. SPECIES

2.1. Taxonomy.
Describe the taxonomic history, using references, and describe the key distinguishing features that can be used to separate this taxon from closely related taxa. Include details of the type specimen, changes in taxonomy, scientific names and common names used for the species.

Diplolaena andrewsii was first described by Carl Ostenfield in 1921. The species differs from other members of the genus by having narrowly oblong petals in comparison to longer, more linear petals (Marchant *et al*., 1987).

This species has no other references associated with its name.

Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).

No ☐ Yes ☒

Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.

Unknown.

2.2. Description

Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (eg short lived, long lived, geophytic, etc).

D. andrewsii as an erect shrub, growing 0.5–1 m high. It has branchlets with ferruginous stellate hairs which are often stipulate. The leaves are chartaceous, flat, broadly ovate, 13-30 x 10-20 mm, and are sparsely stellate-hairy on the upper surface.

Flowering occurs in July to October. The flower heads are small, 10-20 mm across. The outer involucral bracts are thin, broadly ovate, sparsely stellate-hairy outside, and hairy with white, wooly, stellate hairs inside. The inner bracts are reddish-brown with white membranous margins, 10-12 mm long, glabrous outside. The petals are narrowly oblong, approximately 5 mm long, with white-ciliate at the apex. The stamens are exserted, pale red, and 10-15 mm long (Marchant *et al*., 1987).

2.3. Distribution

Describe the distribution of the species <u>in Australia</u> and, if possible, provide a map.

D. andrewsii is known from two locations, 17km apart, in the Swan Natural Resource Management Region, Western Australia. This is a span of 23 to 40km north-east of Perth. Here, the populations are divided between different tenure and occurrences to produce a total of 11 sub-populations.

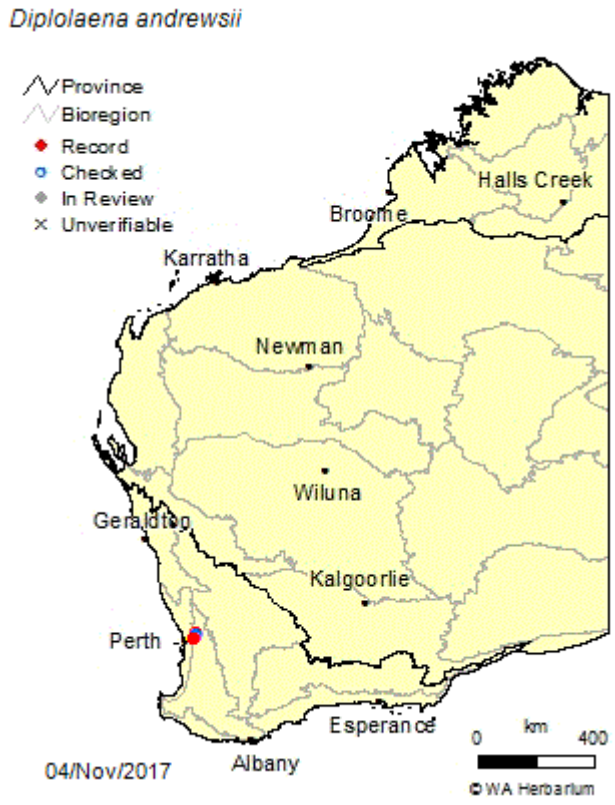

Figure 1. *Diplolaena andrewsii* populations from Western Australian Herbarium (1998–).

2.4. Habitat

Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.

Non-biological habitat

D. andrewsii occurs in the loam and clay soils of granite outcrops and hillsides in the Darling Scarp.

The nearest weather station is Kalamunda (approximately 10-25 km South). The mean annual rainfall here is recorded at 1066mm, with average maximum temperatures ranging from 15.4ºc in July to 30.4ºc in January (BOM, 1993).

Biological habitat

D. andrewsii is found in Marri *(Corymbia calophylla)* and Wandoo *(Eucalyptus wandoo)* woodlands, amongst Two-leaf Hakea *(Hakea trifurcata), Trymalium ledifolium,* Grass tree *(Xanthorrhoea preissii),* Prickly Moses *(Acacia pulchella),* and *Thelymitra dedmaniarum.*

Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.

N/A

Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?

This species does not occur within any Threatened Ecological Community boundaries.

The Gidgegannup sub-populations are associated with the Declared Rare Flora species *Thelymitra dedmaniarum* (Critically Endangered). Also occurring in this locality are the Priority species *Darwinia pimelioides, Drosera occidentalis* subsp. *occidentalis,* and *Acacia oncinophylla* subsp. *oncinophylla.*

The John Forrest National Park sub-populations are associated with the Declared Rare Flora species *Anthocercis gracilis* (Vulnerable), and the Priority species *Darwinia pimelioides*.

2.5. Reproduction

Provide an overview of the breeding system.

For <u>fauna</u>: Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process?

For <u>flora</u>: When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?

D. andrewsii is known to flower between July and October.

No other information about its reproduction has been documented.

2.6. Population dynamics **Provide details on ages of sexual maturity, extent of breeding success, life expectancy and natural mortality. Describe population structure (presence of juveniles/seedlings, mature and senescing individuals).**
No data available.
Questions 2.7 and 2.8 apply to fauna nominations only
2.7. Feeding **Summarise food items or sources and timing/availability.**
N/A
Briefly describe feeding behaviours, including those that may make the species vulnerable to a threatening processes.
N/A
2.8. Movements **Describe any relevant daily or seasonal pattern of movement for the species, including relevant arrival/departure dates if migratory. Provide details of home range/territories.**
N/A
SECTION 3. INTERNATIONAL CONTEXT
For species that are distributed both in Australia and in other countries.
3.1. Distribution **Describe the global distribution.**
The species is endemic to Western Australia.
Provide an overview of the global population size, trends, threats and security of the species outside of Australia.
N/A
Explain the relationship between the Australian population and the global population. What percentage of the global population occurs in Australia? Is the Australian population distinct, geographically separate or does part, or all, of the population move in/out of Australia's jurisdiction? Do global threats affect the Australian population?
N/A

SECTION 4. CONSERVATION STATUS AND MANAGEMENT

4.1. Population

What is the total population size in terms of number of mature individuals? Has there been any known reduction in the size of the population, or is this likely in the future? – provide details. Are there other useful measures of population size and what are they? Or if these are unavailable, provide an estimate of abundance (e.g. scarce, locally abundant etc).

There are 14 sub-populations of *D. andrewsii* consisting of approximately 471 plants.

There is not enough survey data to determine any trends in the populations. In 1996/7 wildfire killed 50% of population 2A. This and the newly discovered 2B, 2C and 2D were then destroyed when wildfire swept through the area again in 2003/4. Although thought to be lost, all of these sub-populations have now been re-located and plant numbers have increased from those recorded pre-fire. Fire is therefore a threat to the species if it occurs before the species has had time to mature and set seed, with the potential for the species to become locally extinct if fire is too frequent.

Population 1A was recorded in 2006 to only have 3 plants, however the plant numbers were not quantified in its initial discovery in 1990. Population 1B consisted of 120 plants when it was located in 1995, reducing to only 25 plants when re-surveyed in 2005. It is unknown whether this decline was due to natural senescence, as the age of the plants was not recorded at the time of the survey. Populations 1C, 1D, 1E and 1F all have only been surveyed the once.

Provide locations of: captive/propagated occurrences or *ex situ* collections; recent re-introductions to the wild; and sites for proposed re-introductions. Have these sites been identified in recovery plans?

N/A

How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

D. andrewsii is known from two locations, one in Gidgegannup and the other in John Forrest National Park, Swan View.

For flora, and where applicable, for fauna, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known location or occurrence.

Confidential Information: Not for Publication

Location	Land status	Date of most recent survey	Number of individuals at location	Area of occupancy at location	Condition of site
1A) Unnamed Shire Reserve, Gidgegannup.	Shire, recreation reserve	2013	0		Moderate.
1B) Gidgegannup.	Private Property	~~21st October 2005~~ 2013	~~25~~ 36	6000m^2.	Healthy.
1C) Gidgegannup.	Private Property	2013	36	5000m^2.	Healthy.
1D) Gidgegannup. (adjacent pop 1C).	Shire, road verge.	2013	27	20m^2.	Moderate.

1E) Gidgegannup.	Private Property.	12th June 2006	30 (partial survey).		Healthy.
1F) Gidgegannup. (opposite pop 1D).	Shire, road verge.	2013	24	100m^2.	Healthy.
2A) John Forrest National Park	Conservation Commission, National Park.	2010	51		Healthy.
2B) John Forrest National Park	Conservation Commission, National Park.	19th July 2006	118	1500m^2.	Healthy.
2C) John Forrest National Park (approximately 220m east of pop 2A).	Conservation Commission, National Park.	2011	6	250m^2.	Healthy.
2D) John Forrest National Park	Conservation Commission, National Park.	2012	11	25m^2.	Healthy.
2E) John Forrest National Park	Conservation Commission, National Park.	2010	12	22 500m^2.	Healthy.
2F) NE of Swan View	Conservation Commission, National Park	2010	127		Healthy
2G) NE of Swan View	Conservation Commission, National Park	2010	54		Poor
2H) NE of Swan View	Conservation Commission, National Park	2011	1		Healthy
2I) NE of Swan View	Conservation Commission, National Park	2012	13		Healthy
3) NE of Swan View	Conservation Commission, National Park	2013	73		Healthy

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.

Plant numbers for sub-populations 1D, 1E and 2E are estimations; the remainder are precise counts of the plants at the locations from targeted surveys of the species.

Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.

The sub-populations in John Forrest National Park (four of the eleven known sub-populations) were unable to be found following a wildfire in the summer of 2003/2004, although surveys in 2006 located the populations once again. The decline in population size is natural for this species after a fire event, however if the interval between fires is too short, this may threaten the John Forrest National Park sub-populations (now totalling five of the eleven known sub-populations) as the species will not have time to set seed.

What is the extent of occurrence (in km^2) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence. If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.

D. andrewsii is known from two three populations with an extent of occurrence estimated to be approximately 17.08km^2. The area was calculated by drawing a boundary around the known populations to create a polygon and using data from DEC's Threatened Flora Database (DEFL) and a Geographical Information System program to calculate the area. The area of occupancy is estimated to be approximately 0.0359km^2, based upon population area calculations of eight of the eleven sub-populations.

Is the distribution of the species severely fragmented? Why?

The distribution of this species is considered severely fragmented as there is no continuous suitable habitat between the two locations, which are 17km apart. [Note, under IUCN guidelines this does not satisfy criterion for severely fragmented as main population in national park with extensive habitat (2016)]

Identify important occurrences necessary for the long-term survival and recovery of the species? This may include: key breeding populations, those near the edge of the range of the species or those needed to maintain genetic diversity.

All of the known populations of *D. andrewsii* are considered essential for the long-term survival of the species.

4.2. Survey effort

Describe the methods to conduct surveys. For example, (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.

Surveys have been completed during the species' known flowering period (July through October) for easy identification and detection.

Survey effort has included targeted species surveys and opportunistic surveys.

Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.

The species is most detectable during its flowering period (July through October), when its red flowers are visible.

Has the species been reasonably well surveyed? Provide an overview of surveys to date (include surveys of known occurrences and surveys for additional occurrences) and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size. Include comments on potential habitat and surveys that were conducted, but where the species was not present/found.

The species was first collected in 1901 by C. Anderson in Swan View. It was collected in Swan View again in 1927 and 1963. In 1964 it was collected in John Forrest National Park by A.S. George. It was collected again in this area by David Briggs in 1990 and given the DEFL population number of 2A. Pop 2A has been re-surveyed numerous times since, going from the 20 plants recorded in 1990, to 10 plants in 1992, 200 plants in 2000, 35 alive and 35 dead in 2003, 0 plants in 2005, and back up to 117 plants in 2006. Similarly, populations 2B and 2C (found in 1992 and 2003 respectively) have shown decreases after the wildfire in the summer of 2003/4, followed by an increase in 2006 when they were re-located post fire. F. Hort discovered pop 2D in 2006, consisting of 16 plants, and 2E in 2008, 164 plants.

Pop 1A was first collected in 1990 by J. Armstrong in a recreation reserve in Gidgegannup. In 1995 it was found that a sub-population also occurred in an adjacent private property (pop 1B), consisting of 120 plants. This reduced to only 25 plants when re-surveyed by N. Willers in 2005, at which time another sub-pop was found on the same private property (pop 1C), with a plant count of 58 mature plants. Here, in 2006, V. Clarke found that 10 plants were extending onto the adjoining road verge (pop 1D). V. Clarke also located another sub-pop on the opposite side of the road (pop 1F), with 10 plants, and a further sub-pop on that same private property (pop 1E), on the opposite side of the creek to pop 1B, with 30 plants. V. Clarke also re-surveyed pop 1A in the recreation reserve and only located 3 plants.

Research Associate, Fred Hort has completed over 87 hours of opportunistic survey for the species from August 2005 to January 2006, during which no new populations were located. These surveys included Julimar Conservation Park, Bindoon Training Area, City of Armadale, Wandering and Serpentine/Jarrahdale Shires, John Forrest National Park, Avon Valley National Park, Flat Rock Gully, Udamung Nature Reserve, proposed Helena National Park, Wandoo National Park, Gillingarra Nature Reserve, and other areas such as along road verges throughout areas which have similar habitats to the known *D. andrewsii* populations. He has also covered a large area of the Darling Scarp since 1998, whilst surveying for other Declared Rare Flora species.

Former Swan Region Flora Conservation Officer, Vanessa Clarke, completed many targeted surveys on private properties surrounding known populations of *D. andrewsii*, and on properties with similar habitat to known populations of *D. andrewsii*, without finding any new populations (apart from those listed above).

Based on the extensive amount of survey completed in the attempt to find any further occurrences of the species, it seems unlikely that any more major populations of the species will be found in the future (nominator's opinion).

4.3. Threats

Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:

a). how and where they impact this species

b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected

c). present supporting information/research

d). does it only affect certain populations?

e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

- **Fire:** *D. andrewsii* is killed by fire and regenerates from soil stored seed. In the summer of 1996/7 wildfire killed 50% of the plants at population 2A, within John Forrest National Park, leaving 35 plants. The population was then destroyed, along with the newly discovered 2B, 2C and 2D, when wildfire swept through again in the summer of 2003/4. The sub-populations showed no signs of regeneration in 2005 and substantial weed invasion was recorded at the sites. The 2006 monitoring of the subpopulations stated that *D. andrewsii* had regenerated well. Fire is therefore a threat to the population at John Forest National Park if it occurs before the species has had time to mature and set seed (time to seed unknown), with the potential for the species to become locally extinct in the National Park if fire is too frequent.
- **Weeds:** Currently weeds affect six of the eleven sub-populations, including all of the John Forrest National Park sub-populations, and they are noted as being a potential threat to a further two sub-populations. Weed species currently affecting the sub-populations include *Watsonia* and *Freesia* species. It was noted at population 2A that a substantial weed invasion occurred following the 2004 wildfire. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species.
- **Road, track and firebreak maintenance:** Slashing and grading activities associated with road maintenance also threaten the species, with two sub-populations occurring on road verges, three on private property, and the last of the sub-populations outside of John Forrest National Park occurring in a recreation reserve near an access track.
- **Public access/recreation:** Sub-population 1A in the recreation reserve, Gidgegannup, is located adjacent to an access track in an area used for camping. Therefore this sub-population is potentially at risk of direct damage (such as trampling and clearing), and indirect damage (such as habitat degradation caused by rubbish, etc.) caused by campers. All of the sub-populations within John Forest National Park are also at risk of damage caused by public access and recreation, being near the popular walking trails of the old railway tunnel and Rocky Pool.

If possible, provide information threats for each occurrence/location:

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)
1A) **Gidgegannup** Shire, Recreation Reserve.		Plants are growing adjacent to an access track in an area used for camping.	- Weeds - Road maintenance activities - Rubbish dumping.	4.4.7 4.4.1 4.4.3

1B) **Gidgegannup** Private Property			Firebreak maintenance activities.	4.4.3 4.4.7 4.4.9
1C) **Gidgegannup** Private Property			Firebreak maintenance activities.	4.4.3 4.4.7 4.4.9
1D) **Gidgegannup** Shire, road verge			-Road maintenance activities -Weeds	4.4.3 4.4.1
1E) **Gidgegannup** Private Property			Firebreak maintenance activities.	4.4.3 4.4.7 4.4.9
1F) **Gidgegannup** Shire, road verge		Weeds: Watsonia and grass species.	Road maintenance activities.	4.4.1 4.4.3
2A) **John Forrest National Park**	-Wildfire (2004) -Weeds (following 2004 wildfire).	Weeds: Watsonia, Freesia and other species.	-Too frequent fire - Public access/recreation.	4.4.2 4.4.1 4.4.7
2B) **John Forrest National Park**		Weeds: Watsonia, Freesia and other species.	-Too frequent fire - Public access/recreation.	4.4.1 4.4.2 4.4.7
2C) **John Forrest National Park**		Weeds: Watsonia, Freesia and other species.	-Too frequent fire - Public access/recreation.	4.4.1 4.4.2 4.4.7
2D) **John Forrest National Park**		Weeds: Watsonia.	-Too frequent fire - Public access/recreation.	4.4.1 4.4.2 4.4.7
2E) **John Forrest National Park**		Weeds.	-Too frequent fire - Public access/recreation.	4.4.1 4.4.2 4.4.7
2F)		Weeds, recreational activities (trampling)		
2G)		Weeds, recreational activities (trampling)		

2H)		Weeds, recreational activities, altered fire regimes		
2I)		Weeds, fire		
3		Weeds, altered fire regimes		

Identify and explain why additional biological characteristics particular to the species are threatening to its survival (e.g. low genetic diversity). Identify and explain any models addressing the survival of the species.

Unknown.

4.4. Management
Identify key management documentation for the species e.g. recovery plans, conservation plans, threat abatement plans etc.

There is no management documentation for this species.

Does this species benefit from the management of another species or community? Explain.

Although the Gidgegannup sub-populations are associated with the Declared Rare Flora species *Thelymitra dedmaniarum*, the actions listed this species' IRP (1999-2002) do not appear to have any benefits for the *D. andrewsii* populations.

How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.

Five of the eleven known sub-populations for this species are located in a National Park, and while management of threatened species is taken into account during operations such as fire prescription planning, identified threats still exist for this species.

D. andrewsii is not located on any land that is actively managed for the species.

Are there any management or research recommendations that will assist in the conservation of the species? Provide details.

Management and research recommendations that will assist in the conservation of *D. andrewsii* include:

1. Undertake weed control for those populations affected, ensuring that chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on *D. andrewsii*.
2. Identify appropriate intensity and interval of fire to promote seed germination and/or vegetation regeneration and implement an appropriate fire management regime.
3. Ensure road and firebreak maintenance activities in areas where *D. andrewsii* occurs do not adversely impact on known populations.
4. Investigate options for linking, enhancing or establishing additional populations as species is only known from two locations.
5. Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment.
6. Implement national translocation protocols (Vallee *et al*., 2004) if establishing additional populations is considered necessary and feasible.
7. Minimise adverse impacts from land use at known sites, including public access on public land and suitably managing access on private land.
8. Raise awareness of *D. andrewsii* within the local community. (eg. providing local property owners with fact sheets and organising field days in conjunction with known industry or community interest groups).
9. Investigate formal conservation arrangements, management agreements and covenants on private land.

4.5. Other

Is there any additional information that is relevant to consideration of the conservation status of this species?

SECTION 5. NOMINATOR

Nominator(s) name(s)	
Organisation(s)	
Address(s)	
Telephone number(s)	
Email(s)	
Date	16th December 2008

If the nomination has been refereed or reviewed by experts, provide their names and contact details.

- Stefan De Haan, District Manager, Perth Hills District, DEC.
- Vanessa Clarke, Project Officer, Species and Communities Branch, DEC. (previously Flora Conservation Officer, Swan Region).
- Fred and Jean Hort, WA Herbarium Research Associates.

SECTION 6. REFERENCES

What references or sources did you use to prepare your nomination? Include written material, electronic sources and verbal information. Include full references, address of web pages and the names and contact details of authorities with whom you had verbal communications.

Bureau of Meteorology (BOM) 1993, *Climate statistic for Kalamunda*, Australian Government, viewed 4 December, http://www.bom.gov.au/climate/averages/tables/cw_009058.shtml

Department of Environment and Conservation (DEC) 2008, *FloraBase- Diplolaena andrewsii*, viewed 4 December 2008, http://florabase.dec.wa.gov.au/browse/profile/4452

Department of Environment and Conservation (DEC) 2008, Records held in DEC's Declared Flora Database and rare flora files. WA Department of Environment and Conservation (DEC).

Marchant, N, Wheeler, J, Rye, B, Bennett, E, Lander, N & Macfarlane, T 1987, *Flora of the Perth Region*, Western Australian Herbarium, Western Australia, pp. 486.

Vallee, L, Hogbin, T, Monks, L, Makinson, B, Matthes, M & Rossetto, M 2004, *Guidelines for the Translocation of Threatened Plants in Australia - Second Edition*, Australian Network for Plant Conservation, Canberra.

Western Australian Herbarium (1998–) *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/.