Threatened Species Assessment

Monotoca glauca
Currant-wood

Taxonomy

Monotoca glauca (Labill.) Druce

The taxon is closely related to *M. billawinica*, differing in size of floral parts, petiole vestiture and features of the fruit. In some locations (VicFlora (2019).

M. billawinica closely resembles the allopatric *M. glauca* and has been confused with the sympatric *M. scoparia* (Albrecht 1995).

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 A3ce+4ce

Species Information

Description and Life History

The taxon is a dense, non-lignotuberous shrub or small tree to c. 7 m high; branchlets puberulous. Leaves elliptic to oblanceolate, c. 8-26(-32) mm long, 2.1-6.5 mm wide, mucronate, flat to convex, glabrous, lower surface usually distinctly whitish; margins smooth, plane to recurved; petioles puberulous abaxially when young. Flowers 2-13, in axillary spikes or the lowermost solitary and pedunculate; lowermost spikes with peduncle (0.4-)0.8-3(-4) mm long, sterile bracts very rarely present; bracts, bracteoles and sepals obtuse; bracts persistent, 0.3-1.2 mm long; bracteoles 0.4-1.1 mm long; sepals 0.6-1.3 mm long; corolla rotate-campanulate, 1.1-1.8 mm long in female flowers; 1.4-2.3 mm long in males; lobes glabrous to papillose, slightly to c. twice as long as tube; anthers 0.6-1.1 mm long, exserted from corolla tube; ovary plus style 0.8-1.2 mm long. Fruit ovoid, ellipsoid or spherical, 1.8-2.4 mm long, greyish-purple at maturity. The taxon flowers from September to April (VicFlora 2020).

Generation Length

The generation length of *Monotoca glauca* is estimated to be 50 to 90 years. This is based on a plausible longevity of 50-100 years or more, and an inference that the taxon is likely to recruit continuously from seed dispersed locally by biotic vectors in the absence of fire. Intense fire is likely to kill mature adults, which lack a lignotuber, and are inferred to be fire-sensitive obligate seed regenerators (OSR). It is unclear whether the taxon recruits from elevated or soil-stored seedbanks following fire or is dependent on biotic dispersal from unburnt refugia. Pre-settlement fire interval is likely to have been in the 45-120 year range, with the most topographically protected sites often escaping fire altogether.

Distribution

The taxon is restricted in Victoria to the Otway Ranges and near-coastal districts in the Westernport region, and in South Gippsland with major concentrations in the Western Otway Ranges and at Wilsons Promontory. In the Otway Ranges, the taxon extends from Curdie Vale and Timboon in the west to Skenes Creek in the east and from Barongarook in the north to Cape Otway in the south. It has also been recorded in Tasmania (Vicflora 2020).

In the Westernport region the taxon has been recorded at The Gurdies and at Rhyll on Phillip Island. In South Gippsland, the taxon is recorded in the Walkerville, Waratah North, Fish Creek and Woorarra districts and from Mount Singapore in the north to the southern tip of Wilsons Promontory.

The significance of a highly disjunct record of the taxon from the Howe Range in far East Gippsland is unclear. A specimen was collected by Willlis in 1969 on the crest of the Wau Wauka Spur in mountain forest north-north-west of Howe Hill and determined by David Albrecht in 1993 as *M. glauca*. Albrecht reviewed the Victorian members of the genus in 1995, suggesting the determination is reliable. However, both *M. elliptica* and *M. scoparia* occur in the Howe Range and the Willis specimen may be referable to one of these taxa or a hybrid of the two.

Habitat

The taxon occurs on infertile sandy soils at sea-level or on near-coastal high-rainfall ranges. It grows in open-forest, heathy woodland, wet closed scrub and margins of cool temperate rainforest. (VicFlora 2020).

The taxon is frequently associated with *Eucalyptus obliqua* (Messmate Stringybark) or *E. baxteri* (Brown Stringybark), but other dominant associates include *Acacia melanoxylon* (Blackwood), *A. mucronata* (Narrow-leaf Wattle), *A. suaveolens* (Sweet Wattle), *A. verticillata* (Prickly Moses), *Allocasuarina paludosa* (Scrub Sheoak), *Amperea xiphoclada* (Broom Spurge), *Aotus ericoides* (Common Aotus), *Banksia marginata* (Silver Banksia), *B. saxicola* (Rock Banksia), *B. serrata* (Saw Banksia), *B. spinulosa* var. *cunninghamii* (Hairpin Banksia), *Bauera rubioides* (Wiry Bauera), *Boronia muelleri* (Forest Boronia), *Bossiaea cinerea* (Showy Bossiaea), *Calochlaena dubia* (Common Ground-fern), *Coprosma quadrifida* (Prickly Currant-bush), *Correa reflexa* (Common Correa), *Dicksonia antarctica* (Soft Tree-fern), *Dillwynia glaberrima* (Smooth Parrot-pea), *Empodisma minus* (Spreading Rope-rush), *Epacris impressa* (Common Heath), *Eucalyptus brookeriana* (Brooker's Gum), *E. croajingolensis* (Gippsland Peppermint), *E. cypellocarpa* (Mountain Grey-gum), *E. falciformis* (Western Peppermint), *E. globulus* (Southern Blue-gum), *E. kitsoniana* (Bog Gum), *E. ovata* (Swamp Gum), *E. radiata* (Narrow-leaf Peppermint), *E. viminalis* subsp. *pryoriana* (Coast Manna-gum), *E. viminalis* subsp. *viminalis* (Manna Gum), *E. willisii* (Promontory Peppermint), *Gahnia radula* (Thatch Saw-sedge), *G. sieberiana* (Red-fruit Saw-sedge), *Gleichenia dicarpa* (Pouched Coral-fern), *G. microphylla* (Scrambling Coral-fern), *Hedycarya angustifolia* (Austral Mulberry), *Hakea decurrens* subsp. *physocarpa* (Bushy Needlewood), *H. repullulans* (Western Furze Hakea), *Hibbertia appressa* (Southern Guinea-flower), *H. hirticalyx* (Bass Guinea-flower), *Hypolaena fastigiata* (Tassel Rope-rush), *Kunzea ambigua* (White Kunzea), *Lepidosperma concavum* (Sandhill Sword-sedge), *L. elatius* (Tall Sword-sedge), *L. laterale* var. *majus* (Variable Sword-sedge), *Leptospermum continentale* (Prickly Tea-tree), *L. lanigerum* (Woolly Tea-tree), *L. laevigatum* (Coast Tea-tree), *L. myrsinoides* (Heath Tea-tree), *Lomandra longifolia* subsp. *exilis* (Cluster-headed Mat-rush), *L. longifolia* subsp. *longifolia* (Spiny-headed Mat-rush), *Lomatia fraseri* (Tree Lomatia), *Melaleuca ericifolia* (Swamp Paperbark), *M. squarrosa* (Scented Paperbark), *Nematolepis squamea* subsp. *squamea* (Satinwood), *Olearia argophylla* (Musk Daisy-bush), *O. lirata* (Snowy Daisy-bush), *O. phlogopappa* subsp. *phlogopappa* (Dusty Daisy-bush), *Platylobium reflexum* (Victorian Flat-pea), *Polystichum proliferum* (Mother Shield-fern), *Pomaderris aspera* (Hazel Pomaderris), *Prostanthera lasianthos* (Victorian Christmas-bush), *P. melissifolia* (Balm Mint-bush), *Pteridium esculentum* (Austral Bracken), *Pultenaea daphnoides* (Large-leaf Bush-pea), *P. forsythiana* (Prickly Bush-pea), *P. mollis* (Soft Bush-pea), *P. muelleri* (Mueller's Bush-pea), *Sprengelia incarnata* (Pink Swamp-heath), *Tetrarrhena juncea* (Forest Wire-grass), *Tetratheca ciliata* (Pink-bells), *T. pilosa* (Hairy Pink-bells), *Xanthorrhoea australis* (Austral Grass-tree) and *Zieria arborescens* (Stinkwood).

The taxon extends into the ecotone of a distinctive floristic community of Cool Temperate Rainforest dominated by *Nothofagus cunninghamii* (Myrtle Beech), *Dicksonia antarctica* (Soft Tree-fern) and *Blechnum wattsii* (Hard Water-fern). This distinctive floristic community is diagnosed by the presence of *M. glauca* and the unusually sandy substrate for a rainforest community.

Threats

The taxon has suffered historic decline through habitat loss to agriculture and to plantation establishment in some districts, and small stands of the taxon in these marginal districts are at ongoing risk of local extinction through agricultural intensification.

As the taxon lacks a lignotuber it is likely to be fire-sensitive, and therefore is potentially threatened by over-frequent fires. Observations on the impact of successive bushfires on populations of *M. elliptica* (another non-lignotuberous species) in Royal National Park near Sydney suggests that populations can disappear from areas if

they are burnt too frequently. As parts of the Otway Ranges and Wilsons Promontory are subject to rather frequent fires, careful consideration must be given to the impact of fire on this taxon (Albrecht 1995).

The taxon is therefore at increasing risk of adult mortality and recruitment failure, and eventual local extinction, in response to the increasing risk of repeat fire events at intervals below the tolerable fire interval (TFI) for the taxon. Since the taxon is likely to depend on recolonisation by biotic vectors from stands in unburnt refugia, the increasing frequency, intensity and, in particular, landscape scale of major fire events compromises the ability of the taxon to successfully recolonise sites from which the taxon has been eliminated by intense fire. The greatest threats to the taxon are therefore the impacts of climatic drying and warming, exacerbated by inappropriate fire regimes including planned burning, which is applied at increasing frequency and landscape scale, with fewer unburnt refugia available for recolonisation than under pre-European settlement conditions.

In addition to the influence of climatic drying and warming on fire regimes and repeat fire events, the projected increase in the frequency and duration of extreme and prolonged drought stress are projected to result in an incremental decline in the local extent of all communities at the wetter and higher rainfall end of the habitat range of the taxon, including Cool Temperate Rainforest, wet closed scrubs and wetter forests, resulting in a contraction in the extent of available habitat for the taxon.

The taxon may also be at increasing risk of recruitment failure in response to targeted browsing of seedling or juvenile plants by feral deer during early stages of post-fire recruitment, or sporadic recruitment in response to localised site disturbance events. Sambar deer have been recorded in the Tamboon district in the Western Otway Ranges in the last two decades and can be expected to expand their range across the Otway Ranges in coming decades. Sambar are now well established around Westernport Bay. They have also been recorded in the Strzelecki Ranges in South Gippsland in the last decade and were recorded on Snake Island in Corner Inlet in 1987 and can be expected to extend their range to Fish Creek and Walkerville districts and Wilsons Promontory in coming decades. Hog Deer are well established in coastal districts of South Gippsland from Westernport Bay to the islands of Corner Inlet and throughout much of Wilsons Promontory. Red Deer were recorded at Lavers Hill in the Western Otways in 2002. Fallow Deer have been recorded in the Western Otways from Curdie Vale to Cape Otway and in South Gippsland from Walkerville and Sunday Island in Corner Inlet.

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.

based on any of the following:

(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 A3 as Endangered

The population reduction over the next 100 years is projected to be 25 to 80 (midpoint 50)%, based on (c) and (e) above.

Future decline cannot be estimated with any confidence since the identified threats operate incrementally or stochastically and with unpredictable intensity.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 270 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 90 (midpoint 50)%, based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

An estimate of past decline is based largely on historic habitat loss to agriculture and plantation establishment, as well as the early impact of climate change and anthropogenic fire regimes.

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 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
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 B2 as Vulnerable

The Area of Occupancy (AoO) is estimated to be 576 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is severely fragmented naturally at the regional and landscape scales and anthropogenically at the landscape scale. It is unclear whether the dispersal range is at the kilometre scale, facilitating recolonisation at the landscape scale, or whether it is at the local scale of 50-100 metres and therefore occurrences at spacings exceeding this dispersal range would be severely fragmented at the landscape scale. The taxon is likely to be dispersed by birds, small mammals or even reptiles.

Two locations can be identified based on land tenure and landscape context: one for occurrences in larger stands of relatively intact native vegetation within parks and reserves or sympathetically managed freehold and one for small and isolated occurrences in fragmented agricultural or silvicultural landscapes subject to a wider range of site-specific threats.

It has a continuing decline in (i), (ii), (iii), (iv) and (v0 above, based on the current and projected impact of the identified threats.

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

There is no available estimate of total population size for the taxon, although it is likely to be in the thousands, given that the taxon is frequently recorded with projective foliage cover of 25-50% or, exceptionally, 50-75%, at the quadrat scale.

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 km2 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

Albrecht, D.E. (1995). Two new species of *Monotoca* (Epacridaceae) endemic in Victoria. *Muelleria*, 8(3), 299-306.

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VicFlora (2020). Flora of Victoria, Royal Botanic Gardens Victoria: *Monotoca glauca*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/cbbe55fc-cc97-4c86-a155-f056fa8f1f6d