amphibian ark

Keeping threatened amphibian species afloat

Newsletter

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In this issue...

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Amphibian Ark Seed Grants for 2016

Kevin Johnson, Taxon Officer, Amphibian Ark

We're very excited to announce four excellent new projects that have recently been awarded Amphibian Ark Seed Grants. This year we received grant applications for thirteen new programs – more than in any other year. We look forward to seeing great progress and success for all of these programs.

AArk's $5,000 competitive Seed Grants are designed to fund small start-up projects that are in need of seed money in order to build successful long-term programs that attract larger funding. More information about the grants can be found on the Seed Grant page on the Amphibian Ark web site (www.amphibianark.org/aark-seed-grant/), and all past grant recipients can be seen on the Seed Grant Winners page, www.amphibianark.org/seed-grant-winners/. The recipients of seed grants in 2016 are:

- *Ex situ* conservation project for the Lake Patzcuaro Salamander (*Ambystoma dumerilii*) - Chapultepec Zoo, Mexico City, Mexico
- Establishment of the *ex situ* supporting program for vanished frog species that reappeared in Costa Rica: taking as model *Lithobates vibicarius* from Juan Castro Blanco National Park - University of Costa Rica, Costa Rica
- An *ex situ* initiative to rescue Merida's Whistling Frog, an endangered undescribed *Leptodactylus* species - Laboratory of Biogeography of the University of Los Andes at Merida, Venezuela
- *Aromobates meridensis*, an endangered Venezuelan frog in need of conservation efforts - University of Los Andes at Merida, Venezuela

Ex situ conservation project for the Lake Patzcuaro Salamander (*Ambystoma dumerilii*)
Chapultepec Zoo, Mexico City, Mexico

The Lake Patzcuaro Salamander (*Ambystoma dumerilii*) is a Critically Endangered amphibian endemic to the Patzcuaro Lake in Michoacán, Mexico. The main threats to the species are habitat loss due to pollution, introduced fish species and over-collection. There have been some efforts in the past to protect this species in the wild, although none of them have considered *ex situ* reproduction as an alternative to secure an assurance population. The Chapultepec Zoo has more than fourteen years experience housing and breeding a similar species, the Axolotl (*Ambystoma mexicanum*); the zoo also participates in a research and conservation program for the Axolotl with the ultimate goal of supplementing the almost extirpated wild population. This project will create a new facility to house Lake Patzcuaro Salamander, enabling us to develop knowledge, techniques and protocols to maintain and breed the species for reintroduction purposes.

The complete project proposal can be viewed here: www.amphibianark.org/seed_grants/Erika-Zamora-Ambystoma-dumerilii.pdf.

Establishment of the _ex situ_ supporting program for vanished frog species that reappeared in Costa Rica: taking as model *Lithobates vibicarius* from Juan Castro Blanco National Park
University of Costa Rica, Costa Rica

Costa Rica has been one of the countries that has reported the most important amphibian population declines, and it has been taken as a reference for iconic species such as the Golden Toad (*Incilius periglenes*). Fortunately, species previously thought to have been extinct have reappeared in the last few years, however, most of the efforts carried out at the moment have been *in situ*. In the last five years, the University of Costa Rica (UCR) has established good relationships with a conservative local NGO; a significant effort has been developed in the conservation of the Green-eyed Frog (*Lithobates vibicarius*). The main goal of this effort is to make this species a conservation symbol of water in the north part of our country. This project's mission is to develop infrastructure and human resources logistics to create an assurance colony of *L. vibicarius*, establish physical facilities and training staff to provide support in case of an emergency when any reappeared species in Costa Rica are in danger. To carry out this project, we will install two containers with the highest biosecurity and animal welfare standards, backed up by the corresponding UCR committees. We will start with two *L. vibicarius* laying eggs, and the main goal will be to achieve the correct development of these animals' life cycles until adulthood, and then eventually, captive breeding. We will develop husbandry and breeding protocols for the species. In addition, we will focus on developing methods that help reduce the impact of potential pathogenic agents; once this species is established in a controlled and healthy captive environment, we propose to proceed with a reintroduction program to the natural sites where this species had completely disappeared.

The complete project proposal can be viewed here:
www.amphibianark.org/seed_grants/G-Alvarado-L-vibicarius-Costa%20Rica.pdf.

An *ex situ* initiative to rescue Merida's Whistling Frog, an endangered undescribed *Leptodactylus* species
Laboratory of Biogeography of the University of Los Andes at Merida, Venezuela

This project aims to rescue populations of the Merida's Whistling Frog, an endangered undescribed *Leptodactylus* species. This is a Venezuelan amphibian with a much-restricted distribution in a highly perturbed urban habitat. The species has not been described yet, but is already known to be in peril. This will be the second Venezuelan *Leptodactylus* in need of protection besides *Leptodactylus magistris*, an endemic species living outside the Andes. No special measurements have been taken to date to protect these species, nor there is official protection for the habitat where they live.

The aim of this project it to establish an *ex situ* conservation program for the Merida's Whistling Frog and to produce husbandry guidelines that could be useful for other such *Leptodactylus* species in risk.

There is an urgent need for conservation of this species of *Leptodactylus*. It shares the same geographic distribution as *Mannophryne collaris* (although not the same habitat requirements; i.e. sympatran but not syntopic species). As per *M. collaris*, the undescribed species faces a high risk of extinction in the wild due to massive habitat destruction through urbanization and other human activities. We plan to establish the right conditions to maintain the frogs, obtain the parental stocks and subject them to strict quarantine and biosecurity standards. Frogs will be kept in captivity in the *ex situ* facilities, with the final goal to establish a long-term program of releases of the offspring to the wild.

The complete project proposal can be viewed here: www.amphibianark.org/seed_grants/Enrique-La-Marca-Leptodactylus.pdf.

***Aromobates meridensis*, an endangered Venezuelan frog in need of conservation efforts**
University of Los Andes at Merida, Venezuela

About a dozen species of *Aromobates*, a genus of dendrobatid frogs, inhabit Venezuelan mountains. Most of them are poorly-known, and have a long history of poor taxonomic understanding of relationships as well as a huge lack of bio geographical and ecological information about them. Most of the species are known to have population declines, and to have been affected by habitat fragmentation and alteration. The Merida Rocket Frog (*Aromobates meridensis*) is perhaps the single most well-known species in the genus, making it an excellent candidate for conservation projects. We propose to undertake an *ex situ* project for a rescue conservation program for this Andean frog.

The objectives of the project are to (1) establish an *ex situ* conservation program for *Aromobates meridensis* with a founder stock collected from the wild; (2) generate information to write the husbandry guidelines for the species; (3) re-introduction of captive-raised F1 descendants into natural conditions; and (4) to spread our knowledge about this species, and the natural forests it inhabits, in regional communities and education centers.

The complete project proposal can be viewed here:
www.amphibianark.org/seed_grants/Osmary-Leal-Aromobates.pdf.

Salamander husbandry courses

Luis Carrillo, Training Officer, Amphibian Ark

Two salamander biology, husbandry and conservation courses were held earlier this year, one in Costa Rica and the other in the USA.

The Neotropical Salamander Biology, Husbandry and Conservation Training Course was hosted by the Costa Rican Amphibian Research Center in Siquirres, Costa Rica, from March 15-18, and was generously supported by The Foundation for the Conservation of Salamanders, John Ball Zoo and Amphibian Ark. Eight participants from zoos, universities and NGOs in Panama, Honduras, Guatemala and Chile attend the course.

From April 11-15 a North American salamander workshop was jointly hosted by Zoo Atlanta and the Atlanta Botanical Garden, USA, which brought together twenty participants, from seventeen institutions in the US, representing zoos, universities and the private sector. Most of the participants are currently working with amphibians or had worked with them in the past. The cost of funding the course was covered by the participants' registration fees, along with the generous support of Zoo Atlanta and the Atlanta Botanical Garden in hosting the workshop.

During the workshops, seventeen instructors provided a range of lectures and hands-on workshops, teaching technical skills necessary for long-term management of *ex situ* assurance populations of salamanders, from species selection to reintroductions, with a focus on husbandry, health, biosecurity and population management. The other objectives of the workshops were to promote the establishment of assurance colonies for imperilled prioritized salamander species, and to aid in ensuring the sound care, welfare and management of captive threatened neotropical and US salamander species. Both courses also provided great opportunities for practitioners in range countries to build networks that will foster better coordination of the conservation of local species.

Participants at the North American salamander workshop, which brought together twenty participants from seventeen institutions, representing zoos, universities and the private sector. Photo: Luis Carrillo.

Course content and learning design

The courses both consisted of a mix of lectures, group activities, practices, and field trips designed to deliver the most relevant information about salamander husbandry and also to put into practice what the students learned during the lectures/ group work sessions. Course content was designed to:

- inform students about the critical situation of many salamander species in the neotropics and the US
- deliver updated salamander husbandry and breeding methods and techniques
- inform students about infectious diseases and biosecurity in captive assurance colonies
- provide the students with information and skills to successfully breed and maintain different species of neotropical and North American salamanders.

Both courses were designed to encourage participation and sharing of knowledge and expertise among instructors and students, providing spaces to do so in a comfortable environment of camaraderie.

On the last day of the US salamander workshop, participants went to Wharton Center, Georgia to learn how to search for and monitor salamanders, using a leave plot technique or/and creek linear transect. Photo: Luis Carrillo.

Course evaluation

To evaluate the effectiveness of the course in Costa Rica, a pre- and post-workshop evaluation was delivered, consisting of

basic questions related to salamander biology, husbandry and management. According to the results, there was an overall students' increment of knowledge of 40% when comparing pre- and post-workshop evaluation. A post workshop survey was also sent to all the students as a way to evaluate the effectiveness of the course in an indirect way. The results of that survey are:

- 100% of the participants expressed that the course content was what they were expecting or better.
- 100% of the participants said that information and knowledge acquired were very good to excellent.
- 100% of the participants said that quality of information was adequate to excellent.
- 100% of the participants said presentations and discussions were good to excellent.

Below are some comments from some of the students after the courses:

"This is a one of a kind course. I found it completely enriching in both a professional and personal context. The relationships and knowledge cultivated during the course are priceless and will be indispensable to me in regard to future salamander conservation work."

"The salamander course provided an excellent background in the ecology and natural history of the taxa, the conservation threats facing salamanders, and policy and disease prevention information. The instructors provided first-hand, useful information regarding care of salamanders from all families, with practical tips on husbandry and diet. I had the opportunity to learn from everyone instructing and taking the course."

One of the amphibian rooms at the Costa Rican Amphibian Research Center. Photo: Luis Carrillo.

"With the amphibian decline crisis in full swing, this course serves as an opportunity to learn in-depth information about salamander research and husbandry. It is imperative that researchers, aquarists, and zoo keepers learn as much about these taxa as possible in order to bolster their representation in conservation efforts."

"Great resource to step into the world of salamander husbandry and conservation by making friends with the instructors and other classmates who know more than you do."

"Very informative! Loved seeing people working to help ensure the health and future of salamanders!"

"This was one of the best classes I ever took!"

"This was a great course! I learned many new ideas and techniques and met a great bunch of people!"

"As a graduate student, I found this course very helpful for my research. I have taken many great concepts from this course and have been able to apply them directly to my research. I was also able to network with individuals in my field which has greatly helped with professional development."

Amphibian Ark's second "Advance"

Anne Baker, Executive Director, Amphibian Ark

Staff and advisors to the Amphibian Ark met at the Atlanta Zoo (Atlanta, Georgia, USA) from April 16th to 18th to review progress since the 2014 Advance (we don't believe in retreating) and to set direction for AArk for the next three years. The three-year Strategic Action Plan resulting from the meeting set forth the following goals:

- Complete Conservation Needs Assessments for all amphibians
- Facilitate the development of amphibian conservation program networks in range countries
- Promote the development of National Amphibian Conservation Action Plans based on results of Conservation Needs Assessments
- Promote the use of *ex situ* recommendations from the Conservation Needs Assessments and, where they exist, National Amphibian Conservation Actions Plans to develop integrated, holistic species level conservation plans (One Plan Approach)
- Expand capacity-building capabilities
- Promote high standards for all *ex situ* programs
- Work with the Amphibian Specialist Group (ASG) Reintroduction and Infectious Disease working groups to identify appropriate captive populations for conservation and reintroduction research
- Work collaboratively with the Amphibian Survival Alliance (ASA), ASG, zoo associations, universities, etc.
- Encourage zoos to allocate more resources to amphibian conservation
- Work with appropriate ASG working groups (infectious disease, ecotoxicology, climate change, habitat protection, etc.) to develop and regularly update emergency response guidelines and protocols for dealing with new threats for various situations so that conservation responses can be appropriate and timely
- Ensure strategic communication is appropriately targeted.

Completing Conservation Needs Assessments for all amphibians. Photo: Kevin Johnson.

Following the April meeting, AArk staff developed specific objectives and actions for each goal. Each action has a timeline and person(s) responsible. Monthly AArk conference calls provide an opportunity to monitor progress.

A meeting of the Amphibian Survival Alliance (ASA) Global Council in late April allowed AArk to share our goals with the broader amphibian community. There was strong support for all of the goals, specifically the completion of Conservation Needs Assessments and efforts to better integrate *ex situ* and *in situ* conservation efforts.

The 2016-2019 Strategic Plan is an ambitious one and though we'd like to accomplish all of the goals overnight (or at least within the next six months), we know that many of them will take much longer to realize. We've already made substantial progress towards a few of the objectives and you'll be hearing about those in upcoming newsletters. Many of our goals cannot be accomplished without participation by all segments of the global amphibian conservation community. Amphibian Ark welcomes offers of help and support in completing this ambitious plan.

Expanding capacity-building capabilities. Photo: Kevin Johnson.

An *ex situ* conservation program for the Merida's Collared Frog

Enrique La Marca, Venezuelan Andean Reptile and Amphibian Conservation Center

A male Merida's Collared Frog (*Mannophryne collaris*). Once common around the Venezuelan city of Mérida, this species in now Endangered due to large-scale deforestation, and habitat alteration, as well as regional climate changes. Photo: Enrique La Marca.

Pristine humid environments, surrounded by snow-capped mountains, most probably flourished on top of the terrace where the Venezuelan city of Mérida was founded in 1558. But, in much less than 500 years, the whole picture has completely changed! A modern city now occupies most of the area and it is expanding onto its surroundings at the same time that all glaciers have retreated to almost disappear. In the last thirty years, temperatures have increased nearly 1ºC and precipitation values have been decreasing. All the combined factors involving large-scale deforestation and habitat alteration, as well as the regional climate changes, have drastically affected the biodiversity.

Once common in this tropical place, the Merida's Collared Frog (*Mannophryne collaris*), is now listed in the IUCN Red List as Endangered, and is now one of the local threatened amphibians. Today, this species is only found in alarming low numbers in a few remaining forested patches, trying to survive. In an effort to rescue the species, the Venezuelan Andean Reptile and Amphibian Conservation Center, through the financial support of Amphibian Ark, initiated an *ex situ* conservation program to achieve long-term viability of its populations. More information on this rescue and captive breeding center for threatened herps is found in the March 2015 edition of the AArk Newsletter, www.amphibianark.org/Newsletters/AArk-newsletter-30.pdf.

Facilities were designed to provide captive frogs with conditions which closely resembled those in their natural environment. Founder animals collected from the wild were kept in large terraria with running water, abundant vegetation and hiding places, where natural photoperiod, fog, and rainy seasons were simulated. An isolated room is devoted to raising a variety of food items to the frogs. The invertebrate food-supply facility provides a reliable source of varied live food items for all stages of the species, and includes fruit flies (*Drosophila melanogaster*), crickets (*Acheta domestica*), wax-moth larvae (*Galleria melonella*), mealworms (*Tenebrio molitor*), weevils (*Sitophilus* spp.), juvenile pill-bugs (*Armadillidium vulgare*), Californian earthworms (*Eisenia foetida*) and unidentified bean beetles. The frogs are fed three times per week and prey items are dusted with calcium, complemented with vitamins and mineral supplements.

The program started with thirty adult frogs, however only fifteen frogs survived the captive conditions and in total produced thirteen egg clutches each ranging from 9-20 eggs. Egg masses were taken away from the terraria in order to avoid damage and once removed, were placed on top of a flat rock close to a small artificial pond within a glass terrarium. They were covered with, but not allowed to touch, humid decaying leaves. Once hatched, larvae were placed in separate plastic containers filled with pebbles and aquatic plants, with a permanent aeration supply. Rocks were provided to facilitate the metamorphosing individuals to climb outside water. Once the tail was reabsorbed, specimens were moved to plastic containers provided with hiding places and a shallow pool. Juveniles were kept in small plastic containers until they reached an appropriate size and mature condition to be released. Just before being released, they were kept for a few weeks in large terrariums duplicating natural conditions, in preparation for releasing them. *Ex situ* management guidelines for the species, produced during the course of this program, are available on the Husbandry Documents page of the Amphibian Ark web site, www.amphibianark.org/?wpfb_dl=199.

In spite of the low production of eggs in every single reproductive event per mating pair, there was a high percentage of survivorship. Of the 110 surviving offspring, 35 have already been released into the wild in a public awareness event (https://youtu.be/CIFFtZThBoo), while the remaining 75 will soon be released. The site where the animals have been released is the Merida's Botanical Garden, a protected urban place we know to having had a small population, now extinct, in its vicinities (La Calera). In this re-introduction phase we initiated a reforestation program to create adequate conditions for the new population, taking advantage of an adjacent small secondary forest lot in the place. We are currently monitoring the reintroduced specimens.

Part of the captive breeding facility at the Venezuelan Andean Reptile and Amphibian Conservation Center. Photo: Enrique La Marca.

The next steps are to continue to produce offspring and to move to the protection of an urban-forested lot where a small wild population still remains. Instead of trying to start a reinforcement program through releasing specimens back to this remnant forest where the founder animals were collected, we started a conservation strategy to preserve the whole area. The forested lot is about six hectares and is connected, through the Albarregas River, to a natural corridor comprising the Albarregas Metropolitan Park, a twenty-two kilometer-long urban-protected space of 612 hectares intended as a wildlife corridor, with high landscape and biodiversity richness. We already have the support of the local community, and for preservation purposes we are currently introducing a document to the city mayor.

Tutorial videos for Conservation Needs Assessments

Kevin Johnson, Taxon Officer, Amphibian Ark

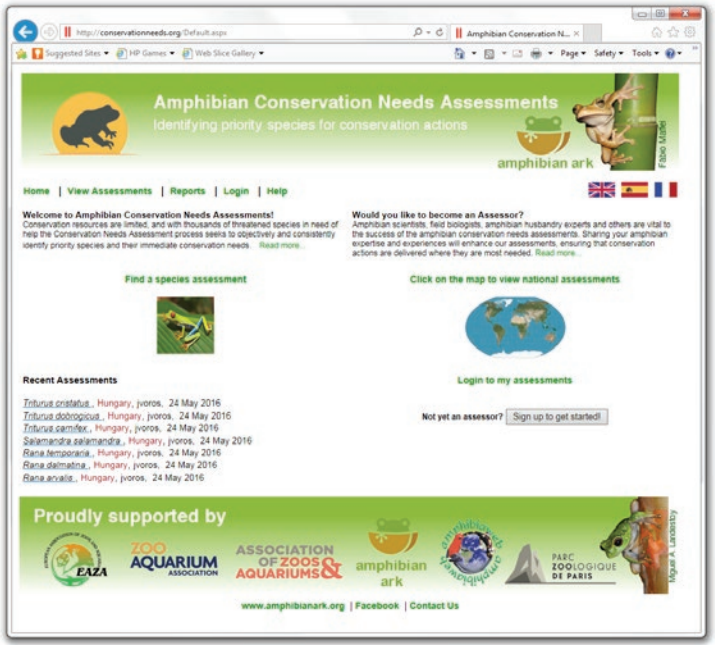
We're excited to announce four new videos for users of the online Conservation Needs Assessment program (www.ConservationNeeds.org). We received feedback from a number of new assessors suggesting that in addition to the online help which is available within the program, tutorial videos with step-by-step instructions for using the program would be useful. We have produced English versions of the videos, and we are currently working on Spanish videos, which will be completed within the next few months. The four videos are available within the help section of the online application (www.ConservationNeeds.org/Help/EN/Help.htm), and also on YouTube (www.ConservationNeeds.org/videos.htm). All four videos are expertly narrated by AArk's Creative Officer, Danny Beckwith.

The first video in the series (www.youtube.com/watch?v=LJeuQ9hM4Ck) is titled *An Introduction to Amphibian Conservation Needs Assessments*, and it provides an introduction to the assessments and why they are important as a tool for conservation planning. It explains how the assessment process was developed, who is involved with the assessments, the benefits of the assessments and the recommended conservation actions that they generate.

In the second video, *The Online Conservation Needs Assessment Program* we introduce the online Conservation Needs Assessments program which was developed in 2015 to supplement the physical assessment workshops which had been run in the past. We show how to use the online program to search for and view assessments, a range of reports and the help system. This video also includes a summary of what is involved in becoming a registered assessor and adding new assessments. This video can be watched here: www.youtube.com/watch?v=WinYMA2dRL4.

The main tutorial video for assessors is the third video, *Managing Amphibian Conservation Needs Assessments*, which is specifically designed to teach assessors how to use the online program. It explains the process of registering to become an assessor, logging into the system, and what assessors should expect to see on their dashboard each time they log in. We explain how to add, edit and complete assessments, and how completed assessments are reviewed and approved by national assessment facilitators. Follow this link to watch the third video: www.youtube.com/watch?v=uxqXkXEyhI0.

The last video is titled *Managing National Amphibian Conservation Needs Assessments*, and is specifically for national assessment facilitators. Facilitators help to manage a complete national or regional assessment, including encouraging new assessors and approving their applications, as well as reviewing and approving completed assessments in their country. This review process ensures high quality assessments, which in turn generate accurate recommendations for conservation actions. This video is available at www.youtube.com/watch?v=juhnWfOBIC0.



We hope these videos will prove to be helpful for anyone who uses the online Conservation Needs Assessment program, and we look forward to completing the Spanish versions and making them available in the near future.

For any enquiries about national amphibian Conservation Needs Assessments, please contact info@conservation-needs.org.

Amphibian Advocates

In this newsletter Jen Stabile from San Antonio Zoo in the US talks about her work with amphibian programs in a number of US zoos. Jen is well known for her work with species from Puerto Rico. Her work, and the efforts of other involved with *ex situ* conservation programs 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 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!

Jen Stabile, Director of Conservation and Research, San Antonio Zoo

I think creating a sense of stewardship for the environment and its species is key to the survival of our global biodiversity. We need to initiate that spark.

My name is Jen Stabile, and I currently serve as the Director of Conservation at the San Antonio Zoo in the US. In many ways, I feel I am living the dream! I grew up in Queens, New York, USA, where my parents took us to the Bronx Zoo often. Those visits fostered an appreciation for animals. As a little girl, I would grab my National Geographic magazine and pretend to be "on assignment" in some foreign land, writing about animals. After moving to Florida in the 90s, my fascination with herpetofauna developed, with my first pets being wild-caught (and likely invasive) turtles and anoles.

I began my zoo career in my early twenties, as a docent at the Central Florida Zoo, and then moved on to an internship with the Department of Herpetology under Nick Clark and Fred Antonio. At that time, I was also interning with Carl Barden at Medtoxin Venom Laboratories. These experiences changed my life, and I am fortunate to have begun my career with such amazing mentors and teachers. Shortly into my internship, a position opened within the Department of Herpetology and I applied, although, I did not think I had a shot. The morning Fred offered me the position as Reptile Keeper is still the happiest day of my life. Most of my duties were taking care of the department's invertebrates and a small amphibian collection.

"There are many dedicated heroes in the field of conservation; the programs they lead are helping pave the path towards a solution to protect the world's amphibian diversity."

I wanted to learn more about the natural history of amphibians, so on my weekends I began working with a Florida biologist, Ray Ashton, from Ashton Biodiversity Research & Preservation Institute, who I met at my first International Herpetological Symposium. Ray taught me how to find amphibians in the wild, and how to pay attention to habitats. As Ray's research assistant, I developed a skill set in trans-relocation efforts, specifically concerning the Gopher Tortoise (*Gopherus polyphemus*). I also developed an appreciation for aquatic amphibians, working often with Water Dogs (*Necturus* spp.) and Dwarf Siren (*Pseudobranchus* spp.).

The Central Florida Zoo hosted an annual Latin festival, which never did as well as expected. We were tasked with opening an exhibit during the festival that would help spread the word, and bring guests through the door. The Orlando area has a robust Puerto Rican population; with the dynamic leadership of our then CEO, Joe Montisano, we decided on a little brown frog called a coqui. My amphibian experience was limited at the time, and I was tasked as their caretaker. We obtained a group of the Common Coqui (*Eleutherodactylus coqui*) from Hawaii where they are invasive. I can recall the first time I heard them chorus, after misting them one evening in quarantine. They throw their voices, and I initially thought a bird had gotten into the room. From that moment on, I was hooked. Needless to say, the festival was extremely successful with the opening of the coqui exhibit, the

Jen Stabile from the San Antonio Zoo in the US says she is fortunate to have begun her career working with amphibians with a number of amazing mentors and teachers.

icon of Puerto Rico, boasting an 800% increase in attendance! The history and culture between the relationship of the frog and its people is captivating.

News of the festival's success reached Puerto Rico, and I was soon contacted by a special professor at the University of Puerto Rico, Dr. Rafael Joglar. Rafael and I began what was to become a long-term partnership, combining efforts and strengths to preserve the coqui frog of Puerto Rico through captive colonies, staff exchange opportunities, and education and outreach. To date, we have worked with nine of the seventeen species of coqui in captivity, and have successfully reproduced five species. Our greatest success in captive reproduction is with the Mona Island Coqui (*Eleutherodactylus monensis*), having bred them to the second generation. We are currently working on exploring the captive needs and breeding protocols for the Bronze Coqui (*Eleutherodactylus richmondi*).

After attending the AZA/AArk Amphibian Biology, Conservation, and Management course, I felt I had the necessary tools I needed to create and construct an amphibian building. In 2009, the Central Florida Zoo opened "Florida's Amazing Amphibians", highlighting seventeen species of frogs, toads, and salamanders native to the state of Florida. The building was a huge success, thanks to friends such as aquatics guru Tim Walsh and the artistic genius of Eric McCarty, who volunteered much of their time to completion. We also implemented two isolated labs, dedicated to the captive reproduction for repatriation efforts of the Striped Newt (*Notophthalmus perstriatus*) as well as maintaining breeding colonies of Southern Dwarf Siren (*Psuedobranchus axanthus*) and several species of critical coqui. Working closely with amphibians means understanding potential pathogens and biosecurity.

Along with Dr. Rafael Joglar from the University of Puerto Rico, Jen has worked with nine of the seventeen species of coqui in captivity, and have successfully reproduced five species.

That same year, I began working with the Florida Wildlife Commission Research Institute (FWCRI) on emerging amphibian pathogens throughout the state of Florida. This four-year contract allowed me to work in the field with friends from the FWCRI labs, Dr. Jan Landsberg, Meredith Zahara, and Yasu Kiru, throughout Florida, studying the presence and prevalence of several amphibian pathogens. We shared great adventures, and uncovered some good information concerning the amphibian chytrid fungus, ranavirus, and protozoa affecting local populations. Around this time, I accepted a position at the ABQ BioPark Zoo (in Albuquerque, New Mexico, USA), to assist in the development and construction of the zoo's amphibian building and conservation lab, "Life on a Limb". While I was there, I met state herpetologist Charlie Painter, and began working with him on tracking amphibian pathogens found in New Mexico. I collaborated with Project SNAP, a group I first learned of during the AZA/AArk amphibian course I took years earlier, to develop a mural for the amphibian building. The mural incorporated the work of ~7,000 students from New Mexico, each producing a painted tile depicting what amphibians mean to them. The tiles come together to create the mural, or big picture, of amphibian conservation.

I am fortunate to have been able to continue my work with the captive conservation and outreach of the coqui frogs and Proyecto Coqui (www.proyectocoqui.org) during my time in New Mexico, and now here in Texas. It is a program I hope to always remain close to, and my goal is to one day see these frogs returned to their native island through reintroduction programs.

In my current position, I assist with the construction and implementation of the Research and Conservation Center for the San Antonio Zoo. Through partnership efforts with Dr. Rick Kline at the University of Texas and colleagues at the Gladys Porter Zoo, I am working on the assessment of relative abundance for the Black-spotted Newt (*Notophthalmus meridionalis*) in Texas and in Mexico. I stay involved with emerging pathogen prevalence, taking samples in historic newt habitats. I have recently accepted a role as editor of the conservation section of Herpetological Review, so please be thinking about sending me the story of your work! I now serve as Secretary for the International Herpetological Symposium, and I cannot stress enough how important it is to get out and communicate in person with colleagues through these types of venues.

There are many dedicated heroes in the field of conservation; the programs they lead are helping pave the path towards a solution to protect the world's amphibian diversity.

The Future For Nature Award

The Future For Nature Award is a prestigious international award that celebrates tangible achievements in protecting wild animal and plant species. Each year three conservationists are awarded a prize of 50,000 euros for their incredible work in order to help them with the next step in their career and in order to help our planet.

The Future For Nature Award aims to:

- Reward and fund individuals for their outstanding efforts in the protection of species of wild animals and plants
- Stimulate Award winners to sustain their dedicated work
- Help winners to raise their profile, extend their professional network and strengthen their funding basis

The Award provides the winners international recognition, financial support and reinforced linkages to an international conservation network.

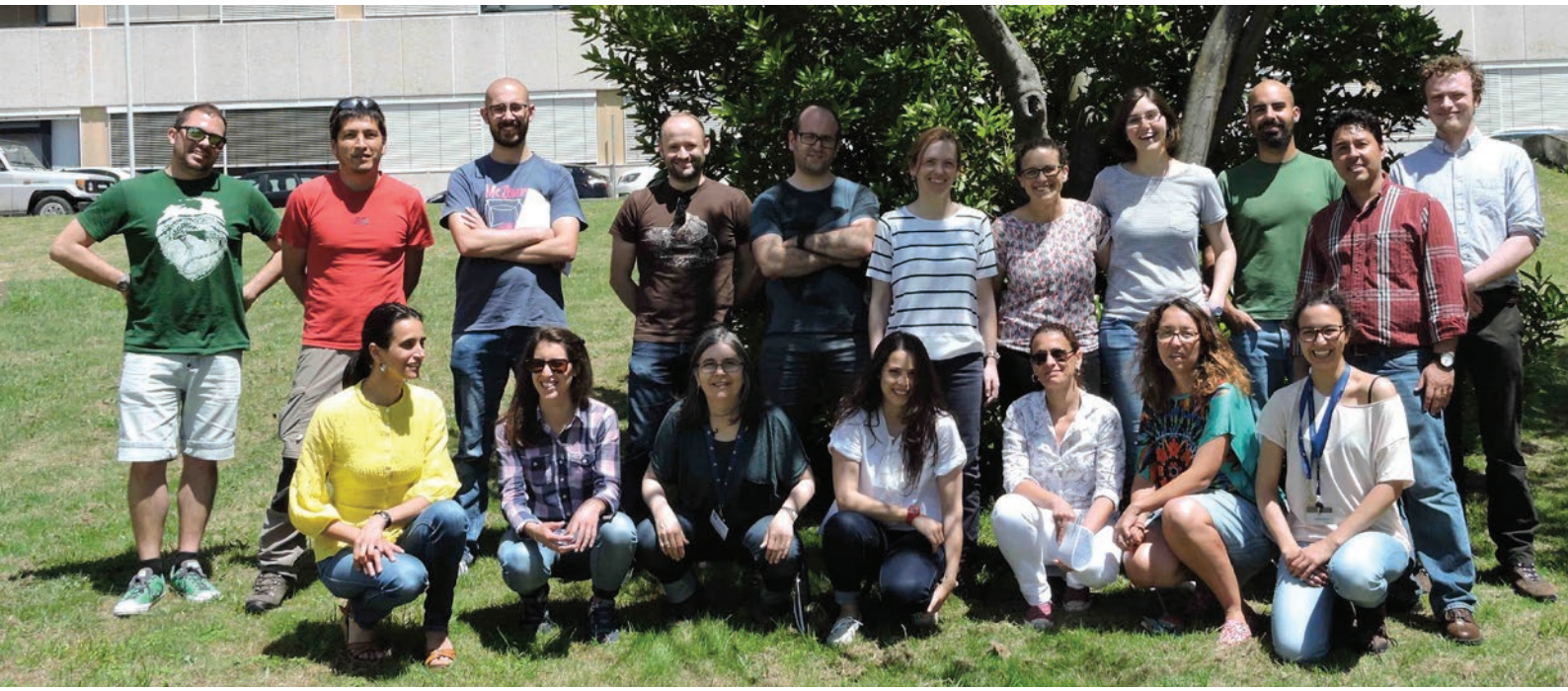
In addition to the award amount, all recipients receive a small Future For Nature sculpture and a Future for Nature Certificate summarizing their achievements. More information is available on the Future For Nature web site, www.futurefornature.org/?page_id=552.

Amphibian Husbandry and Conservation Training Course in Portugal

Luis Carrillo, Training Officer, Amphibian Ark

An estimated 35,000 species of animals and plants can be found in Portugal, with this number representing 22% of the total species described for Europe and representing around 2% of the world's species (Portugal's Biodiversity at Risk, 2013 - IUCN Red List, www.cmsdata.iucn.org/downloads/portugal_s_biodiversity_at_risk_fact_sheet_may_2013.pdf). There are currently 85 amphibian species found in Europe, with 20 (24%) of these of these found in Portugal. Fortunately just one species is currently listed as Vulnerable in the IUCN Red List, with no species listed as Endangered or Critically Endangered.

This group shows high endemic species richness in the Iberian Peninsula, which also has one of the greatest concentrations of threatened species of amphibians. Five percent of the amphibian species that occur in Portugal are threatened at the European level and more than a quarter of the species are Near Threatened. The main threat to this group at the European level is the loss and degradation of suitable breeding habitat mainly due to agricultural activities, through excessive water withdrawal and water pollution by agrochemicals (Portugal's Biodiversity at Risk).



The 1st Course on Amphibian Husbandry and Conservation was held at the University of Aveiro from June 6-10, 2016, with fourteen students representing seven institutions in Europe attending the course. Photo: Luis Carrillo.

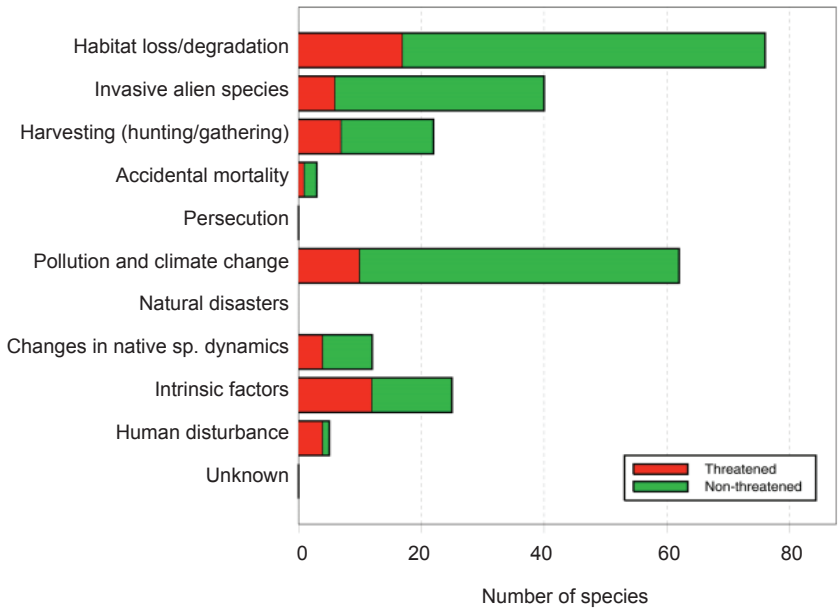
According to Portugal's Institute for the Conservation of Wildlife and Forests (ICNF - www.icnf.pt/portal/icnf) two species are considered threatened in the country, the Palmate Newt (*Triturus helveticus*) listed as Vulnerable, and the Golden-striped Salamander (*Chioglossa lusitanica*).

Arturo Muñoz demonstrates how to decorate the back of a terrarium, using cardboard, styrofoam and expansive foam as examples. Photo: Luis Carrillo.

The Conservation Needs Assessment process recommends a range of conservation actions for each assessed species including captive rescue, *in situ* conservation, *in situ* research, *ex situ* research and others. *Ex situ* research is often carried out by or with the help of universities, and amphibians are very good model species to develop research on ecotoxicology due to their specialized permeable skin, which allow them to intake water, breathe and excrete toxins.

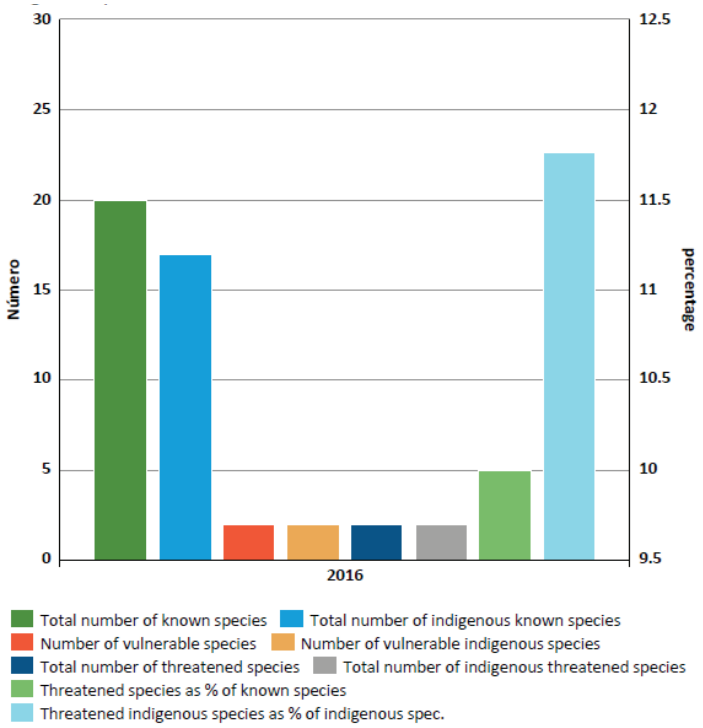
The Ecotoxicology Laboratory at the University of Aveiro in Portugal maintains a research colony of African Clawed Frogs (*Xenopus laevis*) to conduct their experiments. Worried about the welfare of their specimens they contacted Amphibian Ark to help improve the captive conditions of their animals and at the same time offer a training course on amphibian biology, management and conservation, not just for personnel in the laboratory but for other interested people in Europe.

The 1st Course on Amphibian Husbandry and Conservation was held at the University of Aveiro from June 6-10, 2016, with fourteen students representing seven institutions in Europe at-



The major threats to European amphibians. Courtesy of the European Red List of Amphibians, 2009.

> *A highly inspiring, cutting-edge course that provided a new perspective on amphibian biology, whether you're a veteran or a newbie in the field.*



The status of amphibians in Portugal. Courtesy of the Organisation for Economic Co-operation and Development, 2016.

tending the course. The course explored the principles of amphibian husbandry, nutrition and dietary needs, captive reproduction, population management, diseases, biosecurity and quarantine, conservation, threats and global action through theoretical lectures, hands-on practical sessions and group exercises. Lecturers at the course were Christopher Michaels from ZSL London Zoo, Arturo Muñoz from the Bolivian Amphibian Initiative and Luis Carrillo from Amphibian Ark.

The ecotoxicology laboratory at the university is already making plans to improve the housing and filtration system of the aquatic African Clawed Frogs they currently manage and they are also making plans to start a breeding and research colony of the IUCN – Least Concern - Perez's Frog (*Pelophylax perezi*).

Course participants practicing glass drilling during one of the practical workshops. Photo: Luis Carrillo.

Recent animal husbandry documents on the AArk web site

The Husbandry Document library on the AArk web site (www.amphibianark.org/husbandry-documents) currently includes over 180 articles, with additional articles being added regularly. Seven new documents have been added recently:

Relating natural climate and phenology to captive husbandry in two midwife toads (Alytes obstetricans and A. cisternasii) from different climatic zones - www.amphibianark.org/?wpfb_dl=189

Christopher J. Michaels, Michael Fahrbach, Luke Harding, Zoe Bryant, Joseph-Smiley Capon-Doyle, Sebastian Grant, Iri Gill, Benjamin Tapley

Captive husbandry and breeding may be pivotal to the successful conservation of many amphibian species, with captive stock providing research subjects, educational tools and animals for release into the wild. Husbandry protocols are missing for many species and sub-optimal for many more, which may limit the success of captive breeding attempts. It has been suggested that observations and environmental data taken from species in nature may be used to infer optimal captive conditions for amphibians. For species where data from the wild are not available, 'analogue', that is closely related but more accessible species, may be used as surrogates to inform captive husbandry to some degree. These hypotheses, although logically cogent, are not well tested in amphibians. In particular, the suitability of analogue species based on some knowledge of basic ecology and biology is frequently not assessed. We show that captive husbandry requirements and breeding stimuli correlate with field data and phenology in wild populations of the midwife toads *Alytes obstetricans* and *A. cisternasii*. In particular, the provision of hot summer temperatures following a cold brumation period of suitable duration may be important for breeding the western-central European *A. obstetricans*. Conversely, the Iberian *A. cisternasii* responds to hot summer temperatures with a rest period and reproduces in the cooler autumn and winter months. Brooding success was highly variable in *A. obstetricans* and smaller than records from wild toads, possibly due to the young age of breeding stock. Clutch size was similar in *A. cisternasii* to records from wild counterparts. Although specific breeding triggers and annual temperature requirements are likely to vary between localities for both species, these observations provide some useful data on the indoor breeding of both species. Our results also highlight the relevance of field data in designing captive husbandry protocols, while illustrating the inappropriateness of using one species as an analogue for the other in terms of husbandry requirements unless basic aspects of natural history, ecology and phenology can be shown to be broadly similar.

Global Re-introduction Perspectives: 2016 (Amphibian case studies) - www.amphibianark.org/?wpfb_dl=190

Soorae, P. S. (ed.)

Re-introductions are powerful and important. They are powerful in terms of averting extinction, restoring ecological functions to ecosystems, and returning profound commercial, aesthetic, or cultural value. Re-introductions are important, because they can engage generations across the globe in immediate conservation action that has the potential to make a tangible and pervasive difference.

The fifth edition of the Global Re-introduction Perspectives, published by the IUCN/SSC Re-introduction Specialist Group, contains a wide array of projects ranging from corals to amphibians, crocodiles to condors and African lions to many plant species. All these come with different levels of success and some failures. This shows that re-introduction projects are never easy and require careful planning and implementation to succeed. However, projects which have not been successful for one reason or another, provide valuable learning experience, so that those shortcomings could be avoided.

This chapter on Amphibians includes three re-introduction case studies: the Northern Corroboree Frog in Australia, the Agile Frog on Jersey, Channel Islands, and the Northern Leopard Frog in Canada.

Salamanders as Injurious Wildlife - What It Means for Salamander Owners and Scientists - www.amphibianark.org/?wpfb_dl=191

U.S. Fish and Wildlife Service

On January 13, 2016, the U.S. Fish and Wildlife Service listed 201 species of salamanders as injurious wildlife under the Lacey Act. The purpose of this listing is to protect native salamander populations from *Batrachochytrium salamandrivorans* (*Bsal*); a fungus that is lethal to many salamander species. This fact sheet was developed to answer questions about the rule and ensure a basic understanding about what the rule means for salamander owners and scientists.

Ex situ conservation of the Wampukrum Harlequin Toad, McDiarmid's Glass Frog, and Sabetari Glass Frogs at the Amphibian Conservation Center - Zoo Amaru - www.amphibianark.org/?wpfb_dl=200

Fausto Siavichay Pesántez and Carlos C. Martínez Rivera

The Amphibian Conservation Center - Zoo AMARU in Cuenca (ACC-Amaru), is dedicated to helping save Ecuador's endangered amphibians and currently holds populations of several endangered amphibians unique to Cordillera del Condor, including the Wampukrum Harlequin Toad (*Atelopus wampukrum* sp. nov.), McDiarmid's Glass Frog (*Rulyrana mcdiarmidi*), and Sabetari Glass Frogs (*Cochranella erminea*).

Translocation Proposal - Securing the Future of Kosciuszko National Park's Unique Frog Fauna - www.amphibianark.org/?wpfb_dl=194

David Hunter, Michael McFadden, Gerry Marantelli, Ben Scheele, Raelene Hobbs, Peter Harlow, Chris Banks, Laura Brannelly, Lee Skerratt and Lee Berger

Extinctions and declines of amphibians worldwide have been occurring at an alarming rate over the past fifty years (Stuart et al. 2004). Australia has not been spared from this biodiversity crisis (Hero & Morrison 2004), and within Kosciuszko National Park (hereafter

KNP), five frog species have suffered significant declines since the early 1980's. These species are now listed as threatened under the NSW Threatened Species Conservation Act 1995, the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, and by the International Union for Conservation of Nature (IUCN). This includes the iconic Southern Corroboree Frog (*Pseudophryne corroboree*), which is one of Australia's best known frog species, and is KNP's only endemic vertebrate. The primary cause of many recent frog declines around the world, including those in KNP, is a disease known as chytridiomycosis, which is caused by infection with the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*, *Bd*). Genetic studies have shown that *Bd* has only recently spread throughout the world (Morgan et al. 2007, Farrer et al. 2011), explaining why many frog species have limited resistance to this pathogen.

This document outlines the background information, rationale, and methods for developing new management techniques for the conservation of Kosciuszko National Park's unique frog fauna. These techniques will aim to bolster the security and capacity of captive breeding programs for threatened frogs through the creation of pathogen/disease-free populations in the wild.

Husbandry Guidelines, Mannophryne collaris - www.amphibianark.org/?wpfb_dl=199

Enrique La Marca

Husbandry guidelines for Merida's Collared Frog, *Mannophryne collaris*, developed at the Venezuelan Andean Reptile and Amphibian Conservation Center.

Ex situ conservation program for the Andean Marsupial Tree Frog - www.amphibianark.org/?wpfb_dl=202

María Teresa Alvear and Diego Almeida Reinoso

The Quito Zoo in Guayllabamba, Ecuador began an *ex situ* conservation program for the Andean Marsupial Tree Frog (*Gastrotheca riobambae*) in November 2014 with specimens collected from populations in the north east of Pichincha. 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.

"The Rock" helps promote Titicaca Water Frog conservation

Allie Gehle, Vice President, Zoological Students Association of Michigan State University

The Zoological Students Association of Michigan State University in the USA is passionate about supporting conservation efforts in our backyard as well as around the world. This April we decided to create a local survey of amphibians and reptiles and we knew we wanted our fundraiser to focus on conservation efforts of endangered herpetofauna. Amphibians are facing some of the highest rates of endangerment of any Class, so it made sense to highlight a project that was working to save an endangered species for the fundraiser. The Titicaca Water Frog fit the bill perfectly; we found the story compelling from our viewpoint and thought it was something that we could get the general public interested in as well.

For our event, we painted "The Rock" on campus, which is an old Spartan tradition that requires the group to stake out the rock for a day or two and paint it overnight. It is the location of many events on campus and gets a lot of foot traffic so we set up a table with posters, free snacks and drinks, and club members to talk to people as they passed by to share information and facts along with collecting donations. Our two goals for this event were exposure and awareness along with raising money and providing the GoFundMe link (www.gofundme.com/WaterFrog) to anyone who did not have money at that time to make a donation. Not only were we very thankful that almost everyone that we talked to donated, but that we also successfully spread awareness of the devastating decline of the Titicaca Water Frog.

Titicaca Water Frogs can grow up to 145mm long and 380g in weight!
Photo: Bolivia Amphibian Initiative.

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.

The new frogs have finished their quarantine period and are now in their new aquariums.
Photo: Bolivia Amphibian Initiative.

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**.

Amphibian Ark donors, January-June 2016

The work of AArk is possible due to the generous support of the following individuals and institutions:

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