

Threatened Species Assessment

Pterostylis xerophila Desert Greenhood

Taxonomy

Pterostylis xerophila M.A. Clem.

The taxon was thought to be more widely distributed in the north-west, but recent investigation of older records attributed to *P. xerophila* has determined that just about all of these were misidentification of *P. lingua*, which has only recently been identified as occurring in Victoria (Backhouse et al. 2016).

P. xerophila is most similar to *P. boormanii*, but can be distinguished by its widely opening galea, the broad, shallowly concave, sparsely ciliate lateral sepals, and the ovate, fleshy labellum with a few coarse marginal setae (Duncan 2010).

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1995).

Categorised as Endangered in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Critically Endangered in Victoria

Criteria A3ce+4ace; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C1+2a(i,ii)

Species Information

Description and Life History

The taxon is a flowering plant 12-20 cm tall, stem leaves 2-3, closely sheathing. Rosette leaves 5-10, linear-lanceolate, 1.5-3.5 mm long, 9-13 mm wide, margins entire. Flowers 1-8, porrect or semi-nodding, 2.5-3 cm long, shortly pedicellate, reddish brown or brown, with transparent patches on the galea; dorsal sepal with an upcurved filiform point 6-8 mm long; lateral sepals broadly ovate to suborbicular in outline when flattened, conjoined part shallowly concave, margins incurved, shortly ciliate, free points filamentous, 2-2.5 cm long, widely divergent, sometimes slightly hooked forwards at the tips; petals with a poorly developed proximal flange. Labellum ovate to obovate, 4.5-5.5 mm long, 2-2.3 mm wide, brown, thick; marginal hairs 4-6 pairs, 1-3 mm long, white, forward-pointing; basal lobe poorly developed, glabrous. The taxon flowers from October to November (VicFlora 2015)

Very little is known of the biology and ecology of *P. xerophila*. It is dormant during the drier summer months, emerging following autumn and early winter rains. In the Gawler Ranges in South Australia, flowering commences in September and is usually completed by mid-October, while in north-western Victoria, flowering commences in early October and is completed by early November. Flowering can be quite sporadic, and relies on good autumn and winter rainfall, and few plants, if any, flower in dry years. The basal rosette has usually withered by flowering time. About four weeks after flowering finishes, if pollination has occurred, the seed capsule ripens, and seed dispersal occurs soon after (Duncan 2010). In related taxa, pollination is via pseudocopulation (Backhouse and Jeanes, 1995; Jones and Clements, 2002) and the pollinator is not known, however many *Pterostylis* taxa are pollinated by small gnats and/or flies. The longevity of the taxon and response to fire are not known (Duncan 2010).

Generation Length

The generation length of *Pterostylis xerophila* is estimated to be 20 to 40 years (midpoint 30 years). Generation time for non-colonial terrestrial orchids is estimated to be a nominal 30 years based on the annual replacement of the mother tuber by daughter tubers. Whilst somatically immortal, each individual is susceptible to endogenous exhaustion or environmental causes of mortality at rates likely to result in replacement at intervals of several decades only. Such orchids are classed as obligate seed regenerators reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is known from only two sites in the south-west of the Sunset Country near Berrook, in north-western Victoria. The altitude ranges from 45 to 65 metres above sea level. It also occurs in SA (Backhouse et al. 2016; Duncan 2010; VicFlora 2015).

Habitat

The taxon grows in mallee *Eucalyptus* woodland with a Porcupine Grass (*Triodia irritans*) ground layer, on rocky outcrops, on well-drained deep sandy soils (Backhouse et al. 2016). The taxon usually grows in small groups (VicFlora 2015).

Threats

Little is known of the extent or impact of current threats to populations, although several threats are evident. Feral goats and rabbits are present at most sites and can cause severe habitat degradation, and grazing by kangaroos may also be a problem. Weeds, especially Paterson's Curse (*Echium plantagineum*) and Ward's Weed (*Carrichtera annua*) are a minor problem at some sites in the Gawler Ranges National Park. Accidental destruction by vehicle movement and trampling by people is a potential threat at sites where plants occur close to tracks and/or roadsides; one site in Murray-Sunset National Park is at particular high risk of this.

The use of planned burning for fuel management, asset protection, or bushfires early in the season during the growing/flowering/seeding period of *P. xerophila* (June to December) is likely to be detrimental to this taxon. Planned burning at *P. xerophila* sites should be avoided when plants are actively growing and flowering. Climate change probably poses the most significant long-term threat to the taxon. Many of the rufa group *Pterostylis* taxa are adapted to dry conditions, however with the predicted decrease in rainfall and increase in temperatures and evaporation rates resulting from climate change, environmental conditions for *P. xerophila* are likely to become even more marginal, with a reduction in opportunities for flowering, pollination, seed production and recruitment of plants to the adult population, as well as increasing mortality of existing plants. The frequency of bushfires may also increase with climate change (Duncan 2010).

Much of the range of the taxon has suffered from extended drought conditions for a decade or more, which has made relocating populations and determining population sizes difficult. The extended dry conditions may also have led to population decline/loss, as the taxon probably only flowers well in years of above average rainfall. Individual populations of *P. xerophila* are at high risk of extinction from stochastic events, especially extended dry conditions, due to the small population sizes and the highly fragmented distribution. Apparent hybrids between *P. xerophila* and *P. sp. aff. boormanii* (sensu Jeanes and Backhouse 2006) have been observed at the Murray Sunset National Park site, although the extent and significance of this is not known (Duncan 2010).

IUCN Criteria

| Criterion A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4 | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------|------------|
| | Critically Endangered | Endangered | Vulnerable |
| 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:

Eligible under Criterion A2 as Vulnerable

The population reduction over the past 60 to 120 years is estimated to be 30 to 50%, based on (a), (c) and (e) above.

Past decline is based on the effects of the identified threats, all of which have operated in the past.

The causes of reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 60 to 100 years is projected to be 50 to 80%, based on (c) and (e) above.

Future decline is based on the projected impact of the identified threats, including habitat alterations from fire and prolonged drought, with the latter a major threat to the long-term survival of the taxon. Any losses are likely to be gradual.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 60 to 120 year period, including both past and future (up to 100 years in the future), is estimated to be 50 to 80%, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

| Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

The taxon is estimated to have one location, based on the pervasive impact of the identified threats, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above due to the impacts of habitat alterations from fire and prolonged drought.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon has 1 location, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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| Criterion C. Small Population size and decline | | Critically Endangered | Endangered | Vulnerable |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------|
| Number of mature individuals | | < 250 | < 2,500 | < 10,000 |
| AND at least one of C1 or C2 | | | | |
| C1 | An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future): | 25% in 3 years or 1 generation (whichever is longer) | 20% in 5 years or 2 generations (whichever is longer) | 10% in 10 years or 3 generations (whichever is longer) |
| C2 | An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions: | | | |
| (a) | (i) Number of mature individuals in each subpopulation | ≤ 50 | ≤ 250 | ≤ 1,000 |
| | (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 C1 as Critically Endangered

It is estimated that there are 50 to 100 mature individuals. The taxon is only known from two sites at the far south-western end of the Murray-Sunset NP near Berrook (Backhouse et al. 2016), and population numbers are primarily based on an estimate of the Murray-Sunset NP population from Duncan (2010).

A continuing decline of 10 to 30% is estimated to occur within one generation.

Eligible under Criterion C2 as Critically Endangered

It is estimated that there are 50 to 100 mature individuals.

The number of mature individuals is estimated to continue to decline based on the current and projected impact of the identified threats, in particular habitat alterations from fire and prolonged drought.

The percentage of mature individuals in one subpopulation is 90-100%.

| Criterion D. Very small or restricted population | | Critically Endangered | Endangered | Vulnerable |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------|------------|--------------------------------------------------------------------|
| Number of mature individuals (observed or estimated) | | < 50 | < 250 | < 1,000 |
| D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time. | | - | - | D2. Typically: AoO < 20 km ² or number of locations < 5 |

Evidence:

Eligible under Criterion D as Endangered

It is estimated that there are 50 to 100 mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

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