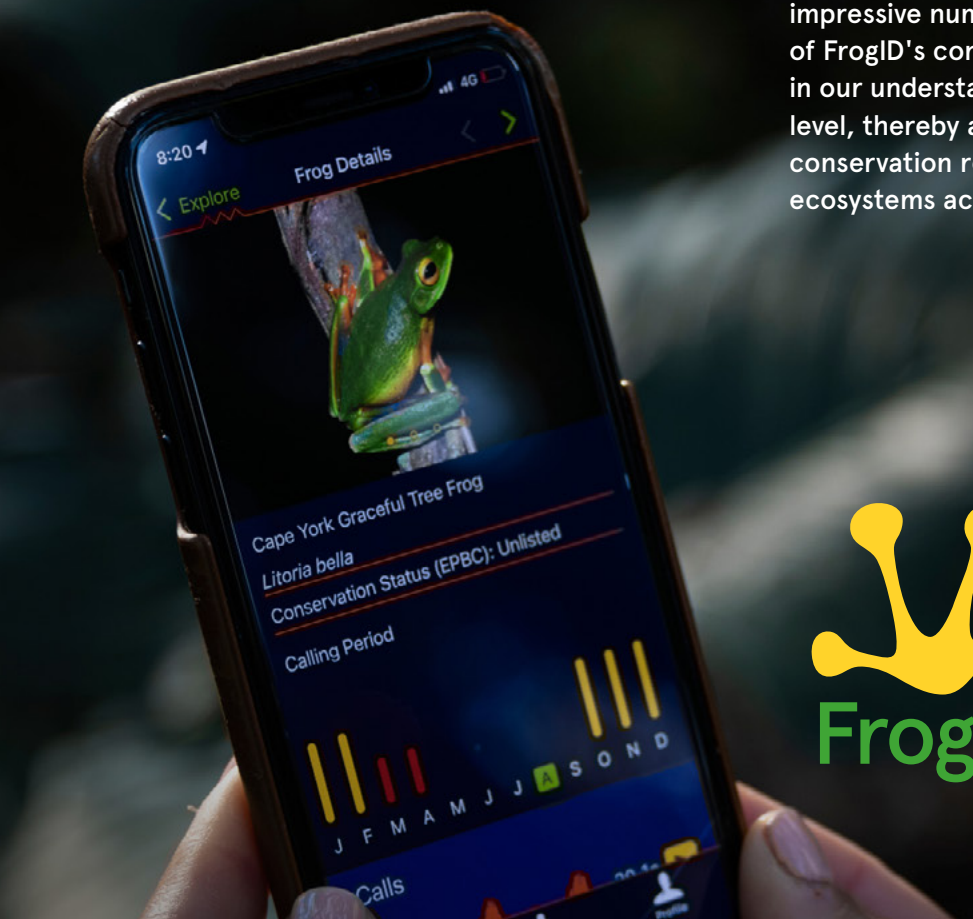
2022–23

FrogID report

Thanks to generous partnerships and donor support, FrogID remains at the forefront of Australia's citizen science initiatives, achieving remarkable results by producing impactful research and gathering valuable frog call data for advancing biodiversity research and conservation.

Between 1 July 2022 and 30 June 2023, a community of nearly 16,000 FrogID participants helped collect 235,000 scientific records of frogs, representing 196 unique species spanning the breadth of Australia. It was during this period that FrogID reached a total of more than half a million submissions, resulting in over 900,000 scientific records of frogs across 218 species. This accounts for approximately 88% of the known frog species in Australia. Notably, FrogID data was gathered across a large spatial scale during this time, covering 26% of continental Australia. These impressive numbers underscore the magnitude of FrogID's contribution to addressing gaps in our understanding of frogs on a nationwide level, thereby advancing efforts to enhance conservation related to frogs and their ecosystems across Australia.



FrogID

AUSTRALIAN MUSEUM

FrogID report 2022-23

144,000+
Audio submissions

15,941
users submitted frog records

235,000
Frog records

295,000
app downloads

26%
coverage across Australia

Media audience reach:

1940
media items published across the world

160,840,958
cumulative audience reach

Scan to reach the latest FrogID stats

Research

The FrogID team produced seven scientific publications using FrogID data during this period, resulting in several key findings.

Response to urbanisation

Liu, G., Kingsford, R. T., Callaghan, C. T., & Rowley, J. J. L. (2022) Anthropogenic habitat modification alters calling phenology of frogs. *Global Change Biology* 28 (21): 6194-6208.DOI: https://doi.org/10.1111/gcb.16367

FrogID research led by Dr Gracie Liu has revealed that frog breeding seasons are starting earlier and lasting nearly three weeks longer in human-modified areas, including cities. The research is the first step to understanding how Australia's frogs are responding to human-imposed pressures. Now that we know that frogs are responding by breeding earlier and for longer, we need to examine whether the consequences are positive or negative. Ongoing use of FrogID is vital in understanding human influence on frogs, and can guide informed conservation strategies.

Advancing our understanding of morphologically-similar species

Cutajar, T. P., and Rowley, J. J. L. (2022) The utility of acoustic citizen science data in understanding geographic distributions of morphologically conserved species: Frogs in the *Litoria phyllochroa* Species Group. *Journal of Herpetology* 56 (3): 318–323. DOI: https://doi.org/10.1670/21-067

Dr Jodi Rowley and Tim Cutajar from the Australian Museum investigated green stream frogs from eastern Australia, indistinguishable by appearance alone, using FrogID audio. Expert-verified acoustic FrogID data accumulated records of cryptic stream frog species 17 times faster than non-acoustic records. The study unveiled previously unknown co-occurrence areas and range extensions, emphasising the powerful role of acoustic FrogID data in better understanding frog biodiversity.

Environmental factors that trigger frogs to breed

Thompson, M.M., Poore, A.G.B., Rowley, J.J.L., & Callaghan, C.T. (2022) Citizen science reveals meteorological determinants of frog calling at a continental scale. *Diversity and Distributions* 28 (11): 2375-2387. DOI: https://doi.org/10.1111/ddi.13634

FrogID research led by Maureen Thompson from the Australian Museum has provided crucial insights into environmental cues that are suitable for frogs to breed. Examining more than 150,000 frog records from FrogID contributions across Australia, a robust seasonal pattern was discovered, with day of the year significantly influencing calling behaviour in 67 of 100 species. Day of year surpassed the influence of temperature and rainfall, highlighting frogs' reliance on seasons, sunrise, sunset, and recent weather for mating cues. Nationwide FrogID data not only provides foundational understanding of the breeding requirements for frogs, but also tracks shifts in frog breeding patterns as time progresses.

Motivations behind FrogID

Thompson, M.M., Moon, K., Woods, A., Rowley, J.J.L., Poore, A.G.B., Kingsford, R.T., & Callaghan, C.T. (2023) Citizen science participant motivations and behaviour: Implications for biodiversity data coverage. *Biological Conservation* 282, 110079. DOI: https://doi.org/10.1016/j.biocon.2023.110079

Another study led by Maureen Thompson surveyed over 1,200 FrogID participants to understand their motivations for volunteering and participating in FrogID citizen science and to find out what would motivate them to help improve their biodiversity sampling efforts. Findings indicated participants' strong motivation for the program's goals: gathering scientifically valuable frog data for effective conservation. Moreover, the survey revealed their willingness to adjust where and when they record with FrogID to collect data with greater scientific value. The results illustrate the potential to harness citizen science for more effective conservation efforts by improving the scientific value of collected data.

Collecting better biodiversity data

Callaghan, C.T., Thompson, M., Woods, A,, Poore, A.G.B., Bowler, D.E., Samonte, F., Rowley, J.J.L., Roslan, N., Kingsford, R.T., Cornwell, W.K., Major, R.E. (2023) Experimental evidence that behavioral nudges in citizen science projects can improve biodiversity data. *BioScience* 73 (4): 302–313. DOI: https://doi.org/10.1093/biosci/biad012

Following on from the great results of the above study, research led by Dr Corey Callaghan designed an experiment to explore if map-based "nudging" in FrogID priority areas would motivate participants to focus on these spots. Results revealed a significant shift in data collection, particularly in areas with local leaderboards. This innovative map-based approach showcases the success of "nudging" citizen science efforts, enhancing data quality and coverage. The experiment offers valuable insights into optimising projects' communication and resource allocation, enhancing impactful contributions to biodiversity research and conservation.

Exploring habitat's influence on frog calls

Gillard, G.L. & Rowley. J.J.L. (2023) Assessment of the acoustic adaptation hypothesis in frogs using large-scale citizen science data. *Journal of Zoology* 320 (4): 271-281. DOI: https://doi.org/10.1111/jzo.13088

FrogID research led by Grace Gillard tested the long-held theory that surrounding physical environment plays an important role in influencing variation in frog calls. Using nearly 700 FrogID recordings of the widely dispersed banjo frogs, the study found that frog calls were not strongly correlated with habitat structure, suggesting that other factors such as microclimate, acoustic competition, and noise interference could have more significant influence. The research highlighted the remarkable potential of national FrogID citizen science data in investigating ecological theories across extensive spatial scales. It underscored that the venue – a dense forest or an open plain – doesn't matter for a banjo frog gig.

Tracking the spread of invasive species

Rowley, J.J.L. & Callaghan, C.T. (2023) Tracking the spread of the eastern dwarf tree frog (*Litoria fallax*) in Australia using citizen science. *Australian Journal of Zoology* 70, 204-210. DOI: https://doi.org/10.1071/ZO23012

FrogID not only unveils the ever-increasing range of introduced species like the Cane Toad (*Rhinella marina*), but also reveals the spread of native species, such as the Eastern Dwarf Tree Frog (*Litoria fallax*), outside of their range. Dr Jodi Rowley and Dr Corey Callaghan examined about 50,000 FrogID records for the Eastern Dwarf Tree Frog, sourced from nearly 6,000 participants. Among these, 500 records were beyond their natural range, confirming expansion beyond known sites in Melbourne and northern Victoria. Northern Victoria's population was also found extending into NSW. FrogID participation is valuable in efforts to understand where species are establishing and the biosecurity risks involved.

Informing conservation

FrogID showcased its significance in informing vital conservation assessments, particularly in the context of bushfire impacts. This was evident in the cases of the Sphagnum Frog (*Philoria sphagnicola*) and Davies' Tree Frog (*Litoria daviesae*) which are now listed as Vulnerable under the EPBC Act, largely due to FrogID research.

Sphagnum Frog (*Philoria sphagnicola*)
VULNERABLE
Around 75% of post-fire FrogID records of this species were from unburnt sites, the remainder of the records being sites that had experienced low or moderate intensity fires (Rowley *et al.* 2019; Rowley and Callahan 2020)

Davies' Tree Frog (*Litoria daviesae*)
VULNERABLE
The species was detected post-fire at seven low to moderately burnt sites via the FrogID project (Rowley *et al.* 2019; Rowley and Callahan 2020). The population trend of this species is unknown, but these survey results infer a possible population decline including potentially a loss of populations.

FrogID dataset 4.0

Thanks to the contributions of over 23,000 FrogID citizen scientists, the fourth instalment of the FrogID dataset was released, resulting in nearly half a million frog records of 207 of Australia's frog species, plus the introduced Cane Toad (*Rhinella marina*). Some notable submissions in the latest dataset include FrogID's first recordings of the Central Ranges Toadlet (*Pseudophryne robinsoni*) from north-eastern South Australia and of the Tawny Trilling Frog *(Neobatrachus fulvus*) from the central west coast of Western Australia. The impressive dataset is now online and free to access from the FrogID website and Atlas of Living Australia. FrogID also provides expert-verified data to all state wildlife atlases across Australia to help inform biodiversity conservation and management.

FrogID Week 2022

The Australian Museum's fifth annual FrogID Week, held in November 2022, gathered over 32,000 frog records from more than 4,600 citizen scientists, receiving an impressive rate of over 3 frog records per minute. This expert-verified data contributes to the national FrogID dataset, which aids in advancing frog research and conservation across Australia.

The event received over 17,800 submissions and recorded 111 frog species, including the Endangered Fleay's Barred Frog (*Mixophyes fleayi*) from the ranges of northern New South Wales, and the Critically Endangered Kuranda Tree Frog (*Litoria myola*) from the wet tropical rainforests of north Queensland, providing valuable insights into their distribution and threats.

The year-on-year data collected during FrogID Week remains an important resource for understanding and protecting Australia's frog species, with over 100,000 scientific frog records collected during the past five FrogID Week events alone.

Additionally, FrogID Week 2022 received a prestigious Mumbrella CommsCon 2023 Award for 'Best campaign on a small budget', acknowledging its remarkable success. This campaign encompassed the release of our extraordinary Australian Frog Calls album, "Songs of Disappearance," which not only made ARIA chart history but also played a crucial role in raising funds for FrogID.

Thanks to thousands of participants across Australia, every FrogID Week adds value to our national understanding of frogs and what is required to better protect them.

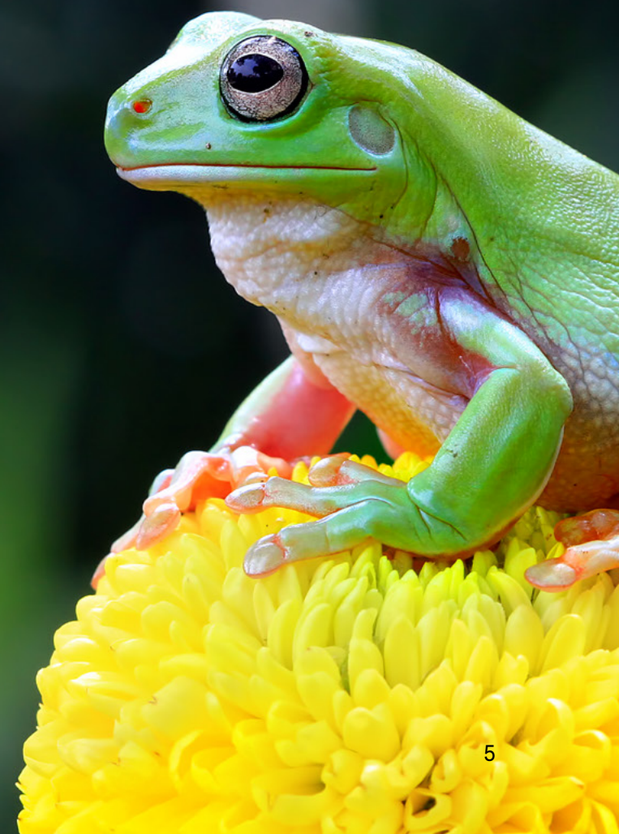
17,800+
recordings submitted

4,600
users who submitted a call with the FrogID app

32,200+
frog records

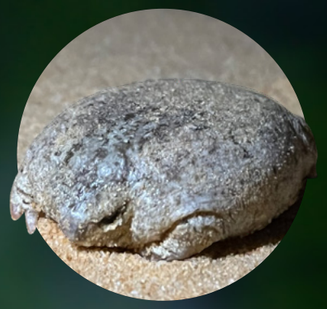
111
species found

Scan to learn more about FrogID Week

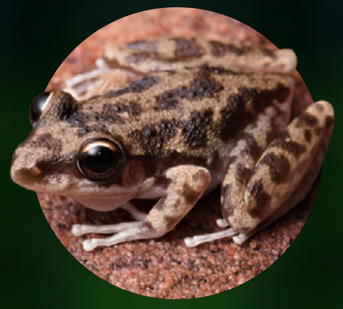


Species added to the FrogID dataset

Eight species recorded by FrogID users led to an increase in the total number of species represented on FrogID from 210 to 218 (approximately 88% of the known frog species in Australia).

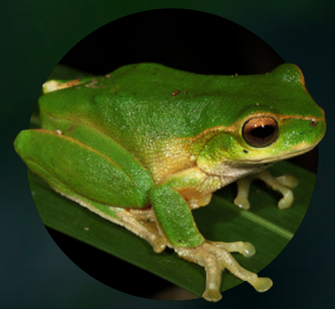


Species no. 211
Southern Sandhill Frog
(*Arenophryne xiphorhyncha*) –
a call previously unknown to science
Image credit: Sam Fischer

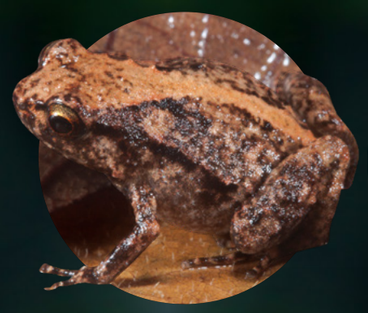


Species no. 212
Chattering Rock Frog
(*Litoria staccato*)
Image credit: Ian Bool

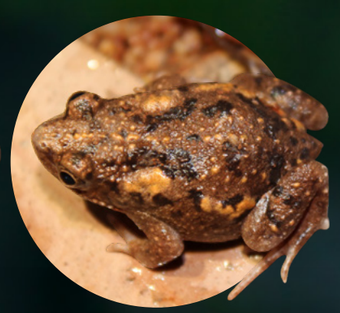
Species no. 213
Kutini Boulder Frog
(*Cophixalus kulakula*)
Image credit: Jodi Rowley



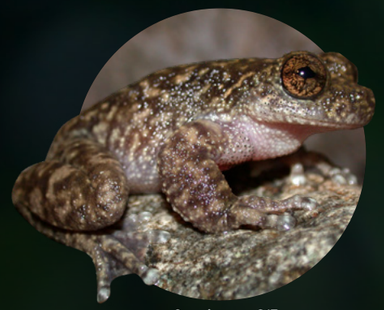
Species no. 214
Kroombit Tree Frog
(*Litoria kroombitensis*)
– listed as Critically Endangered
Image credit: Stephen Mahony



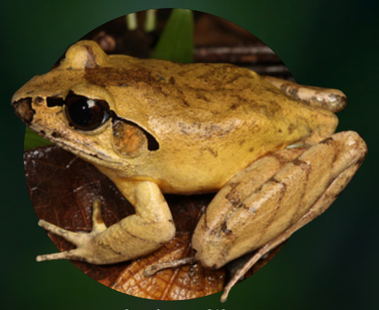
Species no. 215
Northern Tapping Nursery Frog
(*Cophixalus exiguus*)
Image credit: Anders Zimny



Species no. 216
Glandular Toadlet
(*Uperoleia glandulosa*)
Image credit: Renee Catullo



Species no. 217
Waterfall Frog
(*Litoria nannotis*)
Image credit: Jodi Rowley



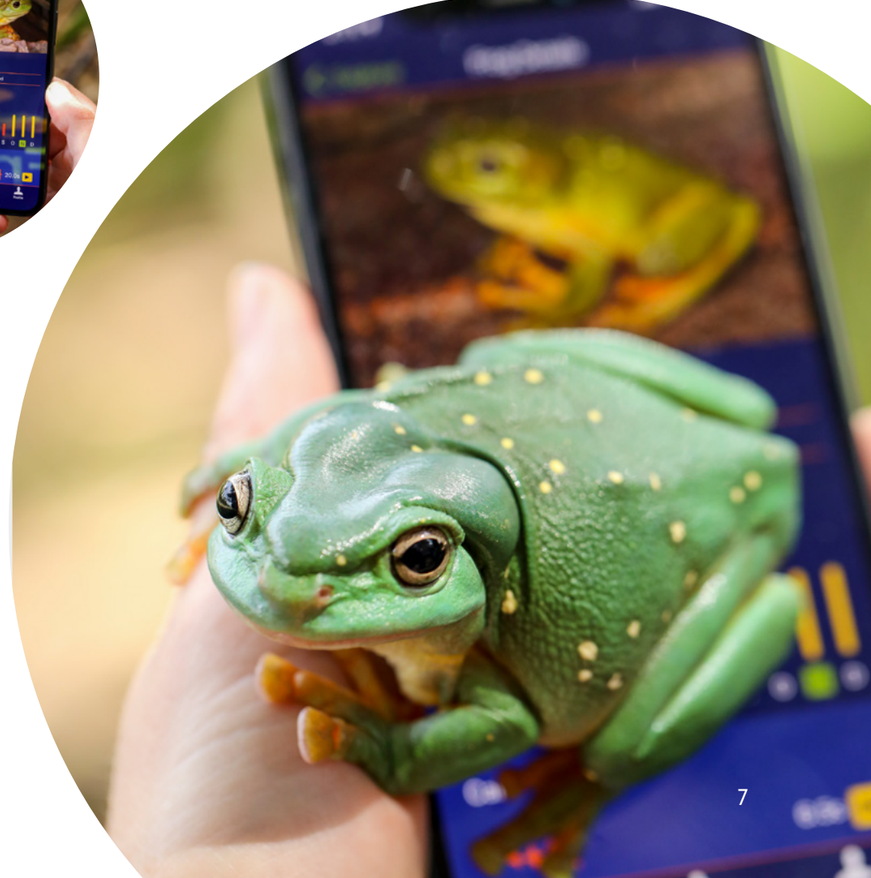
Species no. 218
Southern Stuttering Frog
(*Mixophyes australis*) – a species
described as new to science
Image credit: Stephen Mahony

Thank you

We extend our heartfelt gratitude to thousands of FrogID participants for their remarkable contributions to FrogID during 2021-22; the generous donors who have provided funding for the project including the James Kirby Foundation; the NSW Biodiversity Conservation Trust, the Department of Planning and Environment - Water, and the Saving our Species program as Supporting Partners; the Museum and Art Gallery of the Northern Territory, Museums Victoria, Queensland Museum, South Australian Museum, Tasmanian Museum and Art Gallery, and Western Australian Museum as FrogID partner museums; and the many Australian Museum staff and volunteers who make up the FrogID team.

FrogID has achieved notable milestones, providing precise and valuable frog data on a national scale that drives research, shapes policies, and promotes national biodiversity conservation efforts. The increase in submissions and participants, the addition of new frog species to our database, including species new to science, and the publication of scientific findings all reflect the significant progress and growth of the project. We thank everyone for their incredible contributions and generous support.

The Australian Museum's FrogID project mobile app © Salty Dingo 2021



The Australian Museum's FrogID project helps monitor frogs like this Magnificent Tree Frog (*Litoria splendida*) using a free mobile app © Salty Dingo 2021

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Acknowledgements
The Australian Museum acknowledges and pays respect to the Gadigal people as the First Peoples and Custodians of the land and waterways on which the Australian Museum stands.

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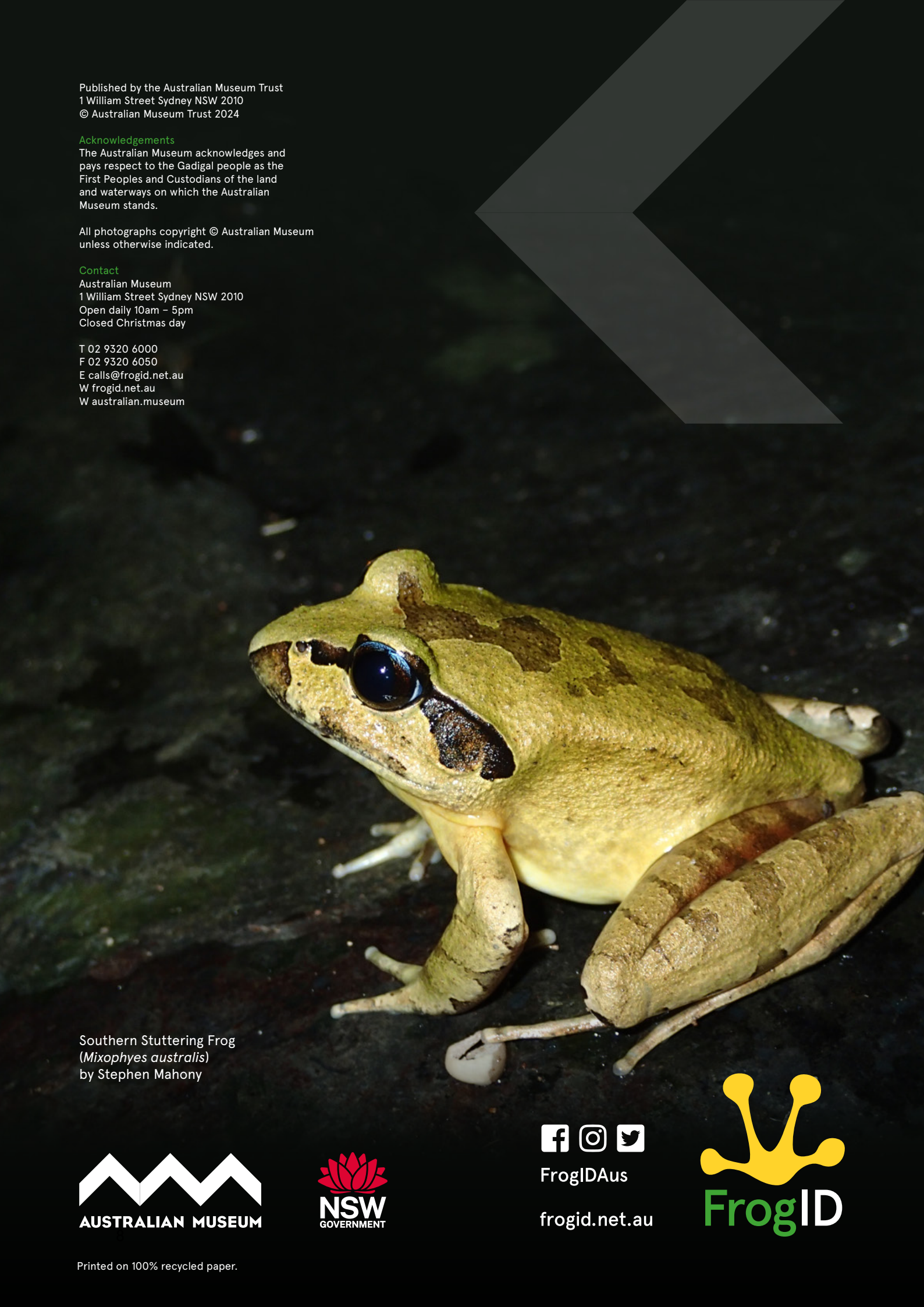

Southern Stuttering Frog
(*Mixophyes australis*)
by Stephen Mahony

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