

Threatened Species Assessment

Michelea microphylla Michelea Species 5256

Taxonomy

Michelea microphylla Poore, 1997

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2002).

Categorised as Vulnerable in the 2009 Advisory list of threatened invertebrate fauna in Victoria (DSE 2009).

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii)+2ab(iii)

Only one specimen of *Michelea microphylla* has ever been found, in Western Port Bay. It is considered to be very rare, as it was not located in any subsequent surveys in the area, including a comprehensive infauna sampling program (O'Hara, 2002; Coleman et al. 1978). However it may occur in wetlands of international significance or other marine protected areas within Western Port (Hale, 2016; Wilson et al., 2012).

Species Information

Description and Life History

The ghost shrimps are bioturbating infauna, with burrows that can exceed 50cm in depth in the sediment and often form complex structures. The burrow structures within the sediment, as well as the bioirrigation of the ghost shrimp create a deep extension of the aerobic surface sediment, facilitating aerobic microbial activities (Bird et al., 2000 cited in Wilson et al., 2012). The taxon belongs to the infraorder Axiidea, known for their cryptic behaviour and ecological importance in sediment turnover, recycling organic matter and nutrients and are an important food source for shorebirds and fish species (Peiró et al., 2014; Butler and Bird, 2010).

There are no data available on the population density or distribution of *M. microphylla*, which may be due to the difficulty in surveying soft-sediment infauna (Butler and Bird 2007). Despite their importance as an ecosystem engineer, little is known regarding the life history of axiidean species as their ecology can be greatly impacted by environmental variables (Peiró et al., 2014). Information available for another species within the same infraorder (namely *Callianassa japonica*), suggests an estimated age at sexual maturity to be one year and that *M. microphylla* may have a brooding period between range between 13 and 22 days and release planktonic larvae (Tamaki et al., 1997). The range of number of eggs produced by each female varies widely between species within the Axiidea, with some species producing a maximum of 1000 eggs and other species up to a maximum of 10,000 eggs per clutch (Tamaki et al., 1997; Peiró et al., 2014). Based on this information it is impossible to extrapolate how many eggs, or clutches, each female would produce in its lifetime. However, it is likely the *M. microphylla* is a seasonal breeder that produces two successive recruitment cohorts, based on information available for other species (Tamaki et al., 1997).

Generation Length

The generation length of *Michelea microphylla* is suspected to be 1 to 3 years, inferred from the age of sexual maturation in another species (*Callianassa japonica*) within the infraorder Axiidea (Tamaki et al., 1997)

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Distribution

The taxon is known only from one individual collected offshore from Crib Point, Western Port, Victoria.

Habitat

The taxon inhabits sandy gravel at a water depth of 19 metres depth, in a burrowing habitat (O'Hara, 2002). *M. microphylla* is the only species in the genus known to occur in truly temperate waters (Poore, 1997).

Threats

Threats encountered are based on those listed in O'Hara (2002) as being specific to vulnerable marine habitats in which this species is found: namely embayments and the intertidal/subtidal shallow zone. The threats include impacts associated with fishing practices, recreational activities, changed inflows and nutrient sedimentation loads from rivers feeding into the systems, pollutions, and climate change.

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>based on any of the following:</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>
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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.

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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 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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

It is suspected to have 1 location, as the taxon only known from a single, immature male specimen, collected from Westernport Bay.

It has a continuing decline in (iii) above, as due to the operating threats.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it has 1 location and has a continuing decline in (iii) 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 as Data Deficient

No reliable estimate of the current total population size of the species is available. No recent surveys have specifically targeted this species so there is no accurate way of estimating the past, current or future population size. It is considered to be naturally very rare as it has only been recorded once, despite over 40 years of surveys in Western Port and Port Phillip Bay (O'Hara 2002).

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 inferred to be very restricted.

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

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