amphibian ark

Keeping threatened amphibian species afloat

Newsletter

Number 34
March 2016

In this issue...

Amphibian Ark
c/o Conservation Breeding 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

Cooperation for the *ex situ* conservation of endangered Ecuadorian amphibians

Luis Carrillo, Training Officer, Amphibian AArk

With more than 500 species, Ecuador is one of the richest countries in the world in terms of amphibian species. Unfortunately Ecuador is also in the top five counties with the most threatened amphibian species. The *ex situ* conservation community in Ecuador is aware of this situation and there are currently four *ex situ* amphibian conservation centers and some new projects focussing on single-species, all of which hold amphibian species that are facing serious threats, and which are unlikely to survive long-term in the wild.

Twenty-five participants representing the four major Ecuadorian amphibian conservation centers, the Ecuadorian government, museums, universities and other small captive breeding initiatives attended a workshop in Quito, Ecuador, to develop a draft action plan for working cooperatively on the *ex situ* conservation of endangered Ecuadorian species. Photo: Francisco Mosquera.

To enhance the impact that those centers have on Ecuadorian amphibian conservation, Amphibian Ark organized a workshop with the support of Saint Louis Zoo, USA and Philadelphia Zoo, USA, that brought together stakeholders interested in *ex situ* amphibian conservation. Both St. Louis and Philadelphia Zoos have long-term relationships with amphibian conservation organizations in Ecuador. The workshop was held from February 24 -26 at the Instituto Nacional de Biodiversidad (National Biodiversity Institute) which is associated with the Environmental Ministry. Twenty-five participants, representing the four major centers, the Ecuadorian government, museums, universities and other small captive breeding initiatives attended the workshop.

The workshop was facilitated by Amphibian Ark and the main goal was to develop a draft action plan for working cooperatively on *ex situ* conservation of endangered Ecuadorian species.

Each organization shared their vision, mission, goals, successes and failures so participants could identify common ground as a base for the rest of the workshop. There was also discussion about the Ministry of the Environment's project "Biodiversity conservation of Ecuadorian amphibians and use of genetic resources" which will focus its captive breeding component on four endangered anuran species.

The Napo Cochran Frog (*Nymphargus anomalus*) is endemic to Ecuador and was recommended for an *ex situ* rescue program during the Conservation Needs Assessment workshop in 2012. Photo: Santiago Ron, Balsa de los Sapos.

Hyloscirtus pantostictus.
Photo: Santiago Ron, Balsa de los Sapos.

Participants developed a plan with twelve goals, with accompanying actions and indicators:

1. Create an *Ex Situ* Conservation Management Task Force
2. Create a Memorandum of Understanding (MOU) among the different conservation centers
3. Share species lists and numbers of individuals in each center
4. Gather information on amphibian reintroduction (including IUCN Reintroduction Guidelines) and propose a general reintroduction protocol
5. Update species protocols and define priority species for conservation
6. Strengthen capacities within each center and among centers
7. Disseminate results and achievements made by each center through discussion forums
8. Update species management plans
9. Standardize and disseminate management protocols by groups of species and individual species when needed
10. Develop a matrix of strengths of the different institutions participating in the workshop
11. Develop grant proposals as a group
12. Develop protocols for preserving specimens for museums or other research uses.

The Tiger's Treefrog (*Hyloscirtus tigrinus*) is one of a group of endangered Ecuadorian amphibian species that will be the focus of the new *Ex Situ* Conservation Management Task Force. Photo: Katty Garzón, Herpetological Fundación Gustavo Orcés.

Two major accomplishments from the workshop were agreement on the creation of an *Ex Situ* Conservation Amphibian Task Force for Ecuador and the appointment of a National Coordinator who will lead the Task Force and facilitate the accomplishment of the above goals. Dr. Diego Almeida was designated to fulfil this position for a period of twelve months, with the generous support of a grant from the Auckland Zoo Conservation Fund, New Zealand. The Saint Louis Zoo and Philadelphia Zoo also expressed their support for this initiative and they will continue to support the projects they are involved with in Ecuador as well as this new cooperative management initiative.

The National Biodiversity Institute was represented by its Director, Dr. Luis Fernando Rodriguez, and he expressed the Institute's support and offered for the Institute to act as a "go-between" among the group and other government departments and offices related to amphibian conservation.

Amphibian Ark will continue to support the different amphibian conservation centers in the country and will also support and encourage the formal creation of the Task Force and its national coordinator.

We are convinced that the collective experience and expertise of the Ecuadorian biologists and researchers involved in *ex situ* amphibian conservation, along with the continued support and help from Amphibian Ark, Saint Louis Zoo, Philadelphia Zoo and the National Biodiversity Institute, will ensure that those amphibian species that can not currently be safeguarded in the wild in Ecuador now have more opportunities to avoid extinction.

A short video about the workshop (in Spanish) was made by the Instituto Nacional de Biodiversidad and this is available on YouTube: www.youtube.com/watch?v=JdpLEmGqbgw.

A number of *Atelopus* species, including the Wampukrum Toad (*Atelopus* sp. nov *wampukrum*) are the focus of captive breeding programs in Ecuadorian organizations. Photo: Carlos C Martínez Rivera, Centro de Conservación de Anfibios, Zoo Amaru.

Amphibian Ark 2016 Seed Grant announcement

Amphibian Ark is pleased to announce the 8th annual call for proposals for its Seed Grant program!

This competitive US$5,000 grant is intended to fund start-up rescue projects for species that cannot currently be saved in the wild. Successful proposals will reflect AArk values; please pay careful attention to the grant guidelines (below and also at www.amphibianark.org/aark-seed-grant/ for details on what types of projects are favored. Past grantees can be seen at www.amphibianark.org/seed-grant-winners/.

Inquiries can be directed to Kevin Johnson, Taxon Officer KevinJ@amphibianark.org.

We would like to acknowledge the generous support of the Naples Zoo, Florida, Andrew Sabin Family Foundation, Ronna Erickson, Woodland Park Zoo, the European Association of Zoos and Aquariums, and the other AArk supporters (www.amphibianark.org/our-donors/) who helped establish this grant.

Priority guidelines - please read very carefully!

This grant is not intended to fund workshops, educational exhibits, project overheard or indirect costs.

Projects must include an *ex situ* component, and must be working with species that need to be rescued (species whose threats cannot be mitigated in nature in time to prevent their extinction and which therefore require urgent *ex situ* intervention to persist). Projects must be based within the native range country of the species and must adhere to recommended biosecurity standards (www.amphibianark.org/pdf/Biosecurity_standards_for_amphibians.pdf), except where a valid scientific argument can be made to the contrary. The concept of a 'seed' grant is to fund newly-launched projects - those at the very beginning of their life, in order to help them attract larger and/or long-term funding for the duration of the program.

Please read the Seed Grant page on the AArk web site, www.amphibianark.org/aark-seed-grant/ and download the application guidelines, www.amphibianark.org/pdf/AArk-Seed-Grant-2016.pdf - **all applications must follow these guidelines**.

AArk staff are available if you need assistance in formulating your proposal. Please do not hesitate to contact us with any questions. Each year several proposals have been rejected due to issues that could have been prevented!

Important dates:

Grant application deadline: **1 May 2016**
Grant decision/notification date: **15 May 2016**
Winners must provide bank details by: **21 May 2016**
Grant payment date: **1 June 2016**
Progress report due **1 June 2017**

Recent animal husbandry documents on the AArk web site

The Husbandry Documents library on the AArk web site (www.amphibianark.org/husbandry-documents) currently has over 150 articles in it, with additional articles being added regularly. One new document has been added recently:

How much UV-B does my reptile need? The UV-Tool, a guide to the selection of UV lighting for reptiles and amphibians in captivity

Guidance is almost non-existent as to suitable levels of UV lighting for reptiles and amphibians, or how to achieve satisfactory UV gradients using artificial lighting. The UV-Tool is a working document that seeks to address this problem, by considering the range of UV experienced by each species in the wild. The UV-Tool contains an editable and expanding database of the microhabitat requirements and basking behaviour of reptile and amphibian species, as derived from field studies, or inferred from observed behaviour in captivity. Since an animal's UV-B exposure is determined by its behaviour within its native microhabitat, estimation of its natural range of daily UV-B exposure is then possible. The current version of the UV-Tool assigns 254 species to each of four 'zones' of UV-B exposure (Ferguson zones) based upon UV-index measurements. Once the likely UV requirement of any species of reptile or amphibian is ascertained, the next step is to plan safe but effective UV gradients within the captive environment. To do this requires knowledge of the UV spectrum and output of the lamps to be used. The UV-Tool therefore includes test reports and UV-index gradient maps for commercially available UV-B lighting products, and a guide to selection of appropriate lamps for use in vivaria and in larger zoo enclosures. There are reports on 24 different products in the current version of the UV-Tool. This document has been compiled by members of the British and Irish Association of Zoos and Aquaria (BIAZA) Reptile and Amphibian Working Group (RAWG) with contributions from zookeepers and herpetologists from the UK and abroad. Further input is welcome and encouraged.

Author: Frances Baines, Joe Chattell, James Dale, Dan Garrick, Iri Gill, Matt Goetz, Tim Skelton and Matt Swatman
Version: Journal of Zoo and Aquarium Research 4(1) 2016
Language: English

The complete document is available at: www.amphibianark.org/?wpfb_dl=188.

Amphibian Advocates

In this newsletter Kay Bradfield from Perth Zoo in Australia talks about her involvement in a wide-range of amphibian programs in several different countries. Along with many others, Kay focuses much of her efforts on captive rescue and research programs for some of the most threatened amphibian species. These captive efforts allow us to buy time, so that the threats faced by the species in the wild can be properly evaluated and overcome, and eventually, captive-bred animals can be returned to a safe environment. The profiles of all of our Amphibian Advocates can be found on the AArk web site www.amphibianark.org/amphibian-advocates.

If you would like to nominate an Amphibian Advocate to be featured in a future edition of the AArk Newsletter, please send us an email to newsletter@amphibianark.org and we'll add your suggestion to our list!

Kay Bradfield from Perth Zoo in Australia says she knows first-hand that zoos can make significant contributions to recovery efforts for threatened species. Photo: Perth Zoo.

Kay Bradfield, Curator Collections, Perth Zoo

The short version...

Over the last 20+ years I've had the privilege of working with a diverse range of amphibians, including a number of Endangered and Critically Endangered species, both *in situ* in fantastic places like north Queensland, south-west Western Australia, New Zealand, the eastern USA, the Caribbean, the Seychelles and the British Channel Islands, and *ex situ*. In terms of *ex situ* experience, I've worked with forty-eight amphibian species in institutions in three countries, including representatives from all three orders, and I've been involved with a number of *ex situ* conservation programs.

The full story...

I was born in the US, and my family lived in the Bahamas and then Florida before moving to north Queensland when I was thirteen - these were all fantastic places to spend lots of time outside exploring, and I spent many very happy hours finding and watching wildlife. I don't think it surprised anyone when I subsequently decided that I wanted to be a biologist! I have to admit that I actually went to university (James Cook University in Townsville, Australia) intending to be a marine biologist, not a herpetologist. I'd always been really partial to frogs, though, so when I was in my second year and a PhD student working on rainforest frogs needed a volunteer, I signed on the dotted line. The first night I spent doing frog field work literally changed my life – I decided that, much as I loved fish, it was really all about the frogs, and I switched from focussing my studies on marine biology to terrestrial and freshwater ecology.

My first 'professional' experience looking after frogs in captivity was providing keeper cover for a colony of threatened Sharp-snouted Day Frogs (*Taudactylus acutirostris*) at James Cook University over the 1993/94 holiday period. These frogs had been brought into captivity because population numbers were crashing in the wild, and all of the captive individuals subsequently died as well. It wasn't until 1998, when Berger et al. documented *Batrachochytrium dendrobatidis* in Sharp-snouted Day Frogs that had died in the wild and in the James Cook University colony that we finally understood why the losses had occurred. Even though I was only involved in a minor capacity, this experience working with one of the species that was sounding the alarm for amphibian biologists globally was an incredible learning opportunity for me. While I continued working and studying at James Cook University, I gained additional amphibian husbandry experience by caring for a range of tropical frogs that were maintained as classroom animals.

I moved to New Zealand in early 2003, and it was while I was living there that I shifted from working in the field and in labs to working in a zoo. I grew up reading Gerald Durrell's books and always believed that good zoos were really well-positioned to make meaningful contributions to wildlife conservation, so I decided to apply when I saw a keeping position advertised at Hamilton Zoo. Given they were looking for a mammal keeper they definitely took a chance employing an amphibian ecologist! Funnily enough though, that mammal keeping job led me right back to amphibians. While I was working there, opportunities arose for the zoo to become involved with conservation efforts for both Archey's Frogs (*Leiopelma archeyi*) and Hochstetter's Frogs (*Leiopelma hochstetteri*), and, since I'd previously worked with both species in the field for the New Zealand Department of Conservation and also had frog husbandry experience, I was ideally placed to establish facilities, develop husbandry protocols and care for the frogs.

I really enjoyed working with frogs again, so, in 2006, I attended an Amphibian Conservation Husbandry course at Durrell Wildlife Conservation Trust in the British Channel Islands. That was another pivotal event in my career, as it ultimately led me to leave New Zealand to take up the position of Amphibian Specialist/Senior Keeper in the Herpetology Department at Durrell. This was a fantastic opportunity for me, as I had the chance to work with a wide range of species from different families, habitat types etc. I also got to work with and learn from some fantastic people based in that part of the world. In addition to husbandry and captive breeding of both amphibians and reptiles, I was also involved with managing the department's amphibian programs (including breeding and rearing Critically Endangered Mountain Chickens (*Leptodactylus fallax*) for release to the wild and head-starting local Agile Frogs (*Rana dalmatina*)), reviewing and improving amphibian biosecurity and husbandry standards, over-seeing annual cycling/breeding regimes and contributing to the design and establishment of biosecure units for conservation breeding programs. I also undertook *in situ* conservation work (with Common Toads (*Bufo bufo*) and Agile Frogs on Jersey and Mountain Chickens in the West Indies), trained staff from the department and from other institutions in amphibian husbandry and contributed to organizing and teaching an Amphibian Conservation Husbandry course.

Kay Bradfield was very closely involved in the head-start for release programs for the threatened White-bellied Frog (*Geocrinia alba*) at Perth Zoo. Photo: Perth Zoo.

In 2010 I decided it was time to come back home to Australia, and I accepted a position at Perth Zoo. In my initial position of Supervisor of the Native Species Breeding Program, I was very closely involved in our head-start for release programs for both threatened White-bellied Frogs (*Geocrinia alba*) and Orange-bellied Frogs (*Geocrinia vitellina*), and in breeding threatened Sunset Frogs. I've since taken on the role of Curator Collections, but I'm still involved in our native amphibian conservation programs. Spring is my favorite time of the year, because I get to join some of the other members of our fabulous frog team on one of the White-bellied and Orange-bellied Frog field trips!

I've been a Co-Convenor of the Zoo and Aquarium Association (Australasia) Amphibian Taxon Advisory Group since 2011, and I'm also a member of the IUCN Amphibian Specialist Group's Conservation Breeding Working Group. Through these roles, I help develop and promote best practice in *ex situ* amphibian management. I know first-hand that zoos can make significant contributions to recovery efforts for threatened species, and I'm more than happy to share any knowledge and experience I have that's of value to others.

AArk web site in Portuguese

In the last edition of the Amphibian Ark Newsletter we announced that we have just completed a major upgrade of the AArk web site, www.AmphibianArk.org. Since then, we have been working to complete the translation of the site into Portuguese, www.AmphibianArk.org/pt/ and this is now almost complete.

In 2010, thanks to the generous support of Oceanário de Lisboa (www.oceanario.pt) in Portugal, we were able to have the pages from our site at that time professionally translated into Portuguese. Our site has grown quite considerably since then and many pages have also been updated, and thanks to three great volunteer translators, William Baptista, Geraldo Quintas and Manuel Sant'Iago Ribeiro, we have almost completed the translation of the new and modified pages.

We hope that the Portuguese version of our site will be of particular interest to amphibian conservationists in Brazil, where amphibian biodiversity is very high, as are the number of threatened species.

Thanks William, Geraldo and Manuel for generously contributing your time to support amphibian conservation!

Lucy is the face of a global fight to save the Lemur Leaf Frog from extinction

Andrew R. Gray, Curator of Herpetology, Manchester Museum, UK; and Matthew O'Donnell, Curatorial Assistant - The Vivarium, Manchester Museum, UK

A nine-year-old schoolgirl has fronted a global educational campaign, launched in January 2016, to save one the world's rarest frogs. Lucy Marland, joined forces with The University of Manchester, after coming face to face with a Lemur Leaf Frog (*Hylomantis lemur*), kept at Manchester Museum. The campaign, called 'Learning with Lucy', aims to educate primary age school children in the UK and in the Guayacan region of Costa Rica, where the frog still survives, about the amphibian and its threatened rainforest habitat. Europe's largest conservation organisation, Norden's Ark, will bring the campaign to Swedish schoolchildren, and University of Manchester students will also take part in conservation work in Costa Rica.

Lucy said: "I am so excited to be part of this project because I love frogs and I am very worried about the Lemur Leaf Frog and its survival. I want everyone to know that with a little effort, we can make a difference for these frogs and other endangered animals."

Andrew Gray, Curator of Herpetology at Manchester Museum, oversees the amphibian collection at Manchester and leads the Lemur Leaf Frog Conservation Project, www.lemurfrog.org. The conservationist has also worked closely with Sir David Attenborough on several BBC television series.

Andrew said: "It was incredible to witness the instant effect this tiny amphibian had on Lucy. She decided there and then that one day she would be a zoologist and once home, with the help of her mother Marie, she wrote to the University and it all happened from there."

Nine-year-old Lucy Marland has fronted a global educational campaign, launched at the Manchester Museum in the UK in early 2016, to save one the world's rarest frogs, the Lemur Leaf Frog (*Hylomantis lemur*). Photo: Alan Seabright.

"It all starts with you, our theme, is about each and every one of us making an impact on the world around us. That someone so young can fully grasp that concept, immediately take it on board, and actively start doing something about it is extra special."

Manchester Museum's Curatorial Assistant Matthew O'Donnell in the Museum's Lemur Leaf Frog facility.
Photo: Andrew Gray/Manchester Museum.

Backing the campaign, Sir David Attenborough said: "I wholeheartedly support Manchester Museum's campaign, headed by Lucy Marland, to save the Lemur Leaf Frog. It is after all, one of the world's most unusual and rarest amphibians – and it is in real trouble."

Project Lemur frog is an international collaboration between several committed individuals and institutions aimed at conserving Lemur Leaf Frogs. This model project uses a holistic approach to amphibian conservation, combining direct *in situ* support for the wild population, *ex situ* conservation in the form of a professionally managed captive assurance colony, a cutting edge conservation research aspect, and a myriad of highly effective public engagement activities.

Andrew adds: "One major aim of the environmental education side of the project is to teach Guayacan children about appreciating their own threatened natural resources and the biodiversity and natural history of their country, Costa Rica". "It's surprising how little they know; educational resources, a booklet and field trips will play a part in correcting that. This aspect has been developed and is being fully delivered by the Costa Rican Amphibian Research Centre, a key and valuable partner in Project Lemur Frog. As well as three short films we have had made for the project, an education pack for primary school children worldwide and placements for Biological Sciences undergraduates are also part of the mix."

Professor Amanda Bamford, Associate Dean for Social Responsibility said: "That this Manchester University project also supports environmental education in a primary school in Costa

Sir David Attenborough supports Manchester Museum's "Learning with Lucy" campaign, saying that one of the world's most unusual and rarest amphibians is in real trouble. Photo: Andrew Gray/ © lemurfrog.org.

Rica, where these frogs occur in the wild, not only reflects a genuine commitment to helping conserve endangered species but also provides us with a wonderful opportunity for our undergraduates to exercise their global citizenship."

The videos and information on the associated learning pack are available at www.ls.manchester.ac.uk/learningwithlucy, and the videos are also available on Vimeo: https://vimeo.com/144412745, https://vimeo.com/145448334 and https://vimeo.com/145971619.

Information about *in situ* education at the Costa Rican Amphibian Research Centre is also available: http://lemurfrog.org/education/environmental-education-in-costa-rica/.

Some of the terrariums for Lemur Leaf Frogs at Nordens Ark in Sweden. Photo: Claes Andrén.

Oregon Spotted Frog recovery in Washington State: Concluding eight years of successful partnerships

Jennifer Pramuk, Animal Curator, Woodland Park Zoo, USA; Kelli Bush, Sustainability in Prisons Project Program Manager, The Evergreen State College, USA; and Sadie J Gilliom, Frog and Turtle Program Coordinator Sustainability in Prisons Project The Evergreen State College, USA

The Oregon Spotted Frog (*Rana pretiosa*) formerly ranging from British Columbia to north-western California in the United States, today occupies less than 10% of its former range. Primary threats to the species' survival include habitat alteration, introduced predators such as the North American Bullfrog (*Lithobates catesbeianus*), and invasive plants. In response to the range-wide decline of this species, it was listed as Endangered in Washington in 1997 and as Threatened in 2014 under the US Fish and Wildlife Endangered Species Act. Recovery efforts are range-wide and in Washington State, they began in 2008 with the Washington State Oregon Spotted Frog Working Group. The goals of the Oregon Spotted Frog Reintroduction Project from its inception were three-fold: to explore whether components of a translocation effort, such as rearing and post-release monitoring could be successful; to establish a self-sustaining population on the Joint Base Lewis-McChord Military Reservation; and to set the stage for a systematically-structured recovery effort for this species.

The Oregon Spotted Frog (*Rana pretiosa*) rearing yard at Woodland Park Zoo in Seattle, USA. Along with four other partner organizations, Woodland Park Zoo have reared and released over 7,000 frogs back into the wild since 2007. Photo Jennifer Pramuk.

Measuring Oregon Spotted Frogs at the Cedar Creek Correctional Center. Photos: Kelli Bush.

Washington State Oregon Spotted Frog Working Group was formed from diverse partnerships including the lead organization, Washington Department of Fish and Wildlife and frog-rearing institutions Northwest Trek Wildlife Park, Oregon Zoo, Woodland Park Zoo, and Cedar Creek Correctional Center. The Fish and Wildlife Program at Joint Base Lewis-McChord manages the translocation site, while Port Blakely Tree Farms, the Washington Department of Fish and Wildlife, and the US Fish and Wildlife Service manage the egg donor sites and provide logistical support. Washington Department of Fish and Wildlife biologists monitor frog populations and during the rearing program they collected eggs in the spring, which were delivered to headstarting institutions.

Perhaps the most unique and well-known aspect of this project is the role of the Sustainability in Prisons Project, a collaboration between the Washington Department of Corrections and The Evergreen State College (Evergreen). Through this program the Sustainability in Prisons Project supported Evergreen graduate students in training frog technicians at the Cedar Creek Correctional Center to care for frogs, from egg through adult life stages. The program promotes wildlife education, science literacy, job skills, and provides a certificate exchangeable for college credit for incarcerated men nearing release to the community. Due to the extensive support provided by prison staff, zoo and agency partners, this program was highly successful for both humans and frogs. Educational and outreach programs were also developed at the partnering zoos, through the development of citizen science amphibian monitoring programs.

Over the course of the program, husbandry changes were implemented including nutritional and water quality improvements, which resulted in increased survivorship that ranged from approximately 30% to 95% toward the end of the program. In order for the Washington Department of Fish and Wildlife and the US Fish and Wildlife Service to focus on habitat enhancements and monitoring of the reintroduced population, the head-starting program will cease indefinitely with 2015 marking the last frog release for the project. Field sites and the status of the frog in Washington will continue to be monitored by state and federal biologists.

Since the project's inception in 2007, partnering institutions have reared more than 7,000 frogs, which were released back to the wild. In recognition of the broadly-based partnership this program represents, it was awarded the Association of Zoos and Aquariums (AZA) North American Conservation Award in 2012. All of the institutions involved in the *ex situ* conservation efforts for the Oregon Spotted Frog, ranging from zoos to a local university and prison, have been full partners in efforts to recover the species in Washington State.

Conservation efforts for the Titicaca Water Frog on the Bolivian side of Lake Titicaca

Arturo Muñoz, Bolivian Amphibian Initiative, Museo de Historia Natural Alcide d'Orbigny, Bolivia, and Ghent University

The Titicaca Water Frog (*Telmatobius culeus*) which lives only in Lake Titicaca on the border of Bolivia and Peru, is listed as Critically Endangered by the IUCN, and is the world's largest fully aquatic frog. This species is facing extinction due to pollution, unsustainable harvesting, the introduction of exotic foreign species such as trout and king fish, and diseases such as chytrid fungus.

The Bolivian Amphibian Initiative together with the Museo de Historia Natural Alcide d'Orbigny has been working over the last several years with the Titicaca Water Frog both *in situ* to evaluate the real situation of this species and to understand better about the natural history and some aspects of this unique frog; and *ex situ*, learning how to keep and breed the species. After some trials we were able to produce offspring multiple times. All of these experiences provided us the with knowledge to improve our work with the species as well as to give us a better understanding of what we want to develop in the future.

In April and May of 2015 a massive die-off of the species was recorded in the "Lago Menor" region of the Bolivian side of Lake Titicaca. The Bolivian Amphibian Initiative decided to monitor the situation first-hand, and the findings were alarming. We found hundreds of dead frogs in very small areas in the shallow shores of the lake. After diving in deeper waters we confirmed that 100% of the frogs in the area were dead.

Apart from managing an *ex situ* breeding program for the Titicaca Water Frog (*Telmatobius culeus*), members of the Bolivian Amphibian Initiative regularly monitor environmental conditions and populations of the frogs in Lake Titicaca. Photo: Arturo Muñoz.

This alarming situation spurred the Bolivian Amphibian Initiative to start a project to try to understand the scale of the problem and to identify the cause of these massive mortalities. In addition to monitoring the situation in the lake, we also wanted to start a captive breeding program for the Titicaca Water Frog for future reintroduction purposes. All of this work so far has been in coordination with Bolivian government departments such as the Ministerio de Medio Ambiente y Aguas (Ministry of Environment and Water) and the Dirección General de Biodiversidad (General Directorate of Biodiversity) and other national and international institutions.

After several months of monitoring the species we have a better idea of the situation in the lake. We already knew that water pollution and sedimentation is the main factor that causes the massive die-offs of the frogs in the lake, but we also found other aspects that are playing a role in the decline of the species. We found an area in the Lago Menor where there are no more frogs - areas where previously the species was relatively common. There are also other areas where adult frogs are absent, and it seems that only juveniles or small adults are present. In these areas we also found that the number of frogs is less than we found in previous years. In a small area of Lago Menor we can still find adult frogs and even breeding activity, but unfortunately the water quality and the densities are not as good as the areas of Lago Mayor where the frogs are in much better conditions. We now see the need to monitor these remaining populations to see how they evolve and react to the constant change of conditions in their habitat.

After identifying this species as a priority for *ex situ* conservation action, and with the support of the IUCN Save Our Species (SOS) fund, Stiftung Artenschutz, Amphibian Ark and other institutions, we decided to start a captive breeding program for the species to maintain genetically and demographically viable populations in captivity while threats in the wild become better understood and mitigated. We obtained two populations as founders, one from Lago Mayor where the habitat and the frogs seem to be in relatively good condition and another population from Lago Menor where the frogs and the habitat are not in good condition, and in some areas the species is already absent.

After our experience with the species in the past and with the need to work under higher levels of biosecurity we decided to set up a new container specifically for this species and where we will be able to manage, monitor and breed the species in a way that will allow reintroduction of the species in a relatively short time. We acquired a second-hand shipping container and installed a cooling system and forty aquariums, with all the electrical equipment and plumbing that will allow easy management of the species. Working with the team from the Bolivian Amphibian Initiative and with the help of staff from Kansas City Zoo and Atlanta Zoo in the US, and Durrell Wildlife Conservation Trust, Jersey, and with help from other volunteers we were able to set up these new facilities in a record time, and we are now ready to work with this unique species.

A number of experts from institutions in Bolivia and overseas were involved with a range of activities to help set up the new amphibian facility at the Bolivian Amphibian Initiative, including the installation of electrical equipment, plumbing for the aquariums and new cooling units. Photo: Dirk Ercken.

As well as helping to setup the new amphibian facility, the team went on a few field trips, including a trip to Lake Titicaca to collect Titicaca Water Frogs for the new facility. Photo: Arturo Muñoz.

The experience of working with a number of different organizations together gave us a great opportunity to join efforts for the conservation of one species; it also created a collaborative network among different institutions that will help us with the goal that we have to work for the conservation of threatened Bolivian amphibians. We are truly thankful for the support of all of these organizations and individuals.

We are starting this new stage of amphibian conservation in Bolivia and we are optimistic as we have received support from different institutions, both within Bolivia and from other countries. We will face new situations in the future where we will need the support from different organizations and people and we hope to start a network with all the institutions interested in working with us, so we can be more effective in the conservation not only of the Titicaca Water Frog, but also other species that need our help. We have a lot to do, and there is not a lot of time to save some of these species, and we know that we need to work together and we welcome anybody who is interested in working with us to conserve Bolivian amphibians to contact us.

To find more information please visit www.bolivianamphibianinitiative.org, www.bolivianamphibianinitiative.blogspot.com or contact us via email at: hyla_art@yahoo.com.

Part of the new amphibian container which has been set up specifically to breed Titicaca Water Frogs (*Telmatobius culeus*) in Bolivia. Photo: Tim Steinmetz.

My adventure in Bolivia

Tim Steinmetz, Animal Curator, Kansas City Zoo, USA

At first the plan for my trip was to go to Bolivia to help build a new amphibian ark, or captive breeding facility, for the Lake Titicaca Water Frog (*Telmatobius culeus*). This trip turned out to be so much more.

Thanks to the Kansas City Zoo's new Conservation Initiative I was able to go to Bolivia. In January 2016 the Kansas City Zoo started this new initiative and the program to help with the Lake Titicaca Water Frog Project was only the second project to be funded. This project was started by the Bolivian Amphibian Initiative www.bolivianamphibianinitiative.org and Dr. Arturo Muñoz.

The Bolivian Amphibian Initiative is a project aiming to protect, monitor, and generate information on endangered species in Bolivia with a focus on the high Andean region, with the Lake Titicaca Water Frog being one of those species. The Water Frog project has several parts: teaching the local community about the frog and the threats causing their decline; doing field research to provide data on the frog's natural habitat; developing education programs about the frogs designed for local schools and communities; and developing a captive breeding facility for the Titicaca Water Frog and other endangered species.

A group of amphibian conservations from several countries spent a couple of weeks helping to set up a new amphibian facility for the Bolivian Amphibian Initiative. Photo: Tim Steinmetz.

As I was soon to find out, Arturo was accompanied by an international group of volunteers, myself, Dr. Ineke Plaetinck (Belgium), Robert Hill (Zoo Atlanta), Dirk Ercken (Belgium), Lizbet Colson (Belgium), Dan Lay (Durrell Wildlife Conservation Trust, England) and from Bolivia: Patricia Mendoza, Gabriel Callapa, Sophia Barron, Adriana Aguilar, Lupe Manani and Saul Suna. This project was also supported by several international organizations: the Kansas City Zoo www.kansascityzoo.org, Zoo Atlanta www.zooatlanta.org, Jacksonville Zoo www.jacksonvillezoo.org, the Museum of Natural History Alcides D'Orbigny of Cochabamba www.museodorbigny.org.bo/home.htm, Amphibian Ark www.amphibianark.org, IUCN www.iucn.org and Durrell Wildlife Conservation Trust www.durrell.org/wildlife/.

I left Kansas City for Bolivia on January 27 and arrived in Cochabamba, Bolivia, to meet up with the other members of the team. I knew right then that this was going to be a very good trip. Everyone started getting to know each other, we had each come from a different place, and only two of us had even met prior to coming on this trip. It was also clear that we all had a passion for conservation and were very eager to get started. We started working on the breeding facility container at the Museum of Natural History Alcides D'Orbigny of Cochabamba the day after I arrived. The container was provided by a grant from the IUCN and Amphibian Ark. When we arrived, the container was in place and all of the aquariums had been purchased from a local vendor and were on site. My job, while I was there, was to install all of the electrical equipment for the container and to help with the plumbing for all of the aquariums. We also supervised the installation of the cooling units and two large water storage tanks. In addition to the plumbing on the aquariums we also did the plumbing for the water storage tanks and a utility sink. We worked with the fantastic volunteer staff at the Museum to get this done.

The Bolivian Amphibian Initiative is a project aiming to protect, monitor, and generate information on endangered amphibian species in Bolivia, including the Lake Titicaca Water Frog. Photo: Tim Steinmetz.

To my surprise, in addition to working on the container to get it ready to receive the frogs, we also went on several field trips to collect data on other endangered Bolivian amphibians. This turned out to be a great addition to my trip. Our first trip was to the cloud forest in the Chapare region, located north of Cochabamba. We were looking for an undescribed member of the *Ameerega boliviana* family. Arturo had recorded its vocalizations on an earlier trip to the area but he was unable to photograph it. We spent several hours in the middle of the night in the cloud forest listening for this frog. We heard a symphony of other frogs and insects, and we saw large groups of frogs in different breeding

Members of the team who had come together to set up a new amphibian facility for the Bolivian Amphibian Initiative went on a field trip to Lake Titicaca, where founder animals for the breeding program were collected. Photo: Tim Steinmetz.

pools. We heard the same species Arturo had recorded before several times but were unable to find it.

Our second trip was to the city of Sucre. One of the objectives of this trip was to find populations of *Telmatobius* sp., which is related to the Titicaca Water Frog, and to see how they were doing. We also planned to travel to two areas near Chuquisaca and Icla, located in the south-east of Sucre, to locate and determine population sizes of this same species. Unfortunately, there were road blockades on the highways during our stay due to a truck drivers' strike and we were unable to get to the study sites. Because of the blockades, we also had a delay starting our third trip. The third trip occurred after we finished with the construction of the container and it was time to collect the frogs. We flew to LaPaz and drove to Lake Titicaca. Because of Carnival, the striking truckers had temporarily opened up the roads. When we got to the lake, we took the ferry at Tiquina and drove to Copacabana and then took a boat to Isla de la Luna (Island of the Moon), where we stayed while we were at the Lake. We had meetings with the local council and we snorkelled both the north-east and south-west sides of the island. We were very successful locating frogs. The day Robert and I had to leave the lake to return to LaPaz for our flight home was the same day that they started to collect frogs for the return trip to Cochabamba. I returned to Kansas City on February 10th.

Three articles were published about our trip, two in a national Bolivian publication and one in the local Cochabamba paper. I made connections with a wonderful group of conservation-minded individuals and great organizations. I have talked to our group about where we need to go in the future, and we have all agreed to stay in touch and continue our involvement in conservation. As a representative of the Kansas City Zoo I talked to several other organizations working in Bolivia with conservation programs to see if there is some way we as an institution could help. I look forward to sharing what I have learned and some of the possible opportunities in the future with the rest of the zoo community.

Shirts for salamanders - Buy yours now!

As we reported in the last edition of the AArk Newsletter, this fantastic "Support Local. Support Global." salamander t-shirt design was created by Natalie Criss and was the winning entry in National Amphibian Expo's Shirts for Salamanders contest. Proceeds from the sales of these great shirts will be sent to two AArk-supported programs: Flatwoods Salamanders (*Ambystoma cingulatum*), run by Mark Mandica at the Atlanta Botanical Garden, USA; and a research and recovery project for eight species of moss salamanders (genus: *Nototriton*) which is run by Brian Kubicki from the Costa Rican Amphibian Research Center. For more information regarding this campaign and the target species please visit www.naexpo.org/conservation.

What better gift than an awesome t-shirt that supports conservation. Get Yours Today! $15.00 plus shipping *, all tees are being sent using EcoEnclose 100% recycled poly mailers.

Order yours here: www.naexpo.myshopify.com.

(* *Unfortunately these shirts are only available for delivery within the US at this stage*.)

Updates from our efforts to help save endangered amphibians from Cordillera del Condor, Ecuador

Fausto Siavichay Pesantez, Centro de Conservación de Anfibios, Zoo Amaru, Ecuador and Dr. Carlos C Martínez Rivera, Philadelphia Zoo, USA

Last year the Amphibian Conservation Center - Zoo Amaru (ACC-Zoo Amaru) in Ecuador received a grant from Amphibian Ark to help us save populations of amphibian species from Cordillera del Condor in the southern corner of the Ecuadorian Amazon. These and many other species of local wildlife are threatened by the imminent destruction of their habitat due to a mine-prospecting project. One of the species rescued is the yet-to-be-described Wampukrum Toad, *Atelopus* sp nov. *wampukrum*, a species associated with other Amazon harlequin toads and whose populations have been already decimated by chytrid fungus and by road construction projects. We also rescued individuals from newly-discovered Ecuadorian populations of glass frogs, *Rulyrana* aff. *erminea* and *Rulyrana mcdiarmidi* (IUCN Data Deficient); which are considered endangered. The grant helped us prepare our facilities to establish assurance populations of these threatened amphibians by outfitting a new room to accommodate populations, improve our feeder insect colonies, tighten our biosecurity protocols, and increase our veterinary staff's capacity to respond to amphibian diseases and treatment.

Staff from Zoo Amaru and the Philadelphia Zoo check some male glass frogs at the Amphibian Conservation Center – Zoo Amaru. Photo: Carlos C Martínez Rivera.

Now, seven months after we rescued our first frogs, we are thrilled to inform the amphibian *ex situ* conservation community that our *Rulyrana mcdiarmidi* laid eggs in mid-February and those eggs have now hatched. ACC-Zoo Amaru is now the proud carers of a batch of more than seventy-five tadpoles produced from two clutches of eggs. We still have our fingers crossed, waiting for the remaining two clutches which were laid in a separate tank to hatch any day now.

Terrariums for adult glass frogs (*Rulyrana mcdiarmidi*). Seven months after the frogs were brought into captivity, four clutches of eggs have been laid, with two clutches already hatched. Photo: Carlos C Martínez Rivera.

But that's not all! Our visits to rescue these amphibians also yielded some impressive results, including finding more Azuay Stubfoot Toads (*Atelopus bomolochos*) from the Andean highlands of Ecuador and three Gualacenita Stubfoot Toads (*Atelopus nepiozomus*), a species that has not been officially reported since 1985. Historically six populations of the Gualacenita Stubfoot Toad were thought to persist, but none were found. Some individuals were observed in 2004 and then again in 2009, but now a new population has been recorded in the Amazon highlands of Morona Santiago Province in Ecuador. Thanks to Amphibian Ark both stubfoot toad species have been incorporated into our rescue mission and we are working diligently with Amphibian Ark and the newly formed *Ex Situ* Amphibian Conservation Coalition in Ecuador to incorporate these management plans into a national strategy for the conservation of amphibians in Ecuador.

Gualacenita Stubfoot Toad (*Atelopus nepiozomus*) recently rediscovered by Zoo Amaru staff.
Photo: Carlos C Martínez Rivera.

New frogs at Mitsinjo: Using surrogates to learn about threatened species in Madagascar

Devin Edmonds and Justin Claude Rakotoarisoa, Association Mitsinjo, Andasibe, Madagascar; Falitiana Rabemananjara and Jasmin Randrianirina, Amphibian Specialist Group of Madagascar; Eric Robsomanitrandrasana, La Direction Générale des Forêts, Madagascar

When we set out to start a conservation breeding facility for frogs in Madagascar we were faced with many challenges. We had to learn how to culture live foods and how to design a breeding center with materials available in-country. We needed to install infrastructure in a remote location and run extensive training courses with Mitsinjo technicians. Finally, we had to pick the first frog species to work with and learn how to keep them in captivity.

As we began this process in 2010, there were few resources available to help choose which species to keep. Eventually through discussions with the Amphibian Specialist Group of Madagascar (ASG) we decided on four common species from the forest around the breeding facility, each with a different life history - *Blommersia blommersae*, *Boophis pyrrhus*, *Heterixalus betsileo*, and *Mantidactylus betsileanus*. After a few months we added three more species to the program, these new ones poorly-known not only in captivity but also in nature.

These first frogs gave us the experience needed to establish a captive survival assurance colony of the Critically Endangered Golden Mantella (*Mantella aurantiaca*) from a population extirpated by a nearby mine. We now maintain a viable captive population of this threatened species and will use captive-bred offspring to stock restored habitat in coming years. We also had success breeding two of the first four species we kept (*Boophis pyrrhus* and *Mantidactylus betsileanus*) to the second and third generations, and we have recently been able to begin disseminating some of the results from this work.

The amphibian breeding facility at Association Mitsinjo in Madagascar. The team is now working with five new analog species to learn more about captive husbandry of their more threatened relatives. Photo: Devin Edmonds.

Technicians at Mitsinjo are working with *Boophis bottae*, a common and often abundant species in eastern Madagascar, to better understand the captive requirements of the highly threatened *B. ankarafensis*. Photo: Devin Edmonds.

In November 2014 a conference was held to promote amphibian conservation in Madagascar. Known as ACSAM2 (A Conservation Strategy for the Amphibians of Madagascar), more than seventy national and international experts attended. From this conference a new and updated conservation strategy began to take shape. One of the most important *ex situ* conservation actions within the plan involved completing the Amphibian Ark Conservation Needs Assessment for Madagascar so that we would have an idea of what each of the 300+ frog species in Madagascar needed to assure their survival. Although still in the process of being completed, more than a dozen herpetologists have already participated in this online assessment process with more than 200 species assessed (www.ConservationNeeds.org).

At the end of 2015 we were able to use preliminary results from the Conservation Needs Assessments to help select new species for Mitsinjo's captive breeding program - *Anodonthyla pollicaris*, *Boophis bottae*, *Gephyromantis boulengeri*, *Platypelis barbouri*, and *Plethodonthyla notosticta*. Also contributing to species selection was input from national collaborators and an evaluation of the feasibility of establishing survival assurance colonies for associated priority species if and when needed.

In February 2016 - thanks to recent support from Niabi Zoo's coins for conservation program - we collected small numbers of these five new species from the forest surrounding the breeding station. We are fortunate that at the moment, with the exception of two highly threatened species of *Mantella*, the local frog populations in the forests around Andasibe appear to be stable and not in a situation that warrants immediate *ex situ* assistance. However, this does not seem to be the case for other frog species elsewhere in the country.

For example, the newly described tree frog *Boophis ankarafensis* is closely related to *B. bottae* from Andasibe, but unlike *B. bottae* it has a tiny distribution confined to a single site and has been proposed to have an IUCN Red List status of Critically Endangered. Both species have never been kept in captivity or successfully bred, so by maintaining *B. bottae*, a common and often abundant species in eastern Madagascar, we will better understand the captive requirements of the highly threatened *B. ankarafensis*. The other four new species at Mitsinjo serve a similar role as *B. bottae*, and were assessed as good analogs for threatened species elsewhere in Madagascar.

One of the technicians at Mitsinjo working in the quarantine area.
Photo: Devin Edmonds.

Second generation captive-bred *Boophis pyrrhus* in amplexus at Mitsinjo.
Photo: Devin Edmonds.

Using species from Andasibe to serve as analogs for threatened species enables us to learn about the best captive management practices for priority species before they are placed in captivity. It also develops capacity within our team at the breeding center to care for frogs with similar captive requirements as those assessed as in need of *ex situ* conservation action.

With the recent detection of *Batrachochytrium dendrobatidis* (*Bd*) at a number of sites around Madagascar, determining the best captive management practices for poorly-known Malagasy frog species is more urgently needed than ever before. We are fortunate that so far no signs of disease or disease-related population declines have been detected, but this still leaves the greater (and often synergistic) threats of habitat loss and climate change. Part of the conservation strategy for the amphibians of Madagascar therefore involves establishing highly-threatened species in captivity to prevent their extinction and facilitate population supplementation and reintroduction efforts. We are pleased to be able to contribute to this effort by keeping surrogates for threatened species at the Mitsinjo breeding facility, preparing us for the critical role of housing captive assurance colonies of additional threatened species in the future.

Currently in quarantine and isolated from the rest of the population, we expect these new frogs will offer a number of opportunities to conduct hypothesis-driven studies not only so we can learn more about their biology but also offer insight into the best captive management practices for the more threatened species they are serving as surrogates for. With the experience we gain with the new frogs, there will still be hope to safeguard Madagascar's frogs from extinction through coordinated *ex situ* conservation efforts.

From Jersey to Madagascar: A keeper's visit to support the development of in-country *ex situ* facilities

Nadine Wöhl, Senior Keeper Herpetology, Durrell Wildlife Conservation Trust, Jersey, Channel Islands

I was extremely fortunate in 2015 to have been granted a work-based travel award within the Durrell Wildlife Conservation Trust. It's called the Rumboll Travel Award, donated annually by a local Jersey family, the Rumboll's. Employees are encouraged to submit a project proposal and the winner is funded for a two-week project trip. That meant I was able to go to Madagascar in January this year and work with frogs - what a dream come true!

In May 2015, an amphibian technician from Association Mitsinjo's Amphibian Survival Assurance Center in Andasibe, Madagascar spent one month with us at Durrell's Herpetology section in Jersey. Mampi (Jeanne Soamiarampionona) trained with us on amphibian husbandry, culturing live-food and quarantine/biosecurity procedures and protocols. My project proposal for the Rumboll grant was to give me the opportunity to head to Madagascar to reciprocate the visit and complete the exchange. The plan was to spend three weeks in Madagascar - two weeks in Andasibe with Association Mitsinjo and one week in Tamatave, visiting Parc Ivoloina, a small zoological collection run by the Madagascar Fauna and Flora Group (MFG) who are in the process of setting up a small captive breeding facility for amphibians.

Leaving behind a cold, wet January in Jersey I arrived in Andasibe exchanging the British winter for Madagascar's tropical rainy season. From the three (hibernating) amphibian species of Jersey to Madagascar's three hundred plus species - Andasibe itself has over one hundred species of frogs recorded there. Long before nightfall on that first wet afternoon the noise of the frogs calling was something incredible and that night Mampi and I were out with

Nadine at the Amphibian Survival Assurance Center at Association Mitsinjo. Photo: Nadine Wöhl/Durrell.

The team at Association Mitsinjo (left to right), Devin, Blasé, Edipsi, Justin-Claude, Samilia and Mampi. Photo: Nadine Wöhl/Durrell.

Golden Mantellas (*Mantella aurantiaca*) in the centre at Andasibe.
Photo: Nadine Wöhl/Durrell.

our torches looking for frogs. What I hadn't quite grasped before I arrived was just how many frogs there would be and how small most of them are! *Boophis pyrrhus* were everywhere, the small males only around 4cm in length. Many of the other species were no bigger and many were even smaller!

The next day, with the entry permits in place, I went to see the biosecure Amphibian Survival Assurance Center where I was shown around by Devin Edmonds, the Amphibian Conservation Director at Mitsinjo who introduced me to the team. As we entered it was shoes off, rubber boots on, hands washed and putting on lab coats to enter the facility. The main part of the building has two rooms: a large insect-breeding room and an even larger amphibian room. The majority of the frog room is used for the assurance population of Critically Endangered Golden Mantella (*Mantella aurantiaca*); the founders are maintained as two separate populations from two different ponds plus their respective offspring. A corner of the room is dedicated to a few small groups of locally abundant amphibian species from the local area that have never been kept, bred or reared in captivity before. While I was there, Mitsinjo staff were preparing the quarantine area to receive some new species. Working in the facility actually wasn't too different to working with the amphibians in our own collection and the system of husbandry is very similar, including service order system, the breeding of food invertebrates, record keeping, the feeding regime as well as maintaining a high level of cleanliness and using clear disinfection procedures.

One of the aims of my visit was to assess the impact of Mampi's training at Durrell and I arrived armed with a questionnaire for Mampi, her colleagues and Devin; the results will help us to identify key areas of further training and prepare for the next member of staff from Mitsinjo to visit Jersey. Some of the ideas Mampi introduced after returning to Madagascar which had quite a big impact included changes to the husbandry of their invertebrate food colonies – even simple things like moving springtails from small clear boxes to large blacked-out containers made a massive difference to their breeding output. Seeing the invertebrate species we breed gave her more ideas: while walking through the local food market she noticed bean weevils on some loose dried beans so Mampi bought some of the beans and now they have an additional local food source for the frogs.

During the rainy season the technicians from Mitsinjo carry out amphibian surveys along transects on the road and in the forest. While there was some overlap in species, during one evening road-survey we found thirteen frog species and during an evening in the forest (on a day in which it had only lightly rained earlier in the day) there were eleven species counted. It was incredible!

Currently, Mitsinjo are also supporting a student who is working on *Mantella aurantiaca*. I was therefore able to join the student and their guide on a site visit to see the *Mantella* population in their natural habitat at the Torotorofotsy marsh which is being threatened by agriculture, small-scale gold mining and timber extraction.

After spending time at Mitsinjo I travelled to visit the Madagascar Fauna and Flora Group's Parc Ivoloina, just outside Tamatave. Once again I met a familiar face in Bernard Iambana Richardson, Parc Ivoloina's 'Chef du Parc', who had spent some time at Durrell in 2015 in both our mammal and herpetology sections.

The Madagascar Fauna and Flora Group are setting up their own amphibian captive breeding centre and Durrell has supported the project with a seed grant and also provided help by facilitating training exchanges with Mitsinjo. While the Madagascar Fauna and Flora Group are in the long process of setting up the centre, there are currently no amphibians being housed there, but staff are concentrating on sustainable live food culturing and ensuring that all the necessary infrastructure is in place. My visit to Ivolonia was more in an advisory role and helping to take a few more steps towards the center being up and running. As this is a considerable task however, the Madagascar Fauna and Flora Group are currently recruiting for a voluntary amphibian husbandry assistant to help get the centre up and running. One of the highlights of my time at Ivoloina was seeing the environmental education; it is a great example of how to implement important components of conservation. The education center and the on-site facilities are impressive. Parc Ivolonia supports local schools groups of all ages and run a Saturday school.

Overall, it was an amazing trip and an invaluable opportunity to put names to faces and to work with so many passionate "amphibian people". It was great to offer all the help and support I could and believe it can only strengthen the links between our organisations and help develop Madagascar's *ex situ* capacity. We look forward to the next member of staff from Mitsinjo arriving for another internship and continuing to develop these important links between us.

National *Ex Situ* Amphibian Conservation Coordinator for Madagascar

Golden Mantella (*Mantella aurantiaca*). Photo: Devin Edmonds.

Green Climbing Mantella (*Mantella laevigata*). Photo: Antoine Joris.

Cowan's Mantella (*Mantella cowani*). Photo: Franco Andreone.

Since 2007, Amphibian Ark staff have facilitated Conservation Needs Assessments for 2,293 (30%) of the world's amphibian species through twenty-six national or regional workshops, bringing together around 350 Amphibian Specialist Group (ASG) members, scientists, field biologists and researchers, animal husbandry experts and other stake-holders who have contributed to these assessments. To date, 198 different species have been assessed as requiring urgent captive rescue to help prevent their extinction.

After the many thousands of dollars and thousands of hours of experts' time it has taken to hold these assessment workshops, many of the recommendations resulting from the workshops for both captive and field conservation actions are yet to be implemented. One of the biggest obstacles for this is a lack of funding. As most conservationists are aware, sufficient funding to effectively carry out conservation actions has always been difficult to obtain, and more and more funds are being sought for an increasing number of projects. However, it appears that in many cases, the lack of a coordinated, national approach and lack of support for developing and implementing conservation actions for amphibians is often the reason why insufficient action occurs.

A solution to this is one that AArk staff have been promoting for some time now - the appointment of part-time, National *Ex Situ* Amphibian Conservation Coordinators. AArk staff work with the local amphibian conservation community in each country to identify a suitable person to appoint to a half-time position for a period of twelve months. These positions work with ASG members and other local stakeholders to help develop additional *ex situ* facilities and conservation programs within range country, support local capacity-building, publish national amphibian conservation action plans and to help forge new partnerships, both in-country and internationally, to ensure that *ex situ* recommendations from Conservation Needs Assessments are implemented in a coordinated way. Experience has shown that having a person dedicated to this type of role for a period after assessment workshops will lead to a more coordinated response, and conservation programs which have a better chance of achieving their aims.

During the past eighteen months we have found support for a National Amphibian Conservation Coordinator in the Philippines (thanks to Virginia Zoo, USA), and in Ecuador (thanks to Auckland Zoo Conservation Fund, New Zealand), and we are now looking to find support for a similar position in Madagascar.

At the Conservation Strategy for the Amphibians of Madagascar (ACSAM2) workshop held in Madagascar in November 2014, local ASG members discussed the appointment of a part-time National *Ex Situ* Amphibian Conservation Coordinator, for a twelve-month period, and they are very keen to identify and employ a suitable local candidate, as soon as funding has been found. This action has been listed as high priority for the short-term in the revised Sahonagasy Action Plan (2015). With the increased risk of Malagasy species likely to need captive rescue, and the fact that husbandry guidelines need to be developed for a range of species, good coordination of *ex situ* programs in Madagascar is a necessity.

We would like to raise US$ 12,000 to support this part-time position in Madagascar, for a 12-month period. If you or your organization has an interest in conservation programs in Madagascar, and would like to help support the coordination of national conservation actions, please contact Kevin Johnson, kevinj@amphibianark.org.

A position description and a draft MOU have been prepared. More information about the position can be found at www.amphibianark.org/pdf/NACC-for-Madagascar.pdf.

Titicaca Water Frogs can grow up to 145mm long and 380g in weight! Photo: Arturo Muñoz.

Saving the Lake Titicaca Water Frog

You can help keep the largest fully aquatic frog from disappearing forever!

In conjunction with the Bolivian Amphibian Initiative, Amphibian Ark has launched a new crowdfunding project to help save the Lake Titicaca Water Frog.

Found only in the cold waters of this high elevation lake, the Lake Titicaca Water Frog has been identified by the International Union for the Conservation of Nature (IUCN) as Critically Endangered because of four catastrophic problems: an amphibian fungal disease, the introduction of exotic species, overharvesting and pollution. These large frogs can grow up to 145mm long and 380g in weight!

Arturo Muñoz, a Bolivian amphibian biologist, and his team are working to save the Titicaca Water Frog. Ultimately this will mean mitigating threats to the species, but in the meantime Arturo has established an assurance population in a secure captive breeding facility at the Museo de Historia Natural Alcide d'Orbigny in Cochabamba, Bolivia, where the water frogs are thriving and reproducing. But now, because of a failing cooling system this population is also at risk.

In some areas of the lake, hundreds of dead frogs have been found. Photo: Arturo Muñoz.

An event in 2015 underscored the critical importance of the captive population. Although an annual pollution spike has caused small die-offs in the past, an unprecedented pollution event at Lago Menor in Lake Titicaca in the spring of 2015 caused massive frog mortality.

Efforts by scientists and local officials are underway to identify and dramatically reduce the sources of pollution in Lake Titicaca, but these will take time and political will to accomplish.

In the meantime, the frogs at the Museo de Historia maybe the Lake Titicaca Water Frog's best hope for the future. Because the frogs are completely aquatic, an effective and secure cooling system is critical to their continued existence. A new cooling system with the addition of an ultraviolet unit to ensure consistently clean water will cost $6,000.

Please help Arturo and his team save the Lake Titicaca Water Frog!

Your donation today will help ensure a future for the Lake Titicaca Water Frog.

Donations can me made at www.gofundme.com/WaterFrog.

Ex situ reproduction of *Pristimantis renjiforum* at Fundación Zoológico Santacruz, Colombia

Alejandra Cáceres, Universidad del Bosque Student; Sandra Gómez, Head Education Conservation Department, Santacruz Zoo; Haydy Monsalve R, Zoo Director, Santacruz Zoo; and Kelly Paola Prieto, Zoo Keeper, Santacruz Zoo, Colombia

Colombia is one of the most biodiverse countries in the world, with 14% of the planet's flora and fauna found here. It ranks as the second highest in amphibian diversity, after Brazil, with 733 species of amphibians (Corridor & Uribe, 2008). Habitat fragmentation, habitat loss and the possible presence of chytrid fungus *Batrachochytrium dendrobatidis* are the principal threats for all amphibians in the Municipality of San Antonio del Tequendama in Colombia, which is between 1,800 and 2,300 meters elevation.

For the past six years, the Santacruz Zoo has been running a conservation program for local species in the area where the zoo is located. The conservation program includes both *in situ* and *ex situ* research, with a strong education component. The Zoo's conservation lab for High Andean amphibians focuses on three principal species: *Rheobates palmatus*, *Dendropsopus padreluna* and *Pristimantis renjiforum*. The genus *Pristimantis* is a group of terrestrial amphibians with higher density and high distribution throughout the neotropics (Frost, 2011), especially those species from Andean rainforests and lowland rainforests (Lynch and Duellman, 1997). Most species of *Pristimantis* have a restricted distribution in poorly explored areas, and another feature of interest in this taxonomic group is the high plasticity and high adaptability that put them in different types of environments (Navas, 1999). Undescribed taxa in the genus are still being discovered (Duellman, W. 1982).

The Santacruz Zoo's conservation lab for High Andean amphibians focuses on three principal species: *Rheobates palmatus*, *Dendropsopus padreluna* and *Pristimantis renjiforum*. Photo: Sandra Gómez.

Pristimantis renjiforum is a species of frog which is endemic to Colombia, and is categorized in the IUCN Red List as Critically Endangered. To ensure the preservation of the species Santacruz Zoo decided to establish a breeding program that will allow us to contribute to the knowledge of the species and its habitat and to develop guidelines that can be adapted to other species of the genus *Pristimantis* known in the area, and for species which are currently undescribed and still being discovered.

To improve reproductive success different reproductive models are being tested so we can develop a protocol for *ex situ* breeding of *Pristimantis renjiforum*. The methodology included determining the standard conditions for appropriate maintenance and reproduction, stimulating reproductive behavior using auditory enrichment and evaluating and monitoring reproduction of the species under captive conditions.

To replicate the natural conditions in captivity, twenty-seven field trips have been made to the Natural Reserve of Peñas Blancas, to document the environmental conditions where the animals are found. The average environmental conditions recorded were: temperature: 18°C; relative humidity 90%; soil characteristics: Rave with a thick layer of leaf litter, decaying organic material; associated vegetation: *Alocasia macrorrhiza*, *Monstera deliciosa*, *Pteridium aquilium* and epiphytes, mosses and lichens.

After we had collected the field data, and with the support of an Amphibian Ark Seed Grant, the breeding lab was modified to provide better conditions for the study and maintenance of the species. A quarantine area was modified and the reproduction area has been divided into two sections. Section 1 is a breeding area for *Pristimantis* species and Section 2 is a breeding area for *Dendropsophus padreluna* and *Rheobates palmatus*. The new lab structure replicates the natural temperature and relative humidity conditions which were recorded from the species' natural habitat, with air conditioning, UV lights, and individual fans for each terrarium being installed.

With these new environmental conditions four experimental terrariums with different reproductive groups have been installed (see Table 1), and we have used natural vegetation that was identified during the field trips as substrate. Another aspect of the biology of *Pristim-*

Terrarium number	Reproductive group
1	2 males : 3 females
2	3 males : 2 females
3	3 males : 1 female
4	1 male : 3 females

Table 1. Reproduction groups during the study.

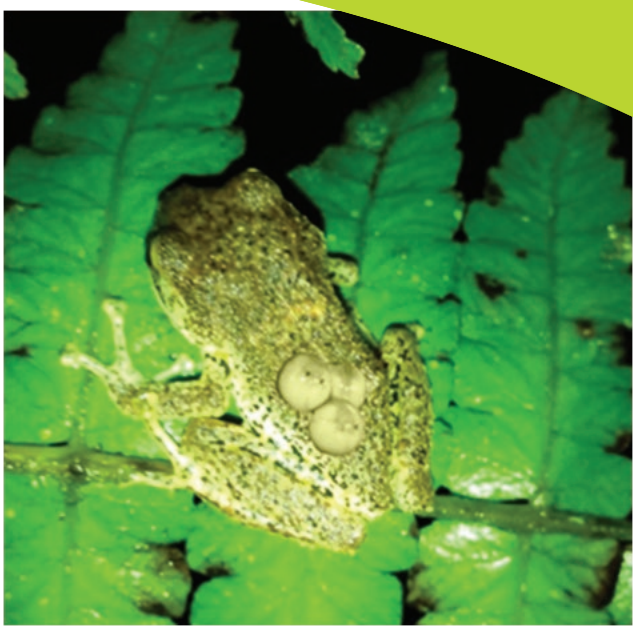
antis renjiforum that we identified was that they frequently change the position of their eggs, and this behavior is different from the other species, requiring us to consider space requirements in the terrariums, making bigger facilities for the reproductive groups.

Before being moved to the experimental terrariums the frogs had been kept for thirty days in the quarantine area, where they received a preventive treatment for Chytridiomycosis, using different doses of Sporanox (itraconazole), determined by body weight, as suggested by medical research run by Haydy Monsalve at the amphibian breeding lab. The doses used for *Pristimantis renjiforum* are shown in Table 2.

Groups	Body weight	Dilution
A	0,5g – 1 g	0,1 Sporanox in 35 ml NaCl
B	1,1g – 2.5 g	0,1 Sporanox in 30 ml NaCl

Table 2. Doses of Sporanox (itraconazole) by body weight.

During the experimental research natural sounds recorded at Peñas Blancas Reserve were played to promote reproductive behavior in the groups.



A male *Pristimantis renjiforum* caring for the eggs.
Photo: Maria Alejandra Sepùlveda Càceres.

Results

Amplexus was observed in the breeding group in terrarium no. 1 (two males and three females) during the quarantine period and later in the breeding aquarium. Finally three cream-colored eggs were observed: one on the bark of a trunk, another under the trunk and the last one among the roots of a fern. Fertility did not change relative to the substrate, or the position, and all eggs were fertile, since all reached their final stage successfully. Each egg was about 3.5mm in diameter when laid, and the male carefully cared for the embryos to prevent them from becoming too dry. Later he also carried them on his back and sometimes we observed the eggs in different places, having been moved daily, for around a month when they eventually hatched.

Even though we have had a successful reproductive event, we still need additional studies to understand the ecological behavior of *Pristimantis renjirforum*, and the other species in the genus. Certainly, our results so far will be helpful for us as we begin to establish programs for *P. suaguae* and *P. bogotensis* at the amphibian breeding lab at the Santacruz Zoo, as part of our conservation goals for the High Andean Amphibians in Colombia.

The substrate in the terrariums is natural vegetation that was identified during the field trips to the Natural Reserve of Peñas Blancas.
Photo: Maria Alejandra Sepùlveda Càceres.

References

Corredor G. & N. Uribe. 2008. Management and reproduction of the Colombian Magdalena River poison-dart frog *Dendrobates truncatus* at Cali Zoo. *Int. Zoo Yb* 42: 71 – 77.

Lynch, J.D. and W.E: Duellman. (1997). Frogs of the genus *Eleutherodactylus* in Wester Ecuador. *Systematics, Ecology and Biogeography*. University of Kansas Museum of Natural Hisotry, Special Publications (23) 1-236.

Navas,C. A. (1999). Biodiversidad de anfibios y reptiles en el páramo: Una visión

Ochoa, A. V., Carmona, P. B., Salcedo, L. D. P., & Correa, M. F. (2013). Detección y cuantificación de *Batrachochytrium dendrobatidis* en anfibios de las regiones andina central, oriental, Orinoquia y Amazonia de Colombia. *Herpetotropicos*, 8(1).

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