

# Threatened Species Assessment

## *Morchella esculenta* Common Morel

### Taxonomy

*Morchella esculenta* (L.) Pers.

There is some uncertainty regarding the application of the name *Morchella esculenta* to Australian specimens currently assigned to this taxon. *Morchella esculenta* was first described by Linnaeus as *Phallus esculentus* in reference to the shape of the fruiting body which may resemble a phallus. The taxon is often referred to in overseas literature as the Yellow Morel. The genus *Morchella* has been traditionally placed in the family Morchellaceae.

The taxon is one of three closely related species of *Morchella* currently recognised for Victoria, the others being *Morchella conica* and *Morchella elata* (the Black Morel). The taxonomy of the Australian Morels is in need of investigation. Overseas sources suggest that the fruiting bodies of *Morchella esculenta* are broader and paler, with a less regular honeycomb pattern, than are those of its relatives (Cameron and May 2003).

### Current conservation status

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

### Proposed conservation status

Endangered in Victoria

Criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

### Species Information

#### Description and Life History

The taxon is a terrestrial species of ascomycete fungus in the genus *Morchella*, members of which are usually known as Morels. The genus *Morchella* is distinctive in appearance and fruiting bodies are easily recognised. Fruiting bodies consist of a rather narrowly conical or ovoid cap supported on a short, thick and tough-textured stem. The fruiting body is hollow and may vary greatly in size. The cap has a characteristically pitted or honeycombed surface with almost straight or else irregularly wavy vertical ridges connected by short cross ridges. The raised ribs tend to darken with age, accentuating the reticulate pattern rather like the lead that holds a stain glass window together. The stem is generally paler than the cap which may range in colour from yellow, yellowish brown or honey brown to grey or even white (Cameron and May 2003).

#### Generation Length

The generation length of *Morchella esculenta* is suspected to be 50 to 300 years. Generation time cannot be estimated for fungi since the longevity of mycelium within the substrate, and the frequency of successful spore germination and adult recruitment, are poorly understood and any estimates highly speculative. Longevity is potentially indefinite, causes of genet mortality highly speculative, spore recruitment success unknown and therefore generation time potentially at least at the decadal scale. In this instance, the relative instability of at least some sandy substrates characteristic of the taxon, such as wind-blown coastal dunes, suggest the frequency of mortality, and therefore the likely frequency of spore recruitment, may be greater than for other fungi on more stable substrates. Consequently, generation time for this taxon may be shorter than for other fungi in more stable habitats.

## Distribution

The taxon was first recorded for Victoria on the Mornington Peninsula (Weatherhead pers. comm.). The taxon was neither photographed nor collected at the time and the details of location and date are unavailable since both recorders are now deceased. On 11 October 1992, the taxon was photographed a single fruiting body at Belar Road on the Mornington Peninsula, on the north side of the freeway reservation and west of Truemans Road near Tootgarook, south-west of Rosebud. May and Avram (1997) observe that "One morel (the *Morchella conica-elata* group) is relatively common, at least in certain habitats (and after fire) and is the taxon most often recorded in field guides and other literature. There are five MEL collections of the *Morchella conica-elata* group from Victoria, and a cursory check of specimens of *Morchella* not named to species indicated that there are four additional Victorian collections which appear to belong to the *M. conica-elata* group. In contrast, there is only a single Victorian collection of *Morchella esculenta*, from a beach near Rosebud (an urbanised area) and the species is rarely reported in the literature."

The taxon was subsequently collected on 9 October 1998 at the Yanakie Isthmus within Wilsons Promontory National Park, 400 m south-east of the entry gate on the road to Tidal River, approximately 130 km south-east of the Tootgarook occurrence.

The distribution of the taxon in Australia is poorly known. The taxon apparently has a cosmopolitan distribution (Cameron and May 2003). Fungimap records in the Atlas of Living Australia (ALA) suggest the taxon also occurs at Nelson, the Lower Glenelg National Park, Dunkeld, Barwon Heads, Blairgowrie, Rye and Rosebud.

## Habitat

In Victoria the species is apparently restricted to coastal scrub vegetation on deep siliceous or calcareous sands. At both known sites, the taxon occurs on old stabilised beach dunes some distance from the sea in scrub dominated by species such as *Leptospermum laevigatum* (Coast Tea-tree), *Leucopogon parviflorus* (Coast Beard-heath), *Allocasuarina verticillata* (Drooping Sheoak) and *Bursaria spinosa* (Sweet Bursaria). At both sites the species occurs in association with another threatened species, *Pterostylis cucullata* subsp. *cucullata* (Leafy Greenhood). In Victoria, the taxon is restricted to the Gippsland Plain bioregion (Cameron and May 2003).

Fungimap records in the ALA suggest the taxon also occurs in similar coastal and subcoastal habitats in far western Victoria and may also occur on sand under *Eucalyptus viminalis* (Manna Gum) near Dunkeld in the Greater Grampians region.

## Threats

The taxon was identified as *Morchella esculenta* as one of only four Victorian macro-fungi for which there is sufficient knowledge of biology, ecology and distribution to accurately assess conservation status and one of only two which are considered threatened and state that:

*Morchella esculenta* is considered under threat due to its very restricted distribution, its rarity (in contrast with other members of the genus), and the likelihood of collection of fruit bodies for food (with unknown effects on population viability). Although there is no direct evidence of historical decline, the taxon is likely to have declined significantly in response to coastal development and, potentially, by targeted and repeated harvesting of fruit bodies for culinary use. May and Avram (1997) noted that "Morels (*Morchella* species) are highly regarded and sought-after edible fungi. There is much collecting for individual use and for sale at market (at relatively high prices). There is evidence of illegal harvesting of morels from reserves, sometimes leading to disturbance to the soil when attempts are made to transplant colonies. The effect of harvesting of fruit bodies (even without disturbance to the mycelium) is unknown." Kuo (2003) suggests that "The yellow morel is probably the most prized of all edible mushrooms. Its flavour is delicate, and its texture is meaty. Yellow morels range from miniscule to enormous - up to nearly a foot high."

The demographic restriction of the species to two small occurrences further threatens the species with elimination through stochastic events. The Mornington Peninsula colony is further threatened with elimination through habitat destruction associated with the future construction of the Mornington freeway. Even if the impacts of the freeway were averted, this site is subject to ongoing decline in habitat quality as a consequence of urbanisation and weed invasion (Cameron and May 2003).

All occurrences are therefore at high stochastic risk from coastal development or other management activity and, potentially, from targeted collection of fruit bodies for culinary use. Occurrences on coastal dunes are also at long-

term risk from beach-front erosion in response to sea level rise and coastal instability associated with anthropogenic 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> <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 between 8,314 and 18,327 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The lower bound is based on a single confirmed and extant occurrence on the Yanakie Isthmus in Wilsons Promontory National Park. This has been made equal to the Area of Occupancy (AoO) to ensure consistency with the definition of the AoO as an area within the EoO. An upper bound is based on the inclusion of a second reliable record for Tootgarook on the Mornington Peninsula which may, however, have become locally extinct since last photographed in 1992, and the additional unvouchered but acceptable to plausible Fungimap records in the Atlas of Living Australia (ALA).

The taxon is estimated to be severely fragmented naturally at the regional scale. It is unclear whether the taxon is also severely fragmented naturally at the landscape scale since it is unknown how far spores are likely to be dispersed by wind

It is estimated to have a continuing decline in (i), (ii), (iii), (iv) and (v) above.

The taxon is severely fragmented.

#### Eligible under Criterion B2 as Endangered

The AoO across the taxon's range is estimated to be between 8 and 40 (28 middle bound) km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. An estimated middle bound is based on the inclusion of a second record for Tootgarook on the Mornington Peninsula. An upper bound is based on the inclusion of Fungimap records in the ALA.

As above, the taxon is severely fragmented and has a continuing decline in (i), (ii), (iii), (iv) and (v) 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

There is insufficient evidence to determine the number of mature individuals.

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:

#### 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

Cameron, D. G., and May, T.W. (2003). Draft Nomination for Listing under the Flora and Fauna Guarantee Act 1988: *Morchella esculenta* (L.) Pers. (Helvellaceae) Common Morel.

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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[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)

Kuo, M. (2003). *Morchella esculenta*: The yellow morel. Retrieved from:  
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May, T.W., and Avram, J. (1997). The Conservation Status and Distribution of Macrofungi in Victoria. A report prepared for the Australian Heritage Commission. South Yarra: National Herbarium of Victoria.