

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this Conservation Advice and included this species in the Critically Endangered category, effective from 07/12/2016

Conservation Advice

Sphaerolobium acanthos

Grampians globe-pea

Taxonomy

Conventionally accepted as *Sphaerolobium acanthos* Crisp.

Summary of assessment

Conservation status

Critically Endangered: Criterion 3 C2a(i)

The highest category for which *Sphaerolobium acanthos* is eligible to be listed is Critically Endangered.

Sphaerolobium acanthos has been found to be eligible for listing under the following categories:

Criterion 2: B1B2ab(v): Endangered

Criterion 3: C2a(i): Critically Endangered

Criterion 4: Endangered

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see

<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided by Victoria to list *Sphaerolobium acanthos*.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 31 business days between 20 June 2016 and 1 August 2016. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species information

Description

Sphaerolobium acanthos (Grampians globe-pea) is an erect, perennial, shrub and is a member of the family Fabaceae. The plant grows to 1 m tall, has rigid stems and branches with rough surfaces, and has numerous spiny branchlets. The leaves are scattered to semi-whorled, slender and tapering, and 2–3 mm long. The leaves are easily detached and shed at an early stage so that the adult plants are leafless. One to two flowers occur on short stalks along the branchlets. The plant flowers in summer (November – January) and its petals are yellow, orange or reddish-brown and around 7–7.5 mm long. It fruits in January and February and its pods are approximately 4.5 mm long and 3.5 mm wide. Each pod contains one to two seeds, which are approximately 1.5 mm in length (Crisp 1994; Jeanes 1996).

Distribution

The Grampians globe-pea is endemic to the Grampians National Park in western Victoria, which is managed by Parks Victoria. It has only been recorded in the Halls Gap – Mt William area and the Victoria Valley (Crisp 1994; Jeanes 1996; AVH 2016). The Grampians globe-pea is found in sclerophyll forest, woodland and heathland where it has been recorded on lower slopes, gullies and near streams (Crisp 1994; Jeanes 1996; SAC 2014). This species sometimes occurs beside tracks and roads (SAC 2014). Herbarium records indicate that one population of the Grampians globe-pea occurred on land that is now the site of the Halls Gap Caravan Park (SAC 2014), however, this record is likely to be incorrect (Walsh pers. comm., 2016).

At the time of the Victorian Scientific Advisory Committee's assessment of the species in 2014 the species was known from three small, disjunct populations with a total population size of fewer than 50 individual plants (SAC 2014). Herbarium records indicate the species was once more widespread throughout the park (AVH 2016) and SAC (2014) noted that there were five known populations in 1949. Following further survey effort in 2015 a new population containing six individual plants was found, as well as an additional 30 plants at a known population (Reiter pers. comm., 2016). Therefore in 2015 the total population size was estimated to be fewer than 70 individual plants across four populations, with the largest population containing fewer than 50 individual plants. Further field work conducted by the Royal Botanic Gardens Victoria in 2015 within the Grampians National Park failed to locate any additional populations (VIC SAC pers. comm., 2016).

The area of occupancy (AOO) of the Grampians globe-pea is estimated to be 20 km² and the extent of occurrence (EOO) is estimated to be 86 km² (Department of the Environment and Energy 2016).

Relevant biology/ecology

The Grampians globe-pea is likely to be an obligate seeding plant, where the adult plants are killed by fire but the fire acts as a cue for seed germination (Reiter pers. comm., 2016). However, there is one herbarium record of an adult plant resprouting following fire (Walsh pers. comm., 2016a). Bushfires are known to have occurred within the Grampians National Park, however the impact of these events on the Grampians globe-pea is uncertain.

The method of pollination for the Grampians globe-pea was not known at the time of this assessment, however members of the genus *Sphaerolobium* from Western Australia are pollinated by insects (Western Australian Herbarium 2008) and therefore it is likely this species is also insect pollinated, most likely by native bees of the order Hymenoptera. Without genetic data it is not possible to assess whether gene flow is occurring between populations. At two populations, no recruitment was observed during surveys undertaken in 2011, 2013 and 2015 (Reiter pers. comm., 2016; SAC 2014). Unlike some pea species, the Grampians globe-pea gives the appearance of being slow growing both in the wild and in cultivation (Walsh, pers. comm., 2016b).

Seed collected from three populations of the Grampians globe-pea has been stored for long term conservation (Reiter 2016). An ex-situ collection of 60 plants has been established at the Royal Botanic Gardens Victoria using vegetative material from several individuals within one population. If cultivation techniques are successful, these plants will be used for seed orcharding when they mature (Reiter 2016; Walsh pers. comm., 2016a). Research into the optimum propagation methods using both seed and tissue was commenced by the Royal Botanic Gardens Victoria in 2015. This research will include testing standard techniques of germination including scarification, hot water and smoked water (Reiter 2016).

Threats

Table 1 – Threats impacting the Grampians globe-pea in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type	Threat status	Evidence base
Invasive species			
Grazing by introduced herbivores, including goats and deer	known	current	Grazing by goats (<i>Capra hircus</i>) and deer (family Cervidae) is a significant threat to the Grampians globe-pea. At one site grazing on the Grampians globe-pea by goats was so bad that some of the plants had been eaten to a nub and no fruit was setting (Reiter 2016). Grazing may lead to a depletion of the soil seed bank and continuous removal of new shoots will eventually kill standing plants. Goats and deer occur within the Grampians National Park and graze on native vegetation, thereby preventing regeneration (Parks Victoria 2003).
Disease			
Disease caused by <i>Phytophthora cinnamomi</i>	known	current	Infection by <i>Phytophthora cinnamomi</i> is a significant threat to the Grampian's globe-pea. Reiter et al., (2004) found that the Grampians globe-pea is susceptible to infection by <i>P. cinnamomi</i> . The risk of extinction from infection was found to be low to moderate, based on a calculation using information on susceptibility, presence of the pathogen and proximity of the species to roads and tracks (Reiter et al., 2004). <i>Phytophthora cinnamomi</i> is present and spreading naturally in the Grampians National Park (Parks Victoria 2003; SAC 2014). Vegetation in the area, including the Grampians globe-pea, is showing signs of dieback and the cause may be <i>P. cinnamomi</i> (SAC 2014). Populations occurring in proximity to tracks and roads are at increased risk from infection.
Grazing			
Grazing by swamp wallabies	potential		Grazing by swamp wallabies (<i>Wallabia bicolor</i>) is also potentially of concern as the numbers of swamp wallabies in the Grampians has increased dramatically over the past decades (Hamilton Field Naturalists Club 2006; Walsh pers. comm., 2016a).

Fire			
Season, severity and frequency	potential		As an obligate seeding species, the soil seed bank would be rapidly depleted if fires occur in the wrong season, before juvenile plants reach maturity and replenish the soil seed bank, are too severe or are too frequent. Prescribed fire should occur no more frequently than an approximately decadal cycle to allow some replenishment of the soil seed bank, particularly following a large bushfire event. A significant fire passed through the Grampians National Park in 2006, the effect of which upon the Grampians globe-pea is unknown, although a previously unknown population was found following this fire in an area that had been severely burnt (Walsh pers. comm., 2016a). In 2014 a bushfire swept through the northern end of the park (Parks Victoria 2016), including an area where one population of the Grampians globe-pea had been recorded but the effect of the fire on the population is unknown.
Habitat loss and fragmentation			
Track and road maintenance	potential	future	As populations occur near roads and tracks within the Grampians National Park (SAC 2014), maintenance of these roads and tracks may cause the loss, degradation or fragmentation of habitat for the Grampians globe-pea.

How judged by the Committee in relation to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) criteria and regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>	<p><i>based on any of the following:</i></p> <ul style="list-style-type: none"> (a) direct observation [except A3] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites 		

Evidence:

Insufficient data to determine eligibility

In 2015 there were fewer than 70 individual plants of the Grampians globe-pea known in the wild. The number of known populations has decreased from five separate populations to three, with a new population discovered in 2015. However, the associated decrease in the number of individual plants is unknown. The generation length of the Grampians globe-pea is unknown.

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion 2 B1B2ab(v) for listing as Endangered

The EOO of the Grampians globe-pea across its known range is 86 km². Therefore the EOO is *very restricted* (< 100km²). The AOO of the species across its known range, based on 2 x 2 km grids, is 20 km². Therefore the AOO is *restricted* (<500 km²).

In 2015 there were fewer than 70 individual plants of the Grampians globe-pea known in the wild found across four populations (≤ 5). There is a projected decline in the number of mature individuals due to grazing by goats and deer and the presence of *P. cinnamomi* in the Grampians National Park.

The Committee considers that the species' extent of occurrence as very restricted and area of occupancy is restricted, and the geographic distribution is precarious for the survival of the species because there are fewer than five populations and decline in mature individuals may be inferred or projected. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

Criterion 3. Population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

Eligible under Criterion 3 C2a(i) for listing as Critically Endangered

The population size for the Grampians globe-pea is *very low*, with fewer than 70 individual plants known in the wild in 2015, found across four populations. The number of individuals in each population is ≤ 50.

There is a projected decline in the number of mature individuals due to grazing by goats and deer and the presence of *P. cinnamomi* in the Grampians National Park.

The Committee considers that the estimated total number of mature individuals of this species is very low, and the geographic distribution is precarious for the survival of the species because there are fewer than 50 mature individuals in each subpopulation and decline in number of individuals may be inferred or projected. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 3 to make it eligible for listing as Critically Endangered.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

Eligible under Criterion 4 for listing as Endangered

The population size for the Grampians globe-pea is *very low* with fewer than 70 individual plants known in the wild in 2015. This estimate is based on survey work carried out at extant and previously known locations of the species between 2000 and 2015.

The Committee considers that the total number of mature individuals is fewer than 70 which is very low.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Insufficient data to determine eligibility

Population viability analysis has not been undertaken

Conservation actions

Recovery plan

A Recovery Plan is not required for the Grampians globe-pea; the approved Conservation Advice for the species will provide sufficient direction to implement priority actions, mitigate against key threats and enable recovery.

Primary conservation actions

1. Minimise the impact of feral herbivores.
2. Minimise the spread of *P. cinnamomi* into the habitat of the Grampians globe-pea and mitigate the impact of *P. cinnamomi* if it is found there.

Conservation and management priorities

Invasive species

- Manage sites to identify, control and reduce the spread of feral herbivores, such as goats and deer, and to minimise browsing by swamp wallabies within the Grampians National Park.
- Construct fencing to exclude feral herbivores, such as goats, deer, and wallabies from populations of the Grampians globe-pea where grazing by feral herbivores is identified to be a significant issue to recruitment and/or mortality.

Disease

- Minimise the spread of *P. cinnamomi* to uninfected habitat of the Grampians globe-pea within the Grampians National Park by modifying human activities via education, restricting access to sites and, when access is necessary, deploying and enforcing hygiene procedures in line with the 'Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*' (Department of the Environment 2014) and 'Victoria's Public Land *Phytophthora cinnamomi* Management Strategy' (DSE 2008).
- Monitor the Grampians globe-pea and nearby plants for the presence of *P. cinnamomi* and other *Phytophthora* species. If presence is detected, undertake measures to manage its impact at these infested sites through the use of phosphate treatments, fumigants, specific vegetation destruction and containment barriers, in line with the 'Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*' (Department of the Environment 2014) and 'Victoria's Public Land *Phytophthora cinnamomi* Management Strategy' (DSE 2008).

Seed collection, propagation and other ex situ recovery action

- Maintain the population in cultivation at the Royal Botanic Gardens Victoria and establish other genetically-diverse populations in institutions such as the Australian National Botanic Gardens.
- Undertake appropriate seed collection from all natural populations to manage the risk of losing genetic diversity. Store seed at appropriate institutions, including the Victorian Conservation Seedbank and the Royal Botanic Gardens Victoria and undertake tests to determine viability of stored seed.
- Establish additional plants within the Grampians National Park in both new, appropriate and secure sites as well as known sites, ensuring that genetic diversity is maintained. Implement the national translocation protocols of Vallee et al. (2004).

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the Grampians globe-pea, that they support rather than degrade the habitat necessary for the species, that they do not promote the invasion of exotic species, and that they do not increase impacts of grazing.
- Physical damage to the habitat and individuals of the Grampians globe-pea must be avoided during and after fire operations.
- Fire management authorities and Parks Victoria should use suitable maps and install field markers to avoid damage to the Grampians globe-pea.
- Avoid the use of managed fire for research and other activities that impact upon the persistence of the population unless there is evidence to show the impact would have a positive and enduring effect on the species persistence.

Habitat loss, disturbance and modifications

- Ensure land managers are aware of the species' location and provide protection measures against key and potential threats to the species' habitat, including road and track maintenance within the Grampians National Park.

Stakeholder Engagement

- Raise awareness with visitors to the Grampians National Park of the presence of the Grampians globe-pea and the threat to the species from infection by *P. cinnamomi*. Ensure visitors are aware of and follow hygiene protocols.
- Promote opportunities for relevant partners to participate in recovery efforts for the Grampians globe-pea, for example the Friends of Grampians Gariwerd group.

Survey and monitoring priorities

- Conduct targeted surveys throughout the range of the Grampians globe-pea to better define its distribution and abundance. Accurately identify potentially suitable habitat and undertake survey work to locate and map additional populations.
- Establish and maintain a monitoring program based on these data to:
 - determine trends in population size and distribution, mortality and timing of life history stages;
 - determine threats and their impacts; and
 - monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

- Monitor the size and structure and reproductive status of populations at different stages in the fire cycle, taking opportunities to monitor after planned and unplanned fires (where they occur) and improve understanding of the fire response of the species.
- Precise fire history records must be kept for the habitat and extant populations (confirmed and suspected) of the Grampians globe-pea.

Information and research priorities

- Assess the species' ecological requirements relevant to the persistence of the species, including investigating regenerative status, age of maturity and senescence, generation length, seed bank status and longevity and fecundity.
- Determine more precisely the germination requirements for the species. Determine the seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli, including responses to magnitude and duration of heating. Undertake vegetative propagation trials to determine the requirements for successful establishment, including the role of fire season and severity on establishment. Implement an annual census to monitor emergence and re-sprouting success.
- Improve understanding of the mechanisms of response to different fire regimes and identify appropriate fire regimes for conservation of the Grampians globe-pea by undertaking appropriately designed experiments in the field and/or laboratory. Fire trials should only be undertaken as a last resort when all other means of regeneration of the species has been investigated and, in addition, all weed management and fire impacts including the timing of fire impacts are fully understood.
- Investigate options for linking, enhancing or establishing additional populations.

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 Critically Endangered category:
Sphaerolobium acanthos
- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

07/09/2016

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