

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this conservation advice and included this species in the Critically Endangered category, effective from 04/07/2019.

Conservation Advice

Cophixalus monticola

(Mountain Top Nursery Frog)

Taxonomy

Conventionally accepted as *Cophixalus monticola* (Richards et al. 1994).

Summary of assessment

Conservation status

Critically Endangered: Criterion 2 B1 (a),(b)(i,ii,iii,v)

The highest category for which *Cophixalus monticola* is eligible to be listed is Critically Endangered.

Cophixalus monticola has been found to be eligible for listing under the following categories:
Criterion 2: B1 (a),(b)(i,ii,iii,v): Critically Endangered

Cophixalus monticola has been found to be eligible for listing under the Critically Endangered category.

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of new information provided to the Committee to list *Cophixalus monticola*.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 30 business days between 7 September 2018 and 22 October 2018. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species Information

Description

The Mountain Top Nursery Frog is a member of the family Microhylidae. It is similar in appearance to *Cophixalus aenigma* and *C. concinnus* but can be distinguished by larger toe discs and body width. It is moderately sized (snout-to-vent length 17.5 mm), has an indistinct tympanum and short hind legs. The snout is bluntly rounded and finger lengths are 3>4>2>1 in decreasing order. The toes are unwebbed and are 4>3>5>2>1 in decreasing length. Subarticular tubules are indistinct. The skin is smooth dorsally and ventrally and the color is variable and ranges from red-brown to yellow-brown, with dark spots on the legs and dorsal

side. The belly is whitish, yellow or reddish-brown with areas of darker pigment laterally and on the throat (Cogger 2014). It is morphologically similar to the Elegant Nursery Frog (*C. concinnus*) but they do not co-occur (Hoskin 2004). The male call is a short trill, similar to, but distinguishable from that of *C. concinnus* (Hoskin 2004).

The eggs of microhylids are relatively large and are laid in very moist soil or vegetation. The tadpole develops inside the egg and when it has completed metamorphosis it hatches from the egg as a fully formed froglet (Zweifel 1985). Two clutches have been found, containing a small number of eggs (8 and 13) laid in a clump linked in a "rosary chain" by a thin, gelatinous cord (Anstis 2017).

Distribution

The Mountain Top Nursery Frog is considered one of the most restricted amphibian species in Australia. It is found only on Mt Lewis in northern Queensland, at altitudes above 1100 m above sea level (Hoskin 2004; Shoo & Williams 2004). Relative to sympatric *Cophixalus* species it is patchily distributed, occupying only approximately 1 percent of the available geographic space (Williams 2007).

Climatic variables explain the majority of the variation in abundance of the Mountain Top Nursery Frog, suggesting that it is particularly susceptible to climate change (Williams 2007). The Mountain Top Nursery Frog requires high precipitation (2500 to 3500 mm) and cooler temperatures (17 to 19 °C) (Williams 2007).

Relevant Biology/Ecology

The Mountain Top Nursery Frog is a high altitude rainforest specialist that occurs in notophyll vine forest but avoids rocky areas (Williams 2007). Males generally call from elevated positions (0.2 to 1.4 m) (Hoskin 2004). It has been suggested that the availability of select microhabitats, such as areas of rainforest where the understorey is dominated by *Linospadix* palms may be an important determinant of local abundance (Shoo & Williams 2004).

The microhylids of the Australian Wet Tropics differ from most other frog species in that they are terrestrial breeders and do not need surface water to breed. They require high levels of soil and litter moisture to prevent dessication of the eggs during development (Williams 2007). One parent (usually the male) will generally attend to the eggs until hatching occurs (Felton et al. 2006; Hoskin 2004; Williams 2007). The Mountain Top Nursery Frog breeds in limnospadic palm apices, where decaying leaf litter gathers and provides a protected environment for eggs and froglets (Williams 2007). The embryo develops directly in the egg and then hatches out as a tiny froglet (Hoskin 2004).

The generation length of the Mountain Top Nursery Frog is unknown, but is estimated to be 10 years, based on the known ages of breeding males being between 4-14 years for *Cophixalus ornatus* (Ornate Nursery Frog) (Felton et al. 2006).

Threats

Threats to the Mountain Top Nursery Frog include climate change, habitat degradation and introduced species. The table below lists the threats impacting the species in approximate order of severity of risk, based on available evidence.

Number	Threat factor	Threat status	Evidence base
1.0	Climate change		
1.1	Temperature increase, extreme weather events	Known potential	The Mountain Top Nursery Frog is found only at high altitude on a single mountain top in the wet tropics of northern Queensland. Distribution modelling carried

	e.g. cyclones, droughts		<p>out by Williams and Hilbert (2006) suggests that five <i>Cophixalus</i> species (including <i>C. monticola</i>) would lose more than 50 percent of their core habitat with a 1 °C increase in temperature. However an increase by 3 – 5 °C is predicted to be more likely in the next 50 years. All species are restricted to mountain tops and are already at the limits of their potential elevational ranges.</p> <p>Changes in hydrology and other effects of climate change (e.g. reduction in food supply) may also alter the susceptibility of frogs to disease, but these impacts are likely to be variable among species and sites (DoEE 2016).</p>
2.0	Habitat loss and degradation		
2.1	Clearing, trampling, fragmentation,	Known potential	Feral pigs are responsible for habitat damage and potentially cause adult frog mortality (Richards et al. 1993).
3.0	Invasive species		
3.1	Yellow Crazy Ants (<i>Anoplolepis gracilipes</i>)	Known potential	Yellow crazy ants spray formic acid to subdue prey, which causes burns and irritates the skin and eyes of animals. They can have severe impacts on a range of ecological processes and lead to significant loss of biodiversity. Yellow crazy ants were detected within the World Heritage Area and Little Mulgrave National Park in 2012 and now cover up to 61 ha (WTMA 2016) within these protected areas. In December 2013 yellow crazy ants were also detected in the Kuranda area (WTMA 2016).
4.0	Disease		
4.1	Amphibian chytrid fungus	Known current	Chytridiomycosis is an infectious disease caused by the amphibian chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) that affects amphibians worldwide, causing mass die-offs and some species extinctions (DoEE 2016). However, the prevalence of chytrid is extremely low in Australian microhylids (Hauselberger & Alford 2012).

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
A1	<p>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>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>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>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>		(a) direct observation [except A3]
A2			(b) an index of abundance appropriate to the taxon
A3			(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
A4			(d) actual or potential levels of exploitation
			(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Insufficient data to determine eligibility

Given that the generation length of the Mountain Top Nursery Frog is estimated to be approximately 10 years, the appropriate time scale for this criterion is likely to be 30 years. There are no data available to evaluate the population trend over any three generation period.

The species may experience natural fluctuations in number due to seasonal and climatic variation and there is insufficient information to conclude whether or not the observed changes in population size are a result of natural fluctuations. The available data does not allow a quantitative estimate of decline, therefore the Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR 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 indicating distribution is precarious for survival:			
(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 2 B1 (a),(b)(i,ii,iii,v) for listing as Critically Endangered

The calculated extent of occurrence (EOO) is 34 km², and the area of occupancy (AOO) is 20 km² (unpublished data DoEE 2017). These figures are based on the mapping of point records from post-1997 (20 year timeframe), compiled from state and Commonwealth agencies along with museums, research institutions and non-government organisations. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014. The EOO meets the threshold for listing as Critically Endangered under subcriteriion B1 and the AOO meets the threshold for listing as Endangered under subcriteriion B2.

There is a single population of the species limited to altitudes over 1100 m above sea level on Mt Lewis in northern Queensland.

A continuing decline in area of occupancy and area, extent and/or quality of habitat, and therefore number of mature individuals, may be inferred based on climate change (Shoo 2005; Williams et al. 2003; Williams and Hilbert 2006). Species that are both geographically restricted and patchily distributed, such as *C. monticola*, are at a high risk of extinction, as local stochastic events may affect the entire population (Williams 2007).

The Committee considers that the species' extent of occurrence is very restricted, the area of occupancy is restricted and the geographic distribution is precarious for the survival of the species because it occurs at only one location and a decline in area of occupancy and area, extent and/or quality of habitat and number of mature individuals has been inferred. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Critically Endangered.

Criterion 3. Population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

Not Eligible

Population density has been estimated during the breeding season to be approximately 31 calling males per hectare (Williams 2007). Williams also estimated that the species used approximately 0.2 percent of the available 19 800 km² of the Wet Tropics. This equates to in excess of 600 000 males in the population.

An alternative estimate can be derived from applying the population density of 31 males per hectare to the AOO of 20 km², equating to approximately 60 000 males. Even without taking females into account this is well in excess of the threshold of 10 000 individuals to be eligible under this criterion.

Following assessment of the data the Committee has determined that the number of mature individuals is not limited. Therefore, the species has not been demonstrated to have met the required element of this criterion.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low (Medium-term future)¹
Number of mature individuals	< 50	< 250	< 1,000
D2 ¹ Only applies to the Vulnerable 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: area of occupancy < 20 km ² or number of locations ≤ 5

¹ The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments that demonstrate eligibility for listing under other criteria may include information relevant to D2. This information will not be considered by the Committee in making its assessment of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [common assessment method](#).

Evidence:

Not Eligible

Population density has been estimated at 31 calling males per hectare (Williams 2007). Williams also estimated that the species used approximately 0.2 percent of the available 19 800 km² of the Wet Tropics. This equates to in excess of 600 000 males in the population. Even without taking females into account this is well in excess of the threshold of 1000 individuals to be eligible under this criterion.

The Committee has determined that the number of mature individuals is not low. Therefore, the species has not been demonstrated to have met the required element of this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Insufficient data to determine eligibility

Population viability analysis has not been undertaken. Therefore, there are insufficient data to demonstrate if the species is eligible for listing under Criterion 5.

Conservation Actions

Recovery Plan

A recovery plan is not recommended because the Mountain Top Nursery Frog is located in a small area in a single jurisdiction and the Conservation Advice sufficiently outlines the priority research and conservation actions needed to support the recovery of this species.

Conservation and Management priorities

Habitat loss and disturbance

- Implement a program ensuring suitable habitat is maintained in areas currently supporting populations of the Mountain Top Nursery Frog and investigate options for enhancing the resilience of the species' current habitat to climate change.

Invasive species (including threats from grazing, trampling, predation)

- Reduce the impacts of habitat destruction by feral pigs on existing populations by using fencing (where feasible) and reducing pig numbers.
- Control yellow crazy ants by baiting at critical stages of the ants' life cycle.

Disease

- Minimise the spread of the amphibian chytrid fungus by implementing suitable hygiene protocols (Murray 2011) to protect priority populations as described in the *Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis* (Department of the Environment and Energy 2016).
- Provide disease identification and prevention protocols (methods of handling, diagnostic keys, etc.) to researchers and land managers for use in the field.

Stakeholder Engagement

- Collaborate with land managers bordering (outside of) the Wet Tropics World Heritage Area to protect and manage rainforest areas where the species occurs, or which contain potential habitat for the species, from threats due to disease and invasive species.
- Interested nature conservation, land management and land holder groups could be engaged in conservation management activities, such as survey and monitoring, but should be made aware of the need to follow correct field practices and hygiene protocols to mitigate the risks of trampling and disease transmission. If necessary, use workshops

to aid stakeholders in developing the skills and knowledge required to manage threats to this species while undertaking these activities.

- Inform the public about the status and recovery efforts for the species, e.g. by providing information to visitors to the Wet Tropics World Heritage Area and publicising the species through the media.

Survey and Monitoring priorities

- More precisely assess the population size, distribution and ecological requirements of the Mountain Top Nursery Frog.
- Design and implement a monitoring program for the Mountain Top Nursery Frog.

Information and research priorities

- Improve knowledge of the reproductive biology, age structure and growth rates of the Mountain Top Nursery Frog.
- Improve knowledge of the thermal tolerance limits of the Mountain Top Nursery Frog and assess its possible response to future climate scenarios.
- Improve understanding of how climate change will likely impact on the Mountain Top Nursery Frog due to altered temperatures, rainfall, environmental stressors and disease virulence.
- Improve understanding of husbandry methods for the species.
- Investigate the development of a strategic assisted colonisation (or translocation) strategy in response to the threat of climate change. The strategy should include consideration of the benefits and risks of undertaking a coordinated series of translocations of *Cophixalus* species to mountain tops further south as increased temperatures impact on their survival and reproductive success.
- Improve understanding of the impacts of feral pigs and yellow crazy ants on the Mountain Top Nursery Frog.

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Critically Endangered category: *Cophixalus monticola*
- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

26/02/2019

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