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Amphibian Ark

c/o Conservation Planning Specialist Group
12101 Johnny Cake Ridge Road
Apple Valley MN 55124-8151
USA

www.amphibianark.org

Phone: +1 952 997 9800

Fax: +1 952 997 9803

www.amphibianark.org



The recovery of the lost habitat in north-eastern Denmark for the European green toad

Lene Vestergren Rasmussen, Zookeeper; and Signe Ellegaard, Zoologist, Copenhagen Zoo, Denmark

The European green toad (*Bufo viridis*) resembles a toad from the tropics because of its bright colours. However, it is common in Europe and one of the fourteen native Danish amphibian species - unfortunately the population of green toads in Denmark has declined severely.

Copenhagen Zoo, in Denmark, collaborates with many external project partners including within our amphibian projects. Our project with European green toads began with an inquiry from a biologist, Jacob Lausen, who had worked with establishing breeding ponds for *Bufo viridis* in the municipality of Halsnæs in the northern part of Zealand, Denmark. The species has now completely disappeared from Northern and Western Zealand, with the exception of one isolated population on the small island of Hesselø, located 20 km from the coast, north of Hundested. It is impossible for toads to be able to reach the mainland on their own and because of this this conservation project became a reality. A back-up population is being established, a method Copenhagen Zoo has extensive experience with, from the reintroduction of fire-bellied toads (*Bombina orientalis*), among others, in Denmark.

In the summer of 2016, Jacob Lausen, who is employed by the Halsnæs Municipality, came to the Zoo with a bucket of *B. viridis* tadpoles which he had collected at Hesselø. There were around forty tadpoles and Copenhagen Zoo's breeding centre for reptiles and amphibians took them into their care. During the previous year, five new ponds had been created in the Halsnæs Municipality, an existing pond had been cleaned, willow and scrub had been cleared, and grazing was established in the area. These actions were to optimize the habitat to suit the requirement of green toads for lowland pastures and coastal meadows. It was really good news that the ponds, which would hold the toads' future offspring, had already been established and for me, it was a great honour to be given the responsibility of rearing the tadpoles.

During the following three years, Jacob and I were regularly in contact, with me sending him photos of the toads, and him returning happy smileys immediately. The Spring of 2019 was the big test - the toads were now three years old and sexually mature. We had not previously bred green toads at Copenhagen Zoo, but with our many years of breeding experience with natterjack toads (*Epidalea calamita*), along with the extremely valuable information shared by Nordens Ark in Sweden, the enclosures were set-up in the breeding centre. Twenty-three large, mature toads had hibernated in the climate-controlled room where they laid inactive without eating all winter, at a temperature of 7°C. Immediately after the temperature in the climate-controlled room was increased, the toads became active and very hungry. The frogs and toads are always fed a lot after hibernation, because shortly after they become active, they must breed, in order to ensure the continuation of the species. So the toads need to mate and lay their eggs. After they were introduced to their breeding enclosures, eggs were laid three days in a row. Long egg strings were taken out of the water and moved to a big tank.



A pair of European green toads (*Bufo viridis*) in amplexus. The population of green toads in Denmark has declined severely and the species has now completely disappeared from Northern and Western Zealand. Photo: Henrik Bringsøe.

So far, everything had gone well. Luckily, the eggs had been fertilized, and the tanks were quickly filled with small tadpoles. For three years I had looked forward to sending a message to Jacob telling him that the project had been a success – to this point at least. Ten days after the eggs were laid, we released the first tadpoles at Hundested. The ponds were perfect for *B. viridis* and it was a great milestone for the project that within a month we were able to release 40,000 tadpoles. A small number of the tadpoles were kept at the Zoo so they could metamorph completely before also being released.

The municipality supplied the land, and the zoo supplied the animals. That is the project in all its simplicity. Jacob and I wanted to share the project with the locals of Halsnæs Municipality and to highlight the visionary decision which the municipality had taken to establish the ponds for the toads, and of the great collaboration between the municipality and Copenhagen Zoo. So, Jacob and I found a free timeslot in each of our bosses' calendars – the Mayor of Halsnæs Municipality, Steffen Jensen and Copenhagen Zoo Scientific Director, Bengt Holst. Luckily, there was lots of interest, and in June 2019, the local TV-station, local newspapers, a radio-station, and not least, many locals showed up near one of the ponds. We had brought forty small toadlets for release as well as a mature toad as an ambassador of the species, so everyone could see what a beautiful animal the European green toad actually is. It was a great success. It is one thing to see a charismatic animal in a photo, but to see it in real life is something completely different. The locals from the Halsnæs Municipality really have something special to look forward to in the future.

Support like this from the locals is very important for the project's future. Local involvement and local ownership play a significant role in activities such as reporting back to us on the population's develop-



A young green toad. Copenhagen Zoo's breeding centre for reptiles and amphibians has been managing a program for the species since 2016. Photo: Henrik Bringsøe.

ment. The feedback on toad calls or if tadpoles can be seen is very important information for us, as we cannot visit the area as regularly as the local people do. Now, two years after the first release, we have been informed that adult toads have been seen and heard in the area, which tells us that we are on the right track. A short video has been made, which shows some of the toads calling and mating in the ponds at night and can be seen at www.youtube.com/watch?v=5jIJOX-jfBc.

The work will continue in the years to come. We will continue to release tadpoles in the coming years until the population is large enough that it no longer needs our help. We are now really getting started and collaboration is the key word. I am sure that the European green toad, camouflaged as a soldier, has inspired an army of locals to help it. The battle has just started, lost ground in Northern Zealand must be recovered, and with the Halsnæs Municipality and Copenhagen Zoo as allies, the weapons are collaboration, dialog, and local ownership!

FrogLog

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Rescuing the southernmost marsupial frog species in Argentina

Mauricio Sebastián Akmentins, INECHOA, UNJu-CONICET, Argentina

The main objective since the beginning of this project was the establishment of the first conservation program for an endangered marsupial frog species in Argentina, combining *in situ* and *ex situ* conservation actions to ensure the long-term preservation of rediscovered populations of La Banderita marsupial frog (*Gastrotheca gracilis*). With help from an Amphibian Ark conservation grant in 2018, we built a breeding facility and husbandry research center for the population supplementation program for the species within the Reserva Experimental Horco Molle (Universidad Nacional de Tucumán, Tucuman province, Argentina).

In 2020 we received a start-up extension grant from the AArk, and our main objective for that year was upgrading the Horco Molle's *ex situ* facilities and to expand the conservation objectives, including the captive breeding of La Banderita marsupial frog. Another important part of our project is the *in situ* component, which includes the search for lost northern populations of La Banderita marsupial frogs and monitoring threats to the rediscovered populations of this endangered marsupial frog.

Our main partner, the Reserva Experimental Horco Molle is fully committed to the project and through funds received from the Universidad Nacional de Tucumán, we collaborated on the improvement to the *ex situ* facilities with labor and materials. We finished upgrading the *ex situ* facilities at the Reserva Experimental Horco Molle. This work included isolation of the facilities, with the installation of a new access door to improve biosecurity, installation of a panoramic window wall for natural illumination of the facilities, roof repairs, interior paint job and air conditioning system maintenance.

An adult male La Banderita marsupial frog (*Gastrotheca gracilis*) registered in Aconquija National Park. Source: <https://sib.gob.ar/especies/Gastrotheca-gracilis>.

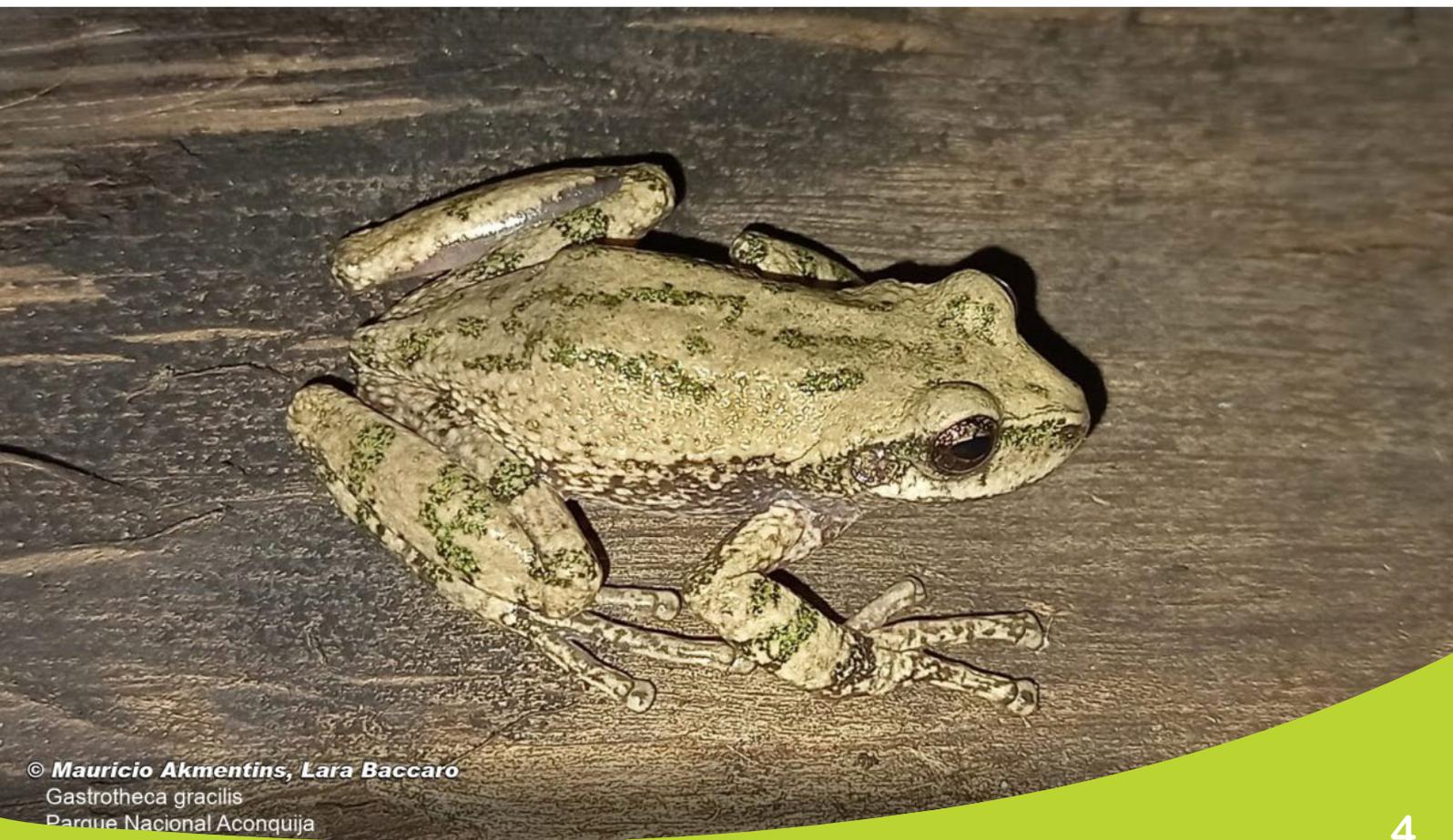
Photo: Mauricio Akmentins; Lara Baccaro.

The National Parks Administration continues supporting our conservation actions in Aconquija National Park, and the government authorities of Tucuman province continue to support to our project and gave their permission for specimen collection. We collected the founder animals for the first captive breeding attempt of La Banderita marsupial frog in 2021. These individuals are juveniles and we intend to obtain the first *ex situ* cohort in 2022. We are also continuing with the population supplementation program of *Gastrotheca gracilis* in Reserva Provincial Los Sosa by raising the first cohort of tadpoles of 2021.

We discovered a large population of adult frogs in the newly incorporated area of "Portal Cochuna" to Aconquija National Park, and this finding now makes three rediscovered populations in this protected area. We also registered a new reproductive site in the protected area of the Reserva Provincial Los Sosa. While we were monitoring the rediscovered populations of La Banderita marsupial frog we detected serious threats to the wild populations. In Reserva Provincial Los Sosa the main threats were the presence of solid waste and domestic animals (pigs) in the reproductive habitats. In Aconquija National Park we discovered several intentional wildfire ignitions points near the national park limits, and near the monitored populations of marsupial frogs.

With the AArk's support we will improve the water management in the *ex situ* facilities with the incorporation of a physical and biological filtering system to ensure a reliable water source for the frogs, and we will improve the treatment and disposal of wastewater to increase biosecurity. We will also prepare a room to raise the live food supply for adult frogs.

In the near future, the *ex situ* facilities will be incorporated into a conservation education discussion as part of the guided tours for visitors to the Reserva Experimental Horco Molle. This chat will be focused on explaining the unique marsupial frog's life



© **Mauricio Akmentins, Lara Baccaro**
Gastrotheca gracilis
 Parque Nacional Aconquija



Juvenile La Banderita marsupial frogs (*Gastrotheca gracilis*) raised in the *ex situ* facilities of the Reserva Experimental Horco Molle (UNT), Tucumán province, Argentina. Photo: Elena Correa.

history and the importance of protecting this distinctive species from the Yungas Andean Forests. The breeding facilities are a valuable tool for conservation education, and so we will improve the design of the outside of the building with an artistic display (i.e. a mural).

Horco Molle's has started an educational program aimed at elementary schools with La Banderita marsupial frog as an ambassador of amphibian biodiversity and as a flagship species for the conservation of Yungas Andean forests ecoregion.

We plan to collect field data about the environmental conditions, particularly air and water temperatures in the reproductive habitats used by marsupial frogs. We will establish a long-term monitoring program of the environmental variables to assess the effect of extreme climate events due to the global climate crisis on marsupial frog populations and to improve the *ex situ* housing conditions of captive frogs. We also aim to incorporate the measurement of water quality parameters in the field.



Upgrade works in the *ex situ* facilities of the Reserva Experimental Horco Molle (UNT), Tucumán province, Argentina. Photo: Mauricio Akmentins.



Burrowing frogs, bushfires, bunkers and COVID

Adam Lee, Specialist Keeper – Amphibian Bushfire Recovery Programs, Melbourne Zoo, Australia

Following the 2019-20 Black Summer bushfires that decimated the eastern coast of Australia, Zoos Victoria along with State Government agencies identified three frog species of significant concern having important population distribution within the fire scar of eastern Victoria, Gippsland and the Victorian Alps. These species are the Southern giant burrowing frog (*Heleioporus australiacus flavopunctatus*), spotted tree frog (*Litoria spencerii*) and Watson's tree frog (*Litoria watsonii*).

Funding from the Australian Government's Bushfire Recovery Program for Wildlife and their Habitats and funds from Zoos Victoria's Bushfire Emergency Wildlife Fund were allocated to construct a state-of-the-art, purpose-built, climate-controlled facility to investigate husbandry and bridge key knowledge gaps for these three species as well as capture genetic representation before further population decline. Additional funds were allocated to support survey work and population monitoring for these little understood and understudied frogs with the aim of assessing population health post-fire.

Fortunately, the La Niña climatic patterns following the bushfires provided perfect breeding conditions for the southern giant burrowing frog, in particular, and combined with the discovery of a new population in East Gippsland in Victoria, instigated pressure to act on this rare opportunity. The Zoos Victoria team worked closely with scientists from the Arthur Rylah Institute and ecologist Danielle Wallace to collect this important life stage of development despite the new facilities not yet being built.

Due to the emergency nature of this collection, a makeshift temporary biosecure facility was rapidly assembled and equipped to house the tadpoles whilst construction on the new facility commenced. In March, this year (2021), 161 tadpoles were collected from the wild and brought back to Melbourne Zoo to be set up in this temporary facility with the aim of developing husbandry for rearing of tadpoles and frogs that would help guide the feasibility of establishing a recovery program.

Ideally, the new dedicated amphibian facility would have already been built, but significant logistical and planning delays due to COVID-19 has seen the construction timeline pushed out until early 2022.

Southern giant burrowing frog (*Heleioporus australiacus flavopunctatus*) undergoing metamorphosis (Gosner stage 43-44). Photo: © Zoos Victoria.

Screening tadpoles for disease during wild collections. Photo: © Zoos Victoria.





The temporary facility established to house the wild collected southern giant burrowing frog tadpoles. Photo: © Zoos Victoria.

Newly collected tadpoles settling into their new temporary home. Photo: © Zoos Victoria.



There is good news in terms of the development of these giant tadpoles. After a somewhat brief winter hiatus, all the tadpoles have now completed metamorphosis and are developing well.

This season's survey work is about to commence and additional collections of tadpoles and adults, should we be lucky enough to find them, are likely to occur given there is another predicted La Niña summer headed our way.

The global impacts of climate change and increased frequency of stochastic events highlight the difficulties many programs face – never more so than now. Unfortunately, for these frogs, the need for these program's continued progression does not cease, nor do the challenges of disease and reversing population decline - a familiar story in the life of an amphibian.

AArk Husbandry Document library

The Husbandry Document library on the AArk web site (www.amphibianark.org/husbandry-documents) currently has over 285 documents in it, with additional documents being added regularly. A new search engine has recently been installed on the Husbandry Documents page, which can now search for particular words or phrases within all pdf files. This provides much more accurate results when searching the document library for particular topics.

Sixteen new documents have been added recently:

Workshop to Establish a Conservation Strategy for the Lake Junín frog (*Telmatobius macrostomus*) (Spanish)

For the purposes of assessing existing information, identifying gaps, and developing a Conservation Strategy for the Lake Junín Frog, the office of The Peruvian Service for Natural Protected Areas (SERNANP) in Junin, Peru, with the support of Peace Corps, the Conservation Program of Denver Zoo, Universidad Peruana Cayetano Heredia, and CBSG Mesoamerica organized a workshop on 28-30 of October, 2013. The meeting was held at the House of Culture of Junin and Rescue Center of Junín frog - Huayre, with a participation of 33 people from 26 different institutions and also attended by 32 observers representing 21 institutions in the region Junín - Pasco.

Editors: Medrano, R., Elías, R., Behmke, S., Herbert, M., Rodríguez, J.E. & Matamoros, Y.

Publication: Conservation Breeding Specialist Group (SSC/ IUCN/CBSG Mesoamerica), 2015

www.amphibianark.org/wp-content/uploads/2021/06/Estrategia-de-Conservacion-de-la-de-Rana-de-Junin.pdf

Ensuring a future for South Africa's frogs: a strategy for conservation research (English)

This document prioritises research on threatened species in South Africa so that scarce resources can be most effectively utilised to understand and reduce threats to the amazing frog diversity found in the country. The first chapter provides a general introduction on global and local amphibian decline, with the remaining chapters covering research priorities for taxonomy, conservation, monitoring and public awareness. Lastly, an appendix provides an update of the IUCN Red List with criteria for all threatened South African amphibians. Despite the large number of frog species in South Africa, and the small number of amphibian biologists, every species was evaluated (no 'Data Deficient' species remain). Now we are left with the challenge to preserve amphibian biodiversity, and herein lies the strategy that will pave the way for the next five years of conservation research.

Editor: G.J. Measey

Publication: SANBI Biodiversity Series 19, 2011

www.amphibianark.org/wp-content/uploads/2021/09/Ensuring-a-future-for-South-African-frogs.pdf

EAZA Best Practice Guidelines for the Lake Pátzcuaro salamander (*Ambystoma dumerilii*) – first edition (English)

The Lake Pátzcuaro salamander, or Achoque, is a Critically Endangered species of aquatic salamander endemic to a single lake located in Michoacán state of Mexico. The species is directly threatened by extinction due to a multitude of factors. Therefore, the maintenance of this species in captive colonies may be of vital importance to enhance future conservation efforts. This best practice guideline is the result of collaboration between multiple individuals and institutions within Mexico and within EAZA that are dedicated to the conservation of this unique and enigmatic species.

Authors: Adam W. Bland, Christopher J. Michaels, Gerardo Garcia, Benjamin Tapley, Omar Domínguez Domínguez, Rodolfo Pérez Rodríguez, Luis H. Escalera Vázquez, Ellie McLaren,

Javier Lopez and Paul Bamford

Publication: EAZA, 2021

www.eaza.net/assets/Uploads/CCC/BPG-2021/2021-Lake-Patzcuaro-salamander-EAZA-Best-Practice-Guidelines-Approved.pdf

Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*) (English)

The goal of this recovery plan is to reduce the threats to the Central California tiger salamander to ensure its long-term viability in the wild and allow for its removal from the list of threatened and endangered species. The strategy to recover the Central California tiger salamander focuses on alleviating the threat of habitat loss and fragmentation in order to increase population resiliency (ensure each population is sufficiently large to withstand stochastic events), redundancy (ensure a sufficient number of populations to provide a margin of safety for the species to withstand catastrophic events), and representation (conserve the breadth of the genetic makeup of the species to conserve its adaptive capabilities). Recovery of this species can be achieved by addressing the conservation of remaining aquatic and upland habitat that provides essential connectivity, reduces fragmentation, and sufficiently buffers against encroaching development and intensive agricultural land uses.

Publication: U.S. Fish and Wildlife Service, 2017

www.fws.gov/sacramento/outreach/2017/06-14/docs/Signed_Central_CTS_Recovery_Plan.pdf

Action Plan for the Conservation of the Common Midwife Toad (*Alytes obstetricans*) in the European Union (English)

The common midwife toad, *Alytes obstetricans*, is widespread in Europe but is currently facing population declines in several countries. This European Species Action Plan (EU SAP) has been prepared with the support of the European Commission.

The aim of this EU SAP is to support the development of national or local action plans and conservation measures as appropriate. The information and proposed conservation actions presented in this EU SAP have been prepared in consultation with a group of species experts from all countries in the midwife toad's distribution range, as well as through a review of available literature.

Compilers: Violeta Barrios, Concha Olmeda, Ernesto Ruiz (At-ecma/N2K Group)

Publication: European Commission, 2012

www.researchgate.net/publication/263452880_Action_Plan_for_the_Conservation_of_the_Common_Midwife_Toad_Alytes_obstetricans_in_the_European_Union

Amphibian Conservation of Chile (Spanish)

Chile has a rather small batrachofauna when compared to other South American countries, however it is characterized by its high degree of endemism, with various shapes and sizes that have evolved independently and with species adapted to living in quite unequal environ-

ments. from the arid north, the heights of the Andes, passing through the Mediterranean area, reaching the temperate and cold forests of southern Chile. In recent years there has been an explosive increase in amphibian research in our country, and thus new problems have also arisen for their conservation. The continuous increase in the invasion of the African frog, the recent description of the fungus *Batrachochytrium dendrobatidis* that causes chytridiomycosis in amphibians, the description of new species and the application of new techniques in genetic studies, are just some examples of new challenges of the amphibian conservation in Chile.

The organization of the amphibian Conservation workshop for public organizations, held at the Andrés Bello University on July 7 and 8, 2011, sought to be a platform for information and discussion on these issues with those in charge of their protection, management and conservation. We hope that this book is a contribution to the knowledge and protection of biodiversity.

Editors: Claudio Soto-Azat and Andrés Valenzuela-Sánchez
Publication: Universidad Nacional Andrés Bello, Santiago, Chile, 2012

www.amphibianark.org/wp-content/uploads/2021/09/Conservacion-de-anfibios-de-Chile.pdf

White-bellied and Orange-bellied Frogs (*Geocrinia alba* and *Geocrinia vitellina*) Recovery Plan (English)

The white-bellied frog (*Geocrinia alba*) and orange-bellied frog (*Geocrinia vitellina*) were discovered in 1983 and described in 1989 (Wardell-Johnson & Roberts 1989) with an extended description provided in 1990 (Roberts et al. 1990). A Recovery Plan was prepared in 1995 (Wardell-Johnson et al. 1995) and this plan constitutes a review of the recovery actions from that plan and an update and development of new recovery actions for the next 10 years, based on updated knowledge and information. This document constitutes a formal recovery plan for these two *Geocrinia* species and includes distribution, salient aspects of ecology and biology, threatening processes and decline, and presents the actions, and associated costs, necessary to recover these species.

Publication: Department of Parks and Wildlife, May 2015
www.awe.gov.au/environment/biodiversity/threatened/publications/recovery/frogs-recovery-plan-2015

Report from the workshop of the New *Mantella cowanii* Action Plan 2021-2025 (English)

The harlequin mantella, *Mantella cowanii*, is likely one of the most threatened Malagasy amphibians. This striking iconic mantella species has a very scattered range, and none of its known populations is currently included in any protected area. Until 2003 has been collected unsustainably for the pet-trade. This workshop and consequent new action plan summarises the current state of knowledge of the *Mantella cowanii* population status, its taxonomy and ecology, and of the threats facing it, and describes the institutional framework for conservation management in Madagascar. It lists the key stakeholders in the action plan, and the vision, goals, objectives, and activities.

Editors: Garcia, G, Andreone, F., Andriantsimanarilafy, R.R., Crocini, A., Bland, A., Candace, M. H-H., Edmonds, D., Rakotonanahary, T. F., Ndriantsoa, S. H & Rajotoarison, A.
Publication: 2020

www.amphibianark.org/wp-content/uploads/2021/10/Report_workshop_APIIcowanii.pdf

National recovery plan for Stream Frogs of South-east Queensland 2001-2005 (English)

This document is a five-year multi-species plan for the recovery of seven threatened stream frogs of south-east Queensland. The southern dayfrog and southern gastric-brooding frog declined and disappeared in the late 1970s to early 1980s. They have not been located since then, despite considerable survey effort. All other species are reported to have undergone population declines, although these are sometimes poorly quantified. One of these species, the cascade tree frog, declined markedly in Queensland in the late 1970s early 1980s. However, numbers have since shown some recovery. This recovery plan details the decline, possible threats, and current and proposed monitoring, research and management actions required for recovery of these species. The estimated total cost of implementing this plan is \$1.3 million and involves the co-operative efforts of community groups, researchers, land managers and funding agencies.

Author: Harry Hines
Publication: Queensland Parks and Wildlife Service and the South-east Queensland Threatened Frogs Recovery Team, 2002
www.awe.gov.au/sites/default/files/documents/stream-frogs.pdf

Action plan for the conservation of Taylor's salamander (*Ambystoma taylori*) (Spanish)

Author: José Alfredo Hernández Díaz
Publication: A product of the EDGE of Existence, Zoological Society of London grant program, 2020
www.amphibianark.org/wp-content/uploads/2021/11/Survival_Blueprint_2019_Ambystoma_taylori_esp.pdf

Species Conservation Strategy for *Mantella aurantiaca* (The Golden Mantella Frog), 2017-2021 (English)

The first conservation strategy for *Mantella aurantiaca* was published in 2010 and implemented between 2011 and 2015. The final evaluation was carried out in October 2016 to measure the achievements against the set objectives. This assessment will allow the update of the conservation strategy to be released for the next five years (2017-2021). The new strategy contains updates on the status of the species, including conservation management and threat analysis. This strategy also contains new guidelines for conservation.

Authors: Rakotondrasoa E.F., Andriantsimanarilafy R. R., Andriafidison D., Razafimanahaka H.J., Razafindraibe P., Rabesihanaka S., Robsomanitrondrasana E., Randrianzahana H., Rakotondratsimba G., Ranjanaharisoa F., Rabemanajara F., Randrianantoandro C.J., Ndrimiary J.N., Rakotoarisoa J.C.I. and Randrianarisoa A.L.

Publication: Ministère de l'Environnement et des Forêts, 2017
www.amphibianark.org/wp-content/uploads/2021/10/ConservationStrategyforMantellaaurantiaca2017-2021.pdf

Action Plan for the Conservation of Urban Amphibians of Cuenca (Spanish)

The city of Cuenca maintains important ecological niches within its green areas that house species of amphibians endemic to Ecuador. The scant scientific information on aspects of the natural history of some of these species, as well as accelerated urban growth, has implemented initiatives from the public and private sectors and international cooperation with the aim of protecting species of amphibians threatened with extinction,

which is a pioneering project in the conservation of wild fauna in urban areas and mainly with long-term objectives and views.

Objectives: Analyze the state of conservation of the amphibian populations that inhabit the urban area of Cuenca, through a systematic gathering of information on distribution, ecological requirements and main threats.

Author: Fausto Siavichay P., Gabriela Maldonado C., Danilo Mejía Coronel, Juan Fernando Webster, Nohemí Torres and Katherine Costa

Publication: 2016

www.amphibianark.org/wp-content/uploads/2021/11/Plan-Manejo-Cuenca-Final.pdf

Experiences in Biological Monitoring of Amphibians (Spanish)

This publication is a collective learning and strengthening of amphibian biological monitoring techniques, which includes the knowledge and experience of herpetologists from Ecuador, together with the advice of colleagues from other countries. The objective of this document is to provide a tool that guides and supports the field work of biologists who follow the tracks of these unique and biodiverse species on the planet. On one hand, we explain the techniques used and that were useful for us to monitor *Atelopus*, as a focal species, in areas of the Andes and the coast of Ecuador. On the other hand, we suggest the necessary and basic instruments and tools for amphibian monitoring and the recommended way to collect data of importance for future research.

Author: Fausto Siavichay Pesántez (editor)

Publication: Ministerio del Ambiente y Agua, 2020

www.amphibianark.org/wp-content/uploads/2021/11/Libro-de-monitoreo-biologico-PARG.pdf

Basic guidelines for the breeding and maintenance of *Atelopus nanay* in captivity (Spanish)

The project "Conservation of Amphibians and Genetic Resources (PARG)", launched in 2015 and supported by the Ministry of the Environment (MAE), the United Nations Development Program (UNDP), the Fund for the Environment Global Environment (GEF), the Jambatu Conservation and Research Center, and IKIAM, is an initiative that contemplates the investigation of biomolecules obtained from the skin of amphibians, the creation of areas for the *in situ* protection of amphibians and the development of strategies for the *ex situ* breeding of threatened species in centers or laboratories that house Ecuadorian amphibians. One of the conservation centers within this project is the Amaru Amphibian Conservation Center (CCAA), located in the city of Cuenca. Since 2007, the CCAA has worked on the breeding and conservation of one of the target species of PARG, *Atelopus nanay*, under the direction of Blgo. Fausto Siavichay P, current coordinator of the center. This species is endemic to Ecuador and is in critical danger of disappearing due to the degradation of its habitat, climate change, the introduction of trout as an invasive species and possibly due to the presence of *Batrachochytrium dendrobatidis*, the causal agent of chytridiomycosis.

Author: Noemí Torres Sarango

Publication: December 2019

www.amphibianark.org/wp-content/uploads/2021/11/Reproduccion-de-Atelopus-nanay.pdf

Urban Amphibians of Cuenca (Spanish)

This manual deals with the amphibians that still inhabit the urban spaces of Cuenca and those that are no longer found in the region due to various factors such as pollution, loss of habitat, introduction of harmful species and other causes. The manual is constituted as a guide for the population to know the amphibian species that with some frequency can be found in patios and parks, such as: cutins, marsupial frogs and possibly some Andean poison frogs, as well as well as to identify those that are threatened with extinction, such as toads, and species introduced in the region, such as the American bullfrog. It also allows to know the degree of threat in which some of these species are found and the reason for their extinction. It contains information on the places of where these frogs were observed and actions for their preservation, in such a way that the amphibians continue forming part of the urban environment of Cuenca.

Author: Fausto Siavichay Pesántez, Gabriela Maldonado Cedeño and Danilo Mejía Coronel

Publication: Autonomous Municipal Decentralized Government of Cuenca Canton Environmental Management Commission, 2016

www.amphibianark.org/wp-content/uploads/2021/11/Manual-anfibios-urbanos-Cuenca.pdf

Improving breed-and-release programmes in the face of a threatening pathogen, *Batrachochytrium dendrobatidis* (English)

As the proportion of threatened species increases, so too does the need for effective conservation strategies. In response, captive breed-and-release and habitat mitigation programmes are two conservation actions that are increasing in use and effectiveness. Success of these programmes is frequently hampered by the continued presence of threatening processes. In the case of amphibian reintroductions, a key threatening process that is difficult to eliminate is the deadly fungal pathogen, *Batrachochytrium dendrobatidis* (*Bd*). This pathogen is the proximate cause of decline for the threatened green and golden bell frog, *Litoria aurea*, and has contributed to the failure of previous breed-and-release programmes of this amphibian. This article discusses how it may be possible to manipulate these factors to improve the success of future breed-and-release programmes, and recommends the construction of warm water bodies and a strategy of prioritizing the release of fewer, large propagules of high body condition and mixed-age class, over large numbers of younger, smaller animals.

Author: Kaya L. Klop-Toker, Jose W. Valdez, Michelle P. Stockwell, Loren Fardell, Simon Clulow, John Clulow and Michael J. Mahony

Publication: Wiley Online Library, First published: 19 August 2021

<https://onlinelibrary.wiley.com/doi/10.1002/aqc.3653?af=R>

Impact of COVID-19 pandemic on conservation activities of the Pickersgill's reed frog in South Africa

Ian du Plessis, Curator: Reptiles, Fish and Amphibians; Piet Malepa, Manager Animal Welfare; Dr Arnold Kanengoni, Manager Veterinary Services, Johannesburg City Parks and Zoo, South Africa; and Dr Adrian Armstrong, Scientific Services, Ezemvelo KZN Wildlife, South Africa

Background

The Pickersgill's reed frog (*Hyperolius pickersgilli*), a small endangered amphibian species endemic to the KwaZulu-Natal (KZN) province of South Africa, has been bred *ex situ* at Johannesburg Zoo in South Africa, a location 500 km away from the native range of the species, as an insurance population since 2017. The collective team effort between Ezemvelo KZN Wildlife and the Johannesburg City Parks and Zoo emerged to save the species, which is threatened by extensive habitat loss. The breeding program involves collection of breeding stock from KZN province, breeding them at Johannesburg Zoo and releasing the offspring in selected suitable rehabilitated habitats in KZN in the central coastal region. The first collection of P1-generation specimens took place in September 2017 and after only one year, in September 2018, the first 200 captive-bred specimens were re-introduced into the same locality from which the breeding specimens were collected.



Pickersgill's Reed Frog (*Hyperolius pickersgilli*). Photo: D. Marais.



The endangered Pickersgill's reed frog (*Hyperolius pickersgilli*), a small amphibian species endemic to the KwaZulu-Natal (KZN) province of South Africa has been bred *ex situ* at Johannesburg Zoo in South Africa. Photo: Ian du Plessis.

The COVID-19 pandemic and implications on conservation activities

The onset of the COVID-19 pandemic presented several challenges to the Pickersgill's reed frog breeding program. On 15 March 2020, the President of South Africa declared a national state of disaster and announced measures such as immediate travel restrictions from 18 March. On 23 March, a national lockdown was announced, starting on 27 March 2020. This lockdown included measures such as the complete closure of all public leisure activities, severe physical distancing rules, an estimated reduction of up to 85% of on-site work force and a 90% reduction in other activities. The Disaster Management Regulations

gazetted by the Government specified sectors and premises that were closed to the public to curb the spread of COVID-19, and this included Johannesburg Zoo. However, to ensure that animals continued to get the highest standard of husbandry during the lockdown period, the Johannesburg Zoo staff members were divided into two groups, which came in alternate two- and three-day shifts. This ensured that the daily activities of the Pickersgill's reed frog program were not unduly affected.

From 1 May 2020, a gradual and phased easing of the lockdown restrictions began, lowering the national alert level, until 21 September 2020, when restrictions were lowered to alert level 1, allowing travel between provinces. A trip was then planned and undertaken from Johannesburg Zoo to KZN to release about 500 frogs. This was timely because in December 2020 the country experienced a second wave of COVID-19 infections and restrictions were again placed on movements starting on 29 December 2020. These restrictions however did not curb the team from Ezemvelo KZN Wildlife and Endangered Wildlife Trust who managed to go to the sites to monitor the released frogs because local travel was allowed outside the curfew hours. The team reported observations of several of the released frogs.

Conclusions

The collaborative efforts across the entities working *in situ* and *ex situ* strengthened the resources that led to the successes to date and improved the understanding and knowledge of the staff from the various stakeholder organisations. The economic and physical activities of the project were sustained from the onset of the COVID-19 pandemic through to the post-term effects of the pandemic. This is reflected in the number of expeditions for field work and post-release monitoring, funding and improvements such as an increase of specimens released in November 2020.

The insurance population at the Johannesburg Zoo is stable and we will continue as we were before the pandemic, to strive to change the status of the species to Least Concern.

During these last few years, the captive breeding program allowed staff to study and understand the various life stages of this species as well as to adapt and improve husbandry methods and techniques to ensure the quality of life of all specimens.

Successful reproduction of the Titicaca giant frog at the K'ayra Center

Ricardo Zurita, María José Borda and Teresa Camacho-Badani, Alcide d'Orbigny Natural History Museum, K'ayra Center for Research and Conservation of Endangered Amphibians of Bolivia

The Titicaca giant frog (*Telmatobius culeus*) is considered the largest fully aquatic frog in the world and its distribution is restricted to Lake Titicaca and nearby lagoons within the department of La Paz in Bolivia and Puno in Peru. It is currently listed as Endangered according to the Red List of the International Union for Conservation of Nature (IUCN) and Critically Endangered in both the Red Book of Vertebrates of Bolivia and the Red Book of Endangered Wildlife of Peru. This is mainly due to problems related to the degradation of its habitat, the introduction of exotic species, illegal trafficking and the consumption of this species.

Due to the population declines suffered by the Titicaca frog and other species of the *Telmatobius* genus in Bolivia, several actions have been taken to conserve these species, among them, an *ex situ* management program for aquatic frogs that has been in operation since 2008 at the Alcide d'Orbigny Natural History Museum in the City of Cochabamba in Bolivia, and now known as the K'ayra Center.

Among the Titicaca frogs that have been in the *ex situ* program for the longest time, there are three frogs (two males and one female) which arrived in 2011 from the town of Pata Patani, in the minor lake of Titicaca. These are the largest frogs in the Center with 12 cm snout-cloaca length, and this size has hardly increased in the ten years that their weights and measurements have been monitored. Since their arrival at the center, these individuals had not successfully reproduced, despite the fact that they had been recorded in amplexus on several occasions.

On October 4, after two and a half weeks in amplexus, the first clutch of these individuals was produced. Two hundred eggs were produced, of which around one hundred were fertile and to date, they are in optimal condition and represent a success for the Titicaca frog conservation program. Despite being the individuals who have been in the *ex situ* program for the longest time, it was the only locality that had not reproduced the Titicaca giant frog at the K'ayra Center.

With this laying, Titicaca frogs from all localities (Isla de la Luna, Guaqui, Sicuani and Pata Patani) that remain in the *ex situ* program have now successfully reproduced. Of these, three have produced F1 animals, most of which have reached their adult stage and females and males have been separated for the planning of the F2 generation.

Currently, the K'ayra Center houses more than 300 giant Titicaca frogs in different stages of development, and we also have the other four species of aquatic frogs of the *Telmatobius* genus that remain in the center such as the Sehuencas aquatic frog (*Telmatobius yuracare*) and the Critically Endangered sucre water frog (*Telmatobius simonsi*), in addition to two species of land frogs.

The K'ayra Center is a benchmark for *ex situ* amphibian management in Bolivia. It has three permanent staff and eleven additional people including research assistants and volunteers who are in charge of the maintenance and care of the frogs. The Center receives support from institutions such as Re:wild, Aquazoo Loebbecke Museum and donations such as those made through the Amphibian Ark.



Giant Titicaca frog (*Telmatobius culeus*) from Pata Patani in amplexus at the K'ayra Center in Bolivia.
Photo: D. Alarcón_D. Grunbaum.



Titicaca giant frog tadpole.
Photo: María José Borda.

Titicaca frogs in amplexus. Photo: Eduardo Navia.



Saving Loa frogs from total extinction: Their rehabilitation, well-being and reproductive success in times of a pandemic

Oswaldo Cabeza, Andrea Caiozzi, Loreto Peña, Sebastián Almarza, Guillermo Cubillos and Alejandra Montalba, National Zoo of Chile

The global pandemic and conservation projects

Globally, biodiversity is changing at unprecedented rates and the conservation status of known biodiversity has declined in recent decades (Collen et al., 2009; Butchart et al., 2010). Added to this, the world has gone through a marked period of changes as a result of the global COVID-19 pandemic, which has affected nature and the ecosystem services that biodiversity provides us.

For this reason, conserving and protecting nature has become an essential matter to sustain our well-being as a human species. However, the pandemic has increased levels of uncertainty for the development of important conservation projects for threatened species, due to the quarantine restrictions imposed by governments around the world to contain the virus. These restrictions have provided an unlikely opportunity to observe ecological responses to an ultimately less active human population (Bates et al., 2021).

The conditions of *ex situ* conservation programs have the advantage of keeping animal populations "isolated" and safe from the effects of emerging diseases such as this pandemic, but at the same time the care and management practices under these controlled conditions are affected by established quarantine restrictions. In the case of the Loa frog (*Telmatobius dankoi*) conservation project, the National Zoo of the Metropolitan Park of Santiago, Chile, has carried out a series of actions and measures, maximizing *ex situ* efforts, to ensure a positive impact on the conservation of this Critically Endangered species.

Emergency rescue and rehabilitation of the Loa frog

In August 2019, as a result of the loss of their habitat due to the indiscriminate extraction of water, the last fourteen known Loa frogs were brought to the Native Amphibian Conservation Center at the National Zoo of Chile, within an emergency rescue operation carried out by specialists from conservation entities.

The animals were in very poor health, with malnutrition, dehydration and severe skin lesions, which resulted in one frog which was in the worst condition dying within days. The frogs were cared for by the zoo's Herpetology and Animal Health staff, who rehabilitated them through nutritional assistance and fluid therapy, allowing them to regain their health within one to two months of their arrival. After three to four months they began to adapt to the conditions under human care - their stress reactions were reduced and they managed to feed themselves, with twelve of the original fourteen frogs recovering and surviving (Cabeza et al., 2020).



Provisional facilities where the Loa frogs were housed during the preventive eradication procedure of *Bd*, in times of the COVID-19 pandemic. Photo: Parquemet.



Evolution of physical condition of the Loa "Danko" frog (*Tematobius dankoi*): "Before" admission condition; "During" condition at two weeks of rehab; "After" condition at four weeks. Photos: Parquemet.



Amplexus of a founding pair of Loa frogs in the Parquemet National Zoo - Chile. Photo: Parquemet.

Reproductive achievements, animal welfare and challenges for the conservation of Loa frogs during the pandemic

During the pandemic, sanitary restrictions began in March 2020 in Chile, which led to mandatory quarantine for people and special permit requirements to be able to move to the workplace. The zoo's herpetology team, given their essential need to take care of animals, had to work in three separate, non-interacting shifts and on a reduced timetable, to minimize the risks of COVID-19 infections among these personnel, whose work is critical for the care and well-being of the animals.

For the safety and health of the Loa frogs, in May and June of 2020 we decided to apply a preventive protocol to eradicate chytrid fungus (*Bd*), by totally disinfecting the facilities, aquariums

and accessories where several species of native amphibians which are part of other conservation projects are housed. In addition, we carried out prophylactic treatment with 0.01% Itraconazole (Wright and DeVoe, 2013) to the animals. Although the National Zoo protocol states that this preventive treatment must be carried out for any amphibian that enters the facilities, upon the arrival of the Loa frogs in August 2019 it was not done, given the deplorable health conditions they presented. Therefore, this procedure had to be postponed until their health had recovered a few months later. It was also delayed due to the difficult social and political situation in Chile from October 2019 onwards, as well as the subsequent start of the pandemic contingency.

During the preventive eradication work for *Bd*, the herpetology staff had to continue working in non-overlapping shifts due to the pandemic, and also in separate groups to ensure high levels of biosecurity during work with amphibians and due to COVID-19. For this, the support of zoo personnel from outside the herpetology team, but who were widely trained in these matters, was used to assist in the *Bd* eradication procedures. These tasks could be carried out satisfactorily, keeping the amphibians in good physical, mental and behavioral well-being during the weeks that the process lasted. We set up the quarantine aquariums with internal visual barriers and easily sterilizable shelters, such as PVC pipes and artificial plants, as well as keeping noise, vibrations and other disturbances to a minimum, to minimize stress on the frogs.

Thanks to these considerations for the well-being of the frogs, both during preventive *Bd* eradication and throughout the time that the frogs have been housed at the zoo, high levels of the frogs' welfare have been evident, reflected in the animals' good health conditions without signs of disease, and with a high diversity of desirable natural behaviors. This was evident when, in August and September 2020, the herpetology team detected behaviors and morphological changes in some of the frogs that were indicative of reproductive activities, including vocalizations, nuptial callus in males, and the sudden increase in the size of the abdomen in the females, due to the possible presence of eggs. For these reasons, the staff moved animals with these morphological characteristics into pairs in aquariums, to promote their breeding behavior.

In October and December 2020, four pairs produced eggs which successfully hatched, with the increase in the population from

Interior environment (left) and exterior visual psychological barriers (below) in Loa frog aquariums at the Parquemet National Zoo - Chile. Photos: Parquemet.



the twelve founding adults to more than 612 individuals, all of which are currently in different stages of development, including tadpoles, and more than sixty post-metamorphic individuals.

Given the behaviors observed in the parents when they were with the larvae, indicators of potential cannibalism were found, and so the adults were preemptively separated. Given these observations, we believe that this species would have a type “r” reproductive strategy, that is, one which favors a high number of offspring over parental care, with the consequent high natural mortality of offspring. Additionally, as a preventative measure, the tadpoles with greater development are separated, to avoid possible cannibalism or attacks between them.

To date, the hatchlings have shown very successful growth rates, with a wide variety of timing for metamorphosis to take place, that is, with asynchronous starting of the process for tadpoles of the same age. Metamorphosis has taken an average total time of approximately six weeks in the individuals who have completed it so far.

In this regard, the extremely low mortality that the offspring have presented so far is surprisingly favorable. Only fourteen individuals (2.3% of the hatchlings born), of which twelve were tadpoles, were euthanized as they presented deformities that were incompatible with their long-term well-being.

Regarding all these reproductive, health and behavioral achievements, we hypothesize that they are mainly due to the housing conditions, which have always been established with strong emphasis on sensory comfort, in providing shelters and psychological barriers to promote natural behaviors and the possibility of environmental choice by frogs. We have also provided specialized nutrition, and constant monitoring of environmental and health conditions, all of which have resulted in high levels of well-being, thus contributing to the successful *ex situ* conservation of this threatened species. Likewise, the phenotypic adaptive plasticity of this species could be playing an important role in reproductive achievements under high levels of care and accommodation for *ex situ* well-being.

For this reason, it is extremely important to continue not only with activities that ensure the survival of this species in the future, but also with research that allows us to provide relevant information on a species which is little known to science.

In parallel to all these efforts, and together with our external collaborators - specialists from conservation entities - we continue to work strongly with government organizations and NGOs, for the future restoration and protection of the natural habitat of the Loa frog, so that in the near future, the animals born within our care can be introduced to their natural environment, thus enhancing the *in situ* conservation of the species and its environment.

Thanks

To the Amphibian Ark for the emergency fund which we received in 2019 for the rehabilitation of rescued Loa frogs. To Chester Zoo for the support funds for the conservation project. To our various external collaborators, protectors of the *Telmatobius*, including representatives of the ASG-IUCN, Chester Zoo, Natural History Museum of Calama, Ministry of the Environment, Re:wild, Chilean universities, and many others.

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Tadpoles (above), and post-metamorphic (below) Loa frogs, born in the Parquem National Zoo - Chile. Photos: Parquem.



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Conservation Needs Assessments for the threatened and endemic amphibians of Argentina

Borja Baguette Pereiro, Ecoparque de Buenos Aires, Argentina; Federico Pablo Kacoliris, University of La Plata, Argentina; and Luis Carrillo, Training Officer, Amphibian Ark

Eleven years after the first Amphibian Conservation Needs Assessment Workshop was held in Argentina in 2010, a second workshop was held from August 2-6 this year, using a virtual format. This workshop focused on endangered and/or endemic amphibian species in Argentina.

Participants in the workshop included experts from all over the country, whose experience and knowledge contributed greatly to the assessment questions, objectively and consistently identifying priority species and immediate conservation needs for both *in situ* and *ex situ* actions. There are ten conservation actions which are not mutually exclusive, that can be attributed to each species: Rescue, *In Situ* Conservation, *In Situ* Research, Husbandry Research, Applied *Ex Situ* Research, Mass Production in Captivity, Conservation Education, Supplementation, Biobanking or No Action Required. These categories are generated from the information in each assessment, which includes the current conservation status, threats, presence in protected habit, previous *ex situ* management experience, potential population recovery capacity, and authorization to collect founder animals, if required.

During the workshop, fifty-four species were assessed by thirty-eight specialists, representing universities, non-government organizations and independent researchers. The assessments have now all been reviewed and approved for publication, with the conservation actions shown in Table 1 being recommended.

Some of the priority species being considered for *ex situ* programs include Darwin's blackish toad (*Melanophryniscus nigricans*), El Rincon Stream frog (*Pleurodema somuncurense*), Patagonia frog (*Atelognathus patagonicus*), *Alsodes neuquensis*, Rivera redbelly toad (*Melanophryniscus devincenzii*), *Melanophryniscus estebani* and Pehuenche spiny-chest frog (*Alsodes pehuenche*). It is worth mentioning that the first three species are already being managed in *ex situ* conservation breeding programs in Argentina, with all of them supported by the Amphibian Ark.



The Patagonia frog (*Atelognathus patagonicus*) is a high priority species for conservation action in Argentina, and is currently in a conservation breeding program. Photo: Federico Kacoliris.

Over the coming months, the conservation actions identified for each species will be compiled into a planning document, in order to have a summary and a template for developing an action plan and a research-needs guide for each of the evaluated species.

The Conservation Needs Assessments for Argentina, along with more information about the process itself is available on the assessment web site at www.conservationneeds.org.

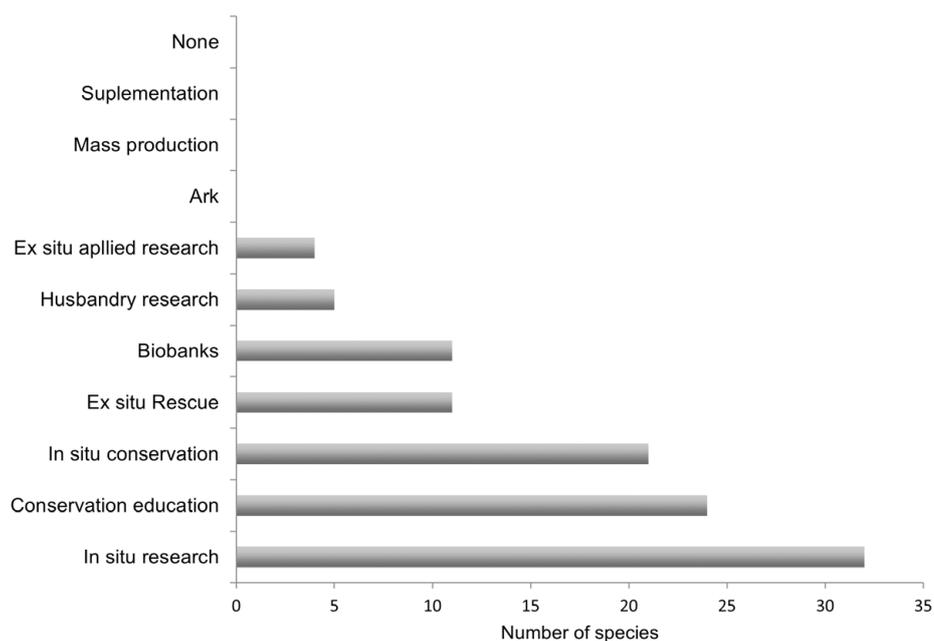


Table 1. Recommended conservation actions for endangered or endemic amphibians in Argentina.

Successful breeding of Kroombit tinkerfrogs at Currumbin Wildlife Sanctuary

Michael Vella, Supervisor, Reptiles & Amphibians, Currumbin Wildlife Sanctuary, Australia

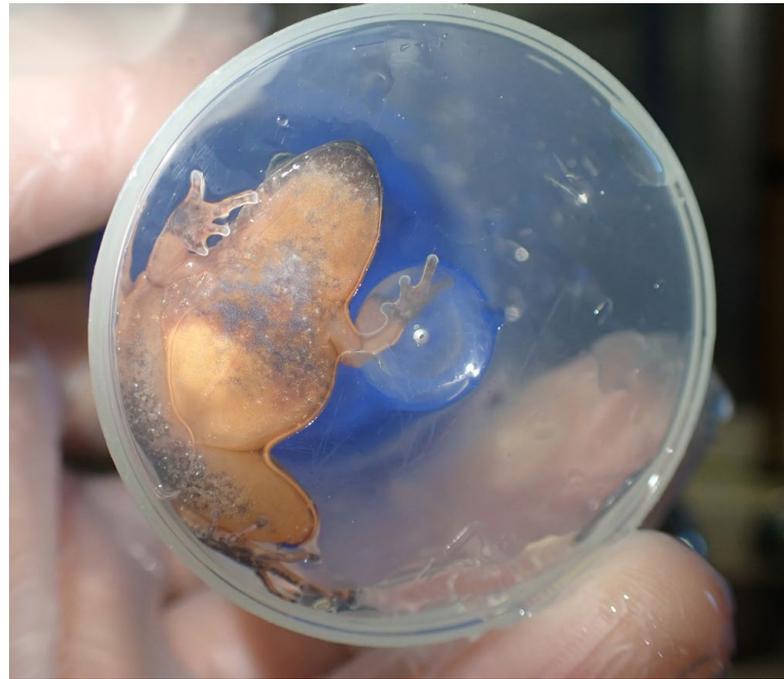
In a recent assessment of the conservation status of Australian frogs, the Critically Endangered Kroombit tinkerfrog (*Taudactylus pleione*) was considered the fifth most-likely species to go extinct by 2040. It also ranked highest in the list of twenty-three priority Australian amphibian species recommended for captive breeding, reflecting a serious need for intervention. Since this assessment, the Australian Government has listed the Kroombit tinkerfrog as one of the top three priority amphibian species in their Threatened Species Strategy Action Plan 2021-2026.

In the last two years, recovery efforts for the Kroombit tinkerfrog have taken a leap forward with the establishment of a captive breeding colony and successful breeding of tinkerfrogs at Currumbin Wildlife Sanctuary. Following the first successful breeding event in early 2019, captive animals held at the Sanctuary have spawned several more times. Tadpoles from these breeding events have metamorphosed successfully and are being reared to adulthood for subsequent release into the wild. 'KT1', the first captive-bred froglet to emerge in late 2020 (as reported in AArk Newsletter number 52, December 2020), is already nearing maturity and may be ready to breed as early as next year.

Protocols for successful breeding and husbandry of the Kroombit tinkerfrog were initially developed at Currumbin Wildlife Sanctuary in conjunctions with former Griffith University researcher Professor Jean-Marc Hero and Dr Ed Meyer, using an analog species, the closely-related Eungella tinkerfrog (*T. lieimi*), in the late 2000s. Successful breeding and rearing of Kroombit tinkerfrogs, however, has required some modifications to those protocols, including the provision of finely-ground food supplements (fish food pellets, dehydrated albumen and a commercial tadpole pellet) for tadpoles and smaller prey (collembola) for recently-metamorphosed frogs.

As well as providing animals for release into the wild, the captive-breeding program at Currumbin Wildlife Sanctuary has yielded valuable insights into the reproductive biology of the Kroombit tinkerfrog. The eggs, spawn and tadpoles of this species have never been observed in the wild, despite intensive searches over many years, and these have all now been observed in captivity at the Sanctuary.

A recently metamorphosed Kroombit tinkerfrog. Juvenile tinkerfrogs raised in captivity are far more brightly coloured than their adult counterparts but lose their bright colouration upon reaching sexual maturity. Photo: Harry Hines, Queensland Parks and Wildlife and Partnerships.



'KT1' the first captive-bred Kroombit tinkerfrog (*Taudactylus pleione*) at Currumbin Wildlife Sanctuary, with early egg development visible in her abdomen. Photo: Michael Vella, CWS.



Male and female Kroombit tinkerfrogs in amplexus prior to spawning at Currumbin Wildlife Sanctuary in November 2021. Photo: Michael Vella, CWS.



With over eighty juvenile Kroombit tinkerfrogs and tadpoles from another two freshly-laid clutches on the way, the existing husbandry facilities at Currumbin Wildlife Sanctuary are now close to capacity. Australian Government funding provided to zoos (including Currumbin Wildlife Sanctuary) in response to the 2019-20 bushfires will fortunately allow these facilities to be upgraded to accommodate the growing number of tadpoles and metamorphs being reared at the Sanctuary for release to the wild. This funding is also supporting *in situ* conservation management measures being undertaken by Queensland Parks and Wildlife and Partnerships at Kroombit Tops National Park, including, enhanced population monitoring, the control of feral pigs, as well as field work supporting the future release of captive-bred animals into the wild, such as eDNA surveys for chytrid fungus. Staff from Currumbin Wildlife Sanctuary have joined forces with Parks and Wildlife staff and volunteers from the Queensland Frog Society to undertake field work supporting recovery of the Kroombit tinkerfrog.

Several Kroombit tinkerfrog tadpoles feeding off protein-enriched substrate. Photo: Michael Vella, CWS.



Late-stage tadpole of Kroombit tinkerfrog nearing metamorphic climax. Once the metamorphs reach Gosner stage 42 (which is signified by the emergence of forelimbs), they are removed from the tadpole tank by net and placed into a small froglet rearing enclosure. Photo: Michael Vella, CWS.

Breeding enclosures contain shallow, gently-running water and are furnished with a variety of rock configurations which act as refuge areas for the frogs, call sites for males, and semi-submerged rocks for oviposition sites for breeding pairs. Photo: Michael Vella, CWS.



Using Conservation Needs Assessments to develop conservation action plans for Brazilian amphibians

Cybele Sabino Lisboa, Caroline Batistim Oswald, Janaína Serrano, Quezia Ramalho, Renata Ibelli Vaz, and Iberê Farina Machado, IUCN Amphibian Specialist Group, Brazil

In 2020, the IUCN SSC Amphibian Specialist Group (ASG Brazil) and Amphibian Ark organized a Conservation Needs Assessment (CNA) workshop with Brazilian experts to assess the conservation needs of amphibian species in Brazil (see AArk Newsletter 52, 2020, www.amphibianark.org/Newsletters/AArk-newsletter-52.pdf). The assessment workshop took place between August and November 2020, however the review and approval process of the assessments wasn't completed until April 2021, when they became publicly available on the CNA website www.conservation-needs.org.

As Brazil is a megadiverse country, which currently has 1,188 known amphibian species, and to make the CNA process more focused on species which most need action, we chose to assess only those species which were listed in one of the threatened categories. We used the last national Red List provided by the RAN/ICMBio (Brazilian government agency) as a reference for this, and although the evaluations took place in 2018, the results are yet to be published.

Sixty-seven species were evaluated, of which thirteen were listed as high priority for *ex situ* rescue conservation actions. Of the species which were evaluated, twenty-five were also recommended for *in situ* conservation actions, sixty-six for further *in situ* research, five for husbandry research, thirteen were recommended for biobanking, fifteen for applied *ex situ* research and forty-eight species were recommended as ideal for conservation education purposes. Of the thirteen high priority rescue species, one is from the southern region of Brazil, nine occur in the southeast, one in the mid-west, one in the north and one in the northeast.

In order to disseminate the results of the CNA to the wider con-

Pithecopus rusticus is a high priority species which is found only on privately-owned land and the primary threat to this species is the alteration of the wetlands in the area. Photo: Elaine Lucas.

servation community, ASG Brazil organized the 3rd ANFoCO (Amphibians in Focus) – Brazilian Symposium on Amphibian Conservation (<https://asgbrasil.wixsite.com/asg-brasil>), which took place from November 30 to December 2, 2021, as a virtual symposium. The idea behind ANFoCO is

to provide a platform that generates contacts, connects different actors, promotes debate and which results in taking action that effectively contributes to the conservation of amphibians in Brazil.

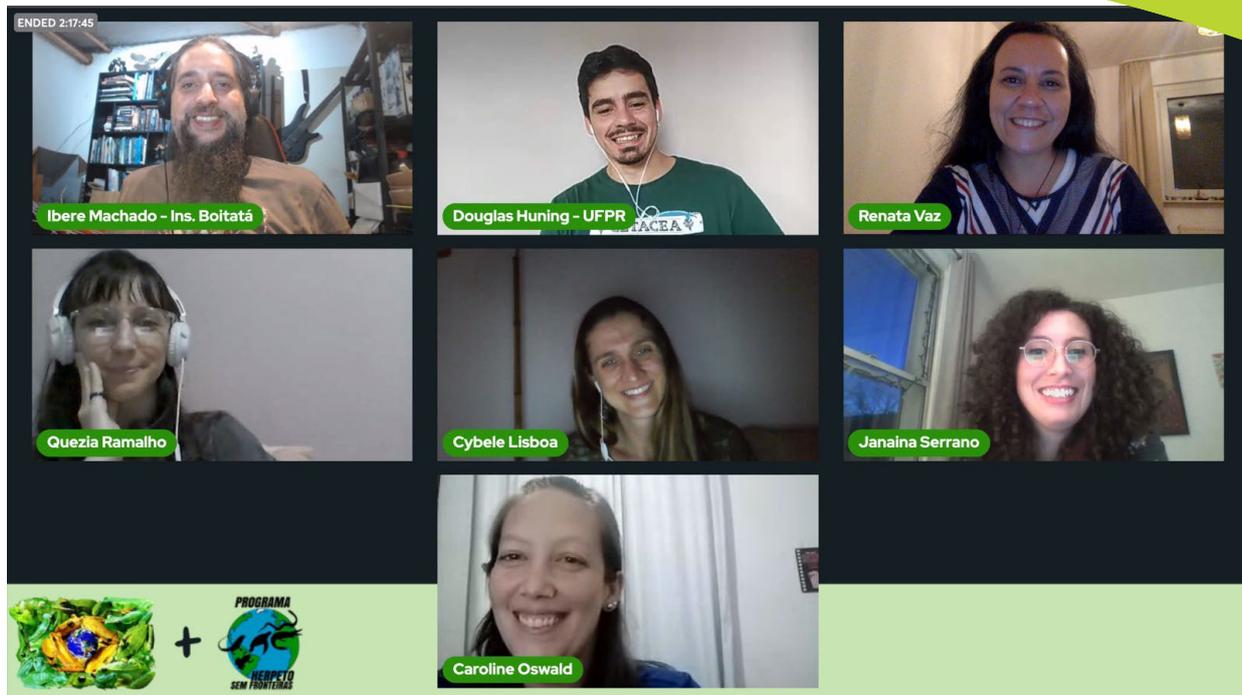
The central theme of the 3rd ANFoCO was the reality of Brazilian endangered species, with emphasis on the thirteen species that are high priority for *ex situ* conservation. Our objective was to discuss the current situation of these species and what paths we should take to conserve them. Therefore, we adopted a slogan for the event: "Where are we, why are we here and where do we want to go?"

The 3rd ANFoCO included thirty-two speakers with different areas of expertise. On the first day of the event, institutions which are important for conserving of amphibians were presented, both in the Brazilian and global context, and the results of the CNA workshop were presented. Lectures were also held to discuss the high priority species in each region of Brazil. The second day focused on the most important threats in the context of Brazilian endangered species, and on the third day we began developing conser-



A competition was held to design a logo for the symposium, with a drawing of *Nyctimantis pomba* by Ibrahim Nehemy winning.





vation strategies for amphibians, including strategies to search for missing species, implement *ex situ* conservation actions, disseminate scientific information and protect amphibian habitat.

The 3rd ANFoCO (Amphibians in Focus) symposium organizing committee (ASG Brazil team) and the “Herpeto sem Fronteiras” representative.

Although it has several limitations, the event’s online format, provided the opportunity to reach and engage more people from different locations, with around 430 participants registering. The 3rd ANFoCO was held in partnership with the YouTube channel “Herpeto sem Fronteiras” (www.youtube.com/c/HerpetoSemFronteiras), and the lectures are available on that channel for anyone who could not attend on the days and times that the event took place. As discussion time at online events is limited, we created a channel on the ResearchGate to connect actors and expand discussions on the topics covered in the 3rd ANFoCO (see www.researchgate.net/post/Estrategias_ex-situ-Anfoco_III).

The completion of the CNA and the 3rd ANFoCO were important steps towards directing and publicizing the actions necessary to help conserve endangered Brazilian amphibians. ASG Brazil’s next steps will be focused on the development of specific action plans for the thirteen high priority species, and will engage all the necessary stakeholders from academia, zoos, governmental and non-governmental organizations.

Amphibian Ark grants

Amphibian Ark has a range of granting opportunities throughout the year. In March each year, we accept applications for our Conservation Grants (www.amphibianark.org/conservation-grants/), and in August of each year we call for applications for the George and Mary Rabb Fellowship (www.amphibianark.org/george-and-mary-rabb-fellowship/).

Conservation Grants

Four different types of grants are available: Start-up grants, Extension grants, Workshop attendance, and Mentorship grants. Each of these grants are described on the Conservation Grants page on our web site. Our grants are intended to support conservation projects for amphibian species that cannot currently be saved in the wild, with a focus on *ex situ* actions, and in partnership with appropriate field activities. Preference will be given to projects for species which have been assessed as in need of *ex situ* rescue or research work, either as a recommendation from a Conservation Needs Assessment (www.conservationneeds.org) or a similar, national assessment process.

George and Mary Rabb Fellowship

This fellowship supports early or mid-career scientists and conservationists in research-based professional development that furthers amphibian conservation. This fellowship is not intended to help support graduate-student research. Proposals that address species research priorities indicated in the Amphibian Red List and/or the Amphibian Ark Conservation Needs Assessment (CNA), or thematic research priorities indicated in the Amphibian Conservation Action Plan (ACAP) will be given preference. Applicants must be formally associated with a mentor or lead scientist at a relevant university, NGO, zoo/aquarium, or other established institution. The fellowship carries a \$5,000 stipend and is open to applicants from all countries.

Amphibian Ark donors, January 2020 - November 2021

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Up to \$60,000

Anne Baker & Robert Lacy,
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