FROGCALL

No 152, December 2017

THE FROG AND TADPOLE STUDY GROUP NSW Inc.
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MEETING FORMAT

Friday 1st December 2017

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 Marion Anstis, taking us on a photographic journey of her recent trip to South Africa

8.30 pm: Frog-O-Graphic 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.

Thanks to all speakers for an enjoyable year of meetings, and all entrants in the Frog-O-Graphic Competition.

Email **monicawangmann@gmail.com** to send an article for FrogCall.

CONTENTS

Cover photo: Green and Golden Bell Frog, *Litoria aurea* Olympic Park **Peter Spradbrow**

President's Page

Arthur White

Another year has passed and FATS continues to do many good things on behalf of frogs. FATS has been as active as ever and has been present in many public events spreading the word about frogs and frog conservation. We have also held several field trips, participated on governmental panels and maintained the Frog Rescue Service.

This year FATS was the major advisor to the Office of Environment and Heritage in discussions about the revision of the licensing and keeping standards for frogs in New South Wales. These revisions are likely to be accepted (either in part or in full) sometime next year. I particularly thank **Marion Anstis**, **Karen Russell** and **Marie Callans** for giving up their time and assisting with this project.

FATS remains financially strong, thanks to our long-standing Treasurer **Karen White**. Because we are so sound, we again offered and awarded a student research grant this year. On the matter of money, **John Diamond** and **Georgina San Roque** have been long time fans of FATS and often send donations to help our cause. This year they were stupendous and donated $4000 to FATS. The committee is considering how best to use this money and would like to honour John and Georgina, perhaps by using this money to seed a student grants scheme in their name.

FATS again held a number of community activities this year including various garden clubs and frog activities at regular venues such as the Willoughby Fauna Fair, Ku-ring-gai Wildflower Centre and Narrabeen Wetlands, as well as being at the Easter Show. We also participated in Science in the City at the Australian Museum during Science Week. Great thanks to **Kathy** and **David Potter** for organising most of these events and extra thanks to the rest of the Potter family and committee members for helping out. FATS also undertook the annual Bell frog auditory surveys at Sydney Olympic Park in November and December. Thanks to SOPA for supporting FATS.

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 print editions produced by **Marion Anstis** are keenly sought by members and non-members and will continue to be published in colour for as long as we can afford it. We are also seeking to get all of the editions of FrogCall digitised so that there is a lasting record of these publications.

Robert Wall organised a great series of field trips that are always well attended. They are a great way to become familiar with frogs. 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.

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

Very special thanks to Website Manager, Membership Officer and Facebook Manager: **Phillip Grimm**.

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.

FATS membership has fallen somewhat over the past few years and we would like some feedback from you about how best to assist new members. Recently SOFAR, our sister organisation in the Hunter Area folded because of lack of membership. Most clubs and societies are suffering the same declines and it appears that belonging to Societies is not as popular as it once was. However, this should not stop FATS from doing its activities, but I do ask members to help with recruiting new members and helping with our various activities.

Swimming in Sand: Frogs and sand-mining at Smiths Lake

Arthur White

Smiths Lake- A biological Paradise

I first went to Smiths Lake as a university student in 1974. The University of New South Wales had leased a small field station on the edge of Myall Lakes National Park, about 350 km north of Sydney. As a student we undertook a series of ecological studies in the lake, in the swamps and across the towering high dunes at Smiths Lake. That first introduction to Smiths Lake was enough to shock my senses – there was so much wildlife, and the landscapes were fascinating. Firstly, there as a serene lake (below) that teemed with interesting aquatic animals, behind the field station was an acid swamp that was also alive (especially with frogs at night) and nearby was the Bridge Hill sand dune. This dune was stunning – its size and steepness was impressive but it was fully forested. But how could this be?

Smiths Lake – a biological paradise A. White

The Smiths Lake field station in 1974 was quite basic compared to the current field station. As students we slept in old army tents (top right) that leaked whenever it rained. There was a concrete area where we could sit and eat, a tiny laboratory where the field microscopes and sampling gear were stored, a very basic toilet/shower block and that was it. The tents were so bad that many of the students took to sleeping in the fishermens' net-shed at the end of the property.

Basic accommodation – old army tents Arthur White

Back to Smiths Lake

Having been hooked on the beauty and abundance of wildlife at Smiths Lake I returned as often as I could. I started doing trapping studies and began collating a list of the vertebrate animals of the area. I assumed that my enjoyment of the place would go on forever and that the area would not be stained by commercial development. I was wrong.

Myall Lakes National Park

Modern day Myall Lakes National Park is rather different from the park that existed in the 1970s. The park began in 1972 when a small area of land

Map of Myall Lakes National Park

between Myall Lake and the ocean was set aside as a national park. This land had been strip mined for rutile and the area that was to become park was revegetated. However, there were plans to extend the park to include land on the western side of Myall Lake and to the north, as far as Smiths Lake (see map p. 4). The problem was that these crown lands, especially those north to Smiths Lake, were covered under a mining lease by Mineral Deposits Ltd, a rutile mining company. To resolve the best use of these lands a commission of enquiry was established by the state government. The commission ran from 1969 to 1974 chaired by Mr Walter Bunning, a prominent architect.

In March 1971 Mineral Deposits Ltd lodged a development application with the local council that proposed to mine two long strips on the high dunes between the Myall Lakes and the Pacific Ocean. Mining of the southern deposit was given approval by the State Planning Authority. In respect of the northern deposit, after considerable discussion and inspection of the area, the Authority withheld its concurrence in February 1972.

To determine the future of the northern deposits a series of public meetings and meetings with the mining company were held. I attended two of the public meetings and spoke at one of them. What began was a long series of sometimes angry disputes between the mining sector and the local activists. Eventually this issue was to draw state-wide attention and conservationists from all over NSW entered the fray. The conservation of a unique landscape and the protection of its flora and fauna was at stake.

In their Environmental Impact Statement, Mineral Deposits Ltd stated that they would be able to strip the dune of vegetation, remove the valuable mineral sands, reform the dune to a smaller and lower conformation, replant it and no-one would be able to tell that they had been there. They were claiming that they would have no environmental impact on the site!

Mining gets the Go Ahead

In 1974 Mr Bunning made his deliberation. He ruled in favour of the mining company and was swayed by the impressive EIS that they had submitted. His decision was tempered by a couple of major rulings: firstly, he disallowed mining of the southern portion of the lease but allowed mining of the northern (Bridge Hill) lease. Secondly, although he believed the miners were sincere in their claims that they could rebuild the dune and ecosystems, he ruled that the mining company was obliged to leave a bond of $1 million dollars; if the rehabilitation work was not as good as it should be, that money would be used to repair the dune.

The decisions to allow mining at Bridge Hill near Smiths Lake was totally unexpected. This was the most bio-diverse section of the lease and one that conservations really fought for. Mr Bunning pointed out in his ruling that it was also out of sight to the public and would not cause angst to passers-by or tourists if it was developed. The decision to invoke a bond was great precedent and one that is now standard practice for most major developments.

How would frogs react to the sand-mining?

Like many people I was shocked and dismayed by the ruling. The mining company had been excused of looking for any impacts as they claimed that they could fix it. This seemed like a fairy story and so I decided that I would conduct a little experiment to see if mining adversely impacted the frogs close to the dune.

Smiths Lake and the northern parts of Myall Lake are on low-lying land. At various times, elevated sea-levels have swept across the land depositing great dunes of sand when the seas retreated. The Bridge Hill dune was the tallest and steepest in NSW and it was fully forested. The dune sand acts like an enormous sponge that collects rain water after storms. The water seeps down through the dune till it hits an impervious layer at its base. The water then runs horizontally northwards to create a large wallum swamp leading to Smiths Lake. There were a couple of small ponds at the base of the dune and the large Dune Swamp that relied on water coming from the dune.

Mining Strategy

Mining began in late 1975. A clearing was established at the eastern end of Bridge Hill and mining commenced at the eastern end and progressed westwards over the next 7 years. The process involved the removal of the vegetation, the stockpiling of the surface soil layers, the excavation of dredge pit and the construction of haul roads. Sand was sucked up through a floating vacuum dredge and a preliminary separation of the sands was carried out on site. The crude ore was then trucked off site to Tomago where the final separation of the rutile, zircon and other minerals was achieved.

Sand mining at eastern end of Bridge Hill Dune, 1976
Barry Fox

As mining was starting at the eastern end of the dune (above), I knew that I had a few years to collect frog data prior to the arrival of the miners, and then, if I was still around, maybe I could do some follow-up frog surveys to what impact there had been (if any) on the frogs. Little did I know that I would still be doing the follow up surveys 40 years later!

Frog Surveys and Frog Sites

I decided to set up two survey areas, one in a small pond that sat at the base of the dune (below), the second in the dune swamp close to this pond (top right). I chose these two sites because they were close to the dune, had good frog populations and were close enough to the mine path to possibly be affected by the mine. I did censuses of the plants in each of the areas as well as some basic water quality measurements.

Dune Pond site at base of dune Arthur White

I started off surveying the sites three times a year. In 1978 I began my first surveys. The miners were still kilometres to the east but were ploughing through the dune at a fast rate. They eventually reached my sites in 1981 and began clearing the vegetation from the dune. In those early years I was able to record not only the frog species that occurred there but also got some information about frog numbers (Fig. 6). Over the duration of the

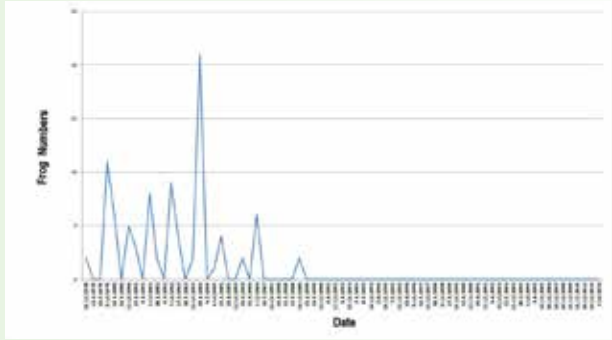
Searching for frogs in the Dune Swamp Site Arthur White

study I recorded 13 frog species at the dune pond and 12 frog species at the swamp site. The frog species present changed as the mine advanced, the dune was stripped and dredged, then reshaped and replanted (see graphs).

How did the frogs React to Sand Mining?

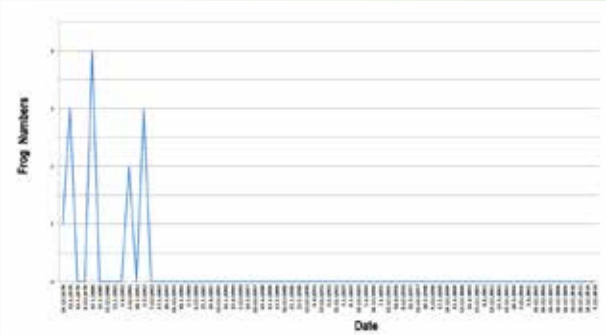
Both the dune pond and the swamp had a sudden and relatively short (5–10 year duration) "shock" period after mining commenced in the area in 1983/84. Some frog species disappeared, only to return at some later point. Some frog species did not reappear ever again while some new frog species turned up to inhabit the altered ecosystems. In the dune pond the three frogs species that disappeared entirely were the **Tusked Frog**, *Adelotus brevis,* **Green and Golden Bell frog**, *Litoria aurea* and the **Broad-palmed Frog**, *Litoria latopalmata*. In the swamp, the species that disappeared entirely were the Tusked Frogs, Spotted Grass Frogs *Limnodynastes tasmaniensis* and the Brown Toadlet *Pseudophryne bibroni.*

The **Green and Golden Bell Frog**, *Litoria aurea*, which was present in the Dune Pond at the start of the study, exhibited an increase in abundance during and immediately after mining but declined steadily throughout the post-mining period before disappearing altogether from the area in 1989.



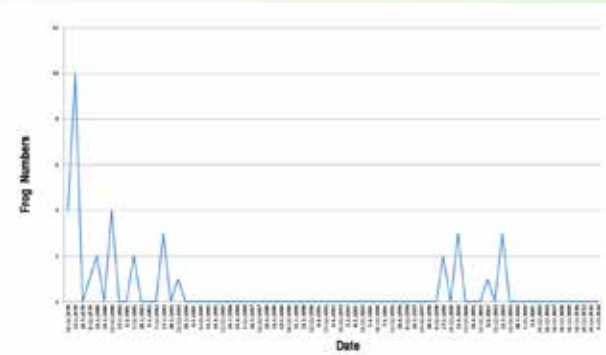
Changes in *Litoria aurea* numbers in Dune Pond 1978–2016

The **Spotted Grass Frog**, *Limnodynastes tasmaniensis* was present in the Swamp Site during the pre-mining and mining phases but disappeared in the early post-mining phase. It was last detected in May 1982. Opportunistic surveys of the Lake Swamp over the ensuing thirty years have failed to relocate the species in the local area.



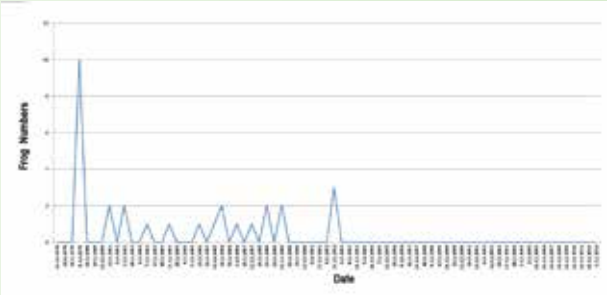
Limnodynastes tasmaniensis numbers in Dune Pond, 1978–2016

Bibron's Toadlet, *Pseudophryne bibroni* was present in the Swamp Site in the pre-mining phase in relatively high numbers, up to 10 frogs detected per transect. However their numbers decreased rapidly during the mining and immediate post-mining phase. The species was not found in the swamp transect between 1985 and 1997. It was eventually re-detected in the swamp site in May 1999 and remained in the site until 2003, before finally disappearing altogether from the site. Bibron's Toadlet was never present in the Dune Pond Site.

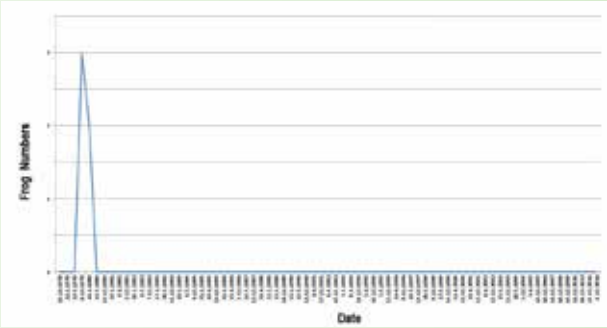


Pseudophryne bibroni numbers in Swamp site, 1978–2016

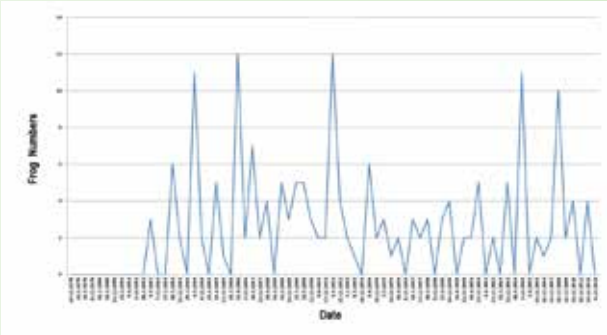
Tusked Frogs, *Adelotus brevis* were present both in the Dune Pond and Swamp Site during the pre-mining phase. This species was present in reasonably high numbers (up to 10 individuals recorded per transect) at both sites before mining but quickly declined once mining commenced. It disappeared completely from the swamp site with the last individuals being detected in late 1980. It persisted at the Dune Pond Site in low numbers until 1989, then seemed to disappear, only to return in 1992 for a period of two years before disappearing again (see next figure).



Above: *Adelotus brevis* numbers, Dune Pond site, 1978–2016
Below: *Adelotus brevis* numbers, Swamp Site, 1978–2016



The **Wallum Froglet**, *Crinia tinnula* was not detected in the Swamp Site until May 1982. This species has been consistently detected in surveys since then and has become one of the more common species in the Swamp Site.



Crinia tinnula numbers in Swamp site, 1982–2016

Changes in Habitat Parameters, Dune Pond Site
Many changes in pond habitat features occurred during the course of this study. The most apparent changes to the pond itself were the gradual reduction in pond depth and reduction of open water area. Concurrent with these changes were increases in the relative spread of emergent plants, particularly *Typha orientalis*. At the same time, there was a measured reduction in the relative abundance of *Baumea juncae*, *B. articularis* and *Schoenus brevifolius*. Other less dominant plants also appeared in the dunal pond after mining such as *Triglochin striatum* and *Crotula coronopifolia*. Changes in water parameters also occurred, particularly a transient increase in pH and salinity, presumably associated with mining.

Changes in Habitat Parameters, Dune Swamp
The habitat parameters associated with the dune swamp site also changed over time. The most abrupt changes to the swamp site occurred during the mining phase with sudden changes in water parameters; in particular, there was a short-lived (3 year duration) but sudden elevation of water pH to alkaline levels. Concurrent with this was a surge in salinity and conductivity levels of the swamp water. The swamp also had an increase in open water area available during the mining phase and the first ten years post mining. Open water levels have since returned to pre-mining levels. Plants in the swamp site also changed with *Leptospermum liversidgei*, *Selaginella uliginosa* and *Xanthorrhoea minor* becoming more abundant post-mining. Species such as *Gahnia sieberi* and *Restio tetraphyllus* have become less abundant in the swamp site.

Discussion

Are there any Trends in the Data?
In the swamp site, the chance of finding a frog was significantly decreased following the cessation of mining, with more frog species found before and during mining. While it is evident that there have been major habitat changes as a result of mining in the areas adjoining the mine path and that these impacted frog communities in both the Dune Pond and Swamp Sites, the response of individual frog species was not uniform. For example, four frog species (*Litoria aurea*, *Adelotus brevis, Limnodynastes tasmaniensis* and *Pseudophryne bibronii*) disappeared from the dune or swamp sites, while one frog species (*Crinia tinnula*) appeared and became relatively common post-mining. In addition, several species underwent major changes in abundance during and after mining. For both the Dune and Swamp sites, the average number of frogs 30 years post-mining is less than the average number of species present before the onset of mining.

Tusked Frog, *Adelotus brevis*, a species seriously impacted by sand mining Arthur White

How has sand-mining changed the local environment?
As the recovery of many animal species from the impacts of sand-mining appears to be dependent on the successful recovery of the vegetation and water quality beforehand, it remains to be determined exactly what impacts were generated by sand-mining and how these impacts affected off-site ecosystems. Andersen *et al.* (2014) in an assessment of the impacts of mining in general on native ecosystems concluded that there were three main impact types to be considered: immediate impacts (eg. land-clearing, changes to topography, changes to hydrology, changes to soil chemistry, introduced pollutants, noise and disturbance); collateral impacts (these occur off-site and include changes to local flora and fauna associated with changing habitats, soil chemistry and hydrology), and long-term impacts (these arise because the site cannot be fully rehabilitated or because the disruption due to mining was so great that original species have been lost).

At Bridge Hill two major environmental changes were recorded by this study: (1) earthworks associated with sand mining and (2) land clearing that mobilised large amounts of salt and calcium carbonate. Once exposed, these water-soluble compounds were quickly flushed into the nearby pond and swamp environments. Salinity levels quadrupled in both the pond and swamp sites and remained at these levels for almost 15 years after sand-mining ceased. Salinity has been slowly falling since, but average salinity in the Dune and Swamp sites 34 years after the cessation of sand-mining are still approximately twice the levels experienced before sand-mining.

The release of calcium carbonate from remnant shells or lime debris in the dune raised the pH of the water in the dune pond and swamp almost immediately when mining commenced. The pH of the dune pond ranged between 6.4 and 6.8 pre-mining but jumped to 8.4 during the mining phase. The swamp site was originally more acidic (pH 5.4–5.8 recorded pre-mining) but rapidly rose in the swamp water with the onset of mining, peaking at 8.4 during mining. The pH of the water in both the dune pond and the swamp has slowly fallen over the years, but both are still substantially different to pre-mining levels.

The impact of a sustained flush of salty, alkaline water into the dune pond and swamp site caused a sudden and severe change to the water chemistry

of the nearby wetland sites. These changes were most likely responsible for the changes in aquatic vegetation that followed in both sites. Frog communities are likely to have responded to both the changes in water chemistry as well as the changes to vegetation, although our statistical analyses only found evidence of increasing pH reducing frog occurrence in the swamp site.

Our current understanding of the influence of pH on amphibian physiology is largely limited to laboratory studies conducted under artificial conditions. Most frog species are tolerant of relatively narrow pH ranges (Barth and Wilson 2010). Laboratory studies suggest a correlation between pH tolerance and inter-specific variation in distribution, with species inhabiting acidic environments exhibiting greater tolerance to low pH (Freda and Dunson, 1986; Pierce and Wooten, 1992; Picker *et al*., 1993). Sustained low pH was found to impede tadpole growth and increase developmental time, but how this affects later stages in the life cycle of frogs is unknown (Freda and Dunson, 1985; Griffiths *et al*., 1993). The effect of increasing pH is likely to be equally disruptive on frog life cycles in most species. Most micro-geographic changes in the distribution and abundance of species are the result of subtle influences of the abiotic and biotic environment, rather than direct mortality effects (Freda and Dunson, 1985).

Meyer *et al*. (2009) found that altered pH can seriously impact the development of tadpoles of *Litoria fallax*, a widespread species that was present in both the dune and Swamp Site at Bridge Hill. *L. fallax* was abundant in the Dune Site and remained abundant throughout the course of the study despite the changes in pH. In the Swamp Site, *L. fallax* was initially a rarely encountered species but became more common over time as the pH's became less acidic in the swamp. Barth and Wilson (2010) found that Australian frogs that occur in wallum habitats (such as the Swamp Site at Bridge Hill) are not only sensitive to pH changes but also respond in unpredictable ways to the presence or absence of the organic acids in the water. Changes in pH in wallum water alters the solubility and activity of organic acids, and these changes can affect the survivorship of frogs in the area.
It appears that sand mining-activated releases of salt and calcium carbonate through the surface water may be enough to explain the subsequent changes in frog communities. The changes in salinity and pH would have a more immediate impact on tadpoles (they cannot move out of the hydrological impact area) and to a lesser extent on frogs (which can move away). The changes in salinity and pH will also result in changes in the vegetation in the affected area, compounding the effect of altered water geochemistry.

Recovery of Frog Habitats
The changes to frog habitats in areas close to the mine path appear to have occurred in two phases: there was an immediate impact associated with the release of salt and lime from the dune and then there appears to have been a later second change that appears to be associated with increased sedimentation of the areas below the dune. Sand-mining finished at Bridge Hill in 1983 and re-vegetation works were carried out for another two years afterwards. The cessation of mining meant that fresh sand deposits were no longer being exposed and the release of salt and lime decreased markedly, however these substances have been deposited in the low-lying areas near the dune and are yet to be cleared from the surface water there.

The exposure of large tracts of elevated dune sand during mining appears to have led to the deposition of a large amount of dune sands in the nearby low-lying areas, including the dune pond and swamp. Both sites are considerably shallower than before mining and water depth will be a factor in the types of aquatic vegetation that ultimately re-establishes in these sites. Unfortunately the only measurement of sedimentation was water depth and little information is available about other changes to the geochemistry of the water. There have been substantial changes in the dissolved oxygen content of the water and the oxidation-reduction potential indicative of other geochemical changes in water quality.

As the salinity and pH of surface water in the dune pond and swamp sites are still well above levels recorded pre-mining and 34 years have now elapsed, it must be concluded that the elevated salinity and pH levels are determining factors in the re-colonisation of these sites by frogs. The longer that salt and pH levels remain high the longer it will take for the frog communities to re-establish themselves as they once were before mining.
Most of the water quality variables measured show the greatest changes during and immediately following the mining phase. While current water conditions fluctuate less dramatically and have returned to levels more similar to pre-mining levels, the combined effects of the initial changes

wrought by mining and secondary changes caused by later modifications to the environment, the ability of most species of frogs to re-colonise these sites is impeded by the initial changes and current condition of the habitats.

Little is documented about the ability of frogs to respond to transient and permanent habitat changes. The only studies in Australia that have considered the ability of frogs to re-colonise areas after major disturbances have concentrated on recovery after wild fires rather than after mining. Fox and Fox (1984) suggested that 20 years would sufficient time for small mammal re-colonisation of sand-mined areas, Twigg and Fox (1991) suggested a similar lag time for re-colonisation by reptiles. At Bridge Hill, some re-colonisation by frogs has occurred but the frog communities have not returned to pre-mining species composition and abundances. It appears the recovery time for frogs may be much longer than for small mammals and reptiles. In a later study, Fox (1996) found that sand mining historically resulted in long-term changes to biodiversity with some ecosystems being unable to return to pre-mining levels.

What can Miners do to reduce their impact on frogs?

The rehabilitation works carried out at Bridge Hill have been promulgated as an example of successful mine site rehabilitation and recovery (Lewis 1996). The rehabilitation works included the collection of seed-bearing topsoil during clearing, the stabilisation of open sand areas where possible, the rapid establishment of temporary ground cover vegetation to prevent sand loss and excessive erosion and finally the return of the original topsoil and the supplementary planting of larger shrubs and trees. These works sped up the recovery time of the vegetation communities on site but the nature of the dune and the dependent wetlands around it has been altered.

This study has demonstrated that the impact of mining does not disappear as a result of rehabilitation work, no matter how good it is. The study has also demonstrated that the environmental changes that result from disruptions to ecosystems are not fully understood and the lasting impacts can only be guessed at. The science of mine site recovery is not advanced enough to enable the full recovery of a site after mining. This being the case, the minimum that miners and other large-scale land impact activities should be obliged to do is to monitor and record the long-term impacts that their actions have created. It is only by creating a long-term database that proactive solutions to environmental change can be addressed.

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Smiths Lake, as viewed from the foreshore of the field station Arthur White

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My introduction to the Green-thighed Frog

Narelle Power

"***Don't move, don't you dare move!***" …..

– that was my introduction to *Litoria brevipalmata*, the **Green-thighed frog**!

After a few nights of incredibly heavy rain (totalling over 600mm), Damian White and I were heading out in the middle of Southport, south-eastern Queensland to check on the dwindling local population of *Crinia tinnula* – the wallum froglet. Years of weed incursions, fires or lack of fire and local bush abuse meant we were hearing less calling – from a high of 20 to 30 individuals (in the early 1990s) to only a few, and now sadly none.

We were wandering along the bitumen walking track through the bush – a mish-mash of land owned by council, State government and main roads. Damian was way ahead, but I had spotted a frog sitting on the side of a rock cut-out about 20 metres in from the main road...

"What are you doing?" Damian yelled, to which I replied, "Taking a photo of a really pretty frog with really green thighs." The immediate response?

"**DON'T MOVE, DON'T YOU DARE MOVE!!**"

And Damian was running back along the track, repeatedly telling me to keep my eye on the frog, and don't move. I wasn't very impressed – if he ruined what looked like it was going to be a nice photo, I would be a bit unhappy! I have never seen someone so excited by a little brown frog with green bits. He kept saying "Do you know what you've found ??" and I kept saying "I can't believe you ruined my photo" LOL. And that is how we discovered *Litoria brevipalmata* on the Gold Coast, on 1st July 2005.

Previously the nearest known populations were at Coolangatta to the South, and Logan Wetlands

The 'little brown frog with green bits'! Our first sighting of *Litoria brevipalmata*, the Green-thighed Frog Narelle Power

Location of first sighting of *Litoria brevipalmata*. Narelle Power

The breeding pond, an ephemeral pond that only fills after heavy rain. Narelle Power

A calling male near the breeding pond, showing the yellow flush only found in breeding males Narelle Power

Litoria brevipalmata emerging from crevice Narelle Power

and Karrawatha Forest Park (Brisbane) to the North. The discovery of that lone frog led us to the identification of their breeding pond – a depression approximately 30 metres in length and 10 metres wide that only fills after incredibly heavy downpours over a short period of time. We had walked past that spot on countless occasions, and Damian had done work on *Pseudophryne major* and *P. raveni* in the area for years, yet these had gone under the radar – a little population of Green-thighed frogs bubbling along quite happily by itself.

In January 2008, after another massive rainfall event, we undertook a monitoring program in conjunction with the Loders Creek Catchment Association and Gold Coast City Council. Approximately 40 males were recorded and several egg masses were identified, with one egg mass collected and lab-raised found to contain 602 embryos. This is more than previously encountered by Lemckert *et al.* (2006) with between 380 and 410 eggs and 366, 556 and 582 recorded by Anstis (2002). Metamorphosis took approximately 25 days for both lab-raised and non lab-raised individuals. It should be noted that this was the minimum time period, with other individuals taking longer.

Numerous metamorphs were seen in the vicinity of the breeding pond in late January and early

Fresh egg clutch (complete) of *Litoria brevipalmata* Narelle Power

Tadpole of *Litoria brevipalmata* Narelle Power

February 2008. The minimum larval life span of 25 days was faster than that recorded in previous studies conducted by Lemckert *et al.* (2006) in NSW who recorded metamorphosis after 52 days in the lab and 34 days or less in the field and is considerably faster than the six weeks stated in Anstis (2002). Interestingly in this study the lab-raised tadpoles developed just as fast as the tadpoles in the breeding pond, in contrast to the Lemckert *et al.* (2006) results.

The original frog discovered in 2005 was approximately 450 metres to the east from what we know now is their breeding pond, and over the years we have found more individuals 150–200 metres to the north-west of the pond. The location of the original frog in relation to the pond suggests the frogs travel a considerable distance into the surrounding habitat matrix when not engaged in breeding activities. We have since discovered individuals emerging from small holes and cracks in rocky cut-outs beside the walking track, and when disturbed they returned to the hole and backed back in, which seems to suggest that it uses a 'burrow' of sorts for concealment. Over the years since then, we have recorded breeding events throughout spring, summer and autumn, dependent, seemingly only on sufficient rainfall. Adults have been found foraging throughout the year, including during the dead of winter.

Litoria brevipalmata 26 days old, raised from a tadpole Narelle Power

If you are adjacent to the area where the breeding pond is located immediately following heavy rain, the frog chorus is deafening! *Litoria brevipalmata* can be heard long before you reach the pond, with *Litoria caerulea, L. fallax, L. gracilenta, L. tyleri, Crinia parinsignifera, C. signifera, Pseudophryne major, P. raveni, Limnodynastes peronii* and *Platyplectrum ornatum* (depending on the time of year), adding to the cacophony of sound.

Since that time, we've witnessed several more breeding events, and the frogs from that area have been featured in publications by the Queensland Museum, been in the local papers, changed the route of the Gold Coast light rail line, and been the subject of several studies by students from the nearby Griffith University campus. While it appears we have lost the fight to save the local *Crinia tinnula* population, the Green-thighed frogs happily breed in Gold Coast suburbia.

Anstis, M. (2002). Tadpoles of south-eastern Australia – A guide with keys. Reed New Holland.

Lemckert, F., Mahony, M., Brassil, T., and Slatyer C. (2006). The biology of the threatened Green-thighed Frog *Litoria brevipalmata* (Anura: Hylidae) in the central and mid-north coastal areas of New South Wales. *Australian Zoologist* 33: 337–344.

White, D., White, W., D., Power, P. N. and White, J. F. (2009). Loders Creek Catchment Threatened Frog Management Plan. Unpublished Report Prepared for Gold Coast City Council and SEQ Catchments.

Orange-thighed Tree Frog
Litoria xanthomera
© Brad McCaffery

FATS Frog-O-Graphic

MOST INTERESTING IMAGE: Above: Myola Tree Frog female, *Litoria myola* **Josie Styles**
Below: Day's Tree Frog, *Litoria dayi* **Cassie Thompson**

Competition WINNERS

BEST IMAGE: Above: New England Tree Frog, *Litoria subglandulosa* **Brad McCaffery**

Below: Peron's Tree Frog, *Litoria peronii*, expertly camouflaged on tree bark **John Pumpurs**

FATS Frog-O-graphic

BEST PET IMAGE: Above: Southern Banjo Frog, *Limnodynastes dumerilii insularis* **Craig Broadfield**

EQUAL BEST PET IMAGE: Red-eyed Tree Frog Pair, *Litoria chloris* **Karen Russell**

Competition WINNERS

PEOPLE'S CHOICE: Dainty Tree Frog *Litoria gracilenta* being eaten by a Rough-scaled snake *Tropidechis carinatus*. The frog was too busy calling to notice the snake's approach from behind **John Pumpurs**

Some other entries...

Myola Tree Frog, *Litoria myola* **Cassie Thompson**

Common Eastern Froglet, *Crinia signifera* **Peter Spradbrow**

Two Reed Frogs from the Okavango Delta, Southern Africa

Marion Anstis

One of the many tranquil scenes in the Okavango Delta in Southern Africa

I have finally been to South Africa!

It has been a long wait, but 2017 and my African safari at last eventuated and I found myself recovering from jet lag on our first tour day looking over the edge of the magnificent Victoria Falls in Zimbabwe! After a wonderful helicopter ride over the falls the next morning, we drove to meet our houseboat on the Chobe River in northern Botswana to begin a three-day cruise and wildlife photography adventure, the first leg in our 11 day tour organised by African Ubuntu safari tours. Although we heard several frogs calling at night beside our moored houseboat home, we were not permitted to go looking, as crocodiles can be anywhere!

The next leg of the tour began with a light aircraft flight to Savute National Park, Botswana, where we were accommodated for three nights in small but comfortable tents and fed like royalty! Each day we had two long safari drives to photograph whatever wildlife we encountered, but being dry savannah woodland, there were no frogs at this time of year.

But our third leg followed another flight to the magical **Okavango Delta**, where we were treated to magnificent five star lodges and gourmet dining. And it was here we were all but surrounded by water from this magnificent swampland. Now I knew we would get to see some frogs at last! However, once again, we were not allowed out at night due to our hosts not wishing us to become dinner for wandering lions or gored by a frenzied hippo! So frogging opportunities were limited to the few times I had access to suitable shallow aquatic habitats in a Makoro canoe or motorised boat during the day.

Makoro canoes lined up on the shore ready for use

Small part of the Okavango Delta from the air. Although the river channels look brown (from tannin stain), close-up the water appears clear and clean. The channels divide small islands, and are surrounded by tall reed beds.

The Okavango Delta is a huge reticulated swampland created by the Okavango River (the fourth longest river in southern Africa) which runs for 1600 km from central Angola in the north in a southeasterly direction to the Kalahari in northern Botswana, where it terminates in this massive, magnificent Delta (see photo from air above).

The Delta has through-flowing river channels with many branches, and tall reed beds divide it into numerous narrower creek lines and smaller lake-like areas where water-lilies thrive. These areas are favoured by Jacan birds and Hippopotamus families, which uproot and devour the water-lilies. I had three lovely trips into this wonderland, one in a Makoro (photo) and later in a small motorised boat. By far the most aesthetic experience was the Makoro, as it slipped silently through the lilies and channels. When Alistair MacDougall and I asked our guide to please help us spot some frogs among the thousands of reed stems surrounding us, we were amazed at his ability to quickly see such well hidden little frogs, each sound asleep while tightly clasping a reed about 50 cm above the water. They only had to be on the opposite side of a thick reed from the line of vision and they couldn't be seen, so it was a challenge to find any!

But before long we were leaning over the Makoro, macro lens in hand and working hard to get a few shots while the guide tried to keep the canoe still.

Anyone who has used a macro lens will know how critical it is to keep the camera still so that the focus can be as accurate as possible, especially if you don't want to use a flash.

Here are our two species, and we found some different colour variation among each, so we did our best to sample what we saw.

First, the **Long Reed Frog**, *Hyperolius nasutus*. This is a small, beautiful little frog (up to about 25 mm) and rather similar in size and shape to our Dwarf Tree Frog, *Litoria fallax*. These frogs live in emergent vegetation at the sides of swamps, ponds and even streams and rivers. They are often translucent green above with white stripes and scattered spots, but some are translucent light brown with spots. Individuals can probably change colour from brown to green, when the white stripes will show up much more. The first little green one

Long Reed Frog on the bow of the Makoro canoe

Long Reed Frog, *Hyperolius nasutus* (brown form) rests on a reed stem above the water

Angolan Reed Frog, *Hyperolius parallelus* (spotted form) sound asleep on a reed stem above the water

we saw hitched a ride on the bow of our Makoro! He wasn't concerned by the movement of the canoe as we moved through the water. The brown one was on a reed, and too asleep to be concerned by our attempts to photograph it. They have a long pointed snout and slender body, and underneath they are mostly transparent showing the internal organs through the skin. The tadpole is also long with a slender body, a long narrowly pointed tail with shallow fins, a golden dorsal surface and gold spots over the tail.

The second frog species we saw was the **Angolan Reed Frog**, *Hyperolius parallelus*, which the locals in Okavango call the Painted Reed Frog, but that common name more correctly refers to another

Angolan Reed Frog, *H. parallelus* (spotted form) resting on a reed above the Delta swampland Alistair MacDougall

Angolan Reed Frog, *Hyperolius parallelus* (marbled form), resting on a reed above water

slightly different species found further to the east, *H. marmoratus*. The Angolan Reed Frog grows to 35 mm and has a broader body than the Long Reed Frog, and a short, rounded snout. They also live on emergent vegetation and breed in deeper water of rivers and large water bodies such as the Okavango. The colours are highly variable, from densely spotted brown or copper on a paler background to broadly marbled dull red on an off-white background. Again they were only found asleep on the reeds, but at least this helped us to photograph them. The Africans seem to think that the marbled ones are the males and the spotted ones the females, but a distinct yellow vocal sac was evident on one of the spotted ones (see photo at bottom of p. 24), so that theory can't be correct! Louis du Preez and Vincent Caruthers (Frogs of Southern Africa, 2009) describe them as white beneath and orange-red beneath their limbs and hands and feet. Two we photographed had a yellow vocal sac, so perhaps it changes colour after recent use. The tadpole is similar in shape to that of the Long Reed Frog, but grows twice as long, and is brown with a reddish tinge on the tail towards the body.

One of many magical sunsets we experienced over the Delta

A Water Monitor watches us from a small island bank

An African Jacana feeds on a Water lily pad

At night I went to sleep in my luxurious tent lodge to the music of the Reed Frogs, which called all night with a lovely soft tinkling sound. In a massive chorus this sounds like many people clinking their glasses of wine together! Add to that the sound of hippos thrashing the water as they mashed up their favoured water lilies, a lone lion roar, and a bull elephant breaking branches off a tree near my tent, I found myself absolutely immersed in a wonderful wildlife symphony as night settled over the Okavango....

And one more new species....

Marion Anstis

One more new species whose description had not been published when I wrote the article on new species of Australian frogs in our December FrogCall colour edition 2016, is **Mahony's Toadlet**, *Uperoleia mahonyi*. The frog was named after Professor Michael Mahony of Newcastle University, who has contributed greatly to frog research most of his career. This species is restricted to coastal leached sandy areas in heath, Melaleuca, wallum or woodland from Port Stephens in the north to east of Wyong in the south. Because much of its habitat is under threat, the species has a vulnerable future. They breed in ponds or ephemeral swamps mainly in spring and autumn, probably after rain.

The frog is fairly small (grows to 32 mm) and quite robust in shape with a grey or brown back and darker variable patches. Many have irregular pale to darker orange or reddish-brown patches or spots, often over the large parotoid glands on the shoulders and on the head and tips of tubercles. Some have a short, vertebral line of small reddish-tipped tubercles between the shoulders. Underneath they are black with white patches and spots and the back of the thighs and groin are yellow or orange while the forearms are pale yellow, beige or orange.

Like all *Uperoleia* they lay eggs singly, scattered over the substrate in the water body and attached to fine stems. The tadpole is plump with dorsolateral eyes, well-arched tail fins and the typical spotty tail of *Uperoleia*.

Clulow, S., Anstis, M., Keogh, J. S. & Catullo, R. (2016). A new species of Australian frog (Myobatrachidae: Uperoleia) from a populated region of the New South Wales mid-north coast sandplains. Zootaxa 4184: 285–315.

Mahony's Toadlet, *Uperoleia mahonyi*, Oyster Cove, NSW Stephen Mahony

Mahony's Toadlet, *Uperoleia mahonyi*, pair in amplexus Stephen Mahony

Mahony's Toadlet, *Uperoleia mahonyi* male calling Stephen Mahony

Some Smiths L

Jervis Bay Tree Frog, *Litoria jervisiensis*, Smiths Lake Josie Styles

Smiths Lake Field Station Arthur White

Lake Memories

Whirring Tree Frog male, *Litoria revelata*, Smiths Lake — Josie Styles

Smiths Lake Froggers 2017 — Scott Martin

Field Trips

***Please book your place on field trips*. Due to strong demand, numbers are limited. 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, whether the field trip is proceeding or has been cancelled. Phone Robert on 9681-5308.**

2nd December 8.30 pm Scheyville National Park Leader: Grant Webster

Meet at the corner of Scheyville Rd. and Dormitory Hill Rd. Scheyville.

Many field-guides often contain misleading information regarding species distributions, abundances and habitat requirements. This occurs because records, often historic, are inadequate or incorrect, or distributions, abundances or taxonomy may have changed over time. Field-guides are continuously evolving to reflect the most recently known data. Tonight, we will acquaint ourselves with the limitations of field-guides. We will also discuss the current paucity of field information, and how, by submitting records, you can help improve the knowledge of our frog fauna.

Grant is spending much of his time looking at the taxonomy of a number of species. His work may eventually have an impact on future field-guides. Tonight he will guide us through some of the problems we may encounter when finding a frog. He will explain what to do when confronted with a confusing species, or one that may simply lie outside a field-guide's distributional range.

3rd December Australian Reptile Park Annual Herpetological Groups BBQ
The Australian Reptile Park will generously hold a Herpetological groups BBQ. Please contact them to find out what FATS membership evidence (membership card?) you need to bring for free entry.
Ph: (02) 4340 1022 Email: admin@reptilepark.com.au Find ARP on Facebook! www.reptilepark.com.au

27th January 7.45 pm The Watagans Leader: Brad McCaffery
Take the freeway north. After approx. 83km, take the Morisset/Cooranbong exit. Turn right and travel approx. 2 km to the corner of Mandalong Rd and Freemans Dr, Morisset.

Frog enthusiasts are aware of the risks that diseases like chytrid and ranavirus pose to our frogs. A less-discussed pathogen is Phytophthora ("fy-toff-thor-a"), a plant dieback disease that affects trees and forest understorey. While not directly impacting on the health of frogs, the pathogen follows groundwater movement along natural land contours, often spreading downslope towards streams and water-bodies. Known to kill fringing vegetation, it is implicated in some frog declines by altering stream-side habitat. More recently, "Myrtle Rust" has entered the country. It too, has a devastating impact upon our forests and stream-side vegetation, and is spreading with alarming speed. With Phytophthora and Myrtle Rust making their presence felt around areas like the Central Coast, tonight we will discuss the importance of limiting the spread of all disease across the landscape, not just those that frog enthusiasts are most familiar with. Brad spends much of his time undertaking bush regeneration. He has first-hand knowledge of the problems confronting our bushland remnants, and in particular, how these problems impact on the local froglife. Tonight he will explain the importance of hygiene protocols, and how by following these protocols, we help protect our native flora and fauna.

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 everyones' satisfaction. All fieldtrips are strictly for members only – newcomers are however, welcome to take out membership before the commencement of the fieldtrip. 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.

FATS meets 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. The internal road is one-way and winds and twists. Just follow it and turn right at the P10f parking sign. Or you can 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, Bicentennial Park. It is a short walk to the single story education centre and its tall tower. Both can be seen from the car park. Directions from your home: **http://www.sydneyolympicpark.com.au/maps/getting-to-the-park?type=venue&id=384059**

THANK YOU to the committee members, FROGCALL supporters, meeting speakers, Frogographic competition entrants, our fabulous events organisers David, Kathy and Harriet Potter, Sarah and Ryan Kershaw for an enjoyable year. The FROGCALL articles, photos, media and webpage links, membership administration and envelope preparation are all greatly appreciated. Special thanks to the many newsletter contributors, Robert Wall, George Madani, Jilli Streit, Karen & Arthur White, Andrew Nelson, Michelle Toms, Josie Styles, Jodi Rowley, Steve Weir, Wendy & Phillip Grimm and Marion Anstis.

Special thanks Marion Anstis who has produced our glossy colour collector's edition each December.

FATS MEETINGS: Commence at 7 pm, (arrive from 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 (but not Good Friday), June, August, October and December. Call, check our web site or email us for further directions. We hold six informative, informal, topical and practical meetings each year. Visitors are welcome. We are actively involved in monitoring frog populations, field studies and trips, have displays at local events, produce the newsletter FROGCALL and FROGFACTS information sheets. FATS attend many community fairs and shows. Please contact Kathy Potter if you can assist as a frog explainer. We always need help, even for just an hour. No experience required. Encourage your frog friends to join or donate to FATS. Donations help with the costs of frog rescue, student grants, research, conservation and advocacy. All expressions of opinion and information in FrogCall 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 over 2,200 Facebook members from almost every continent. Posts cover a whole range of interesting frog-related topics from all over the world. The page includes dozens of information files such as devices to help rescue animals from swimming pools. https://www.facebook.com/groups/FATSNSW/

RESCUED FROGS are seeking forever homes are at our meetings. Please contact us in advance, if you wish to adopt a frog. Cash donation required to cover care costs. Sorry we have no EFTPOS. FATS must sight your current amphibian licence. Licences can be obtained online from NSW National Parks and Wildlife Service, Office of Environment and Heritage. We request you join FATS before adopting a frog. This can be done on the meeting night. Most rescued frogs have not had a vet visit unless obviously ill. If at any time you are concerned about its helath, please take it to a vet.

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