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

Conservation Advice

Crinia sloanei

(Sloane's Froglet)

Taxonomy

Conventionally accepted as *Crinia sloanei* (Littlejohn 1958)

Summary of assessment

Conservation status

Endangered: Criterion 1 A2(a),(c) and Criterion 2 B1 and B2(a),(b)(iii & iv)

The highest category for which *Crinia sloanei* is eligible to be listed is Endangered.

Crinia sloanei has been found to be eligible for listing under the following categories:
Criterion 1: A2(a),(c): Endangered
Criterion 2: B1 and B2(a),(b)(iii & iv): Endangered

Crinia sloanei has been found to be eligible for listing under the Endangered category.

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

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of new information provided to the Committee to list *Crinia sloanei.*

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 31 business days between 17 January 2018 and 2 March 2018. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species Information

Description

Crinia sloanei (Sloane's Froglet) is a small ground-dwelling frog belonging to the family Myobatrachidae. Males average about 15.6 mm snout-to-vent length (SVL) in size, with females being slightly bigger at 17.6 mm SVL (Littlejohn 1958). The froglet has a brown or browny-grey back often with darker brown or olive markings and males may also have orange or ochre coloured spots. The belly is white and peppered with small black spots. The throat of females is white, while breeding males have a greyish-green lower jaw and a pale grey throat. There is no webbing on the feet and toe-pads are absent. Eggs are pigmented and laid individually attached to blades of grass or other submerged vegetation. Tadpoles grow to 25 mm and are light grey or brown all over with scattered dark flecks (Anstis 2013; Knight 2013a).

Sloane's Froglet tadpoles are difficult to distinguish from those of *C. signfera* (Common Eastern Froglet) and *C. parinsignifera* (Plains Froglet) (Anstis 2013). Adult froglets are hard to see so they are best identified by their call. The male call is a distinctive sharp 'eahh', and the males usually call from shallow areas of wetland with thin stemmed vegetation (Knight 2013a). The appearance and call of Sloane's Froglet is similar to two other *Crinia* species (*C. parinsignifera* and *C. deserticola*), and it is likely that there have been considerable misidentifications and incorrect records for Sloane's Froglet in NSW (Spark 2015), particularly with *C. deserticola,* in the north of its range (NSW TSSC 2018).

Distribution

Sloane's Froglet is endemic to the Murray-Darling Basin from where it has been recorded at widely scattered locations in north central Victoria and central western New South Wales from the Victorian to the Queensland border. Nearly three quarters of the records are from the Riverina Bioregion which straddles southern New South Wales and Central Victoria, with a further 18 percent of records within the NSW South Western Slopes. Records for Sloane's Froglet north of Dubbo in New South Wales are likely to be misidentification of other *Crinia* species (Spark 2015).

Sloane's Froglet has disappeared from much of its former range and now appears to be restricted to a very small area of New South Wales near Albury and Corowa, and a series disjunct populations at Wangarratta, Chiltern, Little Lake Charm and Moodies Swamp near Cobram (Knight 2013a; Spark 2015, D. Hunter personal communication).

Recent extensive surveys have only located the froglet at a few general locations and relatively large populations were only recorded in ponds and depressions found within rural residential or peri-urban areas in the Albury – Thurgoona, Howlong and Corowa - Wahgunyah and Rutherglen areas (Knight 2013b). Ninety five percent of all Sloane's Froglets recorded since 2000 have been in these three stronghold areas. It is unclear why rural residential areas are the remaining stronghold of the species, but it may be related to the provision of dams and ponds in these areas, generally less intensive agricultural practices, and greater proportion of remnant wetland habitat areas.

Relevant Biology/Ecology

Sloane's Froglet lives and breeds in temporary and permanent waterbodies including oxbows off creeks and rivers, farm dams, large and small natural wetlands, constructed frog ponds and temporary puddles. It prefers wetlands that contain riparian and aquatic vegetation. Most often it has been found in waterbodies that contain grasses and reeds that are of medium height and have small stem diameters, such as couch *(Elymus repens)*, watercouch *(Paspalum pasplodes)* or the Common Spikerush (*Eleocharis acuta*). Waterbodies containing this type of vegetation are essential for Sloane's Froglet as it lays its eggs attached to vegetation (Knight 2013b). Gilgai and other depressions are favoured habitat on clay plains, while elsewhere they are generally restricted to temporary ponds in the river valley and up to 8 km on either side of large rivers (Littlejohn 1958).

As well as requiring particular breeding habitat, like most amphibian species, Sloane's Froglet needs connections between breeding and refuge sites. The variable climate of inland Australia means that for Sloane's Froglet to survive it has to move across the landscape when it is wet. Sloane's Froglet uses roadside drains, table drains, irrigation channels and inundated grasslands to move from one area to another (Knight 2013b).

The majority of the ecological communities providing Sloane's Froglet habitat are listed nationally as Critically Endangered. These are the *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains,* the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* the *Endangered Grey Box (Eucalyptus microcarpa) Grassy Woodlands* and the *Derived Native Grasslands of South-eastern Australia* ecological communities. These ecological communities that provide habitat for the Sloane's Froglet across its range are threatened by land use and high rates of clearing.

The peak calling time for males is from June to August, though they will also call throughout spring and after summer rains. Males usually call while floating in water of temporary ponds or shallow inundated areas connected to larger wetlands. Females lay small eggs individually and may lay fewer than 30 eggs in total. Hatching occurs 10 days after laying and metamorphosis may occur in late spring to autumn if breeding takes place in winter or spring (Anstis 2013). It is unknown whether a female may lay multiple clutches in a year. Preferred breeding sites are shallow natural or constructed pools to 20 cm depth containing emergent vegetation.

The generation length of Sloane's Froglet is unknown, but is likely to be between 18 months and 3 years. A related species, *Crinia signifera* is known to live for four years reaching sexual maturity in 18 months to 2 years (Bull and Williamson 1996).

Threats

Threats to Sloane's Froglet are principally related to habitat loss and degradation. The table below lists the threats impacting the species in approximate order of severity of risk, based on available evidence. The threats outlined below have corresponding conservation management priorities and actions.

Number	Threat factor	Threat status	Evidence base
1.0	Habitat loss and degradation		
1.1	Clearing, trampling, fragmentation, altered hydrology, salinity	Known current	The entire known range of Sloane's Froglet occurs across highly cleared landscapes with clearing rates amongst the highest for either NSW or Victoria. It is likely that the natural habitat of this species has been substantially impacted by land clearing (Knight 2013a). The distribution of Sloane's Froglet corresponds with one of the heaviest stock grazed environments in Australia. Trampling or destruction of habitat by grazing and the deterioration of water quality in wetlands by stock, may also threaten this species. Extant populations of Sloane's Froglet in NSW are currently in an ongoing state of decline due to habitat degradation. In particular, an Albury population is subject to significant habitat loss associated with urban and industrial development (Knight 2013a, D. Hunter personal communication). Sloane's Froglets may be negatively impacted by the alteration to the natural flow regimes of rivers, streams, floodplains and wetlands. The species' natural range occurs in the Murray Darling Basin the location of the most highly regulated and altered river system in Australia. Major dams occur in all catchments where Sloane's Froglet occurs or has occurred. Specific factors likely to impact the frogs include loss of wetlands associated with removal of water for irrigation and lowered water tables.

1.2	Climate change (temperature increase, extreme weather events e.g. cyclones, droughts)	Known current	It is likely that the recent millennium drought contributed to the broad scale decline of Sloane's Froglet. The susceptibility of Sloane's Froglet to extreme drought would be exacerbated by ongoing habitat degradation and fragmentation where this species historically occurred.
1.3	Chemicals	Suspected current	The range of Sloane's Froglet is within the Murray-Darling Basin, 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)
2.0	Disease		
2.1	Amphibian chytrid fungus	Known current	Chytridiomycosis is an infectious disease caused by the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) that affects amphibians worldwide, causing mass die-offs and some species extinctions (Department of the Environment and Energy 2016). It has been detected in Sloane's Froglet. Tests of 14 individual Sloane's Froglets from Thurgoona and Corowa undertaken in 2011 showed that 10 tested positive, which is a high rate of infection. However, it is difficult to know what influence the pathogen is having without recorded mortalities, and noting that some species of frog have been shown to persist despite high rates of chytrid infection (Retallick et al. 2004; Riley et al. 2013).
3.0	Invasive species		
3.1	Feral pigs (*Sus scrofa*)	Suspected	Feral pigs are responsible for habitat damage and potentially cause adult frog mortality (Richards et al. 1993).

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

Criterion 1. Population size reduction (reduction in total numbers) Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	**Endangered Severe reduction**	**Vulnerable Substantial reduction**
A1	**≥ 90%**	**≥ 70%**	**≥ 50%**

A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased. 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. 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*]\ 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.		*based on any of the followin*	(a) direct observation [*except A3*] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion 1 A2(a),(c) for listing as Endangered

Given the generation length of Sloane's Froglet is unknown, but inferred to be up to approximately three years, the appropriate time scale for this criterion is 10 years.

Despite the species' expansive historical distribution, recent extensive surveys have only located the froglet at a few general locations and relatively large populations were only recorded in ponds and depressions found within rural residential or peri-urban areas in the Albury – Thurgoona, Howlong and Corowa - Wahgunyah and Rutherglen areas (Knight 2013a). Ninety five percent of all Sloane's Froglets recorded since 2000 have been in these three stronghold areas. These data suggest a substantial range reduction for the species.

The available data on Sloane's Froglet do not allow a direct estimate of decline across the species' former range. However, an index can be calculated to infer decline using records of the related Plains Froglet. The plains froglet shares a number of similar features with Sloane's Froglet that are likely to affect their detectability equally:

- both are small cryptic froglets primarily identified on the basis of male advertisement calls;
- both breed from late winter to spring, and call at other times of the year following heavy rains;
- both species occupy the same range, inhabiting the tributaries and plains of the Murray Darling Basin, although the Plains Froglet is more widespread; and
- both species occupy habitats of woodlands, grasslands and disturbed areas and mate in vegetation floating in the water after inundation.

The number of records for both species has increased in the last two decades due to increases in survey efforts. However, the increase in Plains Froglet records (within the distributional range of Sloane's Froglet) is much greater than for Sloane's Froglet. From the databases Atlas of NSW Wildlife and the Australian Museum and CSIRO National Wildlife Collection in the decades 1977 - 86, 1987 - 96 and 1997 - 2006 the ratio of Sloane's Froglets to Plains Froglets has decreased from 4 to 12 (33 percent), to 15 to 74 (20 percent) and 17 to 339 (5 percent) respectively, an overall decline of approximately 85 percent over 40 years or 75 percent over the decade to 2006. A similar comparison of records of the two species from the Atlas of Living Australia database suggests a decline of approximately 87 percent between the decades 1994 - 2003 and 2004 - 2013.

In addition to the broader scale declines, more detailed monitoring for the Albury – Thurgoona population has demonstrated that Sloane's Froglet is in an ongoing state of decline. Over the

past five years, Sloane's Froglet has become locally extinct from six areas where it would not be expected to recolonise due to ongoing habitat loss, degradation and isolation (D. Hunter personal communication). The most recent information available (2017-18 season) indicates that the species was recorded only in the Albury-Thurgoona area (NSW TSSC 2018).

The Committee considers that the species has been observed to have undergone a severe reduction in population size over a 10 year period. Therefore, the species has met the relevant elements of Criterion 1 to make it eligible for listing as Endangered.

Criterion 2.	**Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy**		
	Critically Endangered Very restricted	**Endangered Restricted**	**Vulnerable Limited**
B1. Extent of occurrence (EOO)	**< 100 km²**	**< 5,000 km²**	**< 20,000 km²**
B2. Area of occupancy (AOO)	**< 10 km²**	**< 500 km²**	**< 2,000 km²**
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:			
(a) Severely fragmented OR Number of locations	**= 1**	**≤ 5**	**≤ 10**
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations;(iv) number of mature individuals			

Evidence:

Eligible under Criterion 2 B1 and B2(a),(b)(iii & iv) for listing as Endangered

The distribution of Sloane's Froglet has contracted from extending throughout much of inland New South Wales and northern Victoria (historically the species had an extent of occurrence (EOO) of approximately 156,000 km^2) to now being concentrated along a subsection of the Murray River (Knight 2013a), an EOO of approximately 700 km^2. The distribution is primarily concentrated in two locations, Corowa/Wahgunyah and Albury. It is not known if the populations of these two locations are connected and the distribution appears to be becoming increasingly fragmented.

The area of occupancy (AOO) for the species was historically estimated at 200 km^2 but is now thought to be less than 90 km^2 (unpublished data DoEE 2017). These figures are based on post-1997 observations (20 year timeframe), compiled from state and Commonwealth agencies along with museums, research institutions and non-government organisations. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014. As noted above under Criterion 1 there appears to be an ongoing decline of the species. The AOO and EOO meet the threshold for listing as Endangered under subcriteria B1 and B2.

The species occurs at two locations, which meets the threshold for listing as Endangered under subcriterion (a). The locations of populations have been observed to be decreasing due to reduction of habitat area and quality through development and agricultural practices (Threats table above: Knight 2013a, D. Hunter), which satisfies subcriteria (b)(iii & iv).

The Committee considers that the species' extent and area of occurrence are restricted, and the geographic distribution is precarious for the survival of the species because it occurs at only two locations and a decline in habitat quality has been observed. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

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

Evidence:

Insufficient data to determine eligibility

There are no data available to assess population size or decline. An IUCN assessment (Hero et al. 2004) found the species to be data deficient.

The Committee considers that there is insufficient data to demonstrate that there is a continuing decline in the population or if the species is eligible for listing under Criterion 3.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	**Endangered Very Low**	**Vulnerable Low (Medium-term future)[1]**
Number of mature individuals	**< 50**	**< 250**	**< 1,000**
D2[1] Only applies to the Vulnerable category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time	-	-	**D2.** Typically: area of occupancy < 20 km2 or number of locations ≤ 5

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

Evidence:

Insufficient data to determine eligibility

There are no data available to assess population size. An IUCN assessment (Hero et al. 2004) found the species to be data deficient.

The Committee considers that there is insufficient data to demonstrate if the species is eligible for listing under Criterion 4.

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

Evidence:

Insufficient data to determine eligibility

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

Conservation Actions

Recovery Plan

A recovery plan is not recommended because Sloane's Froglet is located in a relatively small area on the border between two jurisdictions and the Conservation Advice sufficiently outlines the priority research and conservation actions needed to support the recovery of this species.

Primary Conservation Actions

- The primary conservation action for Sloane's Froglet is to identify important extant populations and ensure suitable habitat for this species is being maintained and restored.

Conservation and Management Priorities

Habitat loss and disturbance

- Implement a program ensuring suitable habitat is maintained and protected in areas supporting extant Sloane's Froglet populations and investigate options for enhancing the resilience of the species' current habitat to climate change.
- Investigate opportunities to restore and enhance areas of degraded habitat.
- Develop and implement translocation strategies for Sloane's Froglet to create additional populations whilst preventing the accidental spread of the amphibian chytrid fungus (Department of the Environment and Energy 2016).

Disease

- Minimise the spread of the amphibian chytrid fungus by implementing suitable hygiene protocols (Murray 2011) to protect priority populations as described in the *Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis* (Department of the Environment and Energy 2016).

- Provide disease identification and prevention protocols (methods of handling, diagnostic keys, etc.) to researchers and land managers for use in the field.

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

- Manage priority sites to reduce the impacts of habitat destruction by feral species or livestock by using fencing and controlling feral pig numbers.

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 to land holders on the use of herbicides / biocides against pests and diseases in areas with threatened frogs.
- Inform the public about the status and recovery efforts for the, e.g. by providing information to visitors to the area and publicising the species through the media.

Survey and Monitoring priorities

- More precisely assess the distribution and ecological requirements of Sloane's Froglet.
- Design and implement a monitoring program for Sloane's Froglet.

Information and Research priorities

- Determine the extent, type and quality of habitat required to maintain long-term viable populations of Sloane's Froglet.
- Improve understanding of the impacts of feral species on Sloane's Froglet.
- Improve understanding of the impacts of agricultural chemicals on Sloane's Froglet.

Recommendations

(i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Endangered category:
Crinia sloanei

(ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

27/05/2018

References cited in the advice

Anstis M (2013). Tadpoles and Frogs of Australia. New Holland, London.

Bull CM & Williamson I (1996). Population ecology of the Australian frog *Crinia signifera*: adults and juveniles. *Wildlife Research 23*,249-265.

Hero J-M, Robertson P & Lemckert F (2004) *Crinia sloanei*. The IUCN Red List of Threatened Species 2004: e.T41044A10393265.

Knight A (2013a). The distribution of Sloane's froglet, *Crinia sloanei*, in southern NSW and northern Victoria: a review of historical distribution records and results from surveys

undertaken from 2010 to 2013. Institute of Land, Water and Society, Charles Sturt University Albury.
Knight A (2013b). Sloane's Froglet, *Crinia sloanei*- Fact sheet. Albury Conservation Company, Albury.
Littlejohn MJ (1958). A new species of frog of the genus *Crinia* Tschudi from south-eastern Australia. *Proceedings of the Linnean Society of New South Wales 83*,222-226.
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 (2003). Threat Abatement Plan: Predation by *Gambusia holbrooki* (plague minnor). NPWS, Hurstville, NSW.
Retallick RWR, McCallum H & Speare R (2004). Endemic infection of the amphibian chytrid fungus in a frog community post-decline. *PLoS One 2*,1965-1971.
Richards SJ, McDonald KR & Alford RA (1993). Declines in populations of Australia's endemic tropical rainforest frogs. *Pacific Conservation Biology 1*,66-77.
Riley K, Berry OF & Roberts JD (2013). Do global models predicting environmental suitability for the amphibian fungus, *Batrachochytrium dendrobatidis*, have local value to conservation managers? *Journal of Applied Ecology 50*,713-720.
Spark P (2015). Survey of eight wildlife atlas locations for Sloane's froglet -*Crinia sloanei* between Dubbo and Mungindi as per OEH contract PO4500585307. Office of Environment and Heritage (NSW).

Other sources cited in the advice

Atlas of Living Australia (2016) http://spatial.ala.org.au/?q=lsid%3Aurn%3Alsid%3Abiodiversity.org.au%3Aafd.taxon%3A586367df-b602-44e4-b462-f0c3d0e75a48#

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 *Crinia sloanei*. Unpublished report, Australian Government Department of the Environment, Canberra.

NSW Threatened Species Scientific Committee (2018). Unpublished data from NSW Threatened Species Scientific Committee. Provided 20/8/2018.