

Epacris virgata

Pretty heath



Close up image of flowers

© Paul Black

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Scientific name: *Epacris virgata* Hook.f.

Common name: pretty heath (Wapstra et al 2005)

Previous names: *Epacris virgata* (Beaconsfield) TSS 2010, *Epacris exserta* var. *virgata* (Hook.f.) Benth.

Group: Vascular plant, dicotyledon, family Ericaceae

Status: *Threatened Species Protection Act 1995*: **vulnerable** (under consideration for endangered)

Environment Protection and Biodiversity Conservation Act 1999:
endangered

IUCN Red List: Not listed

Distribution: Biogeographic origin: **Endemic to Tasmania**

Tasmanian NRM Region: **North**

Tasmanian IBRA region (Version V6): **Northern Slopes**



Figure 1. The distribution of *Epacris virgata*, showing IBRA regions (from Natural Values Atlas)



Plate 1. *Epacris virgata* © Paul Black

SUMMARY: *Epacris virgata* (pretty heath) is a woody shrub, endemic to Tasmania and only known from one small area near Beaconsfield. It is strongly associated with serpentinite in the Dazzler Range where it co-occurs with other endemic flora. Its distribution is extremely restricted, and it is under threat from mining, inappropriate fire regimes, and *Phytophthora* suggesting that future declines are highly probable. The key management actions needed for the species include strengthening habitat protection, implementing fire management, and minimizing spread of *Phytophthora*.

IDENTIFICATION AND ECOLOGY

Epacris virgata is a woody shrub in the Ericaceae family, endemic to the Dazzler Range in northern Tasmania, where it is confined to areas with serpentinite geology (Keith 1998). It grows up to 2.5 m tall and occurs in heathy or shrubby woodlands and forests on ultramafic substrates. The species is most easily identified during its peak flowering period, mid to late October.

Pollinators of *Epacris* species include a variety of adult carrion flies from the families Tabanidae, Muscidae and Calliphoridae (Keith 1998). Seed production depends on plant size, fire history and shading by the canopies of neighbouring plants, but individuals can produce several thousand seeds per year (Keith 1998). Seed release occurs in late summer to early autumn (Keith 1998), and seed dispersal is very localised, usually being limited to within a few metres of parent plants.

Epacris virgata accumulates a persistent soil seed bank, and germination is cued by the passage of fire. There are also anecdotal reports of plants resprouting following fire, suggesting that the species is a facultative resprouter. The average lifespan of *Epacris virgata* is unknown, although it is likely to be in the order of 30–40 years based on other *Epacris* species (Keith 1998).

Description

Epacris virgata is an erect shrub, branching near the base, growing up to 2.5 m tall. Its branches are slender, bearing thick ovate flat leaves, 4 to 6 mm long and 2 to 3 mm wide with short stalks (<1 mm long), an obtuse-acute apex and a semi-conspicuous mid-vein on the lower surface.

Flowers are white, solitary in the leaf axils, subsessile and scattered sparsely along new branches. Style 4 to 4.5 mm long; stigma and anthers prominently exserted from the corolla tube which is 2.5 to 3 mm long and has five lobes 3.5 to 4.2 mm long. The species is distinguished by its long virgate ultimate branches, non-pungent leaves and prominently exserted floral parts (Keith 1998).



Plate 2. *Epacris virgata* © Paul Black

There are 28 taxa of *Epacris* in Tasmania, 22 of which are endemic. *Epacris virgata* is one of ten allied taxa in the '*Epacris tasmanica* complex' (Crowden 2007).

Survey techniques

Surveys for *Epacris virgata* should ideally be undertaken during peak flowering time (October), although the species can be detected any time of year. Old flower spikes are almost always present to aid identification. However, differentiating between taxa in the *Epacris tasmanica* complex is difficult and requires a high level of skill. Expert advice should be sought if uncertain about identification.

Care should be taken when conducting surveys to avoid spreading *Phytophthora cinnamomi* by ensuring that field equipment, including footwear, is disinfected.

Taxonomic issues

Epacris virgata has been the subject of considerable taxonomic debate. The species was first collected by Ronald Gunn in 1843 from ‘Asbestos Hills near Yorktown’ and was considered to be restricted to the West Tamar region (Curtis 1962). However, a taxonomic revision of the *Epacris tasmanica* complex (Crowden & Menadue 1990) amended the description of *E. virgata* to include populations from the Channel–Tasman Peninsula areas in the State’s south, previously attributed to *E. tasmanica*.

Despite this, Keith (1998) treated populations of *Epacris virgata* in the north and south of the State as separate taxa, referring to them as *Epacris virgata* [*sensu stricto*] and *Epacris virgata* (Kettering), respectively. Keith’s treatment was reinforced by a genetics study by Gilmour *et al.* (2000) which found substantial genetic differentiation between the two disjunct populations. The revised *Flora Recovery Plan: Threatened Tasmanian Forest Epacrids* (Threatened Species Section 2010) followed Keith’s treatment. However, these informal taxa were never formally recognised by the Tasmanian Herbarium.

In 2023, the Tasmanian Herbarium reviewed specimens of *Epacris virgata* and concluded that collections from State’s south belong to *E. tasmanica*, leaving *Epacris virgata* confined to the Dazzler Range (M. de Salas pers comm 2023).

Confusing species

Epacris virgata is unlikely to be confused with any other species within its known range. However, it is closely related to several other species in the ‘*Epacris tasmanica* complex’. The allied *Epacris tasmanica* has pointed leaves rather than blunt leaves, while *Epacris exserta* and *Epacris moscaliana* have flowers that tend to be clustered at the branch tips rather than forming long sprays.

DISTRIBUTION AND HABITAT

Epacris virgata is endemic to Tasmania, where it is restricted to the Dazzler Range near Beaconsfield. The distribution of the species is extremely restricted, with an extent of occurrence estimated to be just 18 km² and area of occupancy of 36 km².

The species is strongly associated with Cambrian serpentinite, peridotite and associated ultramafic geologies. Serpentine substrates are known worldwide for their high local endemism, and the pronounced boundaries of the *Epacris virgata* population indicate that this species is a serpentine endemic (Brown *et al* 1986).

Epacris virgata grows in heathy or shrubby sclerophyll woodland and forest (Gibson *et al.* 1992). Associated species include *Eucalyptus amygdalina* (black peppermint), *Eucalyptus ovata* (black gum), *Allocasuarina littoralis* (black sheoak), *Leptospermum scoparium* (common teatree), *Hibbertia riparia* (erect guineaflower) and *Euryomyrtus ramosissima* (rosy heathmyrtle). Co-occurring threatened species include *Spyridium obcordatum* (creeping dustymiller) and *Tetratheca gunnii* (shy pinkbells).

The elevation range of recorded sites is 10–140 m above sea level.

POPULATION PARAMETERS

Number of subpopulations: 1

Number of locations: 2

Extent of occurrence: 36 km²

Area of occupancy: 36 km²

Number of mature individuals: >1.7 million

Epacris virgata is currently known from one subpopulation (Table 1), albeit one that is spread patchily over a linear distance of almost 7 km. An outlying subpopulation was thought to occur at Pipers River Regional Reserve, 40 km south-east of Beaconsfield, however the Tasmanian Herbarium now considers these specimens to be *Epacris exserta*. All other specimens previously attributed to *Epacris virgata* from the State’s south belong to *Epacris tasmanica*.

Table 1. Population summary for *Epacris virgata* (Beaconsfield)

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen	Number of plants
1	Beaconsfield	Dans Hill Conservation Area, Anderson Creek Regional Reserve, Future Potential Production Forest & private land	North	Beaconsfield, Bell Bay, Harford & Port Sorell	2021 (1843)	c. 1,700,000 * (\pm 400,000)

* Mean estimates from Keith (1997), North Barker Ecosystem Services (2008a & b) and TSS surveys in 2010.

The total population size of *Epacris virgata* is estimated to be at least 1.7 million individuals based on survey data (Table 1). It has been speculated that the actual number could be in excess of 2 million individuals (North Barker Ecosystem Services 2008b), with anecdotal reports from pre-mining surveys suggesting that the total population may be in the order of 3 million (P. Barker, pers. comm., 2010).

RESERVATION STATUS

Epacris virgata is reserved within Dans Hill Conservation Area and Andersons Creek Regional Reserve. About 60% of the area known to support *Epacris virgata* occurs within Dans Hill Conservation Area, with the remainder split about equally between Andersons Creek Regional Reserve, Permanent Timber Production Zone land, and unreserved private land. Note that mining is permitted in most Conservation Areas and all Regional Reserves.

CONSERVATION STATUS

Epacris virgata is currently listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995* (TSP Act). It was reassessed in June 2023 using the listing guidelines and meets the criteria for listing as endangered on the Tasmanian *Threatened Species Protection Act 1995* (TSP Act), satisfying criterion 2:

Extent of occurrence estimated to be less than 5000 km², and

- known to exist at <5 locations, and;
- continuing decline projected in the area, extent and quality of habitat, and number of mature individuals.

It is therefore under consideration for uplisting to endangered under the TSP Act. Refer to Appendix A for further information about the listing assessment for *Epacris virgata*.

It is also listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

It also qualifies as Endangered using IUCN Red List criteria: B1ab(ii,v) + B2ab(ii,v).

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

The main threat to *Epacris virgata* is mineral exploration/extraction; other threats include inappropriate fire regimes, and infection by the exotic soil-borne plant pathogen *Phytophthora cinnamomi*.

Mineral extraction: Mining is the primary threat to *Epacris virgata* due to its occurrence on ultramafic geology. Mineral exploration and extraction is currently permitted within Dans Hill Conservation Area, Andersons Creek Regional Reserve and the Future Potential Production Forest. Currently about half of the *Epacris virgata* population is covered by a mining lease. An open-cut nickel mine was proposed within the species' range in 2009 which had the potential to impact about 30% of the population known at that time, viz., 500,000 of 1,700,000 (figures derived from North Barker Ecosystem Services (2008a & 2008b)). The mine did not eventuate, however the mining lease persists. The potential threat of mining is likely to continue in the future and could have a significant impact on the species.

Inappropriate fire regimes: Frequent fires (<5 year intervals) have the potential to impact the species. While *Epacris virgata* germinates in response to fire, the seedlings need sufficient time to mature and replenish the soil seed bank before the next fire. The last fire in the species' habitat occurred in January 2010 which burnt about 70% of the population. Several smaller fires occurred in Dans Hill just prior to this (in 2006 and 2007). Post-fire regeneration is strongly dependent on rainfall and recruitment failures in *Epacris* can occur if follow-up rains are not forthcoming. Another factor which can potentially limit post-fire recruitment is browsing from native herbivores. Long-term exclusion of fire (i.e., >30 years between fires) could also cause the population to decline due to lack of recruitment.

Disease: *Epacris virgata* is known to be highly susceptible to the exotic soil-borne plant pathogen *Phytophthora cinnamomi* under laboratory conditions (Barker 1994), and localised infections were observed in the field in the mid-1990s (Keith 1997). However, more recent field observations indicate that, aside from *Xanthorrhoea australis* (southern grasstree), there are fewer visible signs of *Phytophthora* than would be expected given the significant amount of human activity across the site through firewood collection and recreation activities. It is speculated that this may be due to suppressive effects of the local saprolite soils (North Barker Ecosystem Services 2008a & 2008b). A precautionary approach is recommended regarding the risk of *Phytophthora*, especially given the warmer temperatures predicted due to climate change which could exacerbate the spread of the pathogen.

MANAGEMENT STRATEGY

Management objectives

By 2033, the risk of mining on *Epacris virgata* is reduced and other threats are managed with the population increasing or stable.

What has been done?

Surveys for the species were undertaken as part of the Regional Forest Agreement (RFA) between Tasmania and the Commonwealth of Australia (Keith 1997), and during pre-mining

surveys (North Barker Ecosystem Services 2008a & 2008b).

The significance of the ultramafic zone near Beaconsfield was recognised during the RFA process, resulting in the creation of Dans Hill Conservation Area. Land was annexed from State Forest (production or Forest Reserve at the time) or acquired from private landowners using Commonwealth funds through the Private Forest Reserves Program.

Part of Dans Hill Conservation Area is a designated *Phytophthora cinnamomi* management area (Schahinger *et al.* 2003). Any activity proposed in such areas is evaluated against the risk of introducing or spreading the pathogen and, where necessary, prescriptions implemented to mitigate that risk.

Seed has been collected from the population for long-term storage as part of the Millennium Seedbank Conservation Project, a joint project between Kew Gardens, the Royal Tasmanian Botanical Gardens, the Tasmanian Herbarium and the Department of Natural Resources and Environment.

Epacris virgata was included in the *Flora Recovery Plan: Threatened Tasmanian Forest Epacrids* (Threatened Species Section 2011) under the name *Epacris virgata* (Beaconsfield).

What is needed?

Agencies, groups or individuals may assist with some or all of the following recovery actions (coordinated efforts may achieve the best and most efficient results):

- Upgrade the reservation status of Dans Hill Conservation Area and Anderson Creek Regional Reserve to Nature Reserve status under the *Tasmanian Nature Conservation Act 2002* and annex part of the Future Potential Production Forest to establish a cohesive management area;
- Undertake extension surveys of ultramafic substrates in the wider Beaconsfield area;
- Prepare and implement an ecological burning program for management of the species' habitat;

- Rationalise tracks through the species' habitat to minimise the risk of disease spread;
- Undertake monitoring of the known population to determine the level of recruitment and/or plant loss and to better inform management prescriptions;
- Provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents on the locality, significance and management of known subpopulations and potential habitat.

REFERENCES

- Barker, P.C.J. (1994) *Phytophthora cinnamomi*: The susceptibility and management of selected Tasmanian rare species. Forestry Tasmania and Australian Nature Conservation Agency.
- Crowden, R.K. (2007) Additions to *Epacris* (Epacridoidae, Ericaceae) in Tasmania. *Muelleria* 25: 115–128.
- Crowden, R.K., & Menadue, Y. (1990) Morphometric analysis of variance in the “*Epacris tasmanica* Complex” (Epacridaceae). *Australian Systematic Botany* 3: 253–264.
- Curtis, W.M. (1963) *The Student's Flora of Tasmania. Part 2*. Government Printer, Tasmania.
- Gibson, N., Brown, M.J., Williams, K., & Brown, A.V. (1992) Flora and vegetation of ultramafic areas in Tasmania. *Australian Journal of Ecology* 17: 297–303.
- Gilmour, C.A., Crowden, R.K., Vaillancourt, R.E., & Koutoulis, A. (2000) Genetic variation in the *Epacris tasmanica* complex (Epacridaceae). *Papers and Proceedings of the Royal Society of Tasmania* 134: 75–78.
- Keith, D. (1997) *The distribution and population status of rare Tasmanian forest Epacrids*. Unpublished report, Nature Conservation Branch, Tasmanian Parks and Wildlife Service, Hobart.
- Keith, D. (1998) *Recovery Plan – Tasmanian Forest Epacrids 1999–2004*. Tasmanian Parks and Wildlife Service, Hobart.
- North Barker Ecosystem Services (2008a) Barnes Hill and Mt Vulcan – Beaconsfield Nickel Laterite Resource: Botanical Survey and Fauna Habitat Assessment. Report for Proto Resources and Investments.
- North Barker Ecosystem Services (2008b) Nickel Laterite Mine and Infrastructure, Barnes Hill Mining Lease Area (Planning Document): Botanical Survey and Fauna Habitat Assessment. Report for Proto Resources and Investments.
- Schahinger, R., Rudman, T. & Wardlaw, T. (2003) *Conservation of Tasmanian Plant Species & Communities threatened by Phytophthora cinnamomi*. Strategic Regional Plan for Tasmania. Technical Report 03/03, Nature Conservation Branch, Department of Primary Industries, Water and Environment, Hobart.
- Threatened Species Section (2011) *Flora Recovery Plan: Threatened Tasmanian Forest Epacrids*. Department of Primary Industries, Parks, Water and Environment, Hobart.
- Wapstra, H., Wapstra, A., Wapstra, M., & Gilfedder, L. (2005) *The Little Book of Common Names for Tasmanian Plants*. Department of Primary Industries, Water and Environment, Hobart.
- Brown, M.J., Bayly-Stark, H.J., Duncan, F., & Gibson, N. (1986) '*Tetratheca gunnii* Hook. f. on serpentine soils near Beaconsfield, Tasmania', *Papers and Proceedings of the Royal Society of Tasmania*, vol. 120, pp. 33–38.
- Prepared** by Threatened Species Section in 2023 under the provisions of the Tasmanian *Threatened Species Protection Act 1995*.
- Cite as:** Threatened Species Section (2024) *Listing Statement for Epacris virgata (pretty heath)*. Department of Natural Resources and Environment, Tasmania.
- View:** www.naturalvaluesatlas.tas.gov.au
<https://nre.tas.gov.au/conservation/threatened-species-and-communities/lists-of-threatened-species/full-list-of-threatened-species>
www.threatenedspecieslink.tas.gov.au

Contact details: Threatened Species Section,
Department of Natural Resources and
Environment Tasmania, GPO Box 44, Hobart,
Tasmania, Australia 7001. Ph: 1300 368 550.
threatenedspecies.enquiries@nre.tas.gov.au

Permit: It is an offence under Tasmanian
legislation to collect, catch, damage, injure,
destroy, or kill a threatened species listed under
the *Threatened Species Protection Act 1995*, without
a permit.

Revision history

Version	Date	Author	Reason/purpose
1.0	28/8/2023	J. Quarmby (TSS)	The original draft was written by Richard Schahinger, and revised by Joe Quarmby in 2023. The first version submitted to the Threatened Species Scientific Advisory Committee (SAC) as part of a reassessment of the species.
1.1	4/1/2024	J. Quarmby (TSS)	Minor changes made to incorporate comments from the Threatened Species SAC and Community Review Committee (CRC).

Attachment A – Listing Assessment for *Epacris virgata*, June 2023

ASSESSMENT PARAMETERS SUMMARY

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	1,700 000	1,600 600	3,000 000	Estimate based on survey data from North Barker and TSS in 2007 and 2010, respectively. Max value based on anecdotal information from Phil Barker.
Trend	Unknown, but it is suspected that a future decline is possible given the threats to the taxon.			No formal data on population trends. Anecdotal reports suggest that the population is stable, however decline could go undetected without formal monitoring due the large numbers of individuals.
Generation length (years)	30	30	40	Estimate based on similar <i>Epacris</i> species in Keith (1998).
Extent of occurrence	36	15	36	EOO calculated using a convex hull around all records of occurrence is 15 km ² (minimum value). This is less than the AOO (36 km ²), so the EOO was changed to make it equal to AOO as per the IUCN Guidelines.
Trend	Stable. But given the extremely restricted EOO there is potential for future decline if peripheral plants are lost.			Limited evidence to suggest the EOO has declined. It is possible that the species was historically more extensive given the land clearance that has occurred in surrounding areas, especially to the east. There are several historical records that fall just outside the known extent, but these have less precise coordinates and could have been collected within the known range.
Area of Occupancy	36	36	44	AOO calculated using 2 x 2 km grid square overlayed on records of occurrence with a spatial accuracy >100m. Max value includes all known records.
Trend	Stable. But considering the threats to the taxon, a future decline in AOO is possible.			No evidence that the AOO has declined.
Number of subpopulations	1	1	1	Subpopulations calculated using a 500m radii around known occurrences.
Trend	Stable.			No evidence to suggest the species previously occurred in other areas.
Basis of assessment of subpopulation number	Previous surveys in other areas with ultramafic soils suggest that there is only a single subpopulation.			

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
No. locations	2	1	4	Threats used to define locations: Mining: the entire population is on ultramafic geology and is at risk from nickel mining. There is a mining lease across about half of the species' range, and therefore the species is considered to occur in two locations (within and outside the mining lease). The minimal plausible value is 1 based on the entire population being on ultramafic rocks containing nickel deposits. The maximum value is 4 based on the different land tenures (but note that mining is allowed across all the land tenures including Conservation Areas and Regional Reserves).
Trend	Stable.			No evidence to suggest the species previously occurred in other locations.
Basis of assessment of location number	<p>The species is considered to occur in two locations based on the threat of mining because there is a mining lease over half of the population, with the remainder of the population occurring outside of the mining lease (but still on ultramafic geology). Mining is permitted in Conservation Areas and Regional Reserves, so tenure did not influence the number of locations.</p> <p>Other threats to the species that were considered in determining locations include inappropriate fire regimes and <i>Phytophthora</i>, but these were not considered to be the most plausible threats. A single wildfire could rapidly affect the entire population, but the species is capable of regenerating after fire (facultative seeder) and fire <i>per se</i> is not considered to be the most plausible threat. Post-fire recruitment failures are possible due to secondary factors such as drought, <i>Phytophthora</i>, and browsing but the species can also resprout and is likely to persist post-fire. Frequent fires could possibly cause a population size reduction, but it is unlikely to affect the entire population. Lack of fire could also cause the population to decline, but this would be a gradual reduction because some seedling recruitment occurs in the absence of fire. <i>Phytophthora</i> is also a potential threat, but there is currently limited evidence of dieback in the population, despite the disease being present for some time.</p>			
Fragmentation	The species is not severely fragmented because all individuals are contained within one viable population.			
Fluctuations	No extreme fluctuations in EOO, AOO, number of subpopulations, locations, or mature individuals.			

IUCN ASSESSMENT

EN B1ab(iii, v) + B2ab(iii, v)

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 style="text-align: center;"><i>based on any of the following</i></p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>			

Assessment result

Data deficient.

Justification

There is insufficient evidence to demonstrate a substantial population size reduction.



CRITERION 2:

Geographic distribution is precarious 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; (number of mature individuals			

Assessment result

Qualifies as **Endangered** under Criterion B1ab(iii, v) + B2ab(iii,v).

Justification

EOO and AOO is 36 km² AND a) it occurs in two locations; b) projected continuing decline (iii) in area, extent and quality of habitat, and (v) number of mature individuals. The basis for projected continuing decline in quality of habitat is that there is a high probability that habitat degradation will occur over the next 120 years via anthropogenic disturbance, invasive species, and disease. A projected decline in the number of individuals is based on the risk of mining. Phytophthora and fire regimes having the potential to reduce the population.

Note that the EOO is within the threshold for Critically Endangered (<100 km²), but was determined that it occurs in >1 location based on the threat of mining and is not severely fragmented.

CRITERION 3:

Small 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			

Assessment result

Criterion not met.

Justification

Population size estimated >10,000.

CRITERION 4:

Very small population			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Assessment result

Criterion not met.

Justification

Population size >1,000.

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

Assessment result

Data deficient.

Justification

No quantitative analysis of extinction risk has been undertaken.