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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

www.amphibianark.org



Amphibian Ark Seed Grant winners

Amphibian Ark's \$5,000 competitive seed grants are designed to fund small start-up rescue projects for species that cannot currently be saved in the wild, and which reflect AArk values. Projects that are successful seed grant recipients must focus on species whose threats cannot be mitigated in nature in time to prevent their extinction and which therefore require *ex situ* intervention to persist; involve range-country biologists and be based within the range country; must adhere to recommended biosecurity standards for *ex situ* programs; and linking *ex situ* programs to *in situ* conservation.

This year we are very pleased to provide funding for three fantastic new programs: Rescuing the endangered Merida's Collared Frog (*Mannophryne collaris*) at the University of Los Andes at Merida in Venezuela; Establishing a breeding laboratory specializing in *Pristimantis* species, at Fundación Zoológico Santacruz in Colombia; and Saving endangered frogs from Cordillera del Condor at the Amphibian Conservation Center, Zoo Amaru, Ecuador.

Rescuing the endangered Merida's Collared Frog (*Mannophryne collaris*)

Enrique La Marca, Laboratory of Biogeography of the University of Los Andes at Merida, Venezuela

This project aims to rescue populations of the Merida's Collared Frog (*Mannophryne collaris*), an endangered Venezuelan amphibian with a very restricted distribution. The species is already listed as Endangered within the current IUCN Red List, and in the upcoming updated Venezuelan Red List. No special measurements have been taken to protect the species, nor is there official protection for the habitat where it lives.

Funding for this project will help with establishing optimum conditions for *ex situ* captive husbandry, building appropriate enclosures for the animals, including filters, lights, water pumps, and other equipment. Funds will also help in providing for training for amphibian keepers.

The conservation of Merida's Collared Frog is mandatory! There is a high risk of extinction in the wild due to massive habitat destruction as a result of increased urbanization. In the short term we plan to create the right conditions to maintain the frogs, obtain the parental stocks and subject them to strict initial quarantine measures, and to consolidate an already established room to raise a varied source of food items. In the medium time we will maintain the frogs in captivity in the *ex situ* facilities, and finally, in the long term we plan to release the offspring in the wild under a supervised protocol.



Adult female Merida's Collared Frog (*Mannophryne collaris*), an endangered Venezuelan amphibian with a very restricted distribution. Photo: Enrique La Marca.

The complete project proposal can be viewed here: www.amphibianark.org/seed_grants/Mannophryne-Proposal-Venezuela.pdf.

Establishing a breeding laboratory specializing in *Pristimantis* species

Haydy Monsalve and Sandra Gómez, Fundación Zoológico Santacruz, Colombia

Fundación Zoológico Santacruz has been working for about five years in both *in situ* and *ex situ* amphibian research programs. The *in situ* component has taken place at the Natural Reserve of Peñas Blancas located in San Antonio del Tequendama in Colombia - a location in a privileged geographical position in the middle of the high Andean mountains in a cloud forest ecosystem. This ecosystem has highly anthropic intervention, transforming forest areas into agricultural spaces and deforestation for wood trade. *Ex situ* projects have been focused on developing husbandry protocols for three principal species: *Rheobates palmatus*, *Dendropsophus padreluna*, and *Pristimantis renjiforum*. Progress of these two components of the amphibian conservation project includes a species catalog with ecological information, with nine species found. Results include successful reproduction of *Dendropsophus padreluna*, *Rheobates palmatus*, running reproductive observations and oval development observations and nutritional studies. In 2014 reproduction of *Pristimantis renjiforum* was achieved for first time in captivity, and we were able to document behavioral, reproductive and development tracking of the offspring for an average period of three months.



The *ex situ* amphibian lab at Fundación Zoológico Santacruz will be a conservation center for *Pristimantis* species. Photo: Luis Carrillo.

Pristimantis is a genus that we don't have a great deal of information about and is important for conservation programs. During the *in situ* research other species from the *Pristimantis* genus, *P. bogotensis* and *P. susaguae* were found at the study area.

The *ex situ* amphibian lab will be a conservation center for *Pristimantis* species, establishing parameters for *ex situ* management and *in situ* studies of basic ecology, achieving reproduction events, and maintaining viable captive populations. The three species selected have different distribution ranges, require

different environmental conditions that needs to be provided in captivity and special equipment will be needed to guarantee perfect conditions for the captive population and continued research studies of these species. By providing this the conservation program will continue to contribute to and improve our knowledge of the genus, helping us to develop a local conservation plan.

The complete project proposal can be viewed here: www.amphibianark.org/seed_grants/Pristimantis-project-proposal-for-Santacruz-Zoo.pdf.

Saving endangered frogs from Cordillera del Condor

Fausto Siavichay, Amphibian Conservation Center-Zoo Amaru and Carlos C. Martínez Rivera, Philadelphia Zoo

The Amphibian Conservation Center (ACC)–Zoo Amaru is a well-established holistic conservation program for Critically Endangered amphibians from southern Ecuador. Formed in 2009 by Zoo Amaru and the Philadelphia Zoo, it began as ACC-Mazán, one of the few in-country breeding facilities located in the same habitat where the frogs are found within Cajas National Park and Mazán Forest, Ecuador. Today the facility is located at Zoo Amaru in the nearby city of Cuenca.

This year we will establish assurance populations of the yet-to-be-described wampukrum toad, *Atelopus* sp nov. *wampukrum* (IUCN Critically Endangered) and newly-discovered Ecuadorian populations of glass frogs, *Rulyrana* aff. *erminea* and *Rulyrana mcdiarmidi* (IUCN Data Deficient), all from Cordillera del Condor in the Ecuadorian Amazon. This new project arose as a means to save endangered populations at risk of disappearing due to direct effects of legal and illegal mining at Cordillera del Condor. We propose to build new housing facilities for these threatened Amazonian amphibians at ACC-Zoo Amaru to accommodate the parent animals, which are already housed at our facilities, and to rescue new individuals in order to establish assurance populations of these species while learning more about their ecology and conservation status in the field. We don't foresee the immediate reintroduction of these species, but will try to find adjacent, protected habitats where they might be introduced.

The complete project proposal can be viewed here: www.amphibianark.org/seed_grants/Saving-endangered-frogs-Zoo-Amaru.pdf.



The yet-to-be-described Wampukrum Toad, *Atelopus* sp nov. *wampukrum* from Cordillera del Condor in the Ecuadorian Amazon. This species is at risk of disappearing due to direct effects of legal and illegal mining. Photo: Carlos Martínez Rivera.

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On your first visit to AmazonSmile you need to select **Amphibian Ark** as your preferred charitable organization to receive donations from eligible purchases before you begin shopping. AmazonSmile will remember your selection, and then every eligible purchase you make at smile.amazon.com will result in a donation.

The AmazonSmile Foundation will donate 0.5% of the purchase price from your eligible AmazonSmile purchases. The purchase price is the amount paid for the item minus any rebates and excluding shipping and handling, gift-wrapping fees, taxes, or service charges. From time to time, AmazonSmile may offer special, limited time promotions that increase the donation amount on one or more products or services or provide for additional donations to charitable organizations.

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We thank you for supporting many conservation programs for threatened amphibians around the world, simply by selecting Amphibian Ark to receive a donation every time you shop at Amazon.



Online Conservation Needs Assessments

Amphibian Ark is very excited to announce the launch of our online Amphibian Conservation Needs Assessment program at www.ConservationNeeds.org. Since 2007, AArk staff and our partners have worked with our colleagues from the IUCN Amphibian Specialist Group (ASG), the international *ex situ* amphibian conservation community and other stakeholders to evaluate the conservation needs of 3,490 amphibian species. With the move to an online format, we are now able to continue these assessments in a more inclusive environment, with assessments for multiple countries being undertaken at the same time.

Background

The Conservation Needs Assessment process was initially developed in 2006, during an Amphibian *Ex Situ* Conservation Planning workshop in El Valle de Anton, Panama, when a taxon selection and prioritization working group developed a decision tree for the selection and prioritization of species that are most in need of *ex situ* (captive) assistance. The decision tree has subsequently been reviewed and refined, and has now evolved into the Amphibian Ark Conservation Needs Assessment process (www.amphibianark.org/pdf/AArk-Conservation-Needs-Assessment-tool.pdf), which generates prioritized recommendations for both *in situ* and *ex situ* conservation actions. The assessment process has proven to be a logical, transparent, and repeatable procedure for guiding amphibian conservation activities within a country or region.

Between 2007 and the end of 2014, Amphibian Ark staff facilitated 26 national or regional workshops to assess the conservation needs of 3,375 (46%) of the world's amphibian species. With funding for physical workshops becoming more difficult to obtain, the decision was made to build an online version of the assessment process as a solution for ensuring assessments could continue. In late 2014, thanks to the financial support of the Association of Zoos and Aquariums (AZA) the European Association of Zoos and Aquaria (EAZA), and the Zoo and Aquarium Association (ZAA) we began development of an online assessment program, and all previous assessments have now been migrated into the new system. Assessments from previous workshops can be reviewed and updated using the online program.



The information provided in the assessments is then used to prioritize each species for one or more recommended conservation actions. These recommendations are then used to guide the next steps required for the conservation of each species. At the national level, this is most often the development of a National Action Plan for the group of species being assessed (e.g. Amphibians). Conservation practitioners are then able to focus their efforts and resources on the species and environments that are most in need of help, and are likely to benefit the most from those efforts. National action plans generally contain detailed and prioritized conservation actions for both *in situ* and *ex situ* programs, and often contain species-level actions for all threatened species.

Conservation resources are limited, and with thousands of threatened species in need of help, the Conservation Needs Assessment process seeks to objectively and consistently identify priority species and their immediate conservation needs.

Who makes the assessments?

During the past seven years, around 350 ASG members, scientists, field biologists and researchers, animal husbandry experts and other stakeholders have contributed their expertise as assessors during 26 Amphibian Conservation Needs Assessment workshops. Combining and sharing the expertise and experiences of all of these people is vital to enhance the assessments, ensuring that appropriate recommendations for priority national and global conservation actions are delivered. Collectively, they have determined the best course of conservation action to help prevent the extinctions of threatened amphibian species in the wild.

Anyone who has the appropriate expertise is welcome to contribute to the online assessments. Since the bulk of the information required for the assessments relates to the current status of species in the wild, and the threats they face, the primary source of information comes from people with recent knowledge of species in the field. The assessments also contain some details of past *ex situ* experiences for each species, so input from the *ex situ* amphibian conservation community is also required to ensure complete and thorough assessments.

Requests to become an assessor can be made by completing the short registration form or by clicking the "Signup to get started!" button on the Home page. Requests will be verified and approved by the appropriate National Facilitator - normally ASG Chairs, or Amphibian Ark staff - and email notification will be sent as soon as the request has been approved. This approval process ensures that all assessors have appropriate expertise, resulting in assessments and the conservation actions recommended by those assessments that are of the highest possible quality.

Facilitating national assessments

Prioritizing species for their conservation actions has most often been done at the national level, since conservation actions are usually also undertaken at the national level. To help facilitate a complete assessment of a country's amphibians, the National Facilitator will



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Welcome to Amphibian Conservation Needs Assessments!

Conservation resources are limited, and with thousands of threatened species in need of help the Conservation Needs Assessment process seeks to objectively and consistently identify priority species and their immediate conservation needs. [Read more...](#)

Would you like to become an Assessor?

Amphibian scientists, field biologists, amphibian husbandry experts and others are vital to the success of the amphibian conservation needs assessments. Sharing your amphibian expertise and experiences will enhance our assessments, ensuring that conservation actions are delivered where they are most needed. [Read more...](#)



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- [Mantella milotympanum](#), Madagascar, DEdmonds, 12 Feb 2015
- [Mantella crocea](#), Madagascar, DEdmonds, 12 Feb 2015
- [Mantella aurantiaca](#), Madagascar, DEdmonds, 12 Feb 2015
- [Lithobates catesbeianus](#), Philippines, ASG/AArk Workshop, 03 Jul 2014

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Planning for a national assessment

One of the key components of the Conservation Needs Assessment process is to organize assessments for all amphibian species in a country, as the first step in the development of a national amphibian conservation action plan. As well as using the new online application, national assessments can still be undertaken during a physical workshop if that is the preferred option.

Workshop-based assessments bring together the leading amphibian experts for the country's amphibians, along with other relevant stakeholders, for a multi-day workshop. The length of the workshop depends on the number of species to be assessed, but on average, 40-60 species can be assessed each day during a workshop. The workshop ends with the discussion of recommendations and of the next steps needed for implementing those conservation actions. Using the online process, assessors generally work in isolation from each other, and undertake their assessments online, in their own time. The combined assessments from multiple individual assessors are consolidated into a single set of assessments for each country.

An online assessment for all species in a particular country requires considerable planning and monitoring by the host (usually the ASG Chair). It involves the following activities:

- Determine the list of assessors required to assess all species in the country, and ensure they have all registered online.
- Actively encourage assessors to complete their assessments according to a pre-determined timeframe.
- Encourage assessors to review species in that country which have been added by other assessors, and to contact those assessors if they have concerns with their data.
- Consider a physical or web-based meeting (such as Skype) once or twice during the assessment timeframe to help with any questions, keep the momentum going, and to ensure that no one is falling behind. AArk staff are happy to join these Skype calls if we can be of help - we have English and Spanish-speaking facilitators who can provide help and support.
- ASG Chair(s) or National Facilitator reviews and approves all assessments.
- Review species that have not yet been assessed, and encourage assessors to add data for those species.

Moving forward, we plan to work closer with the ASG to advance other *ex situ*-related issues within the ASG, and to focus national ASG members on a wider range of *ex situ* activities during and after the assessments.

The online program is currently available in both English and Spanish, with a French version soon to be made available. Other languages may be added in the future as the need arises and as funding is available for translation.

Links to other amphibian conservation data

The online assessment program includes links to Red List assessments and distribution maps, AmphibiaWeb species accounts and photos from the CalPhotos photo database, where these exist. Having access to these additional data sources can be very helpful when completing assessments, or as an additional reference, and we hope that over time, additional connections will be made with other databases. We hope that eventually all relevant amphibian conservation databases will be accessible from a single data portal.

We would also like to create additional linkages with the IUCN Red List so that Red List categories in our assessments can be automatically updated, and our assessments can be incorporated into the Conservation Actions section of Red List assessments. We also plan to continue discussions with the Amphibian Red List Authority regarding increased links between our respective data, and readily available access to both Conservation Needs Assessments and Red List assessments from the same location, making it easier for assessors to contribute to both types of assessments at the same time.

Amphibian Ark has partnered with AmphibiaWeb to share and provide access to each others' data, and in the coming months, completed Conservation Needs Assessment data will be available from within AmphibiaWeb species accounts.

Challenges and evaluation

The migration of the workshop-based Conservation Needs Assessment process to an online format has many advantages, including cost-effectiveness, ability for multiple countries to hold concurrent assessments, more inclusive access and immediate updating of and access to data, but this format also brings new challenges. Some of these challenges include access to the internet; assessors finding time to make their assessments; working in isolation, as compared to working in a workshop-based environment; and less stakeholder involvement.

We will continue to work with national ASG Chairs to help plan the assessments for their respective countries, and will continue to facilitate the process itself, albeit remotely in most cases. Sharing the AArk staff's experience and expertise in the assessment process will provide expert guidance with online assessments.

Evaluation of the success of migration to an online format will be based on how well the application is received and used by assessors and national facilitators, the number of new assessments made, and the solutions to the challenges mentioned above. AArk staff will document the progress of the application every three months during the next year to evaluate how effective this new format has been, and the results of this will help guide how conservation needs assessments are made over the coming years.

Short-term plans

We have a target of completing approximately 1,200 species in Madagascar, Colombia and Europe before the end of 2015, using both the English and Spanish versions of the program. As each of these national/regional assessments are complete, we will survey all assessors and national facilitators involved with them and solicit their feedback on using the program, the resulting recommended conservation actions, the content in the help pages, and the review and approval process. We will also ask for any suggested additions and improvements. We are planning to increase the number of national assessments after the end of this year, and will work with national ASG chairs to plan assessments for their countries and regions. If you are interested in planning for a national amphibian assessment, please contact us at info@conservationneeds.org.

The online program and databases have been developed in such a way that the basic structure can be readily modified to suit other classes of animals apart from amphibians. We hope to work with other IUCN taxonomic specialist groups to determine if the assessment program meets their needs, and we hope that in the future this assessment process will be adopted by other specialist groups.

Amphibian Ark would like to thank the European Association of Zoos and Aquaria, the Zoo and Aquarium Association and the Association of Zoos and Aquariums for their generous and ongoing support of the development costs of the online assessments program. In addition, the following volunteers have generously given their free time to help with the development of the extensive help pages, translation into Spanish and French and creating the new Conservation Needs Assessments logo: Danny Beckwith, Manuel Beterams, Luis Carrillo, Olivier Marquis, Belén Proaño and Karin Schwartz.

Please visit the new online assessment program at www.ConservationNeeds.org and if you have any questions about Conservation Needs Assessments, please contact info@conservationneeds.org.



Participants at an amphibian Conservation Needs Assessment workshop in São Paulo, Brazil. The new online assessment program allows these assessments to continue in a more inclusive environment, with assessments for multiple countries being undertaken at the same time. Photo: Kevin Johnson.

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Ex situ conservation program for the Andean Marsupial Tree Frog

María Teresa Alvear, Quito Zoo, Guayllabamba, Ecuador and Diego Almeida Reinoso, SARgrillo Insect Breeding Farm, Quito, Ecuador

The Andean Marsupial Tree Frog (*Gastrotheca riobambae*) is endemic to Ecuador, and it was recently named by the mayor of the Metropolitan District of Quito as a kind of city emblem, but unfortunately, the decrease in population is increasingly evident. The Andean Marsupial Tree Frog is listed in the IUCN Red List as an Endangered species, with the main reasons for its decline being urban development, the advance of the agricultural frontier, the use of pesticides, expansion of exotic tree plantations such as pine and eucalyptus and the presence of chytrid fungus or Bd (*Batrachochytrium dendrobatidis*) at various locations where the species is present (Frenkel et al. 2010).



Juvenile Andean Marsupial Tree Frogs (*Gastrotheca riobambae*) bred at the Quito Zoo in Guayllabamba, Ecuador.
Photo: María Teresa Alvear.

The Quito Zoo in Guayllabamba began an *ex situ* conservation program for the Andean Marsupial Tree Frog in November 2014 with specimens collected from populations in the north east of Pichincha. These animals were rescued from the area where the new Quito airport is being built, on the slopes of the Guayllabamba River. These adults are currently on display, although the first tadpoles to be bred at the Zoo have been transferred to a separate management area at the Zoo.

In the first phase of the program we had 333 juveniles, of a total of 382 first generation tadpoles. The tadpoles were kept in 12-gallon plastic containers, with each container holding an average of fifty individuals. All were fed three times per week with a balanced pellet diet with a protein level of 30-50% and maintained at an ambient temperature of 21°C, with access to natural light with access to parts of UVB rays. All water used was chlorine and pesticide-free. The time to metamorphosis varied, with 67% of the tadpoles finishing their metamorphosis in thirty days, while the remaining individuals were delayed up to ninety days to complete their development.

Juveniles are kept in glass containers 120cm long x 40cm wide and 50cm high. These terrariums are fitted with bromeliads, stems, leaves and have a mesh top cover that allows penetration of UVB rays from the sun. They also have a water recirculation system that keeps the humidity level inside the terrarium above 90%, creating ideal conditions for normal development of the frogs.

From the beginning, the frogs were fed three times a week with a varied diet based on insects and invertebrates, and consisting of two species of crickets, mealworm larvae, adults and larvae of the wax moth of abaja, sow bugs and two earthworm species. Once a week the food items were supplemented with calcium. This diet has allowed us to maintain completely healthy frogs.

In the juvenile phase we tested for the presence of chytrid fungus in 5.3% of the population, using polymerase chain reaction in real time (q-PCR). The tests were negative which leads us to conclude that the populations of *Gastrotheca riobambae* held at Quito Zoo in Guayllabamba are free of chytridiomycosis.



María Teresa Alvear taking care of Andean Marsupial Tree Frogs in the frog room at Quito Zoo. Photo: María Teresa Alvear.

As part of the conservation program that we are developing, we have established the first controlled reintroduction in one of the adjacent creeks to Guayllabamba River, which is within the immediate vicinity of the zoo trial. At just six months into the program we have the first 256 adults from six unrelated genetic lines to be reintroduced into their natural environment. The area designated for the reintroduction has been enriched with bromeliads, and artificial water pools which are 60cm in diameter and have a permanent irrigation system. Monthly monitoring consisting of an auditory and visual record of the reintroduced animals will be established.

We have also developed a head-starting program in which we will catch wild tadpoles and raise them in artificial ponds, capturing approximately 10% of the animals found in each natural pool. They will be raised until adulthood and then reintroduced back into the wild in other locations where populations of this species occur, helping

to diversify the genetics in these areas. The intended release sites will be examined in advance to ensure they are suitable. For this we plan to test for chytridiomycosis, check for sufficient pools with uncontaminated water, enrich the habitat with native plants such as bromeliads, sigses and other similar plants that will provide shelter, food and sufficient moisture for the development of the frogs.

The Andean Marsupial Tree Frog program at Quito Zoo is helping to repopulate all the slopes of the Guayllabamba River basin, with the reintroduction of genetically viable individuals. In the future, we intend to also repopulate the parks and gardens of the Metropolitan District of Quito along with an educational campaign for children and youth in local schools district and villagers living in areas close to the reintroduction sites.

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One of the outdoor containers for juvenile Andean Marsupial Tree Frogs. These terrariums are fitted with bromeliads, stems, leaves and have a mesh top cover that allows penetration of UVB rays from the sun. Photo: María Teresa Alvear.

Amphibian trade workshop: Identifying the threats, species most at risk and next steps

The Singapore Zoo, the Animal Welfare Institute, Defenders of Wildlife and the Amphibian Survival Alliance joined forces in March 2015 to host two international amphibian trade workshops. On March 12th and 13th two teams of amphibian and trade specialists from academia, government, and non-governmental organizations gathered at parallel workshops in Singapore and Washington, DC.

Starting with a list of amphibian species prepared for the workshops, the specialists identified the species most at risk from trade (domestic and international), habitat loss, or due to disease. The species requiring the highest priority actions were selected and needed conservation actions were assigned to each species. The original species list was created using data from the IUCN Red List, CITES trade database, and input from the IUCN SSC Amphibian Specialist Group regional chairs.

Predictably, a number of “priority species” are traded locally, regionally and internationally for consumption as bushmeat or in the frog leg trade. Other species of priority concern including a wide range of salamanders, frogs, and toads are traded internationally for the pet trade. Amphibian exploitation for both the bushmeat and the pet trade involves offtake that is depleting wild populations.

The specialists identified conservation actions for priority species or entire taxa. These included stronger national laws and regulations, improved law enforcement efforts, listing or up-listing in CITES Appendices, improved compliance with international trade standards for CITES-listed species, and ongoing monitoring of trade trends and impacts.

Another threat posed by widely traded amphibian species is disease. Such threats include both *Batrachochytrium dendrobatidis* (*Bd*) and *Batrachochytrium salamandrivorans* (*Bsal*) fungal infections, Ranavirus, and other viral diseases. Such diseases affect not just amphibians but also some fish and reptiles. While vector amphibian species (including bullfrogs, *Xenopus* frogs, Korean Fire-bellied Toads and African Dwarf Clawed Frogs) may not be threatened by trade, their trade exposes other animal populations to potentially devastating emerging infectious diseases. To reduce such risks, actions must be taken to improve implementation of existing veterinary health protocols to identify diseased animals prior to export and stricter measures such as quarantine and disease monitoring of imported amphibians must be implemented.

Workshop organizers and participants have initiated efforts to implement some of the recommended conservation actions and intend to collaborate with additional experts from across the amphibian conservation community to achieve meaningful progress for amphibian conservation.



Some of the participants at one of the international amphibian trade workshops which included amphibian and trade specialists from academia, government, and non-governmental organizations. Photo: Alejandra Goyenechea.

Amphibian Advocates

In this newsletter we continue our new series featuring amphibian conservationists from around the world who focus much of their efforts on captive rescue and research programs for some of the most threatened 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. These profiles can also be found on our web site at 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 at newsletter@amphibianark.org and we'll add your suggestion to our list!

Neftalí Ríos-López, Villa Coquí, Puerto Rico

The oldest of three brothers, I was born in San Juan, Puerto Rico. From a young age, I was hypnotized by wildlife documentaries and classic TV shows broadcasted in Puerto Rico since the late 70s, like Marlin's Wild Kingdom, Jacques Cousteau's underwater stories, and Sir David Attenborough's breathtaking documentaries. I believe these were responsible, in a large part, for my particular attraction to nature and wilderness.

I got into college in 1987 to pursue a BSc in Science Education at the University of Puerto Rico - Río Piedras Campus (UPRRP). In 1992, under the supervision of Dr. Rafael L. Joglar, I had the opportunity to participate in several field research projects with *Eleutherodactylus* frogs. It was then that I realized that these were the sorts of activities that I would like as an occupation. Later, while working on my graduate studies/PhD at UPRRP, I met ecologist (and friend) Dr. Thomas Mitchell Aide who became highly influential for my development as a community ecologist.

I completed my PhD in herpetofaunal community ecology under the supervision of a special man, Dr. John Paul Richard Thomas, distinguished herpetologist and my co-author in the description of *Eleutherodactylus juanariveroi* (Puerto Rican Coquí Llanero) in 2007. The Coquí Llanero is the most recent "coquí" frog discovered on the island (in Puerto Rico, we call all frogs of the genus *Eleutherodactylus* "coquí"). After graduation, I became a faculty member of the Wildlife Management BSc program at the University of Puerto Rico - Humacao Campus (UPRH) - an undergraduate institution.

In 2012, state and federal agencies were about to list the Coquí Llanero as Endangered when I heard about an Amphibian Ark husbandry workshop in the Dominican Republic. I thought this workshop could benefit my goals of establishing a captive-breeding program for the coquí. I participated in the workshop (along with six of my undergraduate students at the time) and became aware of the organization's vision and mission first hand. During the week-long workshop, I witnessed the extraordinary level of commitment by the staff and lecturers. It was not a convenient workshop, but it was one of the most influential professional activities in my recent career - thank you guys! Later, I applied and received an AArk Seed Grant that allowed me to start my *ex situ* conservation project by the end of 2013. Expectations were high, but emotions were even higher as I was finally about to engage in this unique initiative with the highland Puerto Rican *Eleutherodactylus* (*E. portoricensis*). In essence, AArk allowed the first project entirely conceptualized, developed, and conducted on the island, for a species in much need for conservation!

Based on what we learned during the AArk's husbandry workshop, I designed and set up the breeding facility room, which undergraduate students later baptized "Villa Coquí" or Coquí Village, now an iconic place at UPRH. The project has represented a considerable challenge bearing an equally large responsibility for



Dr. Neftalí Ríos-López (far right) along with several of his undergraduate students (from left to right: Rayza Hernández, Waleska Tirado, and Eliacim Agosto) at "Villa Coquí", University of Puerto Rico-Humacao Campus. Photo: Neftalí Ríos-López.

me, but ultimately for the benefit to the species and my students. In April 2014, we received a most anticipated reward: the first ever successful reproduction event occurred with an upland species of Puerto Rican *Eleutherodactylus*! We are now rearing juveniles of captive breed *E. portoricensis*. We are so proud of our project that we wanted to share our experiences with you - though at this stage, only in Spanish - at www.uprh.edu/labneftali. I also have a field component focused on studying the population ecology of the species in a locality where they still thrive in Puerto Rico. I continue exploring the central-western mountain range in hope for remnant populations within the species, to find adequate sites for introducing captive-breed individuals that can generate self-sustained populations, and also look for other species that have not been detected in decades.

I have used this whole project as a fundamental educational tool for motivating my undergraduate students into amphibian conservation and wildlife management at UPRH. My future plans include expanding our *ex situ* project, developing a husbandry and reproduction protocol for similar *Eleutherodactylus* species, seeking extra laboratory space for nurseries, and starting a long-time dream of a Coquí Llanero captive breeding program at UPRH. In addition, I foresee local husbandry workshops given in Puerto Rico by trained individuals that were equally influenced by

AArk's capacity-building initiatives - the true legacy of AArk's efforts worldwide. Likewise, I look forward to a Puerto Rican "Amphibiary": one oriented at education, public awareness, professional development, and amphibian conservation and research in Puerto Rico. I am convinced such an Amphibiary can be a reality soon.

The work required by these kinds of projects is enormous and full of sacrifices. These projects require a lot of commitment and patience for success, which can only be achieved by the work of my best collaborators at this time: my undergraduate students at UPRH. For some of them, this project has represented a unique research and educational experience. For others, I have witnessed life-changing experiences that will multiply, for sure, our next generation of amphibian conservationists and wildlife managers for the benefit of those remarkable animals we call "coquíes". In Puerto Rico, I believe the seed has now germinated for good. For that, I thank the Amphibian Ark and their sponsors that make these projects life-changing experiences with profound consequences for education and conservation.

Cybele Lisboa, São Paulo Zoo, Brazil

Nobody, including myself, believes that I used to be afraid of frogs as a child. I was born in Brazil, the richest country in terms of amphibian diversity, but I actually grew up in the city and so the contact I had with frogs was very limited (camps, etc.). It wasn't until I became a biologist several years later that I started working with reptiles and amphibians as an intern in 2003 in the São Paulo Zoo Herpetology Department. This was my first professional interaction with these incredible animals. Despite there being only a few frogs in their collection at the time, I really fell in love with them - for example, species like the Common Milk Frog (*Trachycephalus venulosus*). Some years later, in 2006, I was hired as an employee and started to work with some dendrobatids, with which I had the opportunity to practice amphibian captive breeding. From here, our collection began to increase.



The Amphibian Ark campaign "Year of the Frog" in 2008 introduced the amphibian crisis to Cybele Lisboa and how zoos were important to saving them. Since then, she has been completely committed to this cause.
Photo: Cybele Lisboa.

In 2008, Kevin Zippel came to Brazil to bring the Amphibian Ark campaign "The Year of the Frog". It was then that I was first introduced to the amphibian crisis and how zoos were important to saving them. Since then, I have been completely committed to this cause. During the same year, I was invited to participate in a project that was just starting: *ex situ* conservation of *Scinax alcatraz*, a Critically Endangered tree-frog from Brazil. The care of amphibians in captivity was still a new area in Brazil and much of the husbandry techniques were unknown by professionals. Because of this, we began working with the surrogate species *Scinax perpusillus*, which is common in the wild, to develop captive breeding and maintenance techniques to apply for the endangered species. The technique developed was effective, and in 2011 the founders of *S. alcatraz* were collected and transferred to an isolated laboratory of the São Paulo Zoo. Only a few months later, the animals started to breed. Currently, there is a captive breeding population of the species, which becomes a bank of unique genetic resources. Since the beginning of the program until now, AArk has supported us through all of the challenges and lessons we have had to deal with. Concurrent to this program, in 2009 we also started to develop a new education project at the Zoo, "O Pulo do Sapo" ("Leap of the Frog"). This is the first exhibit dedicated solely to the amphibians of Brazil. The opening took place in 2010 and the exhibit continues to be a success.

With my involvement in these programs, I felt the need to continually improve relevant professional skills and have continually sought opportunities to do so. Two courses were extremely important for my professional training. One of them was the Amphibian Biodiversity Conservation Course at Durrell Wildlife Conservation Trust, which opened my mind further to amphibian conservation. The other was the Association of Zoos and Aquariums (AZA) Amphibian Biology, Conservation and Management Course, which was very important to improve my husbandry techniques. I am very thankful to institutions such as the Latin-American Association of Zoos and Aquariums (ALPZA), the Zoo Conservation Outreach Group, and Cameron Park Zoo (Amphibian Conservation Award) that have supported me to complete these courses.

By participating in *ex situ* initiatives, I also began to get involved with the national amphibian conservation plan for Brazil. Before these, the *ex situ* strategy was not considered by the local conservationists and now it has been included in action plans. There are still many knowledge gaps relevant to Brazilian frogs, hindering the establishment of appropriate conservation programs. Therefore, population, taxonomic, and biogeographical studies are still a priority to understand the threats to the species and what conservation actions should be recommended. *Ex situ* conservation is still poorly explored in Brazil, and although reintroduction is not an immediate action, the formation of populations of endangered species in captivity for possible recovery programs is needed, as well as the development of protocols for emergency rescue. To this end, I think the engagement of other zoos is absolutely necessary. I believe that the work we have done is stimulating other zoos in Brazil to develop *ex situ* projects with amphibians, because we have shown it is possible. With this in mind, I intend to continue developing techniques for husbandry and reproduction of Brazilian amphibian species and also helping other zoos to develop new programs or to even train their technicians.

Amphibian Conservation Center at Parc Ivoloïna, Toamasina, Madagascar

Bernard Lambana, Parc Ivoloïna, Madagascar

Background

Madagascar Fauna and Flora Group's (MFG) mission is to conserve Madagascar's biodiversity by linking *ex situ* and *in situ* conservation. The animal collection at Parc Ivoloïna includes a number of endangered lemur species, and one frog species – the Tomato Frog (*Dyscophys antongilii*). MFG hopes to expand its *ex situ* captive breeding program to include other endemic frog species, especially in light of increased threats to Malagasy amphibians.

To this end, two members of the MFG staff attended a one-week workshop and training on amphibian husbandry held at Association Mitsinjo's facilities in Andasibe, Madagascar, in November 2012. Following this training, MFG was encouraged to apply for funds to initiate a small amphibian husbandry program by first constructing a center for breeding. The initial structure was completed one year later, and forty Blue-back Reed Frog (*Heteraxilus madagascariensis*) were collected from the Ivoloïna Forestry Station in eastern Madagascar.

Devin Edmonds, Amphibian Conservation Director at Association Mitsinjo, visited our center in May 2014 and made some recommendations for improvements. Following Devin's suggestions, the initial population of frogs was released into the wild. At the same time, MFG was awarded a seed grant from Amphibian Ark to improve the biosecurity of the unit.

Progress Report, May 2014 – May 2015

Infrastructural improvements for increased biosecurity

Over the course of one year, an enormous amount of effort has gone into improving the infrastructure at the center to ensure increased biosecurity. Improvements include:

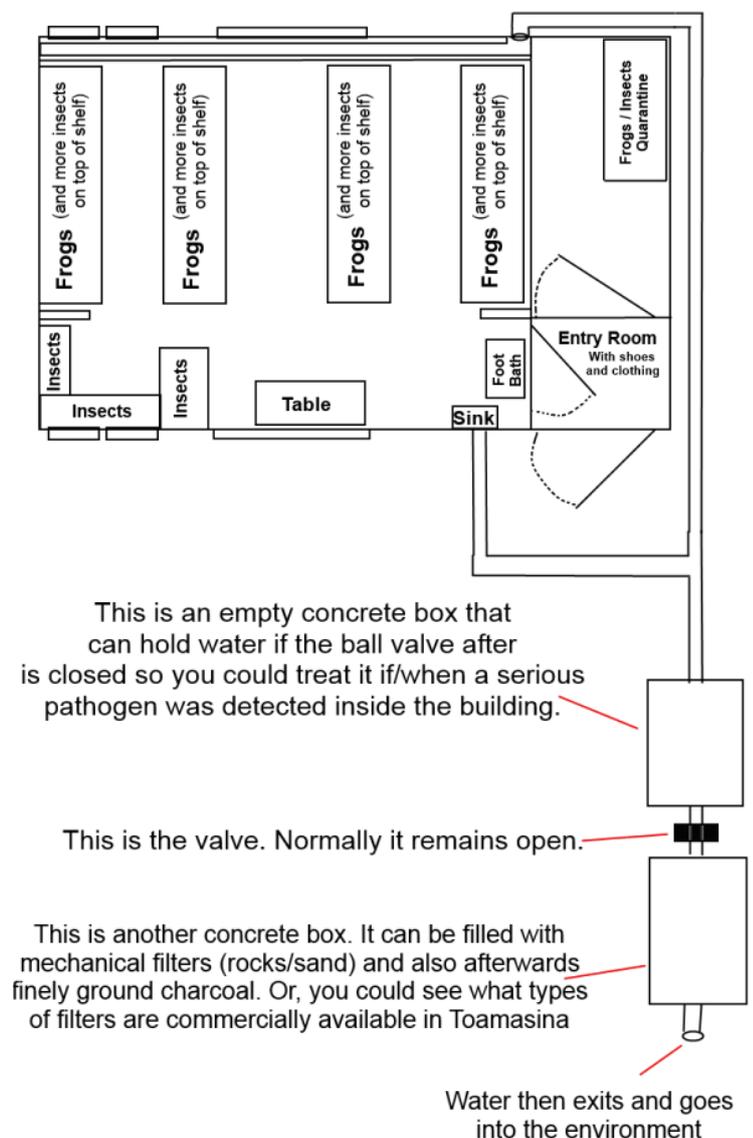
- addition of an entry room for changing clothes and shoes, with a sink for hand washing
- addition of a separate quarantine room
- improvements to the ceiling and additional windows to reduce temperature
- filling cracks around the windows and ceiling so nothing can enter or exit the facility
- new terrariums and shelving units built and installed
- canal and drains for evacuating water from the terrariums were added
- a large sink was constructed in the main room for washing terrariums inside
- outgoing wastewater treatment system installed.

Training exchange program

After the infrastructure modifications were completed, an in-depth series of exchanges between Mitsinjo and Ivoloïna and financed by Durrell Wildlife Conservation Trust was initiated. Two staff from Parc Ivoloïna each spent ten days working at the facility in Andasibe where they learned more about biosecurity measures, including disinfecting materials; what materials are safe to enter the building; amphibian chytrid and how to kill it; important practices to prevent the spread of disease; how to score the condition of frogs; what healthy and sick frogs look like; acclimation procedure and how to weigh frogs. They also learned a lot about live food production, and the focus then was to spend six months developing a population of insects for live food.

Members from Mitsinjo then visited Ivoloïna and taught the staff how to construct terrariums, including how to calculate glass to be cut, where to source materials, constructing insect-proof covers, working with silicone, and building doors.

A second visit by Mitsinjo staff focused on live food production. Since importing live insects is not a viable option due to the risk of potentially introducing a new pest or foreign species, it is important for us to learn how to raise live insects for food. Two members from Mitsinjo (Mampionona and Nirina) came to Ivoloïna to train MFG staff in live insect production. We learnt about labeling and record keeping, the importance of schedules, techniques to culture fruit flies, avoiding mold and fungal problems, collecting and breeding crickets, breeding collembolans, cockroaches and which species are suitable for food, culturing and collecting isopods, live traps and field collecting techniques. By November we started culturing five species of



Plan of the amphibian center and Parc Ivoloïna, after the renovations had been done.



Forty Blue-back Reed Frog (*Heteraxilus madagascariensis*) were collected from the Ivoloina Forestry Station in eastern Madagascar after the renovations to the amphibian center at Parc Ivoloina. Photo: Bernard Iambana.

insects that were collected from Ivoloina Forestry Station: large black crickets, isopods, large field crickets, cave crickets and *Drosophila*.

After the first six months of insect breeding, we found rearing *Drosophila* to be the easiest. Almost 90% are successful because the Ivoloina team had prior training in rearing these insects. Individual colonies are easy to find and collect. The cave crickets produced many eggs, with nearly 90% successful hatching rate because the temperature and humidity on the east coast promotes hatching. The only challenge is to find enough egg cartons. We are still having difficulty rearing the large black crickets, as well as isopods.

Finally, amphibian husbandry guideline templates were translated into French and shared, and these are now also available Husbandry Documents page on the Amphibian Ark web site, www.amphibianark.org/husbandry-documents/.



Staff working in the live food room. Two staff members from Association Mitsinjo, Mampionona and Nirina, visited Parc Ivoloina to train Madagascar Fauna and Flora Group staff in live insect production. Photo: Bernard Iambana.

Next steps

In June this year, Bernard Iambana (Chef du Parc Ivoloina) will visit Durrell Wildlife Conservation Trust in Jersey for further training on amphibian captive breeding. We are also planning on Mitsinjo staff visiting us and providing further recommendations, and we will discuss goals and objectives of amphibian conservation breeding programs during the MFG annual meeting in June. We will also collect biological data for each species that we are considering breeding, and we will focus initially on surrogate species which will help us to understand the captive husbandry requirements of more threatened species.

Acknowledgments

We would very much like to thank Amphibian Ark for their financial support, Association Mitsinjo for their technical support of this project, Durrell Wildlife Conservation Trust for funding the training exchanges and Franco Andreone, from the Amphibian Specialist Group, Madagascar.

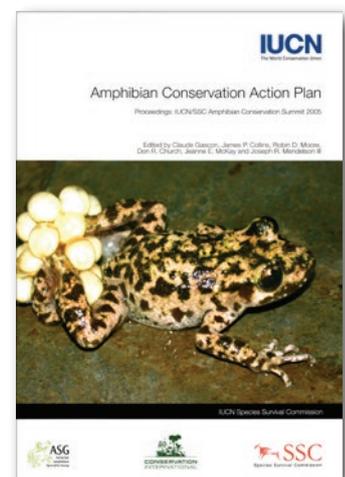
Captive Breeding chapter of the ACAP updated

Kevin Johnson, Amphibian Ark and Ben Tapley, Zoological Society of London

In 2014, the Amphibian Specialist Group (ASG) established a number of thematic working groups in line with the chapters of the 2005 Amphibian Conservation Action Plan (ACAP, www.amphibianark.org/pdf/ACAP.pdf), with the aim of reviewing efforts since the ACAP was published and developing priority actions for the next 1-5 years. The ACAP has subsequently been turned into an online, living document (www.amphibians.org/acap/), which will be updated and revised as actions are implemented by the various working groups.

A new Captive Breeding Working Group was formed, and this is co-chaired by Kevin Johnson from the Amphibian Ark and Ben Tapley from the Zoological Society of London. One of the first actions the group was tasked with was to develop a vision, with the following statement being proposed by the group: "All amphibian species assessed by Amphibian Ark Conservation Needs Assessments or other nationally-recognized organizations that are recommended as priorities for conservation breeding, are established in genetically and demographically viable and financially stable ex situ programs. Where possible, programs should be within the indigenous range, with program outlines which identify short, medium and long term goals for the program and an exit strategy".

The group also developed a range of goals, challenges and priority actions, and these can be found on the Captive Breeding Working Group page on the ASG web site, www.amphibians.org/asg/workinggroups/captive-breeding/. As actions are implemented, we will report on the progress, and the online document will be updated accordingly.



National *Ex Situ* Amphibian Conservation Coordinator for Madagascar

Since 2007, Amphibian Ark staff have facilitated Conservation Needs Assessments for 3,375 (46%) 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 stakeholders who have contributed to these assessments. To date, 412 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 twelve 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, 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.



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



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



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

Recent animal husbandry documents on the Amphibian Ark web site

The Husbandry Document library on the AArk web site (www.amphibianark.org/husbandry-documents/) currently contains over 150 articles, with additional articles being added regularly. We are particularly keen to add documents in languages other than English, so we can ensure that information about good amphibian husbandry practices is readily available to everyone. If you have additional amphibian husbandry documents that you are willing to share, you are welcome to submit them to us using the simple form on the web page.

Your contributions will help make this a one-stop shop for all amphibian husbandry documents!

Four new documents have been added recently:

Principles of Program Development and Management for Amphibian Conservation Captive Breeding Programs

Luis Carrillo, Kevin Johnson and Joseph R. Mendelson III

International Zoo News Vol. 62. No. 2 (2015), pp. 96-107. www.amphibianark.org/pdf/Principles-of-Program-Development-and-Management.pdf

One of the biggest challenges in dealing with amphibian conservation is the huge number of species threatened worldwide. Based on our experience, expertise and observations of various programs worldwide, and on interactions with stakeholders participating in our workshops and courses, Amphibian Ark has developed a set of general principles to be considered in the development phase of an amphibian conservation breeding program.

HabiData - online repository for amphibian and reptile natural history data

Chris Michaels and Rachael Antwis, www.habidata.moonfruit.com

One of the biggest stumbling blocks in designing suitable husbandry protocols for captive amphibians is a lack of information about the conditions they live under in the wild. Providing naturalistic conditions can both improve the health and survivorship of captive animals and also reduce the impact of adaptation to captivity on the gene pool of conservation populations. HabiData is an online resource intended to become a hub or repository for natural history and environmental data from wild amphibian populations.

Amphibian Taxon Advisory Group Best Practice Guidelines for Midwife Toads (*Alytes* sp.)

Elizabeth Wells, David Garcia - Alonso, Gonçalo M. Rosa, Gerardo Garcia & Benjamin Tapley

www.eaza.net/activities/cp/EAZA_Best_Practice_Guidelines/2015_Midwife_toads_EAZA_Best_Practice_Guidelines_Approved.doc.pdf

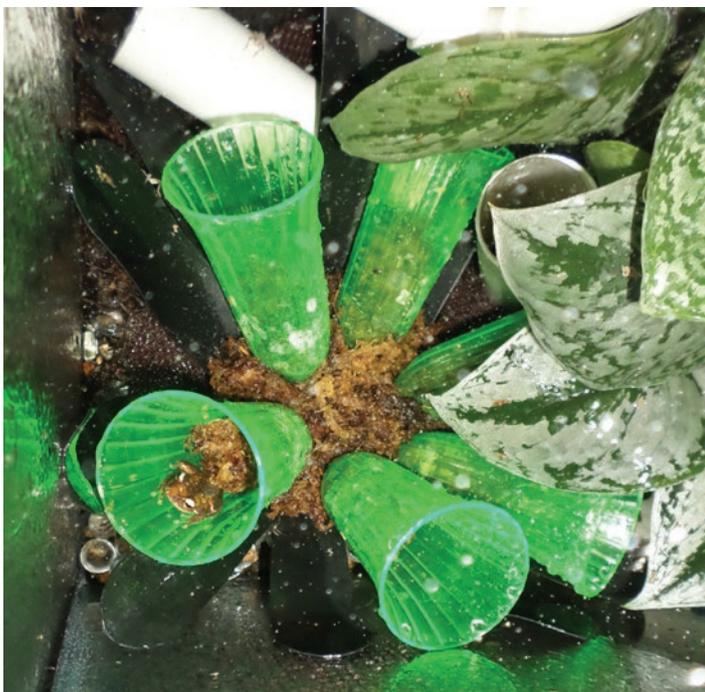
Right from the very beginning it has been the concern of EAZA and the EEPs to encourage and promote the highest possible standards for husbandry of zoo and aquarium animals. For this reason, quite early on, EAZA developed the "Minimum Standards for the Accommodation and Care of Animals in Zoos and Aquaria". These standards lay down general principles of animal keeping, to which the members of EAZA feel themselves committed.

The information in this Best Practice Guideline has come from a variety of sources including an extensive literature review, the experience of the authors and others in the captive husbandry of *Alytes* species as well as direct observations of the species in the field.

Building artificial bromeliads

Neftalí Ríos-López, www.amphibianark.org/pdf/Making-artificial-bromeliads.pdf

Used as breeding and retreat sites by some species, such as *Eleutherodactylus*. For some settings, like terraria in low temperature regimes, bromeliads may be hard to keep and take care off. Functional artificial bromeliads can be made as substitutes.



Alytes obstetricans. Photo: Ben Tapley.

Artificial bromeliads.
Photo: Neftalí Ríos-López.

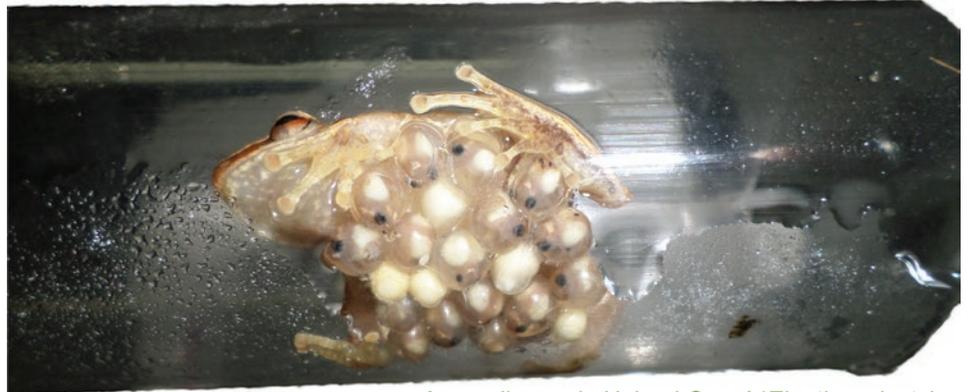
The Upland Coquí program at the University of Puerto Rico

Neftalí Ríos, University of Puerto Rico in Humacao

The Upland Coquí or 'Coquí de la Montaña' (*Eleutherodactylus portoricensis*) from Puerto Rico is a high elevation montane species classified as Endangered in the IUCN Red List, and recommended for *ex situ* rescue during the 2011 Amphibian Ark Conservation Needs Assessment for Caribbean amphibians. This species has a dramatically reducing distribution throughout most central and western mountain ranges (locally extinct), and it is only found in eastern and south-eastern forest areas above 650m in elevation.

Neftalí Ríos from the University of Puerto Rico (UPR) in Humacao was granted collection and Institutional and Animal Care and Use Committee (IACUC) permits in December 2013, and initiated field work, collection of twenty-eight male and female adults, and captive efforts for this species to gain a better understanding of factors influencing its population dynamics and its poorly-known reproductive biology.

In terrariums, several problems arose initially: several mating pairs died due to bedding substrate used in the terrariums - coconut husk on top of gravel - as it is highly absorbent and it sticks to the frogs' skin almost permanently. Calling was rarely heard, and keeping bromeliads alive in conditions of low temperature (21°C) and high humidity (>90%) was a constant challenge and most of them died and became rotten. We managed these problems by changing the substrate to glass beads on top of the same gravel and adding sphagnum moss in one corner of each terrarium. We also setup a playback system with a 7hr-3hr-2hr cycle of chorus-silence-chorus recordings from the field that mimicked the diel variation in the species' natural chorus. We made artificial functional bromeliads using green plastic champagne glasses that provided humidity, retreat, and breeding sites. More information about the artificial bromeliads can be found here: www.amphibianark.org/pdf/Making-artificial-bromeliads.pdf. Since the change of bedding in January 2014, no frogs have been lost, from either the original collection or the second collection. No frogs have needed veterinary care or medical treatments. Males have been calling, and females have become gravid. The new bromeliads have been frequently used for retreat.



A guarding male Upland Coquí (*Eleutherodactylus portoricensis*) with embryos visible in eggs in a clutch deposited in a plastic tube. Photo: Neftalí Ríos and Raiza M. Hernández.

In May 2014, the first ever reproduction event occurred and its amplexus was recorded in the captive breeding facilities at UPR-Humacao. Since then, fifteen egg clutches have been laid in breeding areas, including on artificial bromeliads, but 57% have been lost to oophagy and abandonment by the guarding male. The female is now being removed after detecting oviposition in a terrarium to reduce oophagy. Abandoned egg clutches are being raised in petri dishes until they hatch. Many hatchlings died initially, presumably of starvation as we used fruit flies for food, but hatchlings were moved from deli cups to 1 litre mini-terrariums set up with collembolan colonies in them. Hatchlings took collembolans immediately until they became juveniles at three to five months old and were then ready to feed on fruit flies dusted with multivitamins and calcium. Juveniles were then placed into 1 litre deli cups with sphagnum moss as bedding and are doing fine so far. Approximately sixty juveniles, approximately one third of the adult size, are now being raised on a diet based on multivitamin-dusted fruit flies and pin-sized crickets. The age at which they reach adulthood is not known, but the main goal is raising them until reproductively mature and having them breeding accordingly.

Field work in the south-eastern montane forest site to study the population dynamics of the Mountain Coquí revealed that the species is the most abundant in the four-species *Eleutherodactylus* assemblage. With an estimated monthly mean of 884 adults/ha and 2,362 individuals/ha, these are the densest populations ever recorded on Puerto Rico (reaching up to 1,300 adults and 4,000 individuals per hectare in October 2014). This adult mean population size is approximately fifteen times the population size documented at similar elevation in eastern forests, where the species' population is reported to be decreasing, which suggests that the species' population in our field site is in good condition.

Captive facility terrariums for Upland Coquí (*Eleutherodactylus portoricensis*) at UPR-Humacao. Photo: Neftalí Ríos and Raiza M. Hernández.





Future plans include continuing *ex situ* captive efforts and *in situ* population monitoring with the Mountain Coquí to develop captive breeding protocols for similar montane *Eleutherodactylus* in need of conservation. We have initiated a breeding ecology project using artificial breeding houses (a modified version of the 1970s and 80s 'bamboo houses' frequently used by visiting herpetologists in Puerto Rico) to better understand the species' breeding biology in the wild. So far, the captive breeding project has benefited from a \$5,000 grant from Amphibian Ark, \$1,000 from National Institutes of Health - Research Initiative for Scientific Enhancement at UPR-Humacao, and \$15,000 from private financial support. Additional support is being sought to help with food and supplements, materials in the laboratory for the water filtering system, electrical fixtures and materials for creating new mini-terrariums and costs involved with field work.

For additional information, please visit www.uprh.edu/labneftali (Spanish version only, English version under construction).

A male Upland Coquí guarding an egg clutch in an artificial bromeliad. Photo: Neftalí Ríos and Raiza M. Hernández.

1st Course on Amphibian Conservation and Husbandry

14-18 September 2015, Aveiro, Portugal

The 1st Course on Amphibian Conservation and Husbandry will be an interesting and intensive course for researchers or technical staff working with amphibians and looking for a more complete understanding of amphibian conservation and husbandry. The course explores the principles of amphibian husbandry, nutrition and dietary needs, captive reproduction, population management, veterinary aspects (diseases, pathology, and necropsy), biosecurity and quarantine, conservation, threats and global action. Hands-on demonstrations, practical and group exercises are also included, including tank drilling, false bottoms for terrariums, plumbing and filters.

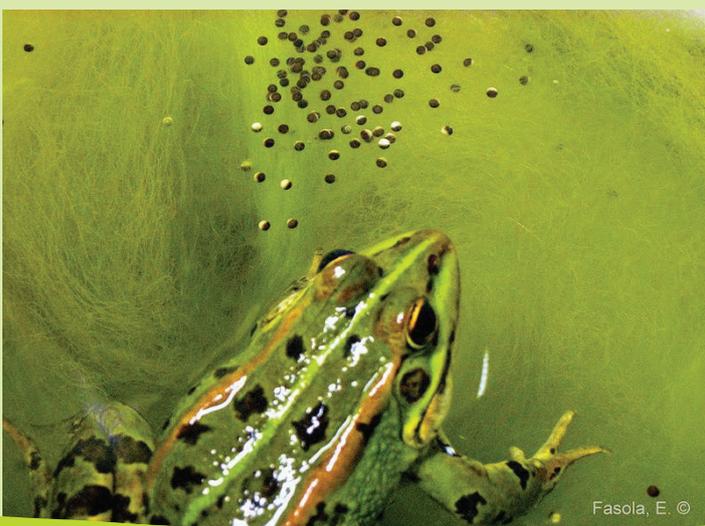
The course will be held at the Department of Biology of the University of Aveiro, located in the Campus de Santiago, Aveiro, Portugal and will be held in partnership with the advanced course "Ecotoxicology of Amphibians and Reptiles: from theory to practice". Please visit <https://sites.google.com/site/ecotoxamre/> for additional information about this course. Discount registration fees apply for participants who register for both courses.

Speakers include:

- Luis Carrillo, Amphibian Ark
- Michael Bungard, Whitley Wildlife Conservation Trust (Paignton Zoo)
- Arturo Muñoz Saravia, Coordinator of the Bolivian Amphibian Initiative and PhD Candidate from Ghent University
- Isabel Lopes, University of Aveiro and Centre for Environmental and Marine Studies, Portugal

Registration deadline is September 31st.

For additional information please contact Emanuele Fasola, emanuele.fasola@ua.pt or visit the web site <http://ach2015.wix.com/ach2015>.



Fasola, E. ©

New rescue lab for endangered amphibians opens in Panama

Brian Gratwicke, Smithsonian Conservation Biology Institute, USA

Smithsonian Conservation Biology Institute (SCBI) and Smithsonian Tropical Research Institute (STRI) scientists working together as part of the Panama Amphibian Rescue and Conservation Project opened a new safe haven for endangered amphibians in April. The state-of-the-art, \$1.2 million amphibian center at STRI's Gamboa field station expands on the capacity of the El Valle Amphibian Conservation Center to implement a national strategy to conserve Panama's amphibian biodiversity by creating captive assurance populations. Together these two centers form the largest dedicated facility for amphibian conservation in Latin America and contribute significant new resources, facilities and staff to the global Amphibian Ark effort.



Conservation Biologist Jorge Guerrel of the Smithsonian Tropical Research Institute tends frogs in one of the amphibian pods. Photo: Brian Gratwicke.



Mural and exhibition niche at the Gamboa Amphibian Research and Conservation Center. Photo: Brian Gratwicke.

Panama is a biodiversity hotspot for amphibians with more than 200 species of frogs, salamanders and caecilians. For the past twenty years, however, many of Panama's unique and endemic amphibian species have declined or disappeared as a result of the deadly chytrid fungus that has spread throughout Latin America and the Caribbean. In fact, a third of amphibian species in Panama are considered threatened or endangered. Amphibian conservationists around the world have been working to establish captive populations of the world's most vulnerable amphibian species to safeguard them from extinction.

"Our project is helping implement the action plan for amphibian conservation in Panama, authored by Panama's National Environmental Authority - now Environment Ministry - in 2011," said Roberto Ibañez, STRI project director. "This is only possible thanks to the interest in conservation of amphibian biodiversity by the government of Panama and the support we have received from businesses in Panama."

The center features a working lab for scientists, a quarantine space for frogs collected from the wild and amphibian rescue pods capable of holding up to ten species of frogs. In the working lab, SCBI scientists will continue research focusing on developing tools that will allow us to reintroduce frogs back into the wild. Seven amphibian rescue pods house the amphibian collection and colonies of insects needed to feed them. The facility also has a back-up generator and waste-water treatment facility. "Our biggest challenge in the race to save tropical amphibians has been the lack of capacity," said Brian Gratwicke, amphibian scientist at SCBI and international coordinator. "This facility will allow us to do so much more. We now have the space needed to safeguard some of Panama's most vulnerable and beautiful amphibians and to conduct the research needed to reintroduce them back to the wild."

As a research facility, the Gamboa Amphibian Research and Conservation Center is not open to the public. However, there are interpretive panels and a window into the research pod where passersby can get a glimpse of the project in action. A small exhibition niche provides a window directly into an active rescue pod, where visitors can see rescued frogs and scientists as they work to conserve these endangered frogs.

To learn more, the public is welcome to visit the new Fabulous Frogs of Panama exhibit at the Smithsonian's Punta Culebra Nature Center, located on the Amador Causeway in Panama City, or the exhibit at the El Valle Amphibian Conservation Center at the Nispero Zoo in El Valle de Anton.

The Panama Amphibian Rescue and Conservation Project is a partnership between the Houston Zoo, Cheyenne Mountain Zoo, Zoo New England, SCBI and STRI. Funding for the new facilities was provided by Defenders of Wildlife, Africam Safari, Frank and Susan Mars, Minera Panama, the National Science Foundation and USAID. Amphibian Ark has provided ongoing support and training for project participants from the beginning of this project.



Exhibition niche window into a working amphibian rescue pod. All frogs in this pod have been captive-bred. Photo: Brian Gratwicke.

Can captive-reared tadpoles re-establish Crawfish Frog populations? An update

Jonathan Swan, Indiana State University, Rochelle Stiles, Indiana State University, and Michael Lannoo, Indiana University School of Medicine



(Above) Three 300-gallon water tanks at Indiana State University used to captive-rear Crawfish Frog (*Lithobates areolatus*) tadpoles.

(Below) Release of late-stage Crawfish Frog tadpoles into the natal wetland at Hillenbrand Fish and Wildlife Area-West (Greene County, Indiana). Photos: Rochelle Stiles.



In the December 2014 edition of the Amphibian Ark newsletter (www.amphibianark.org/Newsletters/AArk-newsletter-29.pdf), we described the initial results of our program to captive-rear Crawfish Frogs (*Lithobates areolatus*), an Indiana State Endangered species, in cooperation with Detroit Zoological Society. Some funding was provided to our project by AArk and the National Amphibian Expo. This spring, we expanded this project to include *ex situ* rearing in the Indiana State University's greenhouse at Terre Haute, Indiana.

We transported two egg masses from Hillenbrand Fish and Wildlife Area-West (HFWA-W) in Greene County, Indiana on 26 March. Upon hatching, we transferred 1,000 tadpoles to two 300-gallon tanks which were filled to approximately 270 gallons and a density of approximately 3.7 tadpoles/gallon on 4 April. We used a third tank to rear additional tadpoles, with density of approximately 7 tadpoles/gallon. We fed Spirulina wafer ("W.T.A. Select" Wafers, Wet Thumb Aquatics, New Baltimore, Michigan) as needed. Macrophytes and periphyton transferred from HFWA-W during the previous summer served as an additional food source for tadpoles. We drained 16% of the tanks and refilled with aged, treated water using Pond Water Conditioner (Topfin, Phoenix, Arizona) when the tanks appeared cloudy or ammonium levels increased. Water temperatures ranged from 19-24°C during daylight hours.

We released late-stage tadpoles prior to hind limb emergence in a staggered fashion, on 23 April, 6 May, and 8 May, into the natal wetland at HFWA-W. Survivorship from hatching to release was high: 97% from approximately 3.7 tadpoles/gallon tanks (965/1,000 and 974/1,000). From the third tank (approximately 7.0 tadpoles/gallon), we released 1,823 tadpoles, however, we were not able to calculate survivorship for this tank due to early tadpole escapes. Tadpoles exhibited density dependent growth. Upon release, tadpoles reared at approximately 3.7 tadpoles/gallon were on average 23.6 mm (snout-vent length [SVL]) and 63.2 mm (total length); these tadpoles grew an average of 0.5 mm/day (SVL) and 1.3 mm/day (total length). Tadpoles reared at the higher density of approximately 7.0 tadpoles/gallon, were on average slightly smaller, 21.2 mm (SVL) and 54.9 mm (total length), because they grew at a slightly slower rate, an average of 0.4 mm/day (SVL) and 1.1 mm/day (total length).

We will continue to monitor these captive-reared tadpoles at metamorphosis. Upon exiting the wetland, juveniles will be captured by a drift fence and pitfall traps. Prior to final release, we will measure, weigh, and mark (toe clip) animals, document malformations, and swab for disease.

This methodology represents a relatively simple, inexpensive way to rear Crawfish Frogs. This project is a portion of the first Crawfish Frog repatriation attempt and will contribute to guidelines for augmentation and re-establishment techniques for this threatened species.

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