

## *Amaranthus grandiflorus* Large-flower Amaranth

### Taxonomy

*Amaranthus grandiflorus* (J.M. Black) J.M. Black

### Current conservation status

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

### Proposed conservation status

Endangered in Victoria

Criterion B2ab(i,ii,iii,iv,v)c(iv)

### Species Information

#### Description and Life History

The taxon is an erect annual to c. 40 cm high. Stems glabrous or sparsely glandular-hairy on youngest growth. Leaves long-petiolate, narrowly ovate to narrowly rhombic, lamina mostly 1-4 cm long, 4-12 mm wide; apex obtuse to acute, sometimes shortly mucronate. Flowers unisexual, in axillary clusters c. 12 mm diam., sometimes the clusters becoming crowded and almost spike-like toward the branch-tips; bracts and bracteoles ovate, acuminate, 1-2; tepals 5, obovate, 4-7 mm long, recurved toward apex, acute, sometimes with a mucro to c. 1 mm long; stamens 3. Utricle indehiscent, flattened-ellipsoid, slightly shorter than perianth, transversely wrinkled; seed ovate, biconvex, 1.5-2 mm long. The taxon flowers from Feb.-Jun (VicFlora 2018).

#### Generation Length

The generation length of *Amaranthus grandiflorus* is estimated to be 1 to 8 years. The taxon is an annual herb and recruitment is presumably triggered by favourable rainfall events, but some episodic recruitment in response to soil disturbance also likely. It is possible that the taxon does not recruit during droughts.

#### Distribution

In Victoria, the taxon is confined to north-west Victoria, at Neds Corner Station, near Karawinna, Merrinee North, Boy Creek (28 km south-west of Merbein), and north of Kooloonong.

#### Habitat

In Victoria, the taxon is confined to sandy rises and sandy loam flats in the far north-west. It is sometimes found on degraded roadsides on sandy soils adjacent to cleared agricultural land, and in wheat stubble. In NSW, the taxon grows in drier areas of the inland, especially red sand areas.

#### Threats

The taxon typically favours moderately fertile sandy loams, which have been eliminated extensively from cropping and the taxon is now also at increasing risk of *Carrichtera annua* (Ward's Weed) and other weeds.

Remnant habitats are now in a mixture of heavily modified agricultural landscapes with numerous off target impacts, such as vehicle activity on roadside native vegetation and regular new weed introductions (e.g. ice plant

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*Mesembryanthemum guerichianum*). Many of the roadsides are also subject to ploughing by farmers as part of their fire management practices.

Climatic drying and warming, and increased drought stress are likely to result in recruitment failure, especially when favourable rainfall or recruitment event is followed by a drought.

### 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 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>			

### Evidence:

#### Ineligible under Criterion A

The past population reduction does not meet the threshold for eligibility under criterion A2, and the future population reduction does not meet the threshold for eligibility under criterion A3.

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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 6645 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA) and confirmed MEL records

There are multiple, small isolated subpopulations, many which are in an agricultural landscape are all at risk from climatic drying and weed invasion, such that there is increased extinction risk and little or no probability of recolonisation should subpopulations become extinct. Considering the limited dispersal ability of the taxon, the barriers to dispersal, or lack of habitat separating them, the individuals can be considered to be severely fragmented.

The main threats to the taxon (i.e. fire, climatic drying and warming, habitat loss and fragmentation, weed invasion, fungal pathogens and extreme drought stress) have a non-reversible impact on the individuals of the taxon and occur in a stochastic manner, and have the potential over time to threaten the majority of individuals in the geographic area. There is considered to be one such area, so there is considered to be one location.

It has a continuing decline in (iii) and (v) above, based on the current and projected impact of the identified threats. In particular, the taxon favours moderately fertile sandy loams that are eliminated extensively from cropping and weed invasion, particularly by *Carrichtera annua*, as well as new weeds, such as *Mesembryanthemum guerichianum*.

It has extreme fluctuations in (iv) above, as it is an annual species, dependent on favourable spring and summer rainfall.

#### 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, the taxon is severely fragmented, has 1 location, has a continuing decline in (i), (ii), (iii), (iv) and (v) and has extreme fluctuations in (iv) 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:

#### Ineligible under Criterion C

It is inferred that there are 50 to 500 mature individuals, but this qualifier is too weak other thresholds under this criterion have not been met.

No reliable estimate of the current total population size of the species is available. The most recent estimate of the number of mature individuals is at Neds Corner Station in Nov 2011, where only occasional plants were observed (V. Stasjic pers. observ.). In 2010 ca. 50 plants were observed at Merrinee North (V. Stasjic pers. observ.). The largest number of mature individuals was observed at north of Karawinna in mid December 2007, where the species was reported as been abundant (on sandy soil in wheat stubble after November rains), however the collectors' field observations make no clear statement of population size.

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:

#### Ineligible under Criterion D

It is inferred that there are 50 to 500 mature individuals.

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



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## References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne. Retrieved from:

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