



Myriophyllum striatum Striped Water-milfoil

Taxonomy

Myriophyllum striatum Orchard

This is a variable taxon with two distinct growth forms. The type form is fully emergent and lacks pectinate foliage. However, the leaves of plants growing in deep water are dimorphic, and these plants resemble larger specimens of *Myriophyllum simulans* but, unlike that species, the male flowers lack sepals (VicFlora 2017).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2001).

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 a perennial terrestrial or aquatic herb, sometimes dioecious; terrestrial plants mat-forming 10-15 cm tall, stems to 1 mm diam., rooting at the nodes; aquatic plants with stems to 30 cm long. Leaves in terrestrial plants alternate, linear, 5-8 mm long, margins entire. Leaves in aquatic plants dimorphic; submerged leaves in pseudo-whorls or scattered, ovate, mostly 10-18 mm long, pectinate, with up to 20 pinnae; emergent leaves alternate, whorled above, terete, mostly 10-18 mm long, margins entire. Bracteoles of male flowers triangular to oblong, 0.6-0.9 mm long; bracteoles of female flowers linear-lanceolate, c. 0.4 mm long; flowers solitary. Male flowers initially sessile, later on pedicel 0.4-5 mm long; sepals absent or vestigial; petals 4, 2.5-2.8 mm long, cream to reddish; stamens 8. Female flowers sessile; sepals and petals absent; ovary 4-celled, styles reflexed, stigmas white. Fruit cubiform, purplish-black; mericarps cylindrical, 0.7-1 mm long, truncate, with 2-4 longitudinal ribs formed by fused papillae. The taxon flowers from spring to summer (VicFlora 2017).

Generation Length

The generation length of *Myriophyllum striatum* is estimated to be 1 to 15 (likely 5), years, based on its perennial, terrestrial or aquatic habit and its habitat. Although the inferred longevity may be greater, mortality and recruitment may occur at intervals of 5-15 years in response to El Nino and La Nina events, respectively.

Occurrences in ephemeral rock pools (gnammas) on outcropping granite are reported to be reduced to a seedbank within a thin layer of sediment each time the pools dry out. The taxon recruits from seed in gnammas following inundation in good seasons, potentially as frequently as each year. In the marshy wetlands on the Northern Plains, established plants may persist as stolons through drier seasons, resprouting when rains or floodwaters return.

Distribution

The taxon is rare and occurs in northern Victoria in the Wedderburn, Terrick Terrick, and Nathalia areas as well as Mt Alexander near Castlemaine. It also occurs in Queensland and New South Wales.



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Habitat

The taxon grows mainly fully emergent in damp situations on creekbanks and around waterholes but is occasionally found in deep water (VicFlora 2017).

At Mt Alexander, Mt Terrick Terrick, Mt Korong and near Mt Hope, the taxon is recorded in shallow, typically ephemeral, rock pools (gnammas) on granite outcrops in association with a suite of aquatic and amphibious plants. On the Patho Plains near Torrumbarry the taxon is recorded in freshwater marshes dominated by *Duma florulenta* (Tangled Lignum) and *Chenopodium nitrariaceum* (Nitre Goosefoot). In the Nathalia, Picola, and Numurkah districts on the Northern Plains the taxon is recorded in shallow ephemeral swamps, depressions in old creek channels and damp mud in gilgais in native grassland.

The taxon is often sympatric with *Myriophyllum crispatum* (Upright Water-milfoil), *M. gracile* var. *lineare* (Slender Water-milfoil) *M. porcatum* (Ridged Water-milfoil) or *M. simulans* (Amphibious Water-milfoil).

The taxon is recorded as the dominant plant in shallow gnammas on flat-topped granite ridges around Mt Terrick Terrick. These pools are generally small (less than 5 m²).

Threats

Threats to the taxon include the continuing impact of habitat modification and loss to agriculture, hydrological modification, weed invasion, climatic drying and warming, reduced reliability of winter rainfall and the increasing risk of adult mortality, recruitment failure and seedbank depletion.

The taxon undoubtedly suffered significant historic decline on the Northern Plains through habitat loss to agriculture, wetland drainage and the impact of stock, particularly through pugging of wetlands and gilgais, resulting in weed invasion and habitat degradation. Occurrences in gnammas in the Wedderburn and Terrick Terrick districts and at Mt Alexander near Castlemaine are likely to have suffered habitat degradation through pugging by stock and goats, resulting in weed invasion, particularly by the exotic aquatic herb *Callitriche stagnalis* (Common Water-starwort).

A proportion of occurrences in both rock pool habitats on granite outcrops and on the Northern Plains are on freehold land exploited for agriculture. Such freehold sites have site-specific threats including trampling, pugging and browsing by domestic stock; recreational vehicles and farm machinery impacts; wetland drainage or changes to irrigation infrastructure; extension of cropping into wetland habitats; discharge of hyper-saline water; and runoff from agricultural activities resulting in eutrophication which accelerates weed invasion and herbicide drift or chemical accumulation within wetlands.

The reduced reliability of flooding because of water diversion for irrigation is an additional threat to the hydrological stability of some sites on the Northern Plains in the vicinity of the Goulburn-Broken floodplain.

Myriophyllum striatum

Striped Water-milfoil

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> <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 A

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 10 to 45 years is suspected to be 10 to 30%, based on (c) and (e) above.

Future decline cannot be estimated with any confidence in the absence of a confident estimate of generation time. However, it is likely to suffer significant decline within the next few decades in response to climatic drying and warming, reduced reliability of winter rainfall and the increasing risk of adult mortality, recruitment failure and seedbank depletion.

Eligible under Criterion A4 as Vulnerable

The population reduction over any 10 to 45 year period, including both past and future, is suspected to be 10 to 30%, based on (c) and (e) above.

Despite very significant historic decline through habitat loss to agriculture and hydrological modification, past decline cannot be estimated with any confidence in the absence of a confident estimate of generation time. Longitudinal monitoring data is unavailable for this taxon, each population monitoring site having been visited only once. Past decline is based on the identified threats.

Myriophyllum striatum

Striped Water-milfoil

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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 68 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 on the Northern Plains. Occurrences in gnammas are naturally isolated at spacings which greatly exceed the dispersal range of the taxon which has no specialised mechanism for long-distance dispersal. Geographically discrete occurrences on the Northern Plains occupy small and isolated habitat remnants in a highly fragmented and degraded rural landscape, at separations which also greatly exceed the dispersal range of the taxon.

It is estimated to have 2 locations. It has a continuing decline in (i), (ii), (iii), (iv) and (v), based on the current and projected impact of the identified threats.

Extreme fluctuations in population size is inferred from field observation, indicating that the habitat of the taxon is subject to extreme fluctuation in the depth and persistence of water, although it is unclear whether the taxon regenerates vegetatively or recruits from seed in response to wetting and drying of the habitat.

Myriophyllum striatum Striped Water-milfoil

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

No meaningful estimate of total population size for the taxon is available since population size is inferred to fluctuate significantly in response to seasonal cycles of inundation and complete drying of gnamma, gilgai and other wetland habitats.

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 ² 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.



Myriophyllum striatum Striped Water-milfoil

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SAC (2001). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 572 *Myriophyllum striatum* Striped Water-milfoil.

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Myriophyllum striatum*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/7567bbdc-fa64-42c9-a1f6-cb8b04f28d7f>