FROGCALL

No 134, December 2014

THE FROG AND TADPOLE STUDY GROUP NSW Inc.
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MEETING FORMAT

Friday 5th December 2014

6.30 pm: Lost frogs needing homes. Please bring your FATS membership card and $$ donation. **NPWS NSW, Office of Environment and Heritage amphibian licence must be sighted on the night.** Rescued frogs can never be released.

7.00 pm: Welcome and announcements.

7.45 pm: The main speaker is Gerry Swan, who will give us a talk entitled 'Life in the Trenches'.

8.30 pm: Frogographic Competition Prizes Awarded.

8.45 pm: Show us your frog images, tell us about your frogging trips or experiences. Guessing competition, continue with frog adoptions, Christmas supper and a chance to relax and chat with frog experts. FATS claendars and Giant Barred Frog T-shirts (see page 13) on sale.

Thanks to all speakers for an enjoyable year of meetings, and all entrants in the Frogographic Competition.

Email **wangmann@tig.com.au** to send an article for Frogcall, or if you would like to receive a PDF copy of Frogcall in colour - every two months.

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Cover photo: Roth's Tree Frog, *Litoria rothii*, Mitchell Plateau, WA. Marion Anstis

President's Page

Arthur White

2013–2014 has been another good year for FATS. We have managed to participate in many public events, hold several field trips, contribute on governmental panels and generally have a good time.

FATS is also financially strong, thanks to our long-standing Treasurer Karen White. Because we are so sound, we again offered student research grants this year. Applications for future grants are currently being considered.

FATS held a number of community activities this year including various garden clubs and fairs, frog activities at the Kuring-gai Wildflower Centre and Narrabeen Wetlands, as well as our display at the Easter Show. We also participated in Science in the City at the Museum during Science Week. Great thanks are given to our events co-ordinator, Kathy Potter (and family) for organising most of these events.

FATS also undertook the annual Bell frog auditory surveys at Sydney Olympic Park in November and December. Thanks to SOPA for supporting FATS.

FATS is a member of the NSW Government's Advisory Committee on Native Animals, as well as the Task Force for Cane Toads in New South Wales. We were the major contributors to the production of a cane toad eradication plan for NSW.

Robert Wall, our field trip co-ordinator, organised a great series of field trips that are always well attended. These are for anyone who wants to come - you don't have to be frog expert to attend. But make sure that you get your name down on the attendance sheet as quick as you can after the trips are announced or else you could miss out.

Monica Wangmann, our editor, has been busy as always, putting out FrogCall, our flagship publication. It is a great credit to her and a wonderful means of getting frog news around. Our special December colour editions designed by Marion Anstis are keenly sought by non-members.

Many thanks to our other executive members: Wendy and Phillip Grimm, Marion Anstis, Andre Rank, Lothar Voigt, Punia Jeffery, Vicky Deluca, Jilli Streit and Robert Wall. Each has contributed whole-heartedly and helped keep FATS alive and well.

This year Punia Jeffery will be stepping down after serving for quite a while as our Chairperson. Her efforts have been greatly appreciated.

Another special thanks to our website manager, Phillip Grimm. Phillip's efforts have turned our website around to become one that is current and much more presentable. If you haven't seen the revised website please do so. Any feedback that you want to give us is welcome. Thank you Phillip for all the time and effort that you put into our website.

Another big thanks is due to Judy Harrington who helps with the room set up each meeting and is a staunch FATS ally. Thank you Judy!

Of course, I would like to thank all of our members for making FATS such a great group to be in. People who are friendly and helpful really make it a pleasure to run an organisation like FATS.

One last point: When FATS first formed over 20 years ago we held our public meetings at the Australian Museum. Because of the demand for space at the Museum we were forced to vacate that venue and were fortunate to find a home at Sydney Olympic Park. With significant changes to the administration of the Museum we have been asked if we would like to hold some of our meetings at the Museum again. I will return to this issue in future as I would like to hear your thoughts about this.

Cane Toads and Ghost Bats: a lethal cocktail

Arthur White and George Madani

Introduction

Since the deliberate introduction of cane toads (now known as *Rhinella marina*) into Australia in 1935, there have been numerous reports of fatalities amongst native wildlife. Early reports of animal deaths were dismissed as "alarmist" and the first serious studies into the impact of toads on native wildlife did not commence until 1975 (Covacevich & Archer, 1975). The first surveys were observational but the loss of frog-eating snakes, goannas and quolls was immediately apparent.

Mitchell's Water Monitor with toad in mouth. Michelle Franklin

The first survey quickly prompted other reports of deaths of native animals such as birds (Van Beurden, 1980). By 1980, over 40 species of native animals were known to be susceptible to toad toxin and to die from ingesting or mouthing toads. The biggest shock to the general public was in 1964 when there was a sudden surge in toad numbers around Brisbane and family cats and dogs died as a result of their encounters with toads (Tyler 1989).

Predators in Australia are not adapted to the cane toad's toxin, which is its main defence mechanism. Due to their inherent toxicity, toads have no need to hide from predators and are consequently targeted by naïve Australian predators that are then susceptible to their toxic effects. One study suggests Australian reptiles are greatly threatened by cane toad invasion, more so than any other group (Mayes *et al*., 2005). The larger the predator is, the better chance it has of survival following toxin ingestion, as a greater body weight effectively dilutes the concentration of the toxin in the body. Some native birds, such as the Black Kite and the Torresian Crow have learned how to kill and eat

Crow eating toad BRGCMC

cane toads without ingesting the poison. They do this by flipping toads onto their backs and delivering a lethal blow to the throat with their powerful bill. Once incapacitated the birds then consume the toad's non-toxic innards.

Many populations of native predators learn not to eat cane toads following an initial drop in population size after the arrival of toads. However, the initial drop in population is often steep and can reduce biodiversity at a local level. One proposed solution is to use "teacher toads", or smaller toads which are less likely to kill predators. Training programs have commenced in the Northern Territory and Western Australia for Northern Quolls and Floodplains Monitors.

But in all of the assessments to date, the impact of toads on native bats has not been seriously considered. Only one species of native bat is known to habitually eat frogs, the Ghost Bat (*Macroderma gigas)*. This report details the impacts of cane toads on these enigmatic bats.

Trouble in Paradise

My first experience of the impact of cane toads on native animals came in 1986/87 when cane toads reached Riversleigh and Boodjamullah National Parks. These two wilderness areas in remote north-western Queensland were a haven for wildlife. Within two years of arrival, toads were widespread in the area. In 1988, when I returned to Riversleigh, a profound change had come over the fauna. The immediate warning bell sounded when I could not

Ghost bat profile A. White

hear the cries of Whistling Kites and Sea-eagles overhead. These had been regular passers-by, flying up and down the river corridor in search of prey.

As I began to walk the land, I was shocked by what was missing. What had happened to the goannas? Only one or two were to be seen. And the majestic Olive pythons - surely they had not been tempted by a fat, toxic toad? Even the freshwater crocodiles had all but disappeared. As the years passed, some of the animals returned. Crocodile numbers have built back up although juvenile crocs are found dead every year. It seems that if they eat too many little toads they die. But if they only eat a few and get an upset stomach, they learn and leave them alone. Goannas reappeared, but only in low numbers. One species, the Mitchells Water Monitor, still has not been seen in this area since

Freshwater croodile eating toad

1987. While there was hope that some of the native animals appear to have learned to avoid toads, were there other victims that we knew nothing about?

Riversleigh's Bats

The shock of the first arrival of cane toads must have numbed my brain. Had I really been thinking, I would have conducted targeted surveys for all of those species that regularly eat frogs, and so were especially prone to the impacts of cane toads. Eventually I started these searches but I overlooked the bats.

Amongst the 15 species of bats so far recorded at Riversleigh (White and Mason 2007) only one regularly feeds on frogs, this is the Ghost Bat. This largish bat was not common in the Riversleigh area but had colonies in Boodjamullah National Park. Colin O'Keefe, the ranger-in-charge at Boodjamullah in the early years recounts seeing Ghost Bats flying down from Lawn Hill Gorge every evening to near the camping area before returning back up the river. The last record of Ghost bats seen in Boodjamullah NP was on the 19th of September, 1993 (by Colin O'Keefe).

My other fauna work kept me distracted from the Ghost bats until 2011. Where were they? Why were we not seeing them anymore? Had they moved roost sites to be further away from the tourist areas along Lawn Hill Gorge? As I thought about this more, I realised the obvious. We had never done a targeted survey for Ghost Bats and our knowledge of their roosting sites and status in north-western Queensland was sadly deficient. So I started the planning for a major survey for Ghost Bats in 2013. This would include Riversleigh, Boodjamullah and Camooweal, the next nearest location where Ghost Bats had been recorded.

To plan for the trip I would need to be able to get to remote locations. There had not been any systematic searches for caves (Ghost Bat roost sites) in Riversleigh and Boodjamullah. Those of you who have been to the area will know there are few roads, and most of the limestone plateau areas are difficult to access. I would need a helicopter.

The caves were likely to be in all shapes and sizes. Some would be deep and require abseiling gear, others shallow and more easily explored. My last serious caving climbs were over thirty years ago and so I would need an experienced caver (and all of the gear as well). I would also need an experienced local who had a good knowledge of the landscape and sensitive aboriginal sites and who could be an impartial observer of our methods. We

would need approvals to do this from the Parks and Wildlife Service in Queensland, Animal Care and Ethics committee and approvals from the local indigenous people.

June 2013

Fortune sometimes favours the simple-minded. I received my approvals through in time. I found a willing caver, Blake Dixon, an Honours student with caving experience who agreed to accompany us on the trip. John Prince, a ranger at Boodjamullah, took time off work to be our independent observer and go-between, and Mike Archer (Head of the Riversleigh Fossil Project) and National Geographic provided the helicopter. We were set to go.

Only one known Ghost bat roosting site had ever been recorded, this was Two Rocks Cave in the Riversleigh World Heritage Area (WHA). Others were suspected or thought to be possible roosts. We began by searching these known or suspected caves to see if they currently contained ghost bats or had so in the past.

Our methods were fairly simple; only one or two of us would enter the cave at a time, staying close to the walls of the cave. We refrained from talking and lights were kept dimmed and aimed downwards so as not to startle any bats in the cave into an exodus. If Ghost bats were located, a quick count was made and the surveyors would retreat if the bats became restive. If the bats obliged, a slow hand-search of the floor of roost was carried out and samples of cave dross were collected (to see if there was any evidence of cane toads being taken as food).

Our first cave was Forbes Inferno, a collapsed sinkhole in the Riversleigh WHA. Rope ladders were dropped down into the cave and we soon found ourselves standing on a depositional cone that spiralled down into the earth, down to the water table about 60 metres below. The cave was hot and contained bats, but not Ghost Bats. We scoured the cave floor for evidence of Ghost bats. There was no fresh guano but we did find several partial skeletons (all quite old). The site had clearly been a roost more than ten years ago but was no longer used. Had the bats moved on or died out?

John Prince with Ghost bat skull, Forbes Inferno Cavee A. White

The second potential cave, Kerb Meister Cave, could not be relocated and so its status as a Ghost bat roost remains a mystery.

It was time to take to the air. Shaun, our helicopter pilot, was amused by our desire to be dropped off to remote holes in the ground, only to be picked up again later in the day, dirty, stinking of bat guano and generally pooped! As the days went on, our searches for bat caves went further afield. Eventually curiosity got the better of Shaun and he turned off the engine of the chopper and came over to see what we were doing. He peered down deep caves, watched bodies disappear down ropes into the darkness and heard yells of delights when bats were found or cries of woe if the caves were empty. He soon got the bug and became much better at finding caves from the air than we were.

Forbes Inferno Cave A. White

Deep Cave spotted from the air A. White

All in all we found 23 new caves but none contained Ghost bats. Most were unsuitable for Ghost bats but those that provided suitable habitat were empty. Toads were present in them all. We visited Two Rocks cave and marvelled at the immense, but now old mounds of Ghost bat guano there - a testament to the hundreds of years of occupation of the site by Ghost bats and the relatively recent abandonment of the sites.

At the completion of the survey, all three of us knew the truth about Ghost bats at Riversleigh and Boodjamullah. They were now locally extinct. But were they also extinct from nearby areas as well? To find out, we drove south to Camooweal Caves.

Camooweal Caves

Camooweal Caves lie about 250 km south-west of Riversleigh, close to the Queensland-Northern Territory border. Unlike Riversleigh, the caves here have formed in dolomite (a magnesium-rich version of limestone). The caves also appear to have formed in quite a different manner. Many of the caves at Camooweal began as subterranean chambers that had dissolved out under the action of hot groundwater. As the caverns enlarged, the roof weight became greater and greater and eventually the roof collapsed. Often this only resulted in a slightly larger chamber. As groundwater levels changed over the millennia, chambers formed at different levels below ground and some of these linked up through roof collapses, and some that were near the surface broke through to create a sinkhole or doline entrance.

In my initial enquiries about Ghost bats at Camooweal, I was dismayed to learn that there were no recent sightings of Ghost bats, although no-one was looking for them. Even worse, no-one seemed too sure what caves the Ghost bats been recorded in during the 1980s (the last definite record). So we headed off to Camooweal, not sure if this would be a waste of time or where any of these mysterious bat caves might be.

Once more the gods smiled upon us. We pulled into the campground near the Great Nowranie Cave to find about a dozen others vehicles there with compressors, scuba tanks and wet suits scattered about. The ranger had said that we were unlikely to see anyone else out there. Curious, we walked over and introduced ourselves to some people filling air tanks. It turned out that we had coincided with the Australian Speleological Federation annual field trip. The group had already been at Camooweal for three weeks and had one more week to go. They were exploring and mapping the underwater passages in the caves. What luck!

The cave divers knew the locations of all the caves that we were interested in, and what's more they knew of many other caves that we had never even heard of. We explained that we were in search of Ghost bats and described a typical Ghost bat roosting cave to them. They went into a huddle and muttered amongst themselves before writing out a list of five cave names that they said fitted the description.

Our first cave to visit was Great Nowranie. This cave had a large doline entrance and we had to use a combination of rope ladders and ropes to get down into it. After descending about 20 metres below ground level, a horizontal tunnel took us on a winding path to a massive chamber. On the way we encountered our first Ghost bats. We moved slowly and quietly deeper into the cave and past the big chamber. Smaller tunnels led down. As we entered one of these, a familiar smell hit my nostrils: fresh bat guano! Moving slowly we found a colony of Ghost bats roosting in a solution dome in the roof of the tunnel. We did our counts and collected dross from the floor of the tunnel. No more Ghost bats were found in other parts of this cave.

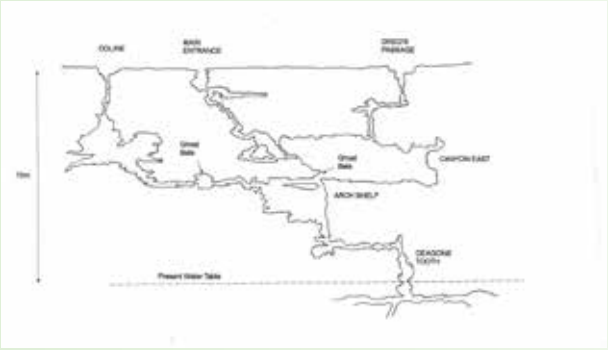
Our days were spent descending into dark entrances, and crawling along sinuous underground tunnels in search of more Ghost bat

Entrance to Great Nowranie Cave A. White

Ghost bats on roof of Great Nowranie Cave A. White

roosting sites. In all, we visited seven caves and found Ghost bats resident in six of them. Although these caves had water in the bottom, they lacked cane toads. Tree frogs were resident in the caves (sometimes at great depths) but not toads.

Toads arrived at Camooweal in 1990 and were present in the waterholes alongside the Georgina River and scattered sites across the land. The dolomite plateau did not have as many hiding places for toads as the limestone at Riversleigh. Furthermore, the caves all had vertical pitches that would prevent toads from entering and residing within the caves. This was an important piece of information as it suggested that Ghost bats could survive in certain areas where cane toads occurred, but possibly only if the particular characteristics of the habitat were appropriate to bats but not to the toads.



Profile of Four Mile East Cave, Camooweal, Qld A. White

The significance

As we packed up our gear we thought more and more about the nexus between toads and Ghost bats. Clearly, any Ghost bat flying around in search of food might encounter a toad - but would one toad kill a Ghost bat or would it need to consume more than one for the meal to prove deadly? If the latter scenario was true, there is a reasonable explanation for the loss of Ghost bats at Riversleigh yet their persistence at Camooweal.

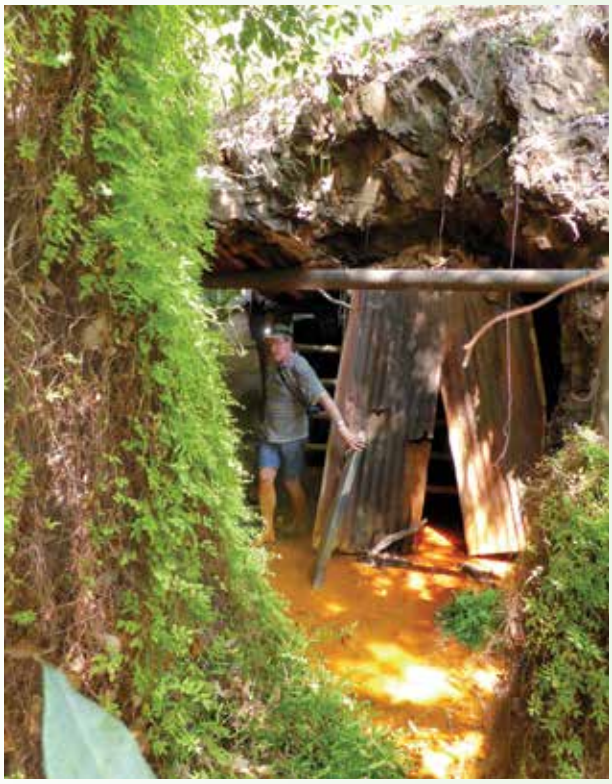
Cane toads at Riversleigh utilise caves to escape the heat and dryness. If caves are easily accessible, toads will concentrate in caves, especially during the dry season. If those caves are also used by Ghost bats, a Ghost bat in search of food is guaranteed to come across a cane toad or two before it even leaves the cave. Our theory is that cane toads have their greatest impact on Ghost bats during the dry season when they may become the most readily available food resource for the bats. If this is true, there may be a way of protecting Ghost bat roosts from cane toads (especially in areas where cane toads have not already reached - such as the Kimberley in WA).

The Kakadu Search Begins

Shortly after returning from our Riversleigh and Camooweal surveys I was contacted by rangers at Kakadu National Park in the Northern Territory. Word was out about what we had found at Riversleigh and they were concerned about the status of Ghost Bats in Kakadu. Could I come up and check the bats for them?

It so happens that I have other reasons to go to Kakadu - my daughter lives in Jabiru in Kakadu NP. So maybe I could visit her and start some bat surveys at the same time. The biggest problem would be discovering where to look for the bats. The rangers had scant information about Ghost bats in the park and they advised that I track down Ian Morris, a noted naturalist who had spent many years around Kakadu, to see if he knew of Ghost bat locations.

Ian Morris turned out to be a wealth of knowledge and a real nice guy. He had detected ghost bats in many sites in Kakadu and Arnhem land during the 1970s and 1980s and was prepared to show them to me. Many of these caves were also aboriginal sites and so we would need the approval of the various aboriginal groups before we could search the old



Ian Morris emerging from lower level of Rockholes Mine A. White

cave sites. Again Ian proved to be the key to our success, not only did he know many of the elders, but spoke three local languages. Needless to say I let Ian do all the negotiating.

In early January 2014 I set off with Ian to the first of the Ghost bat caves. Nawurlandja was our first cave. This was a smallish rock shelter with a small creek trickling through it. We saw one live Ghost bat there and the floor of the cave was relatively free of ghost bat droppings. Clearly this group of bats was in decline. Cane toads were also now living in the cave.

Our next site was an abandoned mine site in the southern part of Kakadu. The Rockholes Mine was an old uranium mine and had not been used for many years. No Ghost bats were found here and about two dozen dead Orange Leaf-nosed bats were found on the floor of the mine. This apparently had been a large ghost bat breeding site, but no more, it seems.

By this stage Ian was getting despondent. He had assumed that ghost bats were still in good numbers in the park as they were still being seen now and then by the rangers. But our two cave visits attested to a very different scenario - one of death and loss.

Ian stamped his feet and announced that we should go to Ngarradj warde djobkeng. This site contained one of the largest colonies of Ghost bats in the park. It was a bit of a hike to get there and it was mid-summer after all. The site was also a sacred site and so he would have to do some slick talking to get approval to go there. We did get approval but on the proviso that an aboriginal leader came with us. Luckily Natasha Neitje, the daughter of Big Bill Neitje, the last of the traditional tribal leaders, agreed to escort us.

We hiked across the baking floodplains and eventually approached a sandstone outcrop. We could see rock art on the walls. Natasha asked us to sit down and wait. As Ian and I sat on the boulders in the shade, Natasha walked up to the rock wall and caressed it, speaking softly. She moved from painting to painting, touching many whilst talking to them. I asked Ian what was happening. He said she was talking to the ancestors, she was telling them who we were and what we wanted to do and was asking their permission for us to go in. She talked to them for about 15 minutes and then came and sat beside us. We waited. Again I asked Ian what was going on. His answer was simple - she is waiting for their answer. After about another 15 minutes Natasha suddenly turned around as though someone had called her and she walked back to the rock wall. More conversation and then she returned to us - apparently we had been given permission to enter the caves.

The caves were in a narrow gorge and were extensive. Rock art abounded and the main cave was guarded by paintings of Oenpelli pythons. The site was perfect except for one thing- no live Ghost bats. We found dead Ghost bats and evidence of large numbers of Ghost bats in the past, but not any more. Cane toads were present. I collected samples of the cave floor dross for later analysis.

During the walk out Ian and Natasha were very quiet. When we finally reached the car, Ian turned around and grabbed my shoulders and said "You've got to tell them what is happening - you have

Natasha Neitje at Ngarradj warde djobkeng A. White

Dead Ghost bat at Ngarradj warde djobkeng A. White

to make them understand- this is a disaster!" It certainly was.

I returned to Sydney with my samples of cave floor debris. Toad remains were present in the dross but were a relatively uncommon component of the droppings. Based on the bones that I found, the most commonly consumed prey items were small birds. There were some reptile bones and small mammal bones in the dross as well. Frog bones were present and toad bones were the least common element. So I only had some indirect evidence that cane toads were the villains in this story.

Following on from Ian's words about alerting the authorities, I wrote a report to the Kakadu NP authorities advising them of our results and the need to do more surveys in the park. George Madani decided to enter into the project and together we prepared a poster paper for the upcoming meeting of the Australasian Bat Society to alert the bat community about the situation. George went to Townsville with it and galvanised the bat community into action. The telephones ran hot after the conference. We needed more information from as many locations as possible to determine the extent of the decline of Ghost bats.

In August 2014, I returned to Kakadu with Ian Morris to search additional cave sites. We got into five main cave areas, and we revisited Nawurlandja. This time there were no Ghost bats. We visited the Blue Rocks area and found a large colony of living Ghost bats (but also several dead ones). I collected some of the recently dead Ghost bats for later dissection. The bat caves at Blue Rocks were above ground and about one kilometre away from the nearest waterbody. Significantly, we did not find any toads in these caves. There was some hope after all.

Our next major foray was to the north of the park into Hawk Dreaming - a large isolated sandstone outlier containing several caves. One of the smaller caves had dead Ghost bats in it, but the larger and more difficult to access main caves had a moderate number of living Ghost bats.

From there we visited Riflefish Dreaming – no live Ghost bats were to be found. At Jabiru Dreaming no live Ghost bats were found either. The caves that were close to water or where toads were plentiful were devoid of Ghost bats.

I wrote another report for Kakadu NP advising that the Blue Rocks population be monitored to see if it was stable or in slow decline. In September 2014, I dissected the Ghost bat carcasses to see what had they had eaten. Only one animal had bones in its belly so I removed these, cleaned them up and set about to identify them. The identification was easy - the bones comprised part of the skull of a cane toad, a few vertebra and a toad arm.

Toad bones found in Ghost bat from Hawk Dreaming A. White

The Future

Our results have reached the relevant authorities. The Action Plan for Australian Bats is currently being modified and the section dealing with Ghost bats is being updated. The status of Ghost bats in Australia is now under serious review.

George is keen to investigate ways to protect Ghost Bats from further decline and we will begin the process of collating the data that has been supplied from bat ecologists in other parts of Australia. It is good that the alarm bells are sounding - I just hope that it is not too late.

References

Covacevich, J., and M. Archer. 1975. The distribution of the Cane toad *Bufo marinus* , in Australia and its effects on indigenous fauna. Mem. Qld Museum 17:305-310.

Mayes, P.J.; Thompson, G. G.; Withers, P. C. 2005. Diet and foraging behaviour of the semi-aquatic *Varanus mertensi* (Reptilia: Varanidae). *Wildlife Research* 32: 67–74.

Tyler, M.J. 1989. "Australian Frogs. Viking O'Neil, Melbourne.

Van Beurden, E. 1980. Report on the results of Stage 3 of an ecological and physiological study of the Queensland Cane toad *Bufo marinus*. Report to Australian National Parks and Wildlife Service, Canberra.

The Silent Frogs of the Long White Cloud

George Madani

Archey's Frog, *Leiopelma archeri* George Madani

New Zealand is a curious place. Having been isolated from the rest of the world 80 million years ago and remaining unoccupied by man until 800 years ago, as science writer and evolutionary biologist Jared Diamond describes: 'New Zealand is as close as we will *get* to the opportunity to *study life on another planet'*.

It is a land where birds have forgotten how to fly and ancient fossil reptiles still patrol the wilderness. Isolated in the Southwest Pacific Ocean, it is perhaps the last place you would expect to find an amphibian. Cast adrift from the nearest landmass, an extraordinarily special and ancient group of frogs has persisted there for a very, very long time. New Zealand frogs, members of the family Leiopelmatidae, are the oldest lineage of frogs in the world. They originated nearly 200 million years ago in a time when the super continent of Gondwana still existed. Ancestors of New Zealand's present day frogs may very well have had to contend with the amphibian crushing footsteps of dinosaurs!

Today, New Zealand is home to no less than four extant species of frog. They include Archey's frog *Leiopelma archeyi*, and Hochstetter's frog, *L. hochstetteri* which are only found in restricted localities on the North Island. Hamilton's frog, *L. hamiltoni* which numbers less then 300 individuals, is only found on Stephens Island in the Cook Strait, whilst the Maud Island frog, *L pakeka*, only occurs on Maud Island in the Marlborough Sound. Several more species, *L. waitomesis*, *L. markhami* and *L. aurorensis,* went extinct roughly 800 years ago when Polynesians first arrived unintentionally bringing with them the Pacific rat. This invasive rodent has been suspected in having annihilated those species.

These primitive anurans are unique in that they possess a number of archaic features. They retain

their tail wagging muscles (even though their tails have long since waggled off), have extra vertebrae in their spines (you never know when you might need a spare) and floating cartilaginous ribs (because ribs connected to your spine are so mainstream). The most interesting feature, however, is that these frogs cannot croak. They'll squeak when handled but they don't even have ears to listen out to one another, making the dating game somewhat complicated. It is suspected that males and females find one another on the forest floor using chemical signals and smell.

In testament to their primitive nature, these frogs (excluding Hochstetter's frog) do not have a free-swimming tadpole stage. Instead, the very small tadpoles develop without feeding in the egg capsules (nourished by their large yolk) before they hatch as tiny froglets still with their tail. During development the fathers guard their brood by sitting over the eggs before they hatch. These doting fathers will, in fact, cover the egg jelly with their skin secretions which protect them from microbial attack. The metamorphs climb aboard their father's back and hitchhike for a time until after their tail has resorbed and they are ready to brave the warm temperate forest world on their own. Hochstetter's frogs are different in that their tadpoles are semi-aquatic; they hatch out after the eggs are first laid in damp conditions under stones and fallen vegetation before making their way to shallow water near the nest site. The semi-aquatic lifestyle of Hochstetter's frog is made evident by the presence of half webbed toes in the adults.

Hochstetter's Frog, *Leiopelma hochstetteri*; note the webbed feet of this slightly more aquatic species G. Finlayson

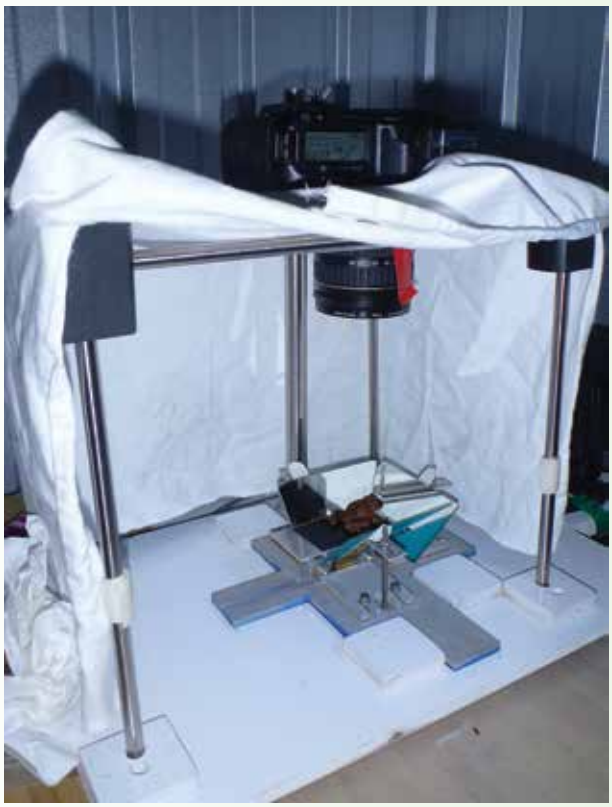
Sadly, as in many other places around the world, chytrid fungus, introduced predators and habitat loss and destruction has taken a serious toll on these frogs. Fortunately there are many dedicated conservationists, rangers and scientists working to help these unique amphibians. Conservation programs include managing for disease, controlling predators, protecting existing habitat and establishing translocated populations.

Earlier this year I was fortunate enough to partake in the monitoring program of one particularly special species, the enigmatic and beautiful Archey's frog. In fact, the Zoological Society of London has ranked Archey's frog as number one of the world's most interesting and unique amphibian species based on its evolutionary distinctiveness and globally endangered status. It was with considerable excitement that I was ready to make acquaintance with one of the most illustrious and unique lineages of amphibian royalty. These frog populations have been a part of some of the longest running amphibian monitoring programs in the world with some individual frogs being studied for nearly 40 years! The team set out at dusk and drove to an undisclosed location. We navigated our way along a tangled path snaking its way through encroaching green walls and avoiding boot-snaring roots. Sometimes stepping over low grown branches, other times crawling below them with the occasional scramble through a screen of foliage. And so it was that I found myself in a secret location, gum-booted up and thoroughly sterilised in the heart of a unique and ancient forest ready to search for a silent frog hidden in the leaf-littered depths of the forest floor.

You have to pay it to the kiwis, they are a thorough lot. The site, small as it was, was marked out with string in a 10 by 10m plot. Divided into ten 1m lanes it was our job to literally crawl and creep along looking for these mysterious, half hidden camouflaged amphibian blobs of green and brown. Painstaking and meticulously we searched our lanes, peering under ferns and turning back logs, careful not to cause any damage.

Duty bound as I was to represent both FATS and Australia I am proud to say that I played my part nobly. A misspent childhood spent largely in the mud paid off and we turned up a record 23 individuals for that site. Each frog was collected and placed in its own clean bag and the spot they were found was marked.

To describe these frogs as exquisite would be an understatement. At less than 40mm, their small bodies were handsomely splashed in brushes of bright green contrasted with the discrete subtle brown and orange hues of the forest along the raised ridges of their backs. Here and there their bodies irregularly patterned with prominent black



A special studio for frog photography was set up G. Madani

Archey's Frog identification photo shoot L. Bridgman

Archey's Frog in the photo studio G. Madani

patches. They were a delight to behold.

There was considerable variation between individuals. This helped with the next stage of the study. The frogs were processed on site and in addition to being weighed and measured they were also photographed. A special frog studio was set up with mirrors positioned to the front and side of the frogs so that in a single photo all sides of the frog could be seen. This helped with identifying individuals based on their unique pattern and colour.

The night drew on and with the processing done we returned each individual to the specific spot where they had been found. Long lived as they are, these frogs are known to occupy a very small home range and in some studies certain individuals have been found perched on the very same rock or log year after year!

I was overjoyed at having had the opportunity to see such a beautiful and curious species. As I released the final little frog I couldn't help but wonder as to the fate of their future. As a family and species they had survived for millions of years. I sincerely hope that they continue to do so for many, many more.

.....In 2009, the type locality and core habitat for both Archey's and Hochstetter's frogs came under threat when the government at the time proposed to relinquish the status of protected reserves of the Coromandel Peninsula and open the region to mining. After huge protests, campaigning and letters of complaints the government revoked their decision. FATS were a proud contributor to the cause, donating $1000 to the fighting fund and writing letters on behalf of its members.

Get your Giant Barred Frog T-Shirt

Renowned wildlife illustrator Gerhard Koertner was commissioned to illustrate the endangered Giant Barred Frog, *Mixophyes iteratus* for design into an exclusive and limited edition frog shirt directly available to FATS members. The shirts portray the frog from both front and back and Gerhard has done a marvellous job in capturing the essence and vibrancy of this unique species.

The shirts, available in both mens and ladies cut, come in various colours and sizes and will be on sale at the December meeting for $30 each.

Bamboozling Bufo

Rick Shine

University of Sydney

The infamous Cane Toad on the march! Matt Greenlees

Cane toads are the unwelcome aliens that all Australians love to hate. Ask around at any gathering of Aussies, and I'm prepared to bet substantial money that nobody will suggest that bringing cane toads to the Land Down Under was a clever idea. In 1935, a scientist from the Sugar Experiment Station, Reg Mungomery, traveled to Hawaii to collect 101 adult toads, in the hope that they would help to control beetles that were threatening the sugar-cane crop. Reg and his colleagues managed to breed from those original toads, and lovingly released a few thousand of their babies along the banks of the Little Mulgrave River, just south of Cairns. The rest is history.

Cane toads didn't hang around the canefields to eat beetles, but instead they and their descendants embarked on a mighty transcontinental adventure. Eighty years later, toads have spread across Queensland, through the Northern territory, and into the Kimberley region of Western Australia. And more slowly, they have moved south along the east coast, reaching northern New South Wales many years ago. Accomplished stowaways, cane toads frequently catch a lift on trucks with landscaping and gardening materials, and turn up in places like Dubbo and Hobart. In Auckland, one New Zealand backpacker was horrified to find a live cane toad inside his boot when he unpacked his gear after a trip to Queensland. Closer to home, toads have bred successfully in a feral population in the Sydney suburb of Taren Point.

The warty tsunami has brought devastation to some native wildlife, and good news to others. Large predators like goannas, bluetongue lizards and quolls – and in some areas, even freshwater crocodiles – have been fatally poisoned when they have tried to eat the toxic toads. Over much of the tropics, populations of these large predators have

crashed dramatically as soon as the toads have arrived. Fortunately, most smaller predators are unaffected at the population level: an individual that eats a small toad is likely to become ill but not die, so smaller animals like fishes, frogs and so forth typically have not been affected. Indeed, quite a few native species have become more common after toad invasion: by killing off the large predators, toads have made life easier for the species that used to be dinner for the goannas and their bully-boy friends.

The ecological impact of cane toads is complicated, and their effect on native frogs is a good example. Toads eat some frogs, and compete for food with others (especially, during the tadpole stage). Frogs eat some toads, and die of poisoning. These are all negative impacts. But it's not all bad news because toads not only reduce the number of frog-predators, but they also also help frogs in other ways. For example, toads seem to reduce the numbers of lungworm parasites in the local frogs, by acting as terminal hosts for the lungworm larvae that would otherwise infect a frog. Several surveys of frog abundance have concluded that the arrival of cane toads has very little effect – if any – on the number of native frogs in an area. No Australian species has been driven to extinction by the cane toad.

Still, we'd all like to get rid of cane toads from our favourite billabong if we could – so, how do we do it? Sadly, that aim has proven a difficult one to achieve. Simply picking up adult toads and popping them into the fridge then freezer, to send them to the Big Swamp in the Sky, doesn't have much effect. A single female toad can produce 30,000 eggs in a clutch, and you can't catch toads at a fast enough rate to make a real difference. The key to controlling toads is to stop them from reproducing. If we could do that, we really COULD make a dent in toad numbers.

Cane toad tadpoles enter trap

My research group didn't set out to become pest-controllers, but we have discovered a couple of tricks that are helping to turn the tide against these alien anurans. In the course of our major project on all things toady (funded by the Australian Research Council), Michael Crossland found that toad tadpoles are highly cannibalistic towards eggs of their own species. As soon as a female toad lays her eggs in a pond, any toad tadpoles in that pond find out that they're there, hurtle across as fast as their tiny little tails can push them, and commence to eat the eggs. The cannibal tadpoles not only get a tasty meal, but also eliminate the future competition – if they don't manage to destroy the eggs, they'll be competing with thousands more hungry mouths in the pool by next week.

How does that help for toad control? It gives us a way to eradicate tadpoles. Michael discovered that the toad tadpoles zero in on the scent of toad poison as it leaks out of the developing eggs. Female toads load the eggs with poison (the same as in their shoulder glands) to protect them – and this is the chemical signature that older toad tadpoles use in their "search and destroy" mission to find the edible morsels. So, if you take a simple funnel trap – a plastic box that tadpoles can swim into, but can't find their way back out of – and bait it with toad poison, it can rapidly catch most or all of the toad tadpoles in the pond. Set one of these traps and come back an hour later, and you're likely to find hundreds – even thousands – of toad tadpoles frantically trying to push their siblings out of the way as they desperately try to get at those eggs. Even better, the "bait" repels the tadpoles of native frogs; they head in the other direction. So, all we catch are toad tadpoles.

After we sent the "how to" information around to community groups, they started trapping in earnest. It's only been a year or so, but I've already had reports of over a million toad tadpoles caught using our trap design, in places all the way from Western Australia to Queensland. And in collaboration with colleagues from the University of Queensland, we are making great strides in developing an artificial bait that works just as well, but is a lot easier and safer to obtain than toad poison. We've taken out a patent, and a commercial company is looking to start producing and selling traps on a broad scale. Michael's trap probably won't hit the shelves at your hardware store for another year or two – we are still tweaking the design – but it looks set to be the most useful anti-toad device yet invented. It won't eradicate cane toads from Australia, but it gives community groups and wildlife management authorities a powerful weapon. If we really want to stop toads from breeding in a given area, now we have a way to do it.

Lemur Frog
Hylomantis lemur

Marion Anstis wins Whitley Silver Medal

Marion's book **Tadpoles and Frogs of Australia**, published by New Holland late in 2013, has won the coveted Whitley Silver Medal for the Best Book on Australian Natural History in 2014. The award was presented at the Whitley awards night in September at the Australian Museum by Arthur White, who is a member of the judging panel. Arthur gave a long speech highlighting the journey Marion has taken to produce this book, and referred to the very positive comments Marion received from Professor Ronn Altig (Mississippi State University) and others who spoke at the launch of the book at Taronga Zoo in November, 2013. Marion was thrilled to receive the silver medal, which is the top award given. She thanked Taronga Zoo and FATS for their generous support towards the publication costs of the book, without which a book this size would not have been published!

Arthur White presents Marion with the Whitley Silver Medal and Certificate P. Grimm

From left: Phillip Grimm, Punia Jeffery, Karen White and Arthur White join Marion (centre) with her medal. A great night had by all! P. Grimm

Alien versus Predator: the impact of cane toads on native predators in southern Australia

Chris Jolly

The ecological impacts of invasive species on native wildlife and ecosystems are known to vary geographically. Therefore, it is important for us to undertake studies on replicate invasion fronts, throughout an invader's range, to understand their overall impacts. Since they were brought to Australia in 1935, the spread of cane toads (*Rhinella marina*: Bufonidae) across tropical northern Australia (QLD, NT and WA) has been devastating for large predators, such as Yellow-spotted Monitors (*Varanus panoptes*), King Brown Snakes (*Pseudechis australis*) and Northern Quolls (*Dasyurus hallucatus*) to name a few. Population declines in these large tropical predators are the result of these species being fatally poisoned when they attempt to consume the toxic toad invaders. However, until recently the toads' impact remains unstudied at the toad's southern invasion front in temperate-zone Australia.

In my honours project with the Shine Lab at the University of Sydney (supervised by Professor Rick Shine and Dr Matt Greenlees), I surveyed habitat characteristics and fauna along the northeastern coast of New South Wales in eight sites that have been colonized by cane toads, and another eight (interspersed among the occupied sites) that have not yet been colonised by toads. The patchy distribution of toads in this region, unlike their continuous distribution in tropical Australia, allowed me to deconfound environmental factors, such as climatic and habitat features, from the effects of toad occupancy on the native wildlife. The presence of cane toads was associated with lower abundance and species richness, and a difference in species composition.

Populations of three species of large lizards (Land Mullets *Bellatorias major,* Eastern Water Dragons *Intellagama lesueurii,* Lace Monitors *Varanus varius*) and a snake (Red-bellied Blacksnake *Pseudechis porphyriacus*) were lower (by 84 to 100%) in areas with toads. Because Lace Monitors are scavengers as well as predators, their scarcity in toad-invaded areas translated into a 52% decrease in rates of carrion removal (based on camera-traps at bait stations). Lizard decline also may explain a large increase (by 61%) in numbers of Australian Brush turkeys (*Alectura lathami*) in sites that contained cane toads. The invasion of cane toads through temperate-zone Australia thus has been devastating for frog-eating predators, flowing through to benefit their competitors and prey (Brush turkeys), as well as causing a decline in rates of scavenging. Those impacts have remained unreported in this densely populated region, whereas similar impacts in wilderness areas of tropical Australia have attracted intense scientific scrutiny.

Given the cane toad's high public profile in Australia, and the substantial investment into research and management of this pest, the lack of previous research on toad impacts in southern Australia seems remarkable. My study paints a bleak cautionary tale; even in one of the best-known invasive species systems, major ecological impacts on conspicuous and iconic species have been overlooked.

Detailed analyses of Lace Monitor populations showed that toad impacts fell primarily on larger lizards. Feeding trials suggested that the ability of smaller goannas to survive the toad invasion reflects their greater wariness and longer prey-handling times prior to ingestion, which allow lizards to detect toad toxins prior to fatal poisoning. Monitors from toad-naïve populations (sites where toads are yet to colonise) readily consumed cane toads as well as frogs, whereas monitors from toad-exposed populations consumed frogs but not toads. Following a single meal of toxic toad, lizards refused toads but continued to eat frogs. Lace Monitors thus can rapidly learn taste aversion to cane toads. This behavioural plasticity, and the lesser vulnerability of smaller specimens, may explain this species' recovery in long-term toad-colonised regions of tropical Australia.

Although previous research in Queensland's tropical north (Townsville) suggested that the toad-vulnerable Yellow-spotted Monitors (*Varanus panoptes*) were unable to rapidly learn taste-aversion to cane toads, the results of my research project provide some hope that impacts to our large native goannas may not be as severe as initially suspected if they are able to learn to avoid these toxic invaders.

NB: Chris Jolly was the main speaker at FATS October meeting.

FATS Frogographic

SENIOR PET IMAGE **Christian Hofmann**

MOST INTERESTING IMAGE **Karen Russell**

BEST SENIOR IMAGE AND PEOPLE'S CHOICE WINNER: Centre spread: Lemur Frog, *Hylomantis lemur,* George Madani

Competition WINNERS!

JUNIOR ARTWORK **Ryan Little**

EQUAL BEST SENIOR IMAGE **George Madani**

Evolution of FATS

Jilli Streit

The first time that I attended a FATS meeting was the very first night it was held at Sydney Olympic Park. My husband Luke and I had come straight from work and had driven out to Olympic Park. It was a moonless night and the park seemed deserted. We followed the sandwich boards that said *FATS MEETING* and ended up in an unlit car park full of cars but not a soul in sight.

"Now what?" my hungry husband said as we looked around at the whispering black sheoaks. He had agreed to accompany me to my first FATS evening - but I could tell he was reluctant. I don't really know what he imagined might happen at a frog lovers' club in the middle of the big empty Olympic Park on a dark night. For that matter I didn't really know myself. I had found the FATS website by accident when I was looking for information on building a frog friendly pond in our back yard. The information was better by many magnitudes than anything else I came across. "These seem like thoughtful and well informed people," I reflected. "I think I'll go and learn more." So here we were.

"There's a path over there, let's see where that leads. Somewhere along the path we smelt something wonderful, could it really be freshly baked pizza? Hmmm. As we stepped into the brightly lit Education Centre a friendly person with a gentle Italian accent invited us to eat a large slice of her authentic Italian pizza. And then there was a glass of red to go with it - and everyone was smiling. We felt part of FATS already and no one even knew our names, nor we theirs.

A woman with bright red lips and coral earrings was sitting at the reception table next to a willowy woman with long silvery golden hair who might easily have been a folk singer. These women were signing up new members and they greeted us warmly. Suddenly, just like that, we had paid our dues and joined the Frog and Tadpole Study Group.

From there we moved to a table where a wise, motherly looking woman hovered over a collection of boxes and inflated plastic bags. Lots of people were crowding around peering into the bags and boxes. We did the same and noticed that they were filled with frogs. The frogs were of various kinds and various sizes, mostly green. They had all been rescued and quarantined and were now ready for adoption, for a fee, to people who had a current amphibian keepers license. The wise woman was answering all kinds of questions, mostly coming from an excited young boy and his Dad. They had just adopted a Chinese take away box containing three, tiny Dainty Green Tree Frogs (*Litoria gracilenta*).

As we took our seats I noticed how truly diverse the audience was. This was not a school kids' naturalist's club, nor was it a club for retired academics. There were people here who looked like Uni students, people who might have been teachers, tradesmen or technicians. And some people who most certainly had corporate backgrounds. Interestingly, there were equal numbers of men and women. "It would be impossible to profile a typical FATS member," I mused. "It must be a case of frog glue!"

At the front of the room a tall man with a beard and kind blue eyes was preparing to speak. An

Dense vegetation around garden pond attracts frogs J. Streit

even taller man was setting up the computer and projector. Suddenly the wall lit up with a dazzling image of a Green and Gold Bell Frog (*Litoria aurea*).

Everything about that first meeting was fabulous. The speakers knew their topics thoroughly. Their presentations were impeccable, impassioned and pointedly scientific. They spoke to us with respect for what we might already know about the affairs of amphibians. Well, in my case it was nothing much. I had a lot of catching up to do I realized, but I still enjoyed every moment. Ultimately, perhaps, it was the exquisitely beautiful images that flooded brilliantly, one after the other, across the wall that really galvanized my conviction as a brand new FATS member. FATS people, it seemed, do more than talk and eat. Evidently, they apply themselves very seriously to developing all kinds of useful skills. Things like photography, like academic research and like empirical observation. In addition, the Frog and Tadpole Study Group clearly aimed to expand and disseminate scientific knowledge, most particularly, but not exclusively, about the life of frogs. I was relieved to see that whatever my husband's worst fears were they hadn't been realized. Like me, he was very happy he had come along. Whew! So this is how frog lovers spend dark Friday nights. Wow!

Thinking about the evening later it all seemed so obvious. I mean, it is obvious that froggy types would want to get together and drink wine, have supper and talk about frogs. Of course, they would organize an appropriate venue, like the Education Centre at Olympic Park. Chairs would be arranged, speakers would appear, excursions would be organized, the urn would boil, the supper would be laid out and proceedings would just run smoothly every time. It had always been like that, hadn't it?

No! The study group we know as FATS runs flawlessly today because of the way a particular cast of characters responded to a particular set of circumstances. It's a bit of a story so I asked Arthur White about it, including how he got interested in frogs. This is what he told me.

"In those days, when I was a youngster, Sydney had a lot of intact bushland. There was a rifle range, not too far away from our house, at Maroubra. It was in effect a sanctuary for birds and reptiles and other native animals. My brothers and I sometimes went there to see what we could find. My oldest brother always kept animals at home, like spiders and reptiles. We also had chooks. We just grew up around animals. Then there were the wetlands at East Lakes, near where we lived that were full of Green and Gold Bell Frogs (Litoria aurea). At that time people could keep anything, without a license.

There was a swamp around our local golf course. We used to go to the golf course and wade around in the swamp to collect the golf balls that had been hit into it. Then we would go up to the clubhouse and sell the balls back to the guys who had lost them. The swamp was full of animals. There were lots of eels and plenty of snakes and lizards. There were also lots of frogs as well, as you would expect. We learnt a lot about Natural History just because of the things we all used to get up to as kids. Eventually, I decided that I wanted to go to the University of New South Wales to study Zoology.

By the time I got to Uni I found I knew more about Natural History than most of my teachers. There was not a lot of scientific knowledge about frogs then. Mike Tyler was really the only person working exclusively on frogs at that time. During our many field trips we would collect animals and take them to the Australian Museum for identification. Harold Cogger was the curator in Herpetology and was always interested with our discoveries. Sometimes we would bring back unnamed species of frogs. Cogger would set to work to describe them. On one particular occasion, he was overworked and stressed and I kept hassling him about a new frog that I had found. "Why haven't you described it yet?" I kept asking. Eventually, he stopped what he was doing, turned to face me and said that it was time that I did it myself. He almost dared me into describe this frog. Suddenly I realized that I would have to learn the rules of taxonomy and become a lot more rigorous in the way that I collected data. Funnily enough, when the time came to do my PhD, I could not find a supervisor willing to take me on to work on frogs so I studied kangaroos instead.

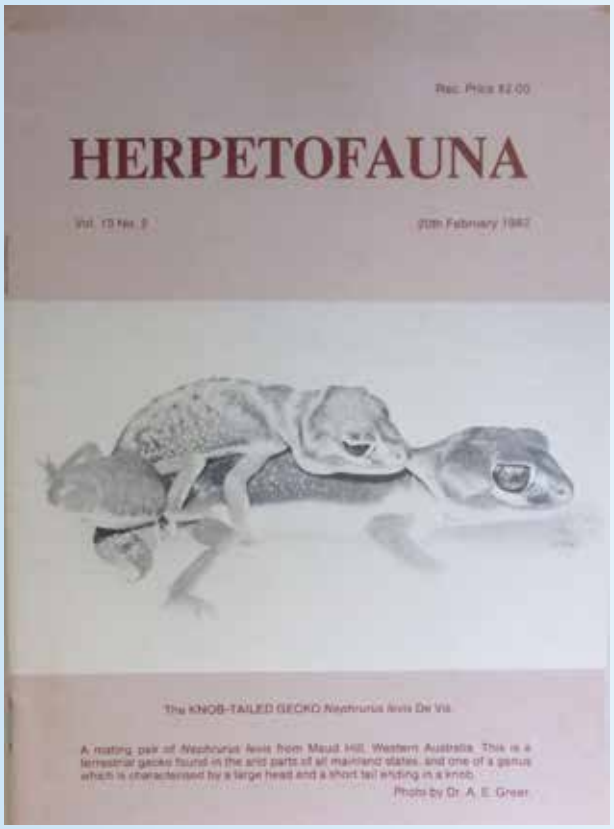
In the late seventies and eighties there was a push to establish or enlarge National Parks in New South Wales. Proposals for new National Parks meant that someone had to go out and do surveys of the populations of animals and plants. Luckily I got to do some of that work. We had to go out and survey wilderness areas looking for fauna to help support proposals for new and expanding National Parks. When Neville Wran was NSW premier he gazetted several parks. He added 160,000 hectares to the Blue Mountains National Park and in 1979 the Wollemi National Park gazetted another 500,000 hectares. The Wollemi National Park was to be unique as it would have a wilderness core where there were no roads at all. People had to hike in through the park and it was on one of those trips that the Wollemi pines were later discovered (in 1994). That was a great time for us. For example, I did one week hiking in the Wollemi National Park and the next week I would be walking around at Smith's Lake which was an extension of the Myall Lakes National Park. In the Southern Blue Mountains National Park we were looking for the Blue Mountains Green Tree Frog

Karen and Arthur White relaxing at home

(Litoria citropa). *We worked extensively throughout the Kanangra-Boyd National Park.*

When I met Karen she was working in the Zoology Lab at New South Wales Uni. We used to go to the Herp meetings at the Australian Museum along with a lot of other zoology people, including Harold Cogger. The Australian Herpetological Society - established itself in 1975 or 76. The new Herp Society started putting together a peer-reviewed publication called "Herpetofauna". For a long time the only publication for identification of reptiles was "Snakes of Australia," published in 1929. "Herpetofauna" has a broad range of herpetological interests, for example, it publishes field observations and tips on reptile husbandry as well as book reviews.

At that time, the Herp meetings were held once a month at the Australian Museum in College Street. All the reptile enthusiasts used to sit down the front talking a lot about collecting and breeding snakes (how big is your snake), or what to do when a snake gets sick and what makes the best design for a reptile cage.



An early issue of Herpetofauna M. Anstis

Low-growing dense clumps of plants are ideal J. Streit

All the frog enthusiasts used to sit up the back and talk frogs, especially what to do about frogs that were becoming endangered. The reptile people and the frog people basically had diverging interests. Finally, people like Harald Ehmann, Lothar Voigt, Martyn Robinson and Stevie Kum-Jew and some others decided it was seriously time to form an independent frog group. The first FATS meetings were, I think, in 1989. We met at The Sydney Tech College in Ultimo, now called UTS. There were only seven or eight people at the first meetings - with a few apologies. At those early meetings we were mainly concerned about the conservation of certain threatened frogs. At about this time a Private Members Bill was before state parliament. The purpose of the bill was to recognize frogs as animals so they could be protected under law. Until then, frogs weren't listed as animals under state legislation so there was no way to have them declared endangered or in need of protection. As soon as the bill passed, the State Government called for submissions on the status of New South Wales' frogs. Harald Ehmann proposed a conservation study that would involve frog lovers across the state. They were to do field surveys and provide their field notes. The project started without funding but after a while the Commonwealth Government decided to contribute some money. The first animal to be listed as endangered was the Green and Gold Bell Frog. Right up until then people were able to keep any kind of frogs, including the critically Corroboree frogs (Pseudophryne corroboree). Once frogs were registered as indigenous animals keepers could be legally compelled to get amphibian licenses.

FATS has always tried to do more than just collect and keep frogs. In fact, many FATS members do not keep frogs at all. Our main aim is to reach out

to the community and educate people about frog conservation. If people learn about frogs they can develop an understanding and respect for them. Frogs are not like snakes. Snakes have a tendency to inspire fear in the collective consciousness. Frogs, on the other hand, are benign and really photogenic and people are more inclined to love them. When people know something about animals they form a connection and maybe that makes it easier to protect them.

So, more and more people started coming to FATS meetings and soon we had to change our venue from UTS to somewhere larger. We moved into the main lecture theatre at the Australian Museum where we met, every two months, for 15 years or more. I was elected president in 1996, and Karen has been treasurer since 1998. As well as our regular meeting we started running frog disease classes - no one else was doing that. There was a lot of scientific interest and now there are at least fifty students and academics working exclusively on threatened frog species. After a while we had 150 members and people started flowing out of the doors of the Museum theatre. So we had to move again, this time we moved to the Education Centre at Olympic Park!

Garden frog pond with surface vegetation J. Streit

The move to Sydney Olympic Park has worked very well in general. There is never a parking problem and the room seems to accommodate us very comfortably. Naturally, frog lovers don't hesitate to step out on pitch-black nights! It's what we do!

Even my cat loves the shady pond! J. Streit

Emergent plants such as iris are ideal for small tree frogs J. Streit

Keeping Green Tree Frogs

Karen Russell

A healthy adult Green Tree Frog K. Russell

I have been keeping and breeding tree frogs for over 10 years. I currently have seven different species of frogs and each has their own different, quirky behaviours. I try and accommodate each frog species in the environments in which they thrive.

Green Tree Frogs (*Litoria caerulea*) are probably the best known of all the Australian frogs. They are certainly a favourite of mine and I find them to be one of the easiest to maintain. There are many different ways to keep frogs and after experimenting with different setups at home and setting up frog displays at the Reptile and Frog Exhibit at the Sydney Royal Easter Show with my friend Marie, I now use the following methods to keep my Green Tree Frogs healthy and happy.

Enclosures

If you are intending on keeping a frog it is important that you set up their enclosure mindful of the conditions they require. Frogs don't seem to mind being in a confined enclosure but as Green Tree Frogs can grow up to 11cm it is important that the enclosure is large enough to house them adequately. The enclosures for my Green Tree Frogs are a minimum of 60cm high x 60cm in length and 45cm in depth. I generally use glass enclosures that have either front opening swing or slide doors, and are waterproof and non-toxic.

Some people have asked about adapting a fish tank to use as a frog enclosure. As frogs tend to congregate around the top, I find using a fish tank very difficult as you have to access the frogs and feed them from the top. My enclosures are always secure and escape proof and the lids are made of soft mesh that provides the necessary ventilation and security while allowing the valuable UV light to reach the frogs. I avoid using abrasive mesh as frogs can injure themselves. One of the common injuries I have observed is nose-rub from using rough mesh.

Temperature/Heating

Green Tree Frogs can handle a wider range of temperatures than most frogs and have a tolerated temperature range between 18–32˚Cs.

I like to keep my temperatures between 25–29 (approximately 5˚C cooler at night). These temperatures seem to keep my frogs happy, eating well and staying active. Frogs do need a temperature gradient and my tanks tend to have warm and cool areas within the enclosure which allows them to move around the tank to find their ideal temperatures.

There are many ways to heat frog enclosures. One option is to use an aquarium heater placed in the water and covered with a guard. My enclosures are heated with various methods. For my Green Tree Frogs I use a heat mat under part of the tank. The tank has a gap under it so that the heat mat isn't sitting directly on the glass. If one isn't enough I will place an additional one on the side of the tank. Caution should be exercised if using a heat mat or cord directly onto a table top as the heat could scorch the furniture. It is also advisable to use a thermostat when heating enclosures to avoid electrical faults that could cause a fire. During winter if there is excessive heat loss, I cover part of the lid with a towel at night or I place styrofoam on the sides of the tank to hold the heat in. The ballast from the light also provides extra heat while the light is on. If you live in a colder climate and more heat is required you can use a ceramic heat globe. These can be kept on through the night as they don't emit any light to disturb the frogs.

Lighting

Although Green Tree Frogs are largely nocturnal they shelter during the day in areas exposed to sunlight. I provide 5% UV fluorescent lighting and feel it is especially important with juvenile frogs as they are still growing rapidly. Exposure to UV lighting together with being given calcium will help avoid deformities. I keep my lights on at least eight hours a day during winter and approximately 12 hours during summer. This is to mimic the natural daylight hours for summer and winter as close to what they would be exposed to in the wild.

Typical tree frog cage set-up K. Russell

Feeding

Green Tree Frogs have big appetites and generally only eat live food, as movement is required to stimulate their feeding. I mainly feed my frogs crickets but I also hand feed them wood roaches. I prefer not to let the wood roaches run loose in the tank as they escape out of the enclosure. Every alternate feed I dust food items with calcium powder and once a week with vitamin powder. I feed my frogs every 2–3 days during summer and less in winter. My juvenile frogs are fed every day. I feed my frogs at night as this is when they are most active.

Substrate

There are many different types of substrate (flooring) but I prefer to use artificial turf. I find it absorbs the smell and I can easily take it out to wash it and dry it in the sun. Having a spare piece makes it easier to replace when cleaning is required. I use the lowest pile so that the crickets cannot hide.

Water

Maintaining water quality is a very important part of keeping your frogs healthy. I use tap water after leaving it in the sun for a couple of days. Alternatively you can use a water conditioner that

Frogs must have fresh water at all times K. Russell

chemically de-chlorinates the water. When leaving the water outside for the chlorine to evaporate, make sure it isn't placed in a spot where wild frogs can jump into the water. I take this precaution to avoid the chance of Chytrid fungus being transferred to the water. I make sure my frogs have fresh water at ALL times. A solid, non-porous bowl approximately 45 cm in depth that crickets cannot hide under is ideal. I use ceramic or resin water bowls. Frogs tend to lie in the water once the lights are off. Failure to provide adequate water at night can mean the death of your frog. Frogs dehydrate very quickly when in an enclosure with no water and a heat mat warming the enclosure.

Synthetic vines can be draped over rocks to provide decoration and more hiding and resting places K. Russell

Furnishings

I decorate my tanks with flexible jungle vines, magnetic shelves and hides and silk plants. If I use a branch I place it in a black plastic bag and leave it in the car for several days so that the heat that builds up in the bag will destroy any bacteria that may be in the branch. I also make sure that there are no sharp pieces on the branch that could injure the frogs.

Shedding

All frogs shed their skin, so don't be alarmed if you see your frog blowing themselves up, then sucking themselves in. They do this to stretch the skin, then peel it skin over their bodies with their front and back legs. You may also notice the frog eating the skin or leaving it on the glass of the enclosure. This is normal frog behaviour.

Captive Behaviour

Juvenile frogs tend to be shy but as they get older they adjust to captivity. Most will become docile but please avoid excessive handling. Always wash hands with warm soapy water before handling, rinsing thoroughly to remove traces of soap, which is harmful to frogs. Make sure that your hands are wet before you handle the frog. Wash your hands thoroughly again after handling your frogs.

I hope this information has provided some ideas that are helpful when setting up an enclosure that is simple and easy to maintain and provides the right conditions for a happy frog. Enjoy your frogs!

NB: Karen Russell is a member of FATS who breeds tree frogs including the Splendid Tree Frog, *Litoria splendida*. Please contact her if you are interested in obtaining some in future. Mobile Phone: 0407 297728

Meet the Family!

Healthy frogs like these are never over-weight, their skin is even green and moist, and their eyes are bright and clear

Two of my frogs at rest showing good condition and colour K. Russell

Field Trips

***Please book your place on field trips*! Due to strong demand, numbers are limited. (phone Robert on 9681-5308).**

Be sure to leave a contact number. Regardless of prevailing weather conditions, we will continue to schedule and advertise all monthly field trips as planned. It is YOUR responsibility to re-confirm in the last few days as to whether the field trip is proceeding or has been cancelled. Check with Robert (9681-5308).

30th November. Australian Reptile Park. Somersby. Host: John Weigel.

The Australian Reptile Park, Pacific Hwy Somersby www.reptilepark.com.au will hold its Inter-club Christmas BBQ on Sunday 30th November 2014 from 10 am to 3pm. This is a once a year get-together of herpetological societies and is an event not to be missed. Free entry to FATS members upon presntation of your current membership card at entry. Meet inside the Reptile Park, Pacific Highway, Somersby. Gates open at 10.00 am, but you may turn up at any time before 3.00 pm. There is a behind-the-scenes look at the reptile centre and free shows throughout the day. There are picnic facilities, so you can bring your own lunch or purchase from the kiosk. No need to book for this one, just turn up!

10th January. 8.00 p.m. The Watagans. Leader: George Madani.

Take the freeway north. After approx. 83km, take the Morisset/Cooranbong exit. Turn right and travel approximately 2 km to the corner of Mandalong Rd and Freemans Dr, Morisset.

Wetlands are amongst our most threatened group of habitats. Few realise they include a bewildering variety of forms including lakes, swamps, mudflats, mangrove forests, salt-marshes, rivers, creeks, overflows, anabranches, irrigation channels, bogs and ditches. In fact, just about any water body, permanent or ephemeral *("ee-fem-er-al" – temporary, subject to drying out*), may be considered a wetland. In the sandstone areas around Sydney, small, seemingly insignificant "soaks" are often overlooked, but can be home to important frog species and are important wetland types. Unfortunately, many wetlands historically were considered to be a "wasteland" as they were not "productive" and were converted to more "useful" purposes. Tonight we will look at a variety of wetlands and we will try to determine why certain species of frogs prefer a particular type of wetland habitat.

George is well-known for his talks at FATS meetings and for his photographic work. He has travelled to many of the world's ecological hotspots to study the local fauna. He spends much of his time in Australia carrying out wildlife research. Tonight he brings his wealth of experience to show us the very rich froglife of the Watagans.

In the event of uncertain frogging conditions (e.g. prolonged/severe drought, hazardous and/ or torrential rain, bushfires etc.), please phone 9681-5308. Remember!, rain is generally ideal for frogging! Children must be accompanied by an adult. Bring enclosed shoes that can get wet (gumboots are preferable), torch, warm clothing and raincoat. Please be judicious with the use of insect repellent – frogs are very sensitive to chemicals! Please observe all directions that the leader may give. Children are welcome, however please remember that young children especially can become very excited and boisterous at their first frogging experience – parents are asked to help ensure that the leader is able to conduct the trip to everyone's' satisfaction. All fieldtrips are strictly for members only – newcomers are however, welcome to take out membership before the commencement of the field trip. All participants accept that there is some inherent risk associated with outdoor fieldtrips and by attending agree to; a release of all claims, a waiver of liability, and an assumption of risk.

Field Trip Disclaimer

All participants accept that there is some inherent risk associated with outdoor field trips and by attending they agree to a release of all claims, a waiver of liability, and an assumption of risk.

FATS meet at 7pm, on the first Friday of every EVEN month

at the Education Centre, Bicentennial Park, Sydney Olympic Park

Easy walk from Concord West railway station and straight down Victoria Ave. By car: enter from Australia Ave at the Bicentennial Park main entrance, turn off to the right and drive through the park. It is a one way road. Or enter from Bennelong Road / Parkway. It is a short stretch of two way road. Park in p10f car park, the last car park before the exit gate. Take a good torch in winter. It is a short walk from the car park to the Education Centre.

THANK YOU to the many Frogcall supporters!

Your articles, photos, media clippings, webpage uploads, membership administration, mail-out inserts and envelope preparation are greatly appreciated.

Special thanks to regular newsletter contributors: Lothar Voigt, Robert Wall, George Madani, Karen & Arthur White, Andrew Nelson, Wendy & Phillip Grimm, Grant Webster, Peter Spradbrow, Marion Anstis and Bill Wangmann.

The FATS committee especially thank Marion Anstis for producing our December Colour Editions.

FATS MEETINGS: Commence at 7 pm, (arrive 6.30 pm) and end about 10 pm at the Education Centre, Bicentennial Park, Sydney Olympic Park, Homebush Bay. Meetings are usually held on the **first Friday of every EVEN month** February, April, June, August, October and December (but not Good Friday). Call, check our web site or email us for further directions. We hold six informative, informal, topical and practical free meetings each year. Visitors are welcome. We are actively involved in monitoring frog populations, other field studies; produce the newsletter FROGCALL and FROGFACTS information sheets. All expressions of opinion and information are published on the basis that they are not to be regarded as an official opinion of the Frog and Tadpole Study Group Committee, unless expressly so stated.

FATS ON FACEBOOK: FATS has about 1100 facebook members from almost every continent. Posts vary from husbandry and frog identification enquiries, to photos and posts about pets, wild frogs and habitats from all over the world. The page includes frog related information files: **https://www.facebook.com/groups/FATSNSW/** **Monica Wangmann**

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