

## *Herpolirion novae-zelandiae* Sky Lily

### Taxonomy

*Herpolirion novae-zelandiae* Hook. f.

### Current conservation status

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

### Proposed conservation status

Endangered in Victoria

Criterion A2ce; B2ab(i,ii,iii,iv,v)

### Species Information

#### Description and Life History

The taxon forms loose, turf-like mats to c. 2 m wide. Leaves tufted, usually c. 5 per rhizome apex, linear, sheathing at base, widely spreading, c. 5 cm long, 1.5-4 mm wide, somewhat glaucous. Flower single, subsessile, subtended by leafy bracts, segments c. 2 cm long, very pale blue, about twice as long as stamens. Capsule globose, 3-5 mm long. Seeds several, c. 2-3 mm long. Flowers Dec.-Jan. (VicFlora 2017).

#### Generation Length

The generation length of *Herpolirion novae-zelandiae* is estimated to be 30 to 50 years. According to DELWP's Vital Attribute database the taxon is a perennial that lives from 10-50 years and its seeds last in the soil perhaps for 100 years. It is also suggested that the taxon resprouts after fire and that seed germination appears delayed post fire with the taxon establishing in later years as the vegetation ages, right through to mature and over-mature (assuming suitable seasonal conditions). The time to reproductive maturity is 2 years. In undisturbed vegetation, where fire occurs perhaps once or twice per century, most plants are expected to live to the end of their reproductive age. Even if fire is more frequent, plants survive and resprout. Therefore, the average plant age is likely to be towards the higher end of its longevity range.

#### Distribution

The taxon occurs throughout the alpine area, from Lake Mountain to Daveys Plain near the Cobberas, where it is reasonably common but cryptic unless in flower. It also occurs in New South Wales, Tasmania and New Zealand (VicFlora 2017).

#### Habitat

The taxon occurs in moist, peaty, herbfield and grassland above c. 1200 m throughout the alpine area (VicFlora 2017).

#### Threats

Alpine taxa such as this taxon are prone to range contraction due to climate change, of which the impacts, particularly in wetter habitat, are likely to be seen first in marginal, lower-elevation sub-populations. Large fires are becoming more frequent and whilst Tolsma *et al* (2011) showed that the taxon appears to recover after a single fire, two fires at a short interval will be particularly detrimental. There are increasing impacts of feral horses, deer

and perhaps hares. Whilst the impacts of these feral animals might be countered to some extent by recovery from cattle grazing, such recovery is likely to occur only on the Bogong High Plains. Overall, the population numbers appear to be declining.

### 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"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul>			

### Evidence:

#### Eligible under Criterion A2 as Endangered

The population reduction over the past 90 to 150 years is estimated to be 25 to 50%, based on (c) and (e) above.

Alpine regions have been subject to a long history of livestock grazing since European settlement and this will have impacted on vegetation communities through selective grazing and physical disturbance, particularly the wetter areas that this taxon prefers. Fire, deliberate or otherwise, also became more frequent after settlement, leading to a long-term decline in habitat quality for many taxa.

#### Eligible under Criterion A3 as Vulnerable

The population reduction over the next 90 to 100 years is projected to be 25 to 40%, based on (c) and (e) above, based on current and projected impact of the identified threats.

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 <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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 Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 12,756 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the landscape scale. It has a patchy distribution with most occurrences isolated from other occurrences by large areas of unsuitable habitat rendering little or no probability of recolonisation should subpopulations become extinct.

It is estimated to have 5 locations. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on current and projected impact of the identified threats.

#### Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 168 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has 5 locations and has a continuing decline in (i), (ii), (iii), (iv) and (v).

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:

#### Ineligible under Criterion C

It is estimated that there are 20,000 to 40,000 mature individuals, which exceeds the thresholds for criterion C.

Criterion D. Very small or restricted populations		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 <sup>2</sup> or number of locations ≤ 5

### Evidence:

#### Eligible under criterion D as Vulnerable

It is estimated that there are 20,000 to 40,000 individuals, and the taxon is estimated to be very restricted.

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

### References

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VicFlora (2017). Flora of Victoria, Royal Botanic Gardens: *Herpolirion novae-zelandiae*. Sky Lily. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/25673bf8-c72b-443a-9031-7154470d77b8>