



Consultation Document on Listing Eligibility and Conservation Actions

Litoria kroombitensis (Kroombit treefrog)

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

- 1) the eligibility of *Litoria kroombitensis* (Kroombit treefrog) for inclusion on the EPBC Act threatened species list in the Critically Endangered category; 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 kroombitensis

(Kroombit treefrog)

Taxonomy

Conventionally accepted as *Litoria kroombitensis* (Hoskin et al. 2013).

Species Information

Description

Litoria kroombitensis (Kroombit treefrog) is a small (< 45 mm snout-to-vent length (SVL)) green or greenish-brown frog with distinct, rounded finger and toe pads; a thin gold line running from naris over eye and tympanum to above forelimb; white gilding on the trailing edges of the fore- and hindlimbs; unpatterned orange posterior thighs; a gold iris; a blunt, gently rounded snout in profile; a smooth dorsum; and a mating call consisting of a short whine followed by one or more chirps (Hoskin et al. 2013). Females are larger than males, being an average of 1.25 times the SVL of males. The overall body shape also differs, with females being rotund in body shape (body width is wider than head), whereas the male body width starts equal to head then tapers as an inverse triangle (Hoskin et al. 2013).

Eggs are darkly pigmented and laid in masses of 100-300. Kroombit treefrog tadpoles have a brown body with darker areas over the braincase and gut and are difficult to distinguish from those of the closely related but allopatric *L. pearsoniana* and *L. barringtonensis* (Hoskin et al. 2013).

Distribution

The Kroombit treefrog is restricted to Kroombit Tops, south-west of Gladstone, east Australia. Kroombit Tops is an isolated northern outlier to the temperate wet forests of south-east Queensland/north-east New South Wales. Based on extensive surveys since the mid 1990s, the Kroombit treefrog is known only from the headwaters of five streams that rise on the plateau on the eastern side of Kroombit Tops; namely Dry, Griffiths, Kroombit, Three Moon and Munholme Creeks. Records are restricted to an elevational range of about 550–900 m above sea level. Survey effort at lower altitudes has been less intensive than at higher altitudes, but the species has not been recorded from several surveys in the lower sections of streams (e.g., Kroombit Creek) (Hoskin et al. 2013).

Relevant Biology/Ecology

The Kroombit treefrog is a wet forest, stream-breeding species. It inhabits rainforest and adjoining wet sclerophyll forest, where calling males and gravid females are encountered along flowing streams. Non-breeding adults and sub-adults are rarely encountered but presumably feed and shelter along the streams and in adjacent forest. Breeding activity (amplexus and/or spawning) has been recorded in all months from August through to February (Hines pers comm 2017). Egg masses attributable to the Kroombit treefrog, comprising roughly 100–300 darkly pigmented eggs encapsulated in jelly, have been found wrapped around submerged twigs and branches in pools with largely static or slow-flowing water (Hoskin et al. 2013).

Kroombit treefrog tadpoles are found in quiet pools along and adjacent to slow and intermittently flowing streams in rainforest and adjoining wet sclerophyll forest. Though only recorded during spring and summer (from August to mid-February) (Hines pers comm 2017), tadpoles may be present at other times of year as well (e.g. early autumn). Tadpoles nearing metamorphic climax and/or recently metamorphosed frogs have been recorded from November to February. Kroombit treefrog tadpoles are largely benthonic, feeding on sediment (most commonly silt) at

the bottom of pools. Recently-metamorphosed frogs have been recorded in summer sitting out on stream-side vegetation, including palm (*Archontophoenix cunninghamiana*) seedlings and rainforest spinach (*Elatostema reticulatum*). Breeding pools in rainforest occupied by Kroombit treefrog tadpoles are free of fish except for the occasional longfin eel (*Anguilla reinhardtii*).

Threats

Threats to the Kroombit treefrog include amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), habitat degradation by introduced species and climate change. 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	Chytridiomycosis is an infectious disease caused by the amphibian chytrid fungus that affects amphibians worldwide, causing mass die-offs and some species extinctions (Department of the Environment and Energy 2016). Surveys of this species since the mid-1990s identified population declines from the late 1990s (Hoskin et al. 2013). Moribund and dead frogs were found with the causative agent identified as chytrid fungus (Berger 2001; Murray et al. 2010).
Habitat loss and degradation (e.g. clearing, trampling, fragmentation, altered hydrology, salinity)	Severe	Whole of range	The weed lantana (<i>Lantana camara</i>) is invading the habitat of this species (Hines 2012) and has the potential to smother native vegetation. It is also likely that colonisation by weeds such as lantana impede the regeneration of rainforest patches post fire events (Gentle and Duggin 1997). Feral pigs (<i>Sus scrofa</i>), cattle (<i>Bos taurus</i>) and horses (<i>Equus caballus</i>) are also present and cause habitat destruction and fouling of water in Kroombit Tops National Park, mainly by trampling (Hines 2012).
Climate change (temperature increase, extreme weather events e.g. cyclones, droughts)	Severe	Whole of range	Recent rainfall data for Kroombit Tops show a downward trend in annual totals over the past two decades and, with most climate models projecting a drier future climate, this trend may continue. In addition, upland rainforests of northern Australia have been predicted to shrink by 50% with a 1°C increase in temperature,

			with severe consequences for some frog populations (Williams et al. 2003). Accordingly, a large reduction in the area of rainforest at Kroombit Tops is likely.
Invasive species	Moderate	Most of range	Feral pigs are widespread within the habitat of the Kroombit treefrog and are likely to prey upon adults and disturb shelter sites. Feral cats may threaten the Kroombit treefrog given they are found at low density in the stream habitat of the species (Hines pers. comms. 2017). Cane toads may act as a vector for the chytrid fungus and may predate on adults and juveniles (although, there has been no direct evidence of predation).
Inappropriate fire regimes	Potential	Whole of range	Kroombit Tops is susceptible to wildfire (Hines 2012; Hoskin et al. 2013), and predicted climate change is expected to increase their frequency and severity. For example, a high intensity wildfire burnt into many rainforest patches used by the species in 1994 (Hines et al. 1999) causing significant damage to these ecosystems.
Population fragmentation	Potential	Whole of range	There are no data with which to assess this threat.

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:

The generation length of the Kroombit treefrog is unknown but is thought to be four to five years, based on an estimate for the closely related and morphologically similar *L. piperata* (peppered tree frog) (Hoskin et al. 2013; NSW Scientific Committee 2008).

Surveys since the mid-1990s have recorded significant declines from the late 1990s (Hoskin et al. 2013) but the extent of decline has not been estimated.

The data presented above appear to be **insufficient** 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.

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 calculated extent of occurrence is 34 km² (Hoskin et al. 2013, QPWS unpublished data), and the area of occupancy is 16 km² (DoEE 2018). These figures are based on the mapping of point records from 1994 to 2011, 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. Within this area the Kroombit treefrog is

restricted to the headwaters of five streams, although the vast majority of records and known habitat for the species is contained within the three most southern streams, i.e. Kroombit, Three Moon and Munholme Creeks (Hoskin et al. 2013).

These populations are relatively isolated and have therefore been considered to be fragmented. However, further genetic testing may show that contemporary gene flow occurs between these streams and if this is so then the species could be considered to exist at a single location.

Continuing decline may be inferred based on the likely reduction in number of individuals due to ongoing threats from chytrid fungus and habitat fragmentation and degradation.

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered** under Criterion B2(a)(bi-v). 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:

There is no estimate of population size available for the Kroombit treefrog. Population density varies greatly across sites, with the maximum number of adult males recorded on four transects varying considerably: 5, 10, 28 and 62 (standardised per 100 m) (QPWS unpublished data, 1996–2011 cited in Hoskin et al. (2013)).

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:

There is no estimate of population size available for the Kroombit treefrog.

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.

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

- Manage priority sites to reduce the impacts of habitat destruction by cattle, feral pigs and feral horses by maintaining fencing and controlling numbers.

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the Kroombit treefrog, that they support rather than degrade the habitat, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing/predation.
- Avoid any use of managed fire research and other activities that impact upon the persistence of the population unless there is evidence to show the impact would have a positive and enduring effect on the Kroombit treefrogs' persistence.
- Ensure that a high proportion of the habitat is maintained with a post-fire age sufficient to provide adequate cover (or habitat) to the Kroombit treefrog.
- Ensure immediate and ongoing post-fire predator control within the habitat when fires do occur.
- Ensure grazing by introduced herbivores is minimised or excluded post-fire until adequate vegetation recovery has occurred.
- Ensure that areas of dense ground cover/ leaf litter are retained within the habitat when prescribed fires are implemented. Reduce the frequency of high intensity fires sufficiently to retain hollow logs and large woody debris on the ground.

Stakeholder Engagement

- 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.
- Provide advice and information on the use of herbicides / biocides against pests and diseases in areas with threatened frogs.
- Assist stakeholders in developing and maintaining the skills and knowledge required to manage threats to the Kroombit treefrog.

Survey and Monitoring priorities

- Conduct targeted surveys throughout the range of the Kroombit treefrog to better define its distribution and abundance.
- Undertake survey work in suitable and potential habitat to locate any additional populations to more precisely assess population size and distribution.
- 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;
 - determine the extent of threats and their impacts; and
 - monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations.

- Improve understanding of the extent and impact of infection by chytrid fungus on the Kroombit treefrog 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. *Litoria wilcoxii* (eastern stony creek frog) and freshwater crayfish) to act as reservoirs or vectors for transmission of the fungus (Department of the Environment and Energy 2016).
- Improve understanding of the likely impacts of climate change on the Kroombit treefrog due to altered temperatures, rainfall, environmental stressors and diseases.
- Improve understanding of husbandry methods for the species.
- Improve understanding of the impacts of environmental toxins.

References cited in the advice

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<http://www.environment.gov.au/biodiversity/threatened/publications/tap/infection-amphibians-chytrid-fungus-resulting-chytridiomycosis-2016>
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<http://www.environment.gov.au/biodiversity/invasive-species/publications/hygiene-protocols-control-diseases-australian-frogs>.

NSW Scientific Committee (2008). Peppered Tree Frog *Litoria piperata* Review of current information in NSW. July 2008. Available from:

<http://www.environment.nsw.gov.au/resources/nature/schedules/PepperedTreeFrog.pdf>

Queensland Parks and Wildlife Service (QPWS). Unpublished data, provided by H Hines by email, January 2018.

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?