

# **Distribution and Conservation Status of South Australian Frogs**

## **The Southern Bell Frog (*Litoria raniformis*) in the South East and River Murray.**

**June 2002**

Project N<sup>o</sup>. 2101

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### **The Southern Bell Frog (*Litoria raniformis*) in the South East and River Murray**

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## **ACKNOWLEDGMENTS**

We are greatly indebted to Ben Smith and Brydie Hill (University of Adelaide) for their considerable enthusiasm and assistance during the field trips. Mark Hutchinson provided the SA Museum records and Helen Owens provided the NP&WS data. Barrie Grigg (Forestry SA) was especially helpful in allowing access to Forestry land and sharing information about the South East region. This project was funded by a grant from the Wildlife Conservation Fund; the Environment Protection Authority provided support and facilities.

## INTRODUCTION

Since 1994, the South Australian Environment Protection Authority has conducted a FROG CENSUS in early spring each year. This involves members of the public taking tape recordings of frogs calling from waterbodies throughout South Australia. This programme has highlighted the distribution and a measure of the abundance of frogs in the State, generally from the more southern parts of SA (Goonan, Gooding and Hill 1997; Goonan, Hill and Walker 1998; Walker, Hill and Goonan 1999; Walker, Hill and Goonan 2000; Walker and Goonan 2001). The results from this programme have also highlighted a number of species that are poorly represented or have not been recorded through the method being applied by the census. Focused studies on individual species distribution and conservation status were initiated in 1999 to collate existing information and include field studies to improve the knowledge base about select species found in South Australia. A study of the Smooth Frog (*Geocrinia laevis*) has already been published (Walker and Goonan 2000).

This report focuses on the Southern Bell Frog (*Litoria raniformis*). This species has been recorded only infrequently between 1994 and 2001 in the census (Goonan et al 1997; Goonan et al 1998; Walker et al 1999; Walker et al 2000; Walker and Goonan 2001) and Tyler (1997) recommended that this species be further studied to determine the current distribution, abundance and conservation status.

*L. raniformis* is not easily confused with any other species found in South Australia. It is a large frog (55–104 mm) characterised by a loud, barking call and distinctive, colourful skin patterns (Fig. 1); they have a pale green mid-dorsal stripe often with large, black spots on the green or brown back. The ventral surface is coarsely granular and the backs of the thighs are turquoise. The fingers are not webbed, but the toes are almost fully webbed (Barker et al 1995).



Figure 1 The Southern Bell Frog, *Litoria raniformis*, collected from Martin's Bend, Berri.

*L. raniformis* generally commences breeding in August, with males calling whilst floating in water. Loose masses of eggs are laid amongst aquatic vegetation. Tadpoles reach a maximum length of approximately 10 cm and may take more than a year to complete development. The habitat of *L. raniformis* is reported as being areas of permanent water, especially around reservoirs, farm dams and swamps (Tyler 1978).

In South Australia, it has been known from four separate populations (within the Murray Valley, the South East, the Mount Lofty Ranges and on the Adelaide Plains; the latter represent specimens collected from drainage ditches within the Defence Research Centre at Salisbury). It is considered possible that the latter two populations were the result of introductions (Tyler and Roberts 1973). Despite the FROG CENSUS program, and a number of other bio-diversity surveys undertaken by the National Parks & Wildlife Service, no reports of this frog have been made in the Mount Lofty Ranges since the mid-1980s. The species has also had marked declines in distribution and abundance throughout its entire range in Australia (Tyler 1997). The purpose of this study was to follow the recommendations of Tyler (1997) in conducting field surveys to document the distribution and status of *L. raniformis* in South Australia.

## METHODS

A review was carried out of existing data sources (published and unpublished records), including the EPA FROG CENSUS, SA Museum Records and National Parks & Wildlife Service regional surveys (Fig. 2.). This provided a number of locations that were superimposed onto maps to assist in the identification of locations that may provide suitable habitat for *L. raniformis*. Mr Barrie Grigg from Forestry SA, Mt Gambier also suggested possible areas to look for frogs in the South East of the State.

As the FROG CENSUS program has resulted in extensive recordings being made in the Mt Lofty Ranges, it was decided that the field surveys should be based in the River Murray and the South East. It is considered unlikely that any *L. raniformis* present in the Adelaide Hills would have remained undetected during the course of the FROG CENSUS program. During the FROG CENSUS, there have been many recordings of *L. raniformis* in the River Murray, but only a handful in the South East. Therefore most of the survey work was carried out in that region.

Surveys were undertaken during three separate trips in September (Riverland) and November (South East) 2000 and June (South East) 2001, to search known and possible sites for the presence of *L. raniformis*. In addition, a site in the Riverland was surveyed in May 2001 during an opportunistic visit. All sites were visited during the day to determine if the habitat was likely to be suitable for frogs (for example, adequate water and refuge sites – abundant riparian vegetation, fallen logs, bark and/or rocks). Those that were considered suitable were then revisited at night.

The first activity at each site was to listen for the presence of any calling *L. raniformis* males. The barking call is a loud modulated growl, followed by a series of short grunts. As the call of the *L. raniformis* is very distinctive, active searches were not undertaken if the frog was heard calling.

If the frog was not heard calling within 15 minutes, searches were carried out which involved looking under logs, leaf litter, stones and amongst vegetation for a minimum of half an hour at each site visited. All species of frog encountered were noted for the purpose of providing opportunistic data for the FROG CENSUS database. Any frogs collected were released on site at the conclusion of collecting and identification.

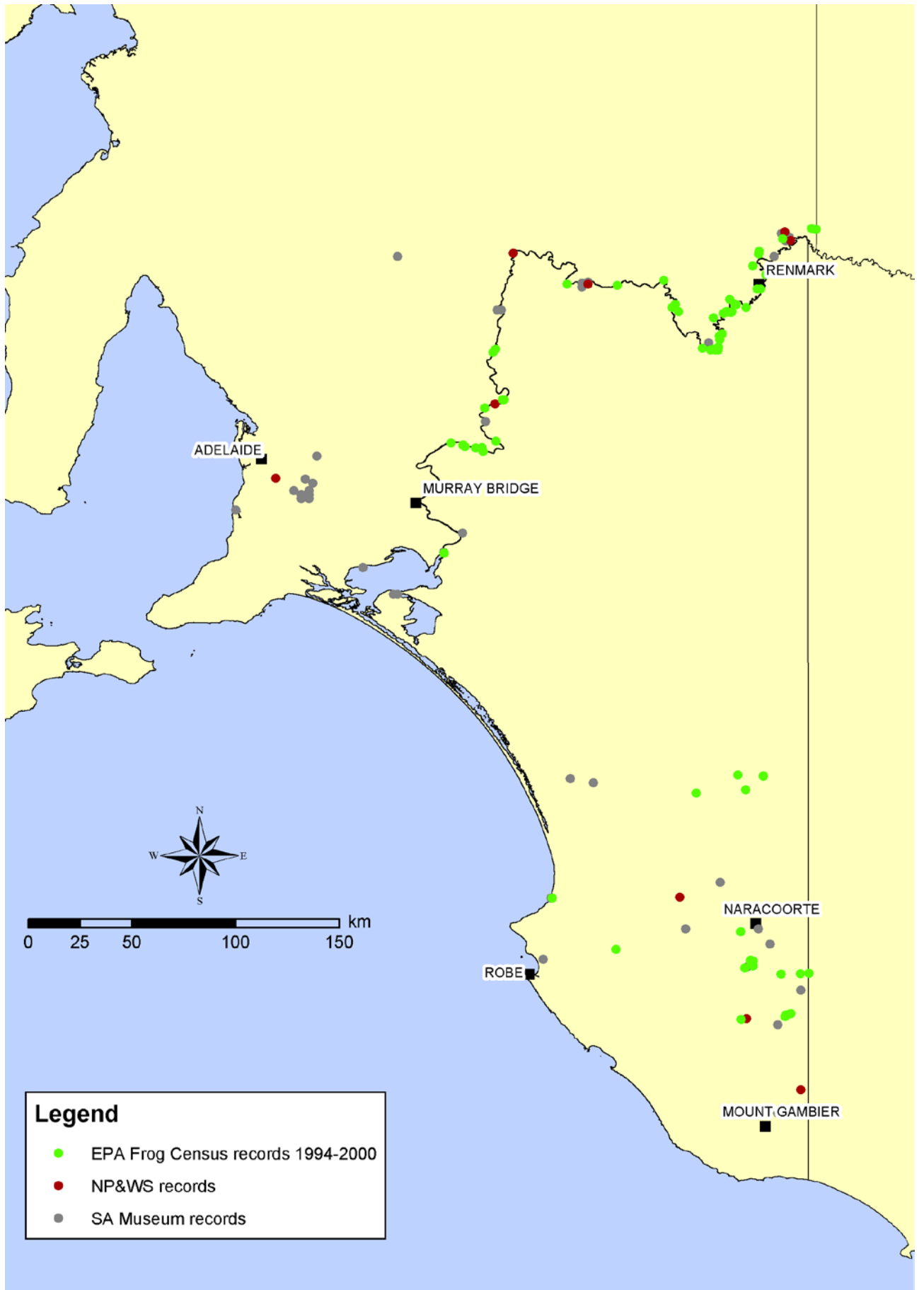


Figure 2 The distribution of *Litoria raniformis* in South Australia as indicated by the EPA FROG CENSUS and historical SA Museum and National Parks & Wildlife Service records.

## RESULTS

In total, 114 locations were visited, comprising 21 sites in the Riverland and 93 in the South East. *L. raniformis* was only present at 17 sites (15% of sites) (Fig. 3); six sites within the Murray Valley and 11 sites in the South East (Table 1).

Three *L. raniformis* individuals were actually collected; one from Martin's Bend, Berri (Fig. 1.), one from Lake Merreti inlet channel, Calperum Station and one from Ral Ral Creek, near Lake Merreti. The presence of calling males permitted a positive identification of *L. raniformis* at these and other locations.

*L. raniformis* were only found in areas with abundant water: rivers, swamps (including land subject to inundation) and wetlands.

Despite extensive searching, no *L. raniformis* were found on the western, coastal section of the South East. They were found from Naracoorte to Penola, Bordertown and from near Mundulla. In the Murray Valley, they appeared to be abundant in the Riverland and are known to extend throughout the river as far as Goolwa. A complete list of the sites visited and frogs present can be found in appendix 1.

While travelling between sites in the evening, a large number of frogs were encountered crossing the roads, usually when it was raining. No *L. raniformis* were found, but the following species were captured and examined: Brown Tree Frog (*Litoria ewingi*), Brown Striped Marsh Frog (*Limnodynastes peroni*), Spotted Grass Frog (*L. tasmaniensis*), Painted Frog (*Neobatrachus pictus*) and Sudell's Frog (*N. sudelli*).

### Additional data

In addition to the surveys, a number of recordings of *L. raniformis* were made during the FROG CENSUS in 2000 and 2001 (Table 2) which extended the distributional database of this species.

A total of 24 sites had *L. raniformis* calling in 2000. These were from both the Murray Valley and the South East, again being restricted to areas with abundant water. While two sites had only one individual calling, most sites had few (2–9) or many (10–50) frogs calling. The majority of recordings (19) were made in the River Murray and adjoining wetlands.

In 2001, *L. raniformis* were recorded from just five sites. As in 2000, these sites comprised the River Murray, swamps and wetlands in the Murray Valley and South East. A lake at Penola also had *L. raniformis* present. With the exception of a swamp at Mannum which had many (10–50) frogs calling, all recordings were of few (2–9) individuals.



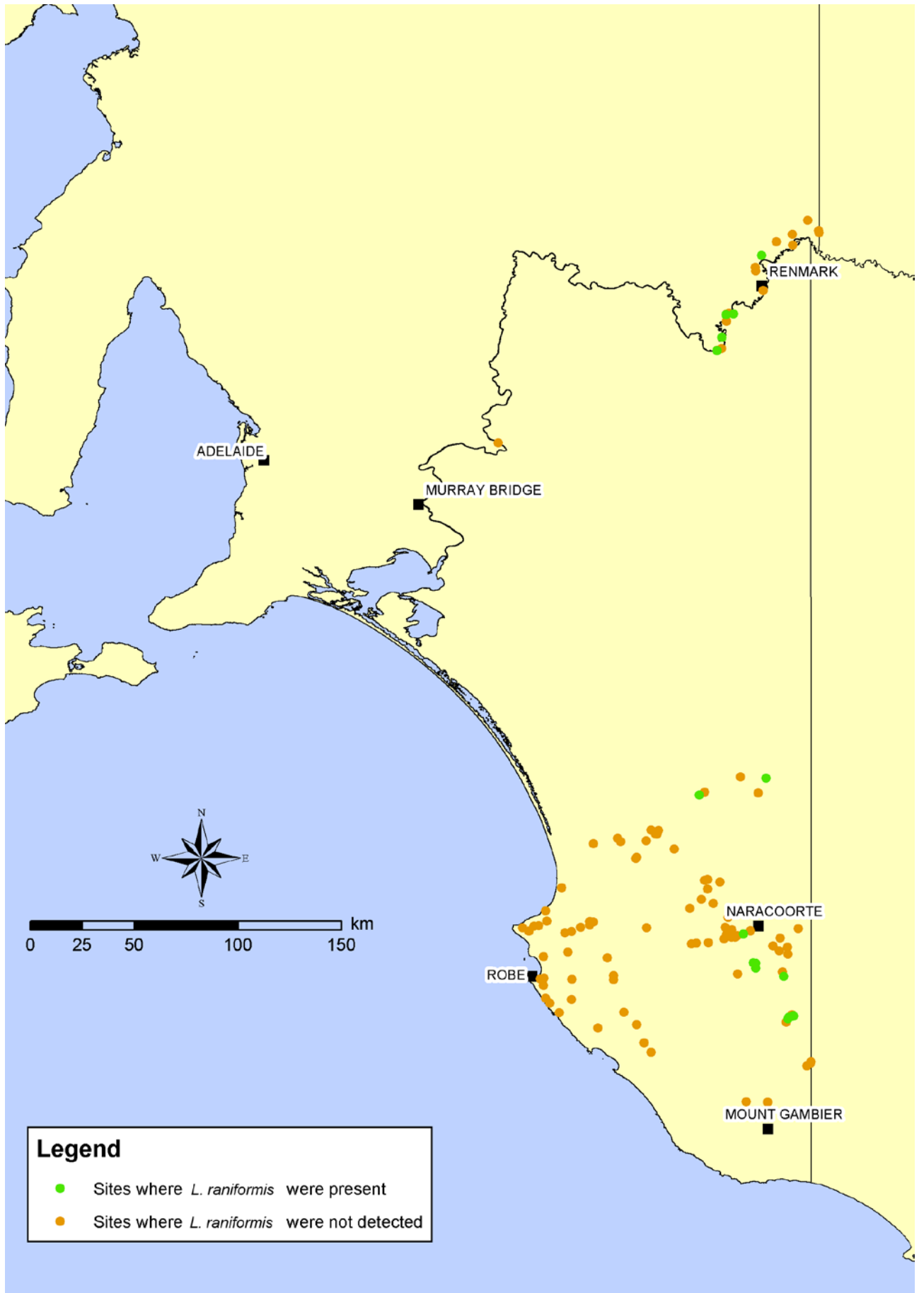


Figure 3 Distribution of survey sites in 2000 and 2001 for *Litoria raniformis* in South Australia.

Table 1 Summary of survey sites in 2000 and 2001 where *Litoria raniformis* were present.

Location	Region*	Date / Time**	Longitude	Latitude	Habitat	Species Present***	# LR calling****
Bool Lagoon (near entrance)	SE	27/11/2000 22:46	140.72671	-37.12814	Wetland	LR,LmP	Few (2-9)
Bordertown (opposite Wetlands)	SE	28/11/2000 23:39	140.77166	-36.30487	Swamp	LR	Few (2-9)
Dead Mans Swamp	SE	30/11/2000 02:02	140.84794	-37.16322	Swamp	LR,LD,LmP	Lots (>50)
Gunawar Walking Trail, Hack's Lagoon	SE	27/11/2000 22:25	140.71584	-37.10402	Wetland	LR,CS,NP	Many (10-50)
Katarapko Creek Floodplain	MV	14/09/2000 22:30	140.57984	-34.39518	Swamp	LR,LD,LF,LT	Lots (>50)
Lake Merreti inlet channel	MV	13/09/2000 20:45	140.75249	-34.02751	Wetland	LtP,LR,CP,LD,LT	[one]
Leicester Park 1	SE	30/11/2000 00:46	140.88333	-37.33619	Swamp	LR,CS,LT,LmP	Few (2-9)
Leicester Park 2	SE	30/11/2000 00:50	140.89001	-37.33556	Swamp	LR,CS,LD,LmP	Many (10-50)
Little Duck Lagoon, Berri	MV	15/09/2000 00:45	140.59793	-34.29766	Wetland	LR,CP,LD,LT	Many (10-50)
Loxton Boardwalk	MV	14/09/2000 23:30	140.55800	-34.45219	Wetland	LtP,LR,CP,LD,LT	Many (10-50)
Martins Bend, Berri	MV	14/09/2000 22:10	140.63055	-34.29370	River	LtP,LR,CP,LD,LF,LT	Many (10-50)
Mosquito Plains, Fogarty Rd	SE	30/11/2000 19:25	140.67227	-36.97967	Swamp	LR	one
Old Conaum Rd 1	SE	30/11/2000 00:28	140.86610	-37.34809	Swamp	LR,CS,LD,LT	Few (2-9)
Old Conaum Rd 2	SE	30/11/2000 00:36	140.86928	-37.34113	Swamp	LR,CS,LD,LT	Many (10-50)
Potom Boardwalk, Hack's Lagoon	SE	27/11/2000 21:30	140.72657	-37.10617	Wetland	LR,CS,LmP	Many (10-50)
Ral Ral Creek, Lake Merreti	MV	12/05/2001 12:30	140.75191	-34.03968	Wetland	LR,LT	[one]
Red Gum Swamp, opposite Wangoola Downs	SE	28/11/2000 20:30	140.48070	-36.37773	Swamp	LtP,LR,CS,LT	Many (10-50)

\*(MV = Murray Valley, SE = South East)

\*\* (Times listed are those of the actual survey, not the initial visit to the site)

\*\*\* (LtP = *Litoria peroni*, LR = *Litoria raniformis*, CP = *Crinia parinsignifera*, CS = *Crinia signifera*, LD = *Limnodynastes dumerili*, LF = *Limnodynastes fletcheri*, LmP = *Limnodynastes peroni*, LT = *Limnodynastes tasmaniensis*, NP = *Neobatrachus pictus*)

\*\*\*\* ([one] denotes that one frog was collected, but not heard calling)

Table 2 Summary of *Litoria raniformis* records for the FROG CENSUS in 2000 and 2001.

Site	Region*	Time & Date	Habitat	Longitude	Latitude	Abundance
Bordertown, wetlands	SE	24-09-2000 11:30	Wetland/Billabong	140.77166	-36.30397	Many (10–50)
East Front Rd, Younghusband, backwater	MV	13-09-2000 21:00	Wetland/Billabong	139.46719	-34.86898	Few (2–9)
East Front Rd, Younghusband, backwater	MV	21-09-2000 21:10	Wetland/Billabong	139.46719	-34.86898	Few (2–9)
Eckerts Ck, Berri	MV	13-09-2000 18:45	Stream/Creek	140.55436	-34.31690	Many (10–50)
Ferry Crossing, Wellington	MV	15-09-2000 20:40	River	139.38579	-35.33677	Few (2–9)
Goat Island area, Renmark	MV	06-10-2000 20:30	Wetland/Billabong	140.74386	-34.19208	Many (10–50)
Gordon Swamp, Wrattonbully	SE	17-09-2000 20:30	Swamp/Flooded Paddock/Marshland	140.93242	-37.16149	Many (10–50)
Greening's Landing, Mannum	MV	11-09-2000 19:30	River	139.41567	-34.85930	Many (10–50)
Gurra Gurra Wetlands, Martins Rd, Lyrup	MV	21-10-2000 20:30	Wetland/Billabong	140.63939	-34.25765	Few (2–9)
Hall Cres & Luther Rd, Loxton	MV	12-09-2000 22:55	Pond	140.57432	-34.45495	One
Hilltop Dr, Loxton	MV	26-09-2000 19:20	Swamp/Flooded Paddock/Marshland	140.56397	-34.45582	Few (2–9)
Lake Alexandrina, Langhorne Ck	MV	15-09-2000 19:00	Swamp/Flooded Paddock/Marshland	139.10085	-35.38311	Many (10–50)
Lake Merreti, inlet channel	MV	13-09-2000 20:30	Wetland/Billabong	140.75248	-34.02750	One
Little Duck Lagoon, Berri	MV	13-09-2000 19:20	Wetland/Billabong	140.59793	-34.29766	Few (2–9)
Loxton Boardwalk	MV	12-09-2000 20:30	Wetland/Billabong	140.55800	-34.45219	Many (10–50)
Lyrup Causeway	MV	20-09-2000 20:40	Swamp/Flooded Paddock/Marshland	140.64701	-34.25497	One
Moot-Yang-Gunya Swamp	SE	04-10-2000 20:50	Swamp/Flooded Paddock/Marshland	140.66000	-36.30000	Few (2–9)
Punkah Ck, Chowilla	MV	04-10-2000 19:10	River	140.98160	-33.92899	Few (2–9)
Ramco Lagoon, Ramco, nr Waikerie	MV	22-09-2000 20:00	Wetland/Billabong	139.92043	-34.16956	Many (10–50)
Rilli Island, Loxton North	MV	17-09-2000 20:05	River	140.59207	-34.38557	Few (2–9)
Santos Evaporation Pond, Berri	MV	13-09-2000 20:10	Pond	140.62500	-34.23700	Few (2–9)
Sheepskin Ck, Chowilla	MV	04-10-2000 18:45	Stream/Creek	140.97944	-33.92899	Few (2–9)
Sheepwash Swamp, Naracoorte	SE	17-09-2000 18:15	Swamp/Flooded Paddock/Marshland	140.96902	-37.16061	Few (2–9)
South Tce, Mundulla	SE	04-10-2000 20:30	Garden/Grass	140.69346	-36.36420	Few (2–9)
Wetland Opposite Nildottie, east of wetland	MV	12-09-2000 20:06	Swamp/Flooded Paddock/Marshland	139.64655	-34.67183	Few (2–9)
Younghusband, opp Teal Flat	MV	21-09-2000 21:20	Swamp/Flooded Paddock/Marshland	139.55017	-34.87811	Many (10–50)
Younghusband, swamp 15m from river	MV	13-09-2000 20:35	Swamp/Flooded Paddock/Marshland	139.55549	-34.89621	Many (10–50)
Greenrise Lake, Penola	SE	08-10-2001 15:30	Reservoir/Lake	140.83561	-37.39757	Few (2–9)
Sec 52, HD Younghusband	MV	20-09-2001 21:30	Wetland/Billabong	139.44930	-34.86064	Few (2–9)
Sheepwash Swamp, Naracoorte	SE	20-09-2001 18:30	Swamp/Flooded Paddock/Marshland	140.96902	-37.16061	Few (2–9)
Swamp opposite Lake Carlet, Mannum	MV	21-09-2001 20:00	Swamp/Flooded Paddock/Marshland	139.52277	-34.88094	Many (10–50)
Wall Irrigation Area, River Murray	MV	26-09-2001 19:15	River	139.32528	-34.96178	Few (2–9)

\*(MV = Murray Valley, SE = South East)

## Other species associated with *Litoria raniformis*

A total of eight other species were present at the same sites where *L. raniformis* were detected during the surveys (Table 3), with one site (Martin's Bend, Berri) having five species coexisting with *L. raniformis*. The most commonly found species coexisting with *L. raniformis* were the Spotted Grass Frog (*Limnodynastes tasmaniensis*), the Eastern Banjo Frog (*Limnodynastes dumerili*) and the Common Froglet (*Crinia signifera*). There were no obvious correlations between the presence of these additional species of frog and *L. raniformis*.

## Peron's Tree Frog

Peron's Tree Frog (*Litoria peroni*) is a species commonly found in the Murray Valley in South Australia and is also distributed in Victoria, New South Wales and Queensland (Tyler 1978). As a result of this survey and the FROG CENSUS, we can now report that it is also found in the South East of South Australia. It was recorded calling from a site at Round Waterhole Native Forest Reserve during the 2000 FROG CENSUS and from a Red Gum swamp near Mundulla during the *L. raniformis* survey. The large distance between these two sites suggests that this species has not spread as a result of a single introduction and it is quite possible that the species has a natural relic distribution in the area. The Red Gum swamps where this species was detected are similar in structure to habitats where they can be found in the eastern states.

Table 3 Other species encountered during the surveys in 2000 and 2001.

Species	Presence at Survey Sites	% Presence at Survey Sites	Presence at Sites with <i>L. raniformis</i>	% Presence at Sites with <i>L. raniformis</i>
<i>Litoria ewingi</i> **	26	23	0	0
<i>Litoria peroni</i>	7	6.2	4	57.1
<i>Crinia parinsignifera</i> *	9	7.1	4	44.4
<i>Crinia signifera</i>	59	52.2	7	11.9
<i>Geocrinia laevis</i> **	1	0.9	0	0
<i>Limnodynastes dumerili</i>	23	20.4	9	39.1
<i>Limnodynastes fletcheri</i> *	3	2.7	2	66.6
<i>Limnodynastes peroni</i> **	32	28.3	5	15.6
<i>Limnodynastes</i>	28	24.8	10	35.7
<i>Neobatrachus pictus</i>	5	4.4	1	20
<i>Neobatrachus sudelli</i> **	14	12.4	0	0

\* not found in the SE

\*\* not found in the Riverland

## DISCUSSION

The surveys described in this report and records from the FROG CENSUS indicate that *L. raniformis* can still be found in apparently secure populations in limited parts of the South East from Bordertown to Penola, and throughout the River Murray. There have been no records in recent years from the Mt Lofty Ranges and Adelaide Plains where they may have been introduced, but now appear to be regionally extinct.

Prior to the drainage scheme in the South East, which first began around 1862, much of the Upper South East of South Australia experienced periods of severe flooding or inundation (South East Drainage Board 1980). Many localities had permanent or semi-permanent waters, ideal habitat for *L. raniformis* and other frog species. However, following the establishment of the drains, large areas of land no longer support the habitat required by most species of frog, including *L. raniformis*.

Deadman's Swamp is a site worthy of special note due to the extreme abundance of *L. raniformis*. The site is a large swamp situated in the middle of a large pine forest near Naracoorte. The huge number of *L. raniformis* present at that site (100's to over 1000) suggests that it is a major refuge and breeding area and is of great conservation value for this and other species in the region. With the major and continual modifications to the drainage system in the South East, consideration should be given to the fact that *L. raniformis* inhabits areas vulnerable to further development and drainage. The land use at many of the sites visited incorporated grazing, forestry and other forms of agriculture. With the low number of formal conservation parks in the area where *L. raniformis* occurs, some of these locations could be incorporated into the reserve system to protect important wetland habitats in the region. Protection of these sites would also fulfil the management actions outlined by Tyler (1997) for the conservation of this species in South Australia.

Along the River Murray, the species is already provided some formal protection by the Bookmark Biosphere Reserve and the listing and development of management plans for the Riverland, Coorong and lower lakes Ramsar wetland sites. Its widespread distribution throughout riverine and floodplain wetlands along the River Murray in South Australia indicates that the species is not seriously threatened in this region of the state.

The National Parks and Wildlife SA has now protected *L. raniformis* by listing it as a vulnerable species under the *National Parks and Wildlife Act 1972*—Schedule 8 Vulnerable species; a permit is now required for collecting this species.

Future monitoring of populations through the FROG CENSUS will provide an important ongoing check of the continued presence of this species in both the South East and Murray Valley in South Australia in the years to come.

## APPENDIX 1 – SUMMARY OF SITES VISITED IN THE FIELD SURVEYS IN 2000 AND 2001

Location	Date/Time	Habitat	Longitude	Latitude	Species Present*
Anderson Scheme Drain M, Princes Highway	21-06-2001 22:42	Drain	140.20940	-37.37251	LE,CS,LmP
Avenue Range - Big Swamp	19-06-2001 23:00	Swamp	140.20691	-36.65210	No frogs detected
Backwater, D/S Purnong Landing Ferry	11-09-2000 17:15	Swamp	139.61079	-34.85177	CS,LD,LT
Bakers Drain on Kingston-Keith Rd	30-11-2000 21:20	Drain	140.21017	-36.64686	CS,LD
Bald Hill, Swamp	30-11-2000 23:55	Swamp	140.60643	-36.90830	No frogs detected
Big Dip Lake, Beachport	20-06-2001 20:00	Reservoir	139.83250	-37.27925	LE,CS,LmP,NS
Bimbimbi Swamp	29-11-2000 01:15	Swamp	140.27168	-36.53005	No frogs detected
Bimbimbi Swamp 2	29-11-2000 01:45	Swamp	140.29109	-36.54550	No frogs detected
Bloomfield Swamp	30-11-2000 02:30	Swamp	140.44108	-36.86941	CS,LmP
Bool Lagoon, Drain M Weir	27-11-2000 20:30	Drain	140.64751	-37.15288	CS,LmP
Bool Lagoon, nr entrance	27-11-2000 22:46	Wetland	140.72671	-37.12814	LR,LmP
Bordertown, opposite Wetlands	28-11-2000 23:39	Swamp	140.77166	-36.30487	LR
Butcher Gap Cons Park	21-06-2001 12:30	Swamp	139.81505	-36.87976	CS
Caves District Rd, Naracoorte	30-11-2000 03:30	Swamp	140.82792	-37.05322	No frogs detected
Caves Rd 1, Naracoorte	30-11-2000 02:45	Swamp	140.80049	-37.03127	No frogs detected
Caves Rd 2, Naracoorte	30-11-2000 03:00	Swamp	140.83147	-36.99785	No frogs detected
Chowilla Ck, Campsite 17	12-09-2000 17:50	River	140.88590	-33.94902	LtP,CP
Chowilla, flooded ground by road	12-09-2000 16:10	Swamp	140.81559	-33.98154	LT
Cockatoo Lake, east	30-11-2000 01:30	Swamp	140.51734	-36.74309	LmP
Cockatoo Lake, south west	30-11-2000 01:15	Swamp	140.57136	-36.75537	LmP
Coles-Spence Rd, Lucindale Rd	30-11-2000 21:00	Swamp	140.46945	-37.01876	LmP
Creek nr Mundulla	28-11-2000 22:30	Stream	140.73707	-36.36813	LT,NS
Darling Rd, Renmark	13-09-2000 13:56	River	140.72619	-34.10759	No frogs detected
Dead Mans Swamp	30-11-2000 02:02	Swamp	140.84794	-37.16322	LR,LD,LmP
Dead Mans Swamp, Boundary	30-11-2000 02:02	Swamp	140.84267	-37.14371	CS,LmP
Dine Swamp	30-11-2000 18:45	Swamp	140.91013	-36.95685	CS,LmP
Drain BF33, Princes Highway	21-06-2001 20:57	Drain	140.15533	-37.31864	LE,CS,NS
Drain L, Princes Highway	21-06-2001 13:10	Drain	140.08303	-37.08360	CS
Drain L, Sandy Lane, Robe	20-06-2001 18:40	Drain	139.80767	-37.17142	CS
Earthquake Springs Drain, Princes Highway	21-06-2001 23:15	Drain	140.11006	-37.17719	CS,LT,NS
Edwards & Concrete Bridge Rd, Naracoorte	30-11-2000 03:10	Swamp	140.86501	-37.06769	No frogs detected
Freshwater Lake, Little Dip Cons Pk	20-06-2001 19:30	Reservoir	139.81478	-37.25834	LE,CS,LmP,NS
Gunawar Walking Trail, Hack's Lagoon	27-11-2000 22:25	Wetland	140.71584	-37.10402	LR,CS,NP
Hatherleigh Drain, Princes Highway	21-06-2001 22:20	Drain	140.27319	-37.49156	CS
Jacky White's Drain, Avenue Range	19-06-2001 23:53	Drain	140.25307	-36.95363	CS,LmP
Katarapko Creek Floodplain	14-09-2000 22:30	Swamp	140.57984	-34.39518	LR,LD,LF,LT
Kingston - Keith Rd 1	29-11-2000 00:10	Drain	140.29832	-36.54824	No frogs detected

Location	Date/Time	Habitat	Longitude	Latitude	Species Present*
Kingston - Keith Rd 2	29-11-2000 00:30	Drain	140.30518	-36.53115	No frogs detected
Kingston - Keith Rd 3	29-11-2000 00:50	Stream	140.25057	-36.57590	No frogs detected
Knights Rd, Lucindale Area	30-11-2000 00:50	Swamp	140.51752	-36.78553	No frogs detected
Lake Battye, Main South Eastern Rd	20-06-2001 19:00	Reservoir	139.79244	-37.17429	CS
Lake George, Magarey's Lane	20-06-2001 21:30	Wetland	140.04206	-37.38750	LE,CS,LmP,NS
Lake Hawdon North	20-06-2001 20:30	Reservoir	139.92983	-37.17660	LE,CS,LmP,NS
Lake Hawdon South	20-06-2001 20:45	Reservoir	139.92861	-37.26303	LE,CS,LmP,NS
Lake Littra, Chowilla Dam	13-09-2000 12:10	Dam	141.00129	-33.94139	LT
Lake Littra, Chowilla wetland	13-09-2000 12:00	Wetland	140.99891	-33.93260	LT
Lake Merreti inlet channel	13-09-2000 20:45	Wetland	140.75249	-34.02751	LR,LtP,CP,LD,LT
Lake nth Kingston nr Princes Highway	21-06-2001 00:39	Reservoir	139.88557	-36.77990	CS,NS
Lake Robe	20-06-2001 19:15	Reservoir	139.80699	-37.20352	LE,CS,NS
Lake St Clair, Beachport	20-06-2001 21:15	Reservoir	139.87361	-37.32111	LE,CS,LmP,NS
Leicester Park 1	30-11-2000 00:46	Swamp	140.88333	-37.33619	LR,CS,LmP,LT
Leicester Park 2	30-11-2000 00:50	Swamp	140.89001	-37.33556	LR,CS,LD,LmP
Limestone Coast Rd 1	18-06-2001 20:00	Swamp	139.74397	-36.96767	LE,CS
Limestone Coast Rd 2	18-06-2001 20:06	Swamp	139.71572	-36.95316	LE,CS,LT
Little Duck Lagoon, Berri	15-09-2000 00:45	Wetland	140.59793	-34.29766	LR,CP,LD,LT
Lochaber Rd, Dam	30-11-2000 00:15	Dam	140.54156	-36.84756	No frogs detected
Lochaber Rd, Swamp	30-11-2000 23:40	Swamp	140.59336	-36.95076	No frogs detected
Lochaber Swamp	30-11-2000 00:30	Swamp	140.49015	-36.82905	No frogs detected
Lock 6 Wetland,Chowilla	13-09-2000 18:25	Wetland	140.88630	-33.99568	LtP,CP,LD,LT,NP
Loxton Boardwalk	14-09-2000 23:30	Wetland	140.55800	-34.45219	LR,LtP,CP,LD,LT
Lucindale Rd / Blackford Rd	18-06-2001 18:30	Swamp	140.02255	-36.92846	LE,CS
Lucindale Rd, nr Katani Park	30-11-2000 21:50	Swamp	140.44683	-37.02210	CS,LD,LmP
Main South Eastern Road, Mt Benson	20-06-2001 18:30	Swamp	139.80691	-37.07751	CS,LmP
Martins Bend, Berri	14-09-2000 22:10	River	140.63055	-34.29370	LR,LtP,CP,LD,LF,LT
Moot-Yang-Gunnya Swamp	28-11-2000 22:00	Swamp	140.66000	-36.30000	No frogs detected
Mosquito Plains, Fogarty Rd	30-11-2000 19:25	Swamp	140.67227	-36.97967	LR
Mosquito Plains, Gun Club Rd	30-11-2000 19:45	Swamp	140.63606	-36.99393	No frogs detected
Mosquito Plains, nr Talinga	30-11-2000 20:30	Swamp	140.58854	-37.00046	CS,LmP,NP
Mosquito Plains, nr Windy Point	30-11-2000 19:35	Swamp	140.64501	-36.98648	No frogs detected
Mosquito Plains, Swamp 1	30-11-2000 19:00	Swamp	140.70313	-36.96553	No frogs detected
Mosquito Plains, Swamp 2	30-11-2000 19:10	Swamp	140.70313	-36.96630	No frogs detected
Mosquito Plains, Swamp 3	30-11-2000 20:10	Swamp	140.62129	-36.99461	No frogs detected
Mosquito Plains, Swamp 4	30-11-2000 20:45	Swamp	140.52130	-37.01751	LD
Nangwarry Range Rd	29-11-2000 22:40	Swamp	140.94748	-37.55171	CS,LD,LmP
Nyroca, nr Padthaway	28-11-2000 18:55	Drain	140.37328	-36.61130	CS
Old Conaum Rd 1	30-11-2000 00:28	Swamp	140.86610	-37.34809	LR,CS,LD,LT
Old Conaum Rd 2	30-11-2000 00:36	Swamp	140.86928	-37.34113	LR,CS,LD,LT

Location	Date/Time	Habitat	Longitude	Latitude	Species Present*
Paringa Paddock	13-09-2000 15:20	Wetland	140.75906	-34.19211	CP,LD,LT
Paringa Park, Cape Jaffa	19-06-2001 12:10	Swamp	139.76503	-36.94557	LE,CS,LT,NS
Potom Boardwalk, Hack's Lagoon	27-11-2000 21:30	Wetland	140.72657	-37.10617	LR,CS,LmP
Princes Highway / Lucindale Rd	18-06-2001 18:39	Swamp	140.00631	-36.92549	LE,CS
Princes Highway / Salt Well Rd	18-06-2001 18:51	Swamp	140.00634	-36.94085	LE,CS
Princes Highway, Kingston SE	18-06-2001 21:10	Road	139.82063	-36.92486	NS
Ral Ral creek flood plain, Renmark	12-09-2000 15:30	Wetland	140.72411	-34.09193	No frogs detected
Ral Ral Creek, Lake Merretti	12-05-2001 12:30	Wetland	140.75191	-34.03968	LR,LT
Red Gum Swamp, opp Wangoola Downs	28-11-2000 20:30	Swamp	140.48070	-36.37773	LR,LtP,CS,LT
Reedy Ck Mt Hope Drain, Princes Highway	21-06-2001 22:26	Drain	140.24265	-37.45168	LE,CS
River Murray, Loxton	15-09-2000 12:03	River	140.56018	-34.45129	LtP,CP,LD,LT
River Murray, nr Bookpurnong Vineyard	15-09-2000 00:30	River	140.59984	-34.32555	CP,LD,LT
Road 108, nr Mundulla	28-11-2000 21:30	Swamp	140.50508	-36.36447	LmP,NS
Road to Lake Littra, Chowilla	13-09-2000 12:55	Swamp	140.95063	-33.88828	NP
Robertson Rd, Kingston SE	19-06-2001 14:30	Swamp	140.02208	-36.58862	CS
Ross Quarry Rd	20-06-2001 23:06	Swamp	139.91145	-37.05820	LE,CS,LD
Salt Creek Regulator, Berri	12-09-2000 12:40	Wetland	140.61047	-34.28913	LD,LT
Salt Well Rd 1	18-06-2001 19:04	Swamp	139.96649	-36.95197	LE,CS,LmP,LT
Salt Well Rd 2 - Quarry 1	18-06-2001 19:18	Pond	139.92846	-36.96973	LE,CS,LmP
Salt Well Rd 3 - Quarry 2	19-06-2001 20:16	Pond	139.74232	-36.96796	LE,CS
Salt Well Rd 4 - Wool Pit Track	18-06-2001 19:30	Swamp	139.89907	-36.97396	LE,CS,LmP
Sawpit Swamp	30-11-2000 00:20	Swamp	140.85865	-37.36134	CS
Stewarts Range Rd, Drain	30-11-2000 23:15	Drain	140.62257	-36.96103	CS,LmP
Stewarts Range Rd, Swamp	30-11-2000 23:00	Swamp	140.60002	-36.98387	No frogs detected
Swamp nr Berri Bridge	12-09-2000 12:00	Swamp	140.60082	-34.29433	LF,LT
Swamp, west of Cockatoo Lake	30-11-2000 02:00	Swamp	140.50539	-36.74836	No frogs detected
Telford Scrub	21-06-2001 19:00	Swamp	140.77877	-37.70845	LE,CS,NP
Thiele's sandbar, Loxton	14-09-2000 23:48	Wetland	140.57709	-34.44369	LD,LT
Tilbooroo	30-11-2000 01:11	Swamp	140.88352	-37.32909	CS,LmP
Topperwein Native Forest Reserve, Duck Pond 1	29-11-2000 22:30	Swamp	140.96377	-37.54100	LE,CS,LD,LmP
Topperwein Native Forest Reserve, Duck Pond 2	29-11-2000 22:05	Swamp	140.96629	-37.53329	CS,LD,LmP
Wandillo Forest	21-06-2001 22:00	Swamp	140.68494	-37.70656	LE,CS,GL
Water Valley Rd	19-06-2001 22:30	Swamp	140.12739	-36.56528	CS,LT
Water Valley Rd 2	19-06-2001 22:45	Swamp	140.14080	-36.58022	LE,CS
Wattle Park, Cape Jaffa	19-06-2001 21:00	Swamp	139.78540	-36.94413	LE,CS,LT
Wilmot Drain, Princes Highway	21-06-2001 13:20	Drain	140.11025	-37.16088	CS
Yelloch Ck & Mosquito Ck junction	30-11-2000 03:20	Stream	140.86378	-37.03704	No frogs detected

\*(LE = *Litoria ewingi*, LtP = *Litoria peroni*, LR = *Litoria raniformis*, CP = *Crinia parinsignifera*, CS = *Crinia signifera*, GL = *Geocrinia laevis*, LD = *Limnodynastes dumerili*, LF = *Limnodynastes fletcheri*, LmP = *Limnodynastes peroni*, LT = *Limnodynastes tasmaniensis*, NP = *Neobatrachus pictus*, NS = *Neobatrachus sudelli*)



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