

## *Irenepharsus magicus* Elusive Cress

### Taxonomy

*Irenepharsus magicus* Hewson

This taxon differs from most other Brassicaceae with beakless fruits in having branched hairs, seeds in 1 (or 2 indistinct) rows and small flowers with white petals. It is similar to the introduced *Arabidopsis*, but in that species the midvein of the fruit is prominent all the way to the apex and the seeds are c. 0.5 mm long (VicFlora 2014).

### Current conservation status

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

### Proposed conservation status

Endangered in Victoria

Criteria B1ac(iv)+2ac(iv)

### Species Information

#### Description and Life History

The taxon is an erect annual or biennial herb, to 80 cm high; stems glabrous. Leaves sparsely covered in shortly stalked, usually branched hairs; basal leaves not persistent, narrowly ovate, lanceolate or elliptic, tapering to petiole, toothed; upper-stem leaves similar, to 15 cm long, reducing. Sepals 2-3 mm long; petals c. 5 mm long. Fruit erect, 10-25 mm long (excluding style), 1.5-2 mm wide, glabrous; style c. 1-2 mm long; valves convex; pedicels erect to spreading, 5-11 mm long; seeds 1.2-1.5 mm long. The taxon flowers in summer (VicFlora 2014).

James Turner reported the taxon can be a robust herb to 2 m tall in an area which had been logged and also burnt in the fires of 2003, on the Angora Range Road where it was presumably responding to the ash bed effect.

#### Generation Length

The generation length of *Irenepharsus magicus* is estimated to be 150 to 300 years. This is based on a plausible pre-settlement fire interval of 150-300 years or more within the core habitat of the taxon, with episodic mass pulse recruitment from a long-lived persistent soil-stored seedbank. The taxon is also likely to recruit opportunistically in response to localised site disturbance events such as landslip, tree-fall, storm damage and in production forests, forestry operations as well as road and track maintenance and fuel reduction practices.

The plant is a short-lived annual or biennial, and is only observed following localised or landscape-scale disturbance events.

#### Distribution

The taxon is largely concentrated in Victoria on the Nunniong Plateau and the Swifts Creek district south-east of Omeo. It is reliably recorded in Victoria from the Mt Baldhead area near Brookville, south-west of Swifts Creek east and north-east to Mt Seldom Seen, west of Wulgulmerang and from Mellick Munjie Creek near Mt Stewart north to the Mt Nunniong area and the Marble Gully - Mt Tambo Nature Conservation Reserve near Bindi.

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### Habitat

The taxon occurs in disturbed forest sites in the Omeo area (VicFlora 2014). Its core habitat is Montane Forest dominated by *Acacia dealbata* (Silver Wattle), *Bedfordia arborescens* (Blanket Leaf), *Blechnum nudum* (Fishbone Water-fern), *Dicksonia antarctica* (Soft Tree-fern), *Eucalyptus delegatensis* (Alpine Ash), *E. obliqua* (Messmate Stringybark), *E. viminalis* (Manna Gum), *Lomatia fraseri* (Tree Lomatia), *L. myricoides* (River Lomatia), *Olearia argophylla* (Musk Daisy-bush), *O. phlogopappa* (Dusty Daisy-bush), *Poa helmsii* (Tall Mountain Tussock-grass), *Polystichum proliferum* (Mother Shield-fern), *Pteridium esculentum* (Austral Bracken), *Rorippa dictyosperma* (Forest Bitter-cress), *Senecio linearifolius* (Fireweed Groundsel), *Urtica incisa* (Scrub Nettle) and *Xerochrysum bracteatum* (Golden Everlasting).

In the Bindi district the taxon extends to drier shrubland vegetation dominated by *Pomaderris oraria* subsp. *calcicola* (Limestone Pomaderris), a rare and threatened FFG-listed community Limestone Pomaderris Shrubland with associated species including *Allocasuarina verticillata* (Drooping Sheoak), *Austrostipa blackii* (Crested Spear-grass), *Convolvulus remotus* (Grass Bindweed), *Pimelea flava* subsp. *dichotoma* (Diosma Rice-flower), *Teucrium thieleanum* (Mountain Germander) and *Vittadinia cuneata* (Fuzzy New Holland Daisy).

### Threats

The taxon is unlikely to have suffered any significant historic decline through habitat loss to agriculture, since all reliable records are from public land. It is unclear whether forest operations pose a net threat to the taxon. Forestry and slash burning practices simulate the pre-settlement impact of high intensity bushfire, in creating soil disturbance, removing densely competitive canopy vegetation and providing an ash bed highly conducive to mass germination of soil-stored seed. Unlike bushfire, however, forestry operations are highly localised and likely to concentrate the browsing pressure of wallabies, rabbits, hares and Sambar deer, and, in some instances, stock and feral horses, with the possibility that localised stands of *I. magicus* or *Rorippa dictyosperma* (Forest Bitter-cress) may be intensely browsed prior to successful flowering, seed-set and seedbank replenishment. This may result in seedbank depletion, exhaustion and local loss.

The increasing density of both Sambar and feral horses throughout the alpine region may be significant. In addition, both these habitat specialists belong to the Brassicaceae family, which is highly palatable and therefore likely to be preferentially browsed by both native and exotic herbivores. This may be compensated, however, by the possibility that, like all Brassicaceae and related families, the distinctive chemical signature includes glucosinolates or mustard oil precursors which act as defensive chemicals to mitigate the impact of herbivory.

Both *I. magicus* and the far more widespread *R. dictyosperma* share a unique ecological role as key fire response taxa, dependent on landscape scale fire to germinate in sufficient densities to exhaust the browsing pressure of pre-settlement herbivores, and to successfully commit to soil storage the large numbers of seed required to ensure mass recruitment at the end of the next cycle in the post-fire secondary succession. Under pre-European settlement conditions, such fires occurred at intervals of several to many centuries in high rainfall Wet or Montane Forests dominated by ash eucalypts which, like the two Brassicaceous taxa, are also obligate seed regenerators (OSR). The contraction of the fire regeneration cycle and the impacts of novel herbivores pose risks to the ecological processes which maintain wet forest ecosystems, exacerbated by climate change and inappropriate fire regimes.

Spatial analysis of likely habitat on all land tenures for the taxon indicates that 68% occurs within the CAR reserve system, including parks and reserves and special protection zones. Further areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). Species-specific protections for the taxon are included in the Code. Other more general prescriptions also provide protection from forestry operations.

In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

### 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%
A1	Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.		
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.		
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]		
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.		
	<i>based on any of the following:</i> <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:

#### Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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 Endangered**

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 807 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 with geographically isolated occurrences at separations likely to exceed the dispersal range of the taxon, which has no specialised mechanism for long-distance dispersal. This precludes the opportunity for recolonisation in the event of local extinction

It is estimated to have 1 location. It has extreme fluctuations in (iv) above. Population size and density at any one site are likely to fluctuate significantly between successive pulse recruitment events in response to the extent and severity of the disturbance event which, in pre-settlement times, is likely to have been predominantly very rare but intense wildfires ignited by lightning strikes. Smaller localised disturbance events such as landslip, tree fall or storm damage are likely to have promoted far smaller stands.

**Eligible under Criterion B2 as Endangered**

The Area of Occupancy (AoO) across the taxon's range is estimated to be 48 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it severely fragmented, has 1 location and has extreme fluctuations in (iv).

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 as Data Deficient**

Population size cannot be estimated in any meaningful way, since it is inferred to fluctuate wildly between successive recruitment events at any one site, as illustrated by estimates of population size at three population monitoring sites: 25, 1000 and 10,000 individuals each taken within a year of logging or burning of forestry coupes.

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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 <sup>2</sup> or number of locations ≤ 5

### Evidence:

#### Eligible under criterion D2 as Vulnerable

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

DEPI (2014) *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne. Retrieved from: [https://www.environment.vic.gov.au/\\_\\_data/assets/pdf\\_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf](https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf)

VicFlora (2014) Flora of Victoria, Royal Botanic Gardens Victoria: *Irenepharsus magicus*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/fc7c1e1a-f087-4e65-b65f-5988a7269fc3>