



Consultation Document on Listing Eligibility and Conservation Actions

***Litoria rheocola* (common mist frog)**

You are invited to provide your views and supporting reasons related to:

- 1) the eligibility of *Litoria rheocola* (common mist frog) for inclusion on the EPBC Act threatened species list; and
- 2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public are welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species and provides its recommendation to the Australian Government Minister for the Environment.

Responses are to be provided in writing either by email to:
species.consultation@environment.gov.au

or by mail to:

The Director
Marine and Freshwater Species Conservation Section
Wildlife, Heritage and Marine Division
Department of the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 2 March 2018.

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General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the department's website at: <http://www.environment.gov.au/biodiversity/threatened/index.html>.

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at: <http://www.environment.gov.au/biodiversity/threatened/pubs/guidelines-species.pdf>.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: <http://www.environment.gov.au/biodiversity/threatened/nominations.html>.

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the department's website at: <http://www.environment.gov.au/biodiversity/threatened/recovery.html>.

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department's website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

Privacy notice

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department's obligations under the Privacy Act 1988 (Cth) and the Department's Privacy Policy.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the '[common assessment method](#)'. As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department's Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint. A copy of the Department's Privacy Policy is available at: <http://environment.gov.au/privacy-policy>

Litoria rheocola

(common mist frog)

Taxonomy

Conventionally accepted as *Litoria rheocola* (Liem 1974)

Species Information

Description

Litoria rheocola (common mist frog) is a moderate sized frog, with males being 27 - 36.4 mm snout-to-vent length (SVL), and females being 31.7 - 41.2 mm SVL. The dorsal surface is dull grey or brown, with irregular darker markings. There is a distinct inverted triangle marking on the top of the head, stretching between the eyes down to the coccygeal region. An obscure darker band runs along the side of the snout, through the eye and ear to the shoulder. The skin is smooth above, with scattered small tubercles. The ventral surface is granular, white in colour. The finger and toe discs are large. The fingers are moderately webbed, and the toes nearly fully webbed. The tympanum is small and covered by skin, though the rim may be distinct. The male nuptial pads are small, with fine dark spicules. The tip of the snout is bluntly pointed (Liem 1974; Cogger 1994).

The male mating call is a regular, repeated long drawn single note call, a rather nasal "wreak wreak wreak" (Liem 1974).

Large (1.4 - 1.8 mm diameter) unpigmented eggs are deposited in a compact gelatinous clump under rocks in fast-flowing streams (Liem 1974). Tadpoles have a flattened, sandy coloured body, which is darker ventrally. The tail is very muscular, creamy yellow lightly dusted with diffuse dark pigment. The tail fins are clear, with only a few scattered melanophores confined to small aggregations. The mouth is suctorial, surrounded by marginal and submarginal papillae. There are two anterior and three posterior tooth rows (Richards 1992; Anstis 2013).

Distribution

The common mist frog occurs in rainforests north of the Herbert River in the Wet Tropics Biogeographical Region from Broadwater Creek National Park (18° 23'S, 145° 57'E) to Amos Bay (150 41'S, 145 19'E), from 0-1180 m above sea level (asl). No population declines have been observed in lowland rainforests below 400 m, but the common mist frog disappeared from most sites above this altitude in the early 1990s, most likely due to chytrid fungus (Richards et al. 1993). The species is now showing recovery at some high altitude sites (up to 750 m asl) (McDonald et al. 2005; Roznik & Alford 2015).

Chytrid fungus prevalence remains relatively high in the species, with the most negative effects occurring at the more elevated sites (Sapsford et al. 2013). At low elevation sites chytrid fungus prevalence may be high, particularly in winter, and exerts a dampening effect on population growth rates (Phillott et al. 2013).

Relevant Biology/Ecology

The species is widespread throughout the Wet Tropics biogeographic region but is restricted to perennial rainforest streams. It uses a variety of streamside vegetation and rock perches, usually near fast-flowing sections of stream (Roznik & Alford 2015).

Calling males and gravid females are found throughout the year and breeding has been observed during most months (Liem 1974; Dennis & Trenerry 1984). Large (1.4 - 1.8 mm diameter) unpigmented eggs are deposited in a compact gelatinous clump under rocks in fast-flowing streams (Liem 1974). The tadpoles graze on algal-covered rocks in fast-flowing waters (Liem 1974).

Threats

The common mist frog is threatened by disease (most notably chytridiomycosis) and invasive species. The table below lists the threats impacting the species in approximate order of severity of risk, based on available evidence.

Threat factor	Consequence rating	Extent over which threat may operate	Evidence base
Disease - Chytrid fungus	Severe	Whole of range	Numerous studies (e.g. Laurance et al. 1996; Berger et al. 1998) have shown that this species is being impacted by amphibian diseases, most notably chytridiomycosis. 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 (Department of the Environment and Energy 2016). Populations of common mist frog disappeared from high elevation sites (> 400 m asl) but persisted at lower altitudes during the pandemic. The species is now showing recovery at some high altitude sites (up to 750 m asl) (McDonald et al. 2005; Roznik & Alford 2015) although high endemic rates of infection may still render populations vulnerable to other threatening processes, particularly those that affect recruitment success (Phillott et al. 2013).
Habitat loss and degradation (e.g. clearing, trampling, fragmentation, altered hydrology, salinity)	Moderate	Part of range	Feral pigs (<i>sus scrofa</i>) are responsible for damage to riparian habitats and potentially cause adult frog mortality. However there is very little research into their impacts on native frog populations (Richards et al. 1993). There are a substantial number of impoundment structures (dams, weirs etc.) on many of the rivers and streams of the Wet Tropics (Northern Queensland Threatened Frogs Recovery Team 2001). Given the stream dwelling nature of the common mist frog it is reasonable to expect that this may affect the species,

			especially at lower altitudes where the remnant populations currently persist. However, the potential impact of existing or proposed water extraction on these species has not been examined (Northern Queensland Threatened Frogs Recovery Team 2001).
Climate change (temperature increase, extreme weather events e.g. cyclones, droughts)	Moderate	Whole of range	Climate change is predicted to result in increased rainfall across northern Australia (Haylock & Nicholls 2000). This may alter the hydrology and breeding frequency of stream-dwelling frogs, and make them vulnerable to being dislodged in high flows. Changes in hydrology and other effects of climate change (e.g. reduction in food supply) may also alter the susceptibility of frogs to the chytrid fungus, but these impacts are likely to be variable among species and sites (DoEE 2016).
Invasive species	Moderate	Most of range	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 Wet Tropics World Heritage Area and Little Mulgrave National Park in 2012 and now cover up to 61 ha within these protected areas (Wet Tropics Management Authority 2016). In December 2013 yellow crazy ants were also detected in the Kuranda area (Wet Tropics Management Authority 2016).

Assessment of available information 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	Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.	based on any of the following	(a)	direct observation [except A3]
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.		(b)	an index of abundance appropriate to the taxon
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]		(c)	a decline in area of occupancy, extent of occurrence and/or quality of habitat
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.		(d)	actual or potential levels of exploitation
			(e)	the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

While there was a substantial decline in the population of common mist frogs, this occurred predominantly in the late 1980s and early 1990s and only at upland sites south of the Daintree River (Richards et al. 1993). The species is now showing recovery at some high altitude sites (up to 750 m asl) (McDonald et al. 2005; Roznik & Alford 2015).

Generation length is not known with certainty, but is estimated to be 3.5 years based on two similar-sized *Litoria* species found in similar habitats (red-eyed tree frog (*L. chloris*), Lesueur's tree frog (*L. lesueuri*))(Morrison et al. 2004). Consequently, that decline now falls outside the relevant time period for this criterion. As the species' population is now stable (or increasing) and is common over a wide area (Phillott et al. 2013; Sapsford et al. 2013; Roznik & Alford 2015), it does not meet the requirements of this criterion.

The data presented above appear to demonstrate that the species is **ineligible for listing** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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 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 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:

The common mist frog is distributed in the Wet Tropics area of northern Queensland from north of the Daintree River to north of the Herbert River. The calculated extent of occurrence is 12 919

km², and the area of occupancy is 432 km² (DoEE 2017). These figures are based on the mapping of point records from post-1997 (and post-chytrid) observations (20 year timeframe), compiled from state and Commonwealth agencies along with museums, herbaria, 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 species is found at more than 10 locations, and the population appears to be relatively stable.

The data presented above appear to demonstrate that the species is **ineligible for listing** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

Given the broad distribution and high abundance of the species at a multitude of lowland stream sites, it is likely that the population is >10 000 mature individuals.

The data presented above appear to demonstrate that the species is **ineligible for listing** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

Given the broad distribution and high abundance of the species at a multitude of lowland stream sites, it is likely that the population is >10 000 mature individuals

The data presented above appear to demonstrate that the species is **ineligible for listing** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

Population viability analysis appears not to have been undertaken. Therefore, there are **insufficient data** to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Consideration for delisting

The common mist frog was listed as Endangered under the EPBC Act at the commencement of the Act in 2000. There was a dramatic range contraction with an observed reduction in population size in the late 1980s and early 1990s due to the spread of the chytrid fungus. However, the common mist frog population appears now to have remained relatively stable at low altitude sites (< 400 m asl) (e.g. McDonald & Alford 1999; Northern Queensland Threatened Frogs Recovery Team 2001; Hodgkinson & Hero 2003; Phillott et al. 2010; Hoskin & Puschendorf 2014). The species is now also showing recovery at some high altitude sites (up to 750 m asl) (McDonald et al. 2005; Roznik & Alford 2015).

The common mist frog has extensive occupied habitat located within protected areas in Queensland (Wet Tropics World Heritage Area). Delisting the species is not expected to result in the loss of any recovery actions that could result in it becoming eligible for re-listing in the future.

Note: if the species is found to be ineligible for listing as a threatened species under the EPBC Act, the following section of this consultation document will not be relevant

Conservation Actions

Recovery Plan

A decision about whether there should be a recovery plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

Conservation and Management priorities

Disease

- Minimise the spread of the 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.

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

- Manage priority sites to reduce the impacts of habitat destruction by feral pigs by using fencing and reducing pig numbers.
- Minimise the spread of yellow crazy ants and manage their impacts by implementing an eradication program based on baiting at critical stages of the ants life cycle, as outlined on the Wet Tropics Management Authority website (Wet Tropics Management Authority 2016).

Stakeholder Engagement

- Encourage ongoing and effective coordination of state-wide action to support conservation of the common mist frog, including eradication programs for invasive species.
- Provide input to Wet Tropics Management Authority environmental codes of practice with land management agencies (fire, water infrastructure, transport and public utility, mining and quarrying, defence and grazing) to ensure conservation and management actions are compatible with amphibian requirements.
- Provide advice on Queensland Department of Natural Resources and Mines water management issues and programs including:
 - domestic extraction of water,
 - water extraction policy/usage through the Water Allocation Management Program,
 - impact of ground water pumping,
 - impact of water extraction on water flow, and;
 - in-stream riparian impacts including small perennial streams and seasonal streams.
- Provide advice and information on the use of herbicides/biocides against pests and diseases in areas with threatened frogs.
- 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.

Survey and Monitoring priorities

- Conduct targeted surveys throughout the range of the common mist frog to better define its current distribution and abundance, including sites above 400 m asl.
- Establish and maintain a monitoring program based on these data to:
 - determine trends in population size and distribution, mortality and timing of life history stages; and
 - monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Improve understanding of the extent and impact of infection by chytrid fungus on the common mist frog to better inform how to apply existing or new management actions relevant to the recovery. This includes knowledge on:
 - the different strains of the fungus;
 - levels of virulence;
 - mechanisms for resistance to the disease;
 - treatment options; and
 - the potential of other species (e.g. freshwater crayfish) to act as reservoirs or vectors for transmission of the fungus (Department of the Environment and Energy 2016).
- Determine the extent of the threat and the likely impacts from yellow crazy ants.
- Improve understanding of how climate change will likely impact on the common mist frog due to altered temperatures, rainfall, environmental stressors and disease virulence.
- Improve understanding of husbandry methods for the species.
- Improve understanding of the impacts of environmental toxins.

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Other sources cited in the advice

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Consultation questions

1. Do you agree with the current taxonomic position of the Australian Faunal Directory for this taxon (as identified in the draft conservation advice)?
2. Can you provide any additional references, information or estimates on longevity, age of maturity, average life span and generation length?
3. Has the survey effort for this taxon been adequate to determine its national distribution and adult population size?
4. Do you accept the estimate provided in the nomination for the current population size of the taxon?
5. For any population with which you are familiar, do you agree with the population estimate provided? If not, are you able to provide a plausible estimate based on your own knowledge? If so, please provide in the form:
 - Lower bound (estimated minimum):
 - Upper bound (estimated maximum):
 - Best Estimate:
 - Estimated level of Confidence: %
6. Can you provide any additional data, not contained in the current nomination, on declines in population numbers over the past or next 10 years or 3 generations, whichever is the longer?
7. Is the distribution as described in the nomination valid? Can you provide an estimate of the current geographic distribution (extent of occurrence or area of occupancy in km²) of this taxon?
8. Has this geographic distribution declined and if so by how much and over what period of time?
9. Do you agree that the taxon is eligible for inclusion on the threatened species list, in the category listed in the nomination?
10. Do you agree that the threats listed are correct and that their effects on the taxon are significant?
11. To what degree are the identified threats likely to impact on the taxon in the future?
12. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this taxon at any stage of its life cycle?
13. In seeking to facilitate the recovery of this taxon, can you provide management advice for the following:
 - What individuals or organisations are currently, or need to be, involved in planning to abate threats and any other relevant planning issues?
 - What threats are impacting on different populations, how variable are the threats and what is the relative importance of the different populations?
 - Would the development and implementation of a translocation strategy be of benefit?
 - What recovery actions are currently in place, and can you suggest other actions that would help recover the taxon? Please provide evidence and background information.
14. Can you provide additional data or information relevant to this assessment?

15. Can you advise as to whether this species is of cultural significance to Indigenous Australians?