



## Consultation Document on Listing Eligibility and Conservation Actions

### *Litoria castanea* (yellow-spotted bell frog)

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

- 1) the eligibility of *Litoria castanea* (yellow-spotted bell frog) 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](mailto: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 castanea*

(yellow-spotted bell frog)

## **Taxonomy**

Conventionally accepted as *Litoria castanea* (Steindachner, 1867)

## **Species Information**

### **Description**

The yellow-spotted bell frog (Steindachner 1867) is a large (53 to 85 mm snout-to-vent length) long-snouted terrestrial hylid frog (Cogger 2014) belonging to the Australian Bell Frog complex (NSW NPWS 2001). The back of the species is dull olive to emerald green with scattered black spots and irregular bronze spotting and blotches. The skin on the back is warty. A pale green stripe runs down the centre of the back. The underside of the species is white with glandular skin. The groin and hind side of the thighs are blue-green with large yellow or cream spots. The tympanum (ear drum) is dark and conspicuous. The species has a pair of raised ridges that run down each side of the back (dorso-lateral folds) which are pale cream and also conspicuous (Robinson 1996). A narrow black stripe runs from the nostril, behind the eye, extending over the tympanum and bordering the dorso-lateral folds (Cogger 2014). The species has fully webbed toes with toe discs narrower than the toe itself.

The advertisement call of the yellow-spotted tree frog is variable with no regular pattern. The call of the species is generally monophastic, with a sequence of several short pulsed notes (grunts) which are sometimes lengthened into short growls (Thompson et al., 1996). A description of the tadpole is outlined in Anstis (2013).

There is currently uncertainty regarding the taxonomic status of the yellow-spotted tree frog. Genetic research is required to determine whether the species is genetically distinct from closely related *Litoria* species, particularly *L. raniformis* (growling grass frog) (Voros et al., 2010) and whether the northern and southern subpopulations represent one species (NSW Scientific Committee 2009).

Other common names include the yellow-spotted tree frog.

### **Distribution**

The yellow-spotted bell frog has historically been recorded in two separate biogeographical regions in south-eastern Australia: the New England Tableland Bioregion around Guyra and the South Eastern Highlands Bioregion around Lake George – Canberra and Bombala – Delegate (Heatwole et al. 1995; Osborne et al. 1996; NSW National Parks and Wildlife Service 2001).

The species' distribution on the New England Tableland Bioregion is restricted, with all records occurring in an area approximately 50 km by 25 km at an altitude of 1000-1500 m Australian Height Datum (AHD) (White & Ehmann 1997). In the South Eastern Highlands Bioregion (including the southern tablelands), the species has been recorded at an altitude of 700-800 m AHD (Osborne et al. 1996).

The species has not been recorded in the southern tablelands since 1980 and has not been recorded in the New England Tableland Bioregion since 1975 (Hero et al. 2006; NSW Scientific Committee 2009; Osborne et al. 1996). This indicates that the entire population of the species has undergone a very large and rapid reduction (NSW Scientific Committee 2009). The timing of the decline is uncertain, but has been estimated to have occurred between 1978 and 1981 (Osborne et al. 1996).

There is no known extant population of the yellow-spotted bell frog (NSW National Parks and Wildlife Service 2001). In 2004, the IUCN Red List of Threatened Species estimated that the population contains fewer than 50 mature individuals (Hero et al., 2004). The yellow-spotted bell frog may be extinct in the wild, however, there is a possibility that some individuals have remained undetected as a result of insufficient survey effort (NSW National Parks and Wildlife Service 2001; Hero et al. 2006).

The yellow-spotted bell frog was thought to have been rediscovered in 2009 in the southern tablelands near Yass (OEH 2015). Individuals recorded were identified as *L. castanea* as they morphologically resembled the taxonomic assessment by Thompson et al. (1996) (Voros et al. 2010). However, a genetic assessment of this newly discovered population found that these individuals clustered within the *L. raniformis* inland group at a low level of sequence divergence (Voros et al. 2010).

Targeted surveys conducted in the New England Tablelands Bioregion in 2016 did not record the yellow-spotted bell frog (D. Hunter pers. comm. 2016).

### Relevant Biology/Ecology

The yellow-spotted bell frog has been found in permanent ponds, swamps, lagoons, farm dams and the still backwaters of slow flowing streams, usually with emergent vegetation such as tall reeds or with overhanging grassy banks (White & Ehmann 1997).

The behaviour and breeding biology of the yellow-spotted bell frog is presumed to be similar to other bell frog species (NSW National Parks and Wildlife Service 2001). Breeding occurs in still or slowly flowing water bodies during warmer months following reasonable rainfall. Frogs lay large spawn masses on the water surface, usually attached to emergent vegetation (Courtice & Grigg 1975). Osborne et al. (1996) reported the species in the South Eastern Highlands Bioregion calling at water temperatures ranging from approximately 13 to 18 °C. Adults over-winter in hollow logs and in earth amongst the roots of fallen trees (Courtice & Grigg 1975).

Individuals reach sexual maturity at three years and have a life expectancy of six years (Hero et al., 2004).

### Threats

Threats to the yellow-spotted bell frog are principally related to disease and habitat degradation. 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 ( <i>Batrachochytrium dendrobatidis</i> ) that affects amphibians worldwide, causing mass die-offs and some species extinctions (Department of the Environment and Energy 2016). A pathogen such as chytrid fungus is considered likely to have caused or contributed to the decline of the yellow-spotted bell frog (Hero et al., 2004; NSW NPWS 2001; NSW Scientific

			Committee 2009), based on the pattern and speed of decline of the species and co-occurring species, <i>L. aurea</i> and <i>L. raniformis</i> (Hamer et al. 2009).
Disease - Infection from myxosporean parasites	Unknown	Unknown	<p>Myxosporean parasites are a group of pathogens known to cause infection in aquatic fauna, including amphibians (Hartigan et al. 2013). Myxosporean infection occurs in frogs and tadpoles. It can cause the disruption and destruction of organ function (including the inflammation, haemorrhage and necrosis of organs (e.g. brain, liver, gall bladder, kidneys and reproductive organs) and nervous tissue), which can result in reduced health (including emaciation, neurological dysfunction, delayed metamorphosis, reduced limb movement and decreased fertility) and mortality of infected individuals (Hartigan et al. 2013). Myxosporean parasites have been observed in Australian frogs for over 100 years and is suggested to represent a key threatening process contributing to amphibian decline (Hartigan et al. 2012; Hartigan et al. 2013).</p> <p>Myxosporean infection has been reported in the yellow-spotted bell frog, but this was from the apparently misidentified colony (Voros et al. 2010). Nevertheless, the occurrence of infection in related species including <i>L. aurea</i> and <i>L. raniformis</i> (Hartigan et al., 2013), suggest that it may have contributed to the decline of the yellow-spotted bell frog.</p>
Habitat loss and degradation (e.g. clearing, trampling, fragmentation, altered hydrology, salinity)	Moderate	Part of range	Agricultural practices, including cropping, livestock farming and the application of herbicides and pesticides, are considered a possible threatening process to the yellow-spotted bell frog (Hero et al., 2004; NSW Scientific Committee 2009; OEH 2015). Impacts from agriculture that may have contributed to the

			decline of the species include loss and modification of wetland habitat, alteration of water flow and water quality, removal of emergent and adjacent vegetation, and removal of shelter habitat (such as rocks, fallen timber and other debris) (NSW Scientific Committee 2009; OEH 2015). However, the threat of agriculture on the yellow-spotted bell frog has not been proven.
Small population sizes and population fragmentation	Potential	Whole of range	Despite significant survey effort, the species has not been found in the wild for 30 years (Osborne et al. 1996; NSW National Parks and Wildlife Service 2001; Hero et al. 2006). If populations persist they are likely very small and isolated.
Climate change (temperature increase, extreme weather events e.g. cyclones, droughts)	Potential	Whole of range	There are no data with which to assess this threat.
Chemicals	Potential	Most of range	Most of the range of yellow-spotted bell frog is within established agricultural areas, where application of agricultural chemicals to farming land is a regular occurrence. The application of fungicides, fertilisers, herbicides and pesticides to land adjoining known frog populations poses the risk of these entering and contaminating habitat areas or causing direct harm to the individual animals. The level of knowledge on the response of this species of frog to the range of agricultural chemicals is poor. However there is literature that highlights the sensitivity of frog species to commonly used agricultural chemicals (Mann et al. 2009).
Invasive species	Potential	Most 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%
<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>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p> <p><i>based on any of the following</i></p>		

#### Evidence:

Generation length is not known with certainty, but is estimated to be four to five years based on two similar *Litoria* species found in similar habitats, *L. aurea* and *L. raniformis* (Gillespie et al. 1995; NSW Scientific Committee 2008). Consequently, that decline now falls outside the relevant time period for this criterion. There are no data available to evaluate the population trend over any three generation period.

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 <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 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 4 km<sup>2</sup>, and the area of occupancy is 4 km<sup>2</sup> (DoEE 2017). These figures are based on the only sighting of this species since 1980. The EOO and the AOO were calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014. Given that the species has not been located in many years, despite significant effort, it is reasonable to assume that if extant, this species would likely only be present in one or two wetlands. If there are remaining populations they can also be inferred to be severely fragmented. Continuing decline is inferred based on the ongoing threats of chytridiomycosis and habitat degradation.

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered** 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:

There are no population estimates for this species, but the inability to locate the species over multiple decades suggests that the remaining population if still extant, is very small and likely contains less than 250 mature individuals. Continuing decline is inferred based on the ongoing threats of chytridiomycosis and habitat degradation. If the species persists in the wild it may be in a single population.

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered** 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:

Although there are likely to be very few individuals of this species remaining in the wild, it is not possible to discern with precision how small the population may be and consequently it cannot be effectively assessed against this criterion.

The data presented above appear to demonstrate that the species is eligible for listing under this criterion, at least as Endangered. However, it may be possible to argue Critically Endangered if data (including search effort and detectability) can be confirmed. 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 would be confirmed 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 in potential habitat for the yellow-spotted bell frog 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.

## Habitat loss, disturbance and modifications

- Ensure land managers are aware of the yellow-spotted bell frog's potential occurrence.
- If the species is found provide protection measures against suspected and potential threats through the protection and rehabilitation of wetlands and creeks, by:
  - Avoiding and/or minimising clearing and disturbance of vegetation in, or adjacent to, potential habitat;
  - Maintaining natural water flows and implementing erosion and sediment control;
  - Retaining fallen timber, rocks and other debris in potential habitat;
  - Minimising the use of pesticides and herbicides in, or adjacent to, potential habitat; and,
  - Avoiding livestock disturbance to potential habitat by installing fencing so sheep and cattle cannot access the riparian zone.

## Invasive species

- Undertake control of invasive fish species in areas where the yellow-spotted bell frog potentially occurs, when appropriate control methods have been developed and trialled. The implementation of control methods should be well planned and risk to the yellow-spotted bell frog must be fully considered.
- Avoid control methods that are likely to constitute an additional threat to the species.

## Stakeholder Engagement

- Engage with research institutions, state government agencies, interested nature conservation groups and land management groups to encourage conservation management activities, such as surveying and monitoring for the species. If necessary, use workshops to aid stakeholders in developing the skills and knowledge required to survey the yellow-spotted bell frog and manage suspected threats to this species.
- Increase protection of potential habitat for the yellow-spotted bell frog through community awareness (i.e. signage) and involvement.

## Survey and Monitoring priorities

- Undertake survey work in suitable habitat and potential habitat to locate any extant populations of the yellow-spotted bell frog to more precisely assess population size and distribution.

## Information and research priorities

- Develop captive husbandry protocols and suitable amphibian translocation strategies based on information on closely related species, in the event that the yellow-spotted bell frog be rediscovered, in order to establish insurance populations of the species.
- Undertake a screening process of museum specimens to be used as 'references' for genetic comparison. Genotype 'reference' specimens using ancient DNA technology.
- Undertake a genetic study of the species' New England Tableland and Southern Tableland forms using 'reference' specimens to assess and clarify the species' taxonomic status and nomenclature.

- Undertake research to determine the threatening processes that contributed to the decline of the yellow-spotted bell frog.
- Investigate the impact of myxosporean parasites and their potential to cause decline in frog populations.

### **References cited in the advice**

- Anstis, M. (2013) Tadpoles and Frogs of Australia. New Holland, Sydney. 164 -165.
- Cogger, H. G. (2014). Reptiles and amphibians of Australia. Seventh Edition. CSIRO Publishing, Collingwood, Victoria.
- Courtice GP & Grigg GC (1975). A taxonomic revision of the *Litoria aurea* complex (Anura: Hylidae) in south-eastern Australia. *Australian Zoologist* 18,149-163.
- Hamer AJ, Lane SJ & Mahony MJ (2009). Using probabilistic models to investigate the disappearance of a widespread frog-species complex in high-altitude regions of south-eastern Australia. *Animal Conservation* 13,275-285.
- Hartigan A, Phalen DN & Slapeta J (2013). Myxosporean parasites in Australian frogs: importance, implications and future directions. *International Journal for Parasitology: Parasites and Wildlife* 2,62-68.
- Hartigan A, Sangster C, Rose K, Phalen DN & Slapeta J (2012). Myxozoan parasite in brain of critically endangered frog. *Emerging Infectious Diseases* 18,693-695.
- Heatwole H, de Bavay J, Webber P & Webb G (1995). Faunal survey of New England. IV. The frogs. *Memoirs of the Queensland Museum* 38,229-249.
- Hero J-M, Morrison C, Gillespie G, Roberts JD, Newell D, Meyer E, McDonald K, Lemckert FL, Mahony M, Osborne E, Hines H, Richards S, Hoskin C, Clarke J, Doak N & Shoo L (2006). Overview of the conservation status of Australian frogs. *Pacific Conservation Biology* 12,313-320.
- Mann RM, Hyne RV, Choung CB & Wilson SP (2009). Amphibians and agricultural chemicals: Review of the risks in a complex environment. *Environmental Pollution* 157,2903-2927.
- NSW National Parks and Wildlife Service (2001). Yellow-spotted Bell Frog (*Litoria castanea*) and Peppered Tree Frog (*Litoria piperata*) recovery plan. NPWS Hurstville.
- Osborne WS, Littlejohn MJ & Thomson SA (1996). Former distribution and apparent disappearance of the *Litoria aurea* complex from the Southern Tablelands of New South Wales and the Australian Capital Territory. *Australian Zoologist* 30,190-198.
- Robinson, M. (1996). A field guide to frogs of Australia from Port Augusta to Fraser Island including Tasmania. Australian Museum and Reed Books/New Holland, Sydney.
- Thomson SA, Littlejohn MJ, Robinson WA & Osborne WS (1996). Taxonomy of the *Litoria aurea* complex: a re-evaluation of the Southern Tableland populations of the Australian Capital Territory and New South Wales. *Australian Zoologist* 30,158-169.
- Voros J, Bertozzi T, Price L & Donellan S (2010). Identification of southern tablelands bell frogs (*Litoria aurea* species complex). Unpublished report South Australian Museum
- White AW & Ehmann H (1997). New England Bell Frog, *Litoria castanea/flavipunctata*. In: Ehmann H (ed) Threatened frogs of New South Wales: Habitats, Status and Conservation. Frog and Tadpole Study Group of NSW Inc. pp 164-169.

### **Other sources cited in the advice**

Department of the Environment and Energy (2016). Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis, Commonwealth of Australia 2016. Available from:  
<http://www.environment.gov.au/biodiversity/threatened/publications/tap/infection-amphibians-chytrid-fungus-resulting-chytridiomycosis-2016>

Department of the Environment and Energy (2017). Area of Occupancy and Extent of Occurrence for *Litoria castanea*. Unpublished report, Australian Government Department of the Environment, Canberra.

Hero, J-M., Hines, H., Lemckert, F. & Robertson, P. (2004). *Litoria castanea*. The IUCN Red List of Threatened Species 2004. Viewed on: 5 December 2016. Available on the internet at: <http://www.iucnredlist.org/details/12145/0>

Hunter, D. (2016). Personal communication by email. 14 December 2016. Threatened Species Officer, NSW Office of the Environment and Heritage.

NSW Office of Environment and Heritage (OEH) (2015). Yellow-spotted tree frog – profile. Viewed on: 14 December 2016. Available on the internet at: <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10486>

NSW Scientific Committee (2008). Yellow-spotted Tree Frog *Litoria castanea* – Review of current information in NSW. Viewed on: 23 October 2017. Available on the internet at: <http://www.environment.nsw.gov.au/resources/nature/schedules/YellowspottedBellFrog.pdf>

NSW Scientific Committee (2009). Yellow-spotted Tree Frog *Litoria castanea* – critically endangered species listing. NSW Scientific Committee – final determination. Viewed on: 5 December 2016. Available on the internet at: <http://www.environment.nsw.gov.au/determinations/yellowtreefrogFD.htm>

## **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 km<sup>2</sup>) 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?