

Amphibian Ark

Five years since the launch



amphibian ark
keeping threatened amphibians afloat

Front cover photo: The San Lucas Marsupial Frog (Gastrotheca pseustes), is classified as Endangered in the IUCN Red List of Threatened Species, and is being successfully bred by both the Pontificia Universidad Católica del Ecuador and the Centro Jambatu de Investigación y Conservación de Anfibios in Ecuador.

Back cover photo: A Rana Stefania Del Hermano Gines, Stefania ginesi, in Canaima National Park, Bolivar, Venezuela. This species reproduces via direct development and eggs and froglets are carried on the females' backs.



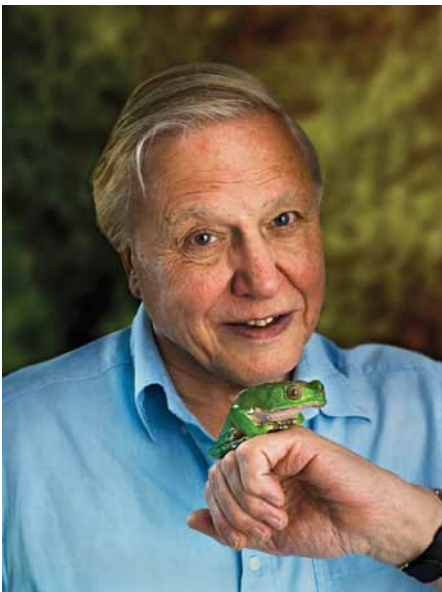
Contents

A word from our Patron.....	2
A word from our Executive Officers.....	3
Introduction	4
Launching the Amphibian Ark.....	5
Activities of the AArk	6
Five years of donor support.....	17
Five years of model programs.....	18
AArk Seed Grant	21
Supporting other ACAP partners.....	26
Advisory Groups.....	28
The next five years	29
AArk organization	30
AArk staff	31
What can you do to help?.....	32
Our donors	33
Further reading.....	40

A word from our Patron

Almost everyone can recognize frogs and toads. They are those extraordinary vertebrate animals which change from egg to adult by undergoing metamorphosis. This remarkable process played a crucial part in these animals' pioneering invasion of the land. It demonstrates evolution compressed into just a few weeks and it sparks our imagination.

Today amphibians can be found in enormous variety and occupy a wide range of water and land habitats – except for the oceans and the frozen polar regions. They are so familiar to most people that they have become part of the myths, legends, and folk tales of many cultures. Yet their habitats are being destroyed at such a speed that now many species have already disappeared, and many other species may have gone before we even discover that they exist. The continued spread of chytrid fungus, for which there currently is no known cure, is threatening entire amphibian communities. There is thus the real possibility that much of an entire category of animals may become extinct worldwide – unless we act quickly. Captive breeding has been shown by the scientific community to be one of the most important and appropriate ways to slow down the effects of this crisis. Selected species, bred in favorable ex situ conditions, can multiply and prosper to such an extent that populations can be released into secure environments in the wild.



The IUCN/SSC Amphibian and Conservation Breeding Specialist Groups and the World Association of Zoos and Aquariums launched the Amphibian Ark in 2007 to support such ex situ projects around the world. The global zoo and aquarium community has taken on this challenge with enthusiasm and is providing appropriate facilities and breeding grounds within their institutions. However, further implementation calls for greatly increased financial and political support from all parts of the world.

I have spent much of my life bringing images of the Earth's astounding wildlife into the homes of many people around the world, and I hope that through the work of organizations such as the Amphibian Ark, that the planet's precious wildlife can be saved, to be enjoyed and treasured by generations to come.

Sir David Attenborough, Amphibian Ark Patron

A word from our Executive Officers

Our world is crowded, warming and damaged . Our fellow passengers most in need of support are amphibians.

We can do something about it – we can invest in a world for our children that includes wonderful, fascinating and ecologically vital amphibians.

Invest in Amphibian Ark.

Professor Chris West, World Association of Zoos and Aquariums



I have been with the Conservation Breeding Specialist Group (CBSG) for almost 20 years and one of the things I am proudest of is our contribution to the establishment of the Amphibian Ark. Created in response to the IUCN Amphibian Conservation Action Plan and its subsequent call for action, the AArk team has worked tirelessly on behalf of amphibian species that cannot be saved in the wild. CBSG is committed to doing all we can to ensure AArk's continued success.

Dr. Onnie Byers, IUCN Conservation Breeding Specialist Group



I may be biased when I tell people that “Amphibians are the most important class of animals on the Earth” but there is no controversy in the statement that “Amphibians are the most threatened class of animals on the Earth”. We only recognized that amphibians were in trouble in the early 1990s and our response has been painstakingly slow. Unfortunately, our slow response has driven many species of amphibians into the critically endangered category and the only way to save these species now is through captive breeding programs. The Amphibian Ark is the driving force behind most of these captive programs ensuring that institutions have the resources and knowledge to successfully breed these species, thereby preventing their extinction. There are still many more species that urgently require captive programs and considerable resources are required to save these species and to implement the next step of reintroducing captive-bred frogs back into the wild.

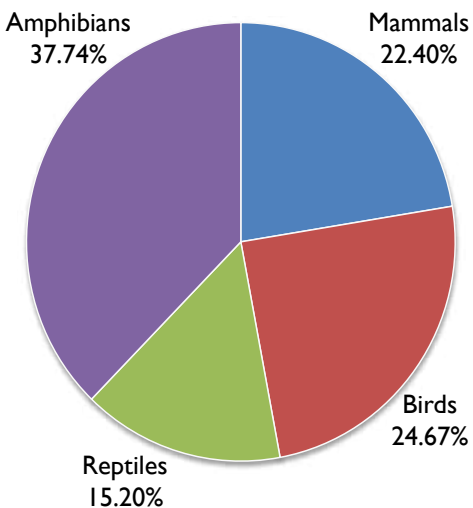
Saving amphibians from extinction is one of the most important conservation issues of our time. With new and ongoing financial contributions the Amphibian Ark can continue to make a significant difference in the world of amphibian conservation.

Associate Professor Phil Bishop, Amphibian Survival Alliance



Introduction

Amphibians are a critical part of the global food web. They consume millions of insects and other invertebrates, many of which are considered pests to humans and our crops or spread disease.



Status of threatened or extinct amphibians (IUCN Red List version 2011.3).

Why amphibians?

From their moist, sometimes colorful (and sometimes not!) skin, amphibians provide us countless pharmaceuticals and other useful chemicals. They help us to assess the health of both specific habitats and the global ecosystem. Finally, amphibians help connect us all with the natural world. Whether it's our children chasing that hopping frog in the backyard or marveling at colored poison frogs in a display, they remind us of the inherent value of our biodiverse world and inspire us to protect it.

Scientists have been documenting and discussing global amphibian declines for several decades now. However, it was not until publication of a Global Amphibian Assessment in 2004 (www.natureserve.org/library/amphibian_fact_sheet.pdf) that we understood the gravity of the situation. Approximately 160 species are believed to have gone extinct in recent times. Almost one third of the remaining species are threatened with extinction, and one quarter of the species are so poorly known that they are listed in the IUCN Red List of Threatened Species as Data Deficient.

Although few groups are as thoroughly assessed, amphibians already have a higher number of globally threatened species than any other group of organisms except flowering plants and fish (which have almost fifty and five times as many total species, respectively) and a higher percentage of threatened species than any other group.

According to studies undertaken in 2007, we are losing amphibian species faster than ever before. The amphibian extinction crisis is reminiscent of the loss of the dinosaurs, and is quite probably the most significant taxon-specific extinction event facing conservationists.

In addition to the 6,800+ currently known species of amphibians, it is likely that there are possibly a further 6,000 species that are yet to be discovered. These are likely incredibly rare species, many of which might also be highly threatened and could possibly become extinct before we discover them. Potential future losses of amphibian species are no doubt much higher than we currently anticipate.

In 2005, nearly 100 conservationists convened under the auspices of the IUCN and Conservation International to outline steps to understand, halt, and reverse the crisis. The results of this Amphibian Conservation Summit (www.amphibi-anark.org/pdf/ACAP_Summit_Declaration.pdf) led to the publication of an Amphibian Conservation Action Plan (ACAP, www.amphibi-anark.org/pdf/ACAP.pdf) in 2007. Along with various activities in research, assessment, and conservation actions in the wild (*in situ*), the Amphibian Conservation Action Plan identified the need for amphibians on the verge of extinction to be safeguarded in captive assurance populations.



Launching the Amphibian Ark

The IUCN/SSC Conservation Breeding Specialist Group (CBSG) and the World Association of Zoos and Aquariums (WAZA) both discussed the crisis at their 2005 annual meetings and pledged to help launch the rescue effort. Realizing the need for an urgent and coordinated response to the crisis from the captive (*ex situ*) community, both organizations worked together to establish an appropriate coordinating body. Within eighteen months, and with the partnership of the IUCN/SSC Amphibian Specialist Group (ASG), they launched the Amphibian Ark (AArk, www.amphibi-anark.org).

The Amphibian Ark is an umbrella organization under which *ex situ* amphibian conservation organizations from around the world aim to improve and expand their efforts to safeguard species in need. AArk partners work together with their *in situ* partners to assist mitigating threats and securing species in the wild. Ideally, these *ex situ* programs should only be temporary measures with species headed back to nature as soon as possible.



This work of the Amphibian Ark is only made possible by the generous support of readers and donors like you. Your support is making a difference, and we are making great progress. If you wish to see these types of activity continue into the future, please support the AArk today!

Amphibian Conservation Summit declaration

The Amphibian Conservation Summit was called because it is morally irresponsible to document amphibian declines and extinctions without also designing and promoting a response to this global crisis. To this end, the Amphibian Conservation Summit has designed the Amphibian Conservation Action Plan (ACAP), and commends it to governments, the business sector, civil society and the scientific community for urgent and immediate adoption and implementation.

Amphibian Conservation Summit,
September 2005.

Captive survival assurance programs

The ACAP recommends prioritized (as outlined below) captive survival assurance programs that are primarily in-country, coupled with an obligation to deliver in situ threat mitigation and conservation programs. This is both a stopgap to buy time for species that would otherwise become extinct, and an integral component of other approaches to tackling amphibian declines. Guidelines for including species in captive survival assurance programs will be based on predictive models of threats so that species are targeted proactively and representative populations are collected. Decision processes will involve consultation with representatives across the ACAP consortium and the range country will be the ultimate arbiter.

Several hundred amphibian species, perhaps more, are facing threats such as disease and climate change that cannot be addressed in the wild with currently available conservation management strategies. Captive programs will include a variety of operations from rapid-response, portable units, to large-scale permanent facilities. The goal is to maintain and breed in captivity species at risk of extinction, which should be collected from places where declines have not yet occurred, as well as from places where animals need to be rescued urgently before they disappear.

Amphibian Conservation Summit declaration,
September 2005.

Activities of the AArk

The vision of the AArk is *the world's amphibians safe in nature*, and its mission is to *facilitate partnerships that ensure the global survival of amphibians, focusing on those that cannot currently be safeguarded in nature*. An Executive Committee represents the interests of the three founding partners, while a Steering Committee comprises representatives from stakeholder groups around the world. A small staff raises awareness and tries to build capacity and partnerships, while a network of partners around the world gets on with the business of rescuing and managing amphibians.

The activities of the staff can be divided into three general categories: raising awareness and funds, building capacity and forging partnerships.

Raising awareness and funds

During 2008, Amphibian Ark initiated and ran a very successful global campaign called 2008 Year of the Frog. Many hundreds of zoos, aquariums, museums, universities, schools and other organizations took part in this campaign, and our messages reached millions of people around the world. The main goal of the campaign was to generate public awareness and understanding of the amphibian extinction crisis and to ensure sustainability of survival assurance populations by creating funding for this conservation work that continues well beyond 2008. The money raised from the global campaign is also helping to fund Amphibian Ark's international coordination activities and regional initiatives such as assessment and husbandry workshops and coordination of activities within each region.

The Year of the Frog received wide publicity across many countries, with a great deal of print media, television coverage and electronic articles. It is estimated that the collective publicity raised by these articles in the first three months of 2008 alone was worth around one million dollars in advertising costs. Hundreds of zoos, aquariums, museums and botanical gardens across the world promoted the Year of the Frog, drawing attention to the plight of amphibians and the conservation programs that many of the institutions are involved with. Actual visitation figures for all organizations that promoted the Year of the Frog in 2008 are unknown, but it is estimated that many millions of visitors were made aware of the campaign during 2008.

Some notable celebrities generously offered their time to support Year of the Frog activities. AArk Patron Sir David Attenborough formally launched the Year of the Frog at London Zoo and made a short promotional video discussing the amphibian crisis and how zoos and aquariums around the world can establish breeding programs for their own local species to safeguard them while threats are mitigated in the wild. Sir David also became one of the first people in the world to sign a global petition, which called for governments and politicians around the world to take the threats seriously. The petition was signed by approximately 70,000 people.

Animal/nature conservationist Jeff Corwin, best known as the host and Executive Producer of several Animal Planet cable channel television programs, also lent his support to the campaign, appearing on the Ellen DeGeneres Show with a live Panamanian Golden Frog, raising awareness of the crisis by alerting viewers to the fact that the species is nearly extinct in the wild. Jeff pleaded with viewers to join Amphibian Ark to help raise funds to support conservation programs.



Jeff Corwin lent his support to the Year of the Frog campaign, appearing on the Ellen DeGeneres Show with a live Panamanian Golden Frog.



Kermit joined with Disney's Selena Gomez in 2008 to produce a public service announcement raising awareness of the Year of the Frog campaign.



The Clorox Company generously provided funding for planning the Year of the Frog and supplied a quantity of Clorox Bleach to ACAP partners.

The well-known and much loved Kermit the Frog joined zoo directors on Capitol Hill in Washington DC during the Year of the Frog in support of saving amphibians. Kermit spoke about the plight of amphibians and how we should all help save endangered species that are threatened by pollution, loss of habitat, climate change and disease. Kermit also promoted Disney's work with NASA to focus attention on the global amphibian crisis, when he became a crew member for the 122nd flight of the Space Shuttle, launched on March 11, 2008. Kermit also joined with Disney's Selena Gomez in 2008 to produce a public service announcement raising awareness of the campaign. These and many other videos are featured on the AArk website (www.amphibianark.org/education/videos/).

Corporate support was received from the Clorox Company, which generously provided funding for planning the Year of the Frog, as well as supporting a documentary called "The Vanishing Frog" that was made by Jeff Corwin for Animal Planet. The Clorox Company also assisted the El Valle Amphibian Conservation Center in Panama to complete their public exhibit and supplied a quantity of Clorox Bleach to ACAP partners to help minimize the spread of chytrid fungus.

Support for Year of the Frog activities was by no means limited to celebrities and corporate sponsors. Hundreds of thousands of dollars were raised by zoos and aquariums, individuals, community groups, and schools in a variety of ways. Some of the more unique ideas used to raise funds included abseiling down a bridge, carving large amphibians from ice and snow, asking for donations to the Year of the Frog campaign in lieu of birthday and wedding gifts, donating a percentage from sales of amphibian art work, and a wide variety of school-based activities. Latin American Studies classes at Nipmuc High School in Massachusetts, USA raised thousands of dollars for Amphibian Ark work in Panama.

The amphibian conservation community clearly dedicated additional funds and resources to their commitment to amphibian conservation programs, both *in situ* and *ex situ*, as a result of Year of the Frog publicity and fund-raising efforts. Amphibian Ark partners increased their collective spending on captive amphibian programs from \$2.9 million in 2007 to \$4.4 million in 2008, with a commitment to spend an additional \$12.1 million from 2009-2013. Those same organizations increased their support for *in situ* amphibian conservation programs from around \$460,000 in 2007, to almost \$870,000 in 2008, and an additional \$2.1 million committed to *in situ* programs from 2009-2013. During the fund-raising campaign, a number of zoos and regional and national zoo associations agreed to donate a percentage of the funds they raised to the AArk, and this resulted in over \$386,000 to support the core operations. A large percentage of this amount was raised by members of the European Association of Zoos and Aquaria, but significant contributions were also made by members of the Zoo and Aquarium Association (Australia), the Japanese Association of Zoos and Aquariums and the Verband Deutscher Zoodirektoren (Association of German Zoo Directors), as well as many other individuals and institutions.



AArk Patron Sir David Attenborough formally launched the Year of the Frog at London Zoo.

AArk newsletter

Amphibian Ark produced its first electronic newsletter (www.amphibianark.org/newsletter.htm) in August 2007, thanks to the generous support of Artizan Internet Services. The newsletter has been produced quarterly since then, and for the last six editions, has also been produced in Spanish, thanks to the help and support of a small group of volunteer translators.

A new membership program (www.amphibianark.org/membership.htm) was developed in 2009, providing free membership for AArk supporters who wish to receive the newsletter, and we currently have over 6,000 members.

Website and tools

The Amphibian Ark website (www.amphibianark.org) was first launched in 2007, and since that time, has grown to be one of the largest online sources of information for *ex situ* amphibian conservationists, as well as providing a wealth of information about amphibians and the global amphibian crisis for the general public. Thanks to the generous support of Robert Conquest and Moxie Interactive, the site received a major upgrade and a new look and feel in 2010. Apart from providing a more intuitive layout, and a better experience for site visitors, the colors in AArk's logo were used as the basis for the new color scheme.

Following the main activities of the AArk, the site includes extensive information to help raise awareness amongst the general community of the threats facing amphibians, provides a series of pages and online tools to assist with the establishment and ongoing maintenance of captive amphibian programs, and through our data portal (www.AArkFrogMatchMaker.com) we are also helping to facilitate partnerships between those organizations looking for additional resources to support their amphibian conservation projects, and organizations that can provide the support that is needed. We are very grateful to the International Species Information System (ISIS), which hosts our data portal, and provides the software required to maintain it.

In an attempt to make the website accessible to as many people as possible, we are working towards providing the complete website in four languages: English, Spanish, Portuguese and German. Work on the Spanish and German site is continuing, thanks to the help of a number of volunteers, and we are very grateful to Oceanário de Lisboa for their generous support of professionally translating the entire site into Portuguese. We are always keen to accept help from additional volunteers who are willing to help with our translations, ensuring that we can provide current information to a larger number of visitors.



The website provides a great deal of amphibian husbandry advice (www.amphibianark.org/resources/amphibian-husbandry/), with a large number of pages devoted to establishing *ex situ* programs, maintaining existing programs using best practice techniques, species-specific husbandry guidelines, monitoring progress, and program exit strategies. We have two online tools to assist with establishing new programs: our program implementation tool (www.amphibianark.org/program_implementation_tool.htm) providing guidance through all the steps required to be in place prior to estab-

lishing a new program, and our founder calculation tool (www.amphibianark.org/founder_calculation_tool.htm) provides the suggested number of founder animals required for a new program, based on a series of biological criteria for the species being considered.

We also track the progress of around 100 *ex situ* programs for threatened amphibian species (www.amphibianark.org/ex_situ_programs.htm), with those that meet Amphibian Ark's model standards being highlighted (www.amphibianark.org/model-facilities.htm). We consider that there are two steps which are vital in any good *ex situ* conservation program, especially those that might eventually involve release back into the wild: the program should be based within the range country; and the population being managed should be housed in isolation from other populations occurring outside its range.

We hope that by providing continuing education and guidelines, and by assisting organizations that require additional resources, that we can improve the existing programs that do not currently meet AArk's ideal standards. Careful planning is critical to the success of these programs and we encourage all institutions that are considering implementing new programs to make use of our free online tools.

Photo competition and 2012 calendar

In 2010, AArk launched an international amphibian photography competition. We received 950 entries, submitted from 52 countries. A panel of six international judges was appointed to review the entries. Each of the judges has many years experience in wildlife photography or wildlife conservation, and they collectively contributed many hours of their valuable time to review the entries. The judges were Dr. Franco Andreone (Italy), Jeff Corwin (USA), Pavel German (Australia), Francisco José López López (Colombia), Bryan Maltais (USA) and Dr. George B. Rabb (USA).

The overall winner of the competition was Gonçalo M. Rosa, from Lisboa, Portugal, with a spectacular photo of a *Boophis* sp., taken in Betampona, Madagascar. Gonçalo says: "The photo was taken during a frog survey at Betampona reserve - possibly the largest relict of low-altitude rainforest block in the east coast region". As well as being awarded the best photo in the competition, Gonçalo's photo also was the winner in the category of In the Wild.

The winning photos in the Youth category was a magnificent Fantasy Horned Frog, *Ceratophrys* hybrid, taken by Lena White (aged 14) from Atlanta, USA. J.P. Lawrence from Kalamazoo, USA submitted the winning entry in the category of In Captivity, with a fantastic photo of a Mimic Poison Dart Frog, *Ranitomeya imitator*.

The additional nine winners were:

- Gert Benaets from Alken, Belgium, Ghost Glass Frog, *Sachatamia ilex*
- Matt Wilson from Manchester, UK, Splendid Leaf Frog, *Cruziophyla calcarifer*
- Alejandro Arteaga from Quito, Ecuador, Pacific Robber Frog, *Pristimantis appendiculatus*
- Victor Luna-Mora from Ibagué, Colombia, Harlequin Frog, *Atelopus laetissimus*
- Fábio Maffei from Bauru, Brazil, Snouted Treefrog, *Scinax fuscovarius*
- Jorge Armín Escalante Pasos from Mérida, Mexico, Savelhead Treefrog, *Diaglena spatulata*
- J.P. Lawrence from Kalamazoo, USA, Mimic Poison Dart Frog, *Ranitomeya imitator*
- Pedro Peloso from New York, USA, Spix's Snouted Treefrog, *Scinax nebulosus*
- Todd Pierson from Athens, USA, Black-Bellied Salamander, *Desmognathus quadramaculatus*

The judges also made special mention of two additional wonderful photos, a Purple Frog, *Nasikabatrachus sahyadrensis*, by K.P. Dinesh from Bangalore, India and a European Toad, *Bufo bufo*, by Gleb Elenev from Smolensk, Russia.



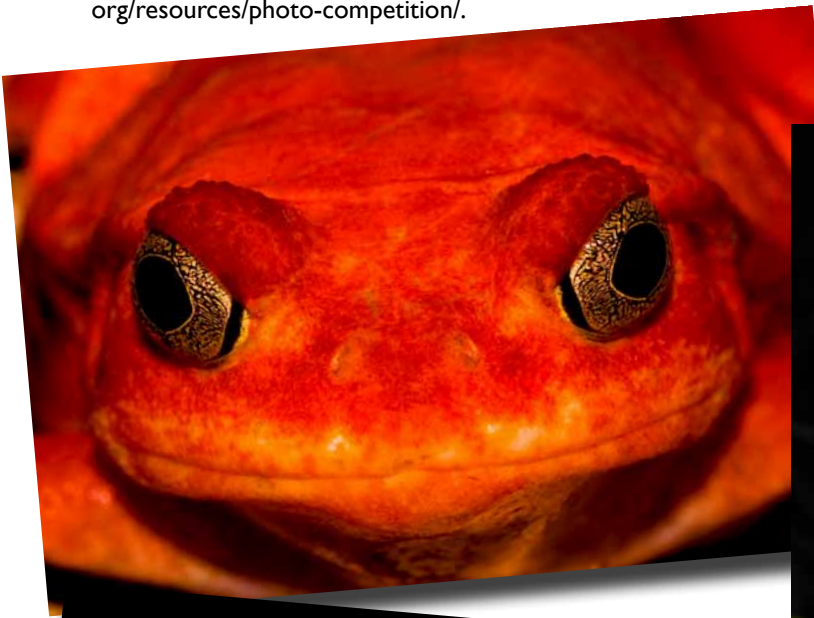
A selection of amphibian books was generously donated as prizes for the competition:

- Frogs of Panama by Dr. Douglas Woodhams (www.blurb.com/bookstore/detail/174126)
- Sapos, by Santiago Ron, Martin Bustamante, Luis Coloma and Belén Mena (www.puce.edu.ec/zoologia/sron/sapos/index.html)
- Threatened Amphibians of the World published by the IUCN and NatureServe and edited by Simon Stuart et al. (www.lynxeds.com/product/threatened-amphibians-world)
- Treefrogs...prehistoric survivors with a global message by National Geographic photographer Ted Schiffman (www.imageartisan.com/treefrogs.html).



The twelve winning photos are featured in the 2012 Amphibian Ark calendar, which went on sale around the world in July 2011. This beautiful calendar features the winning photographs, and includes information about each of the species.

The top one hundred photographs from the amphibian competition are featured on the AArk website, at www.amphibianark.org/resources/photo-competition/.



Building capacity for *ex situ* response

With many threatened amphibian species in need of urgent *ex situ* rescue and propagation, a vital part of the AArk's work is to help build capacity where it is most needed to ensure that captive programs can be established following the best possible practices, and to provide the highest chances of success throughout the life of each program.

The first step towards determining the actions that need to be taken is to collate the most current knowledge on the threats facing species in the wild and the status of wild populations. AArk Taxon Officers facilitate this process on a country-by-country basis during Conservation Needs Assessment Workshops (www.amphibianark.org/conservation_needs_workshops.htm). Working with the national or regional Chairs of the IUCN/SSC Amphibian Specialist Group, a team of experts is identified to come together in a workshop setting to evaluate the conservation requirements for all species, using a standard set of questions. The Conservation Needs Assessment process has grown out of the work undertaken by the Species Selection Working Group at the CBSG/WAZA Amphibian *Ex Situ* Conservation Planning Workshop, held in Panama in 2006 (www.amphibianark.org/pdf/Ex_Situ_Planning_Workshop_Report.pdf).

The decision tree for selection and prioritization of taxa for *ex situ* conservation that was developed by the working group has subsequently been modified and enhanced and now assesses all species for a variety of conservation actions, including rescue, *in situ* conservation, *ex situ* and *in situ* research, supplementation, cryopreservation and conservation education. Results from each workshop are made available to all participants at the end of the workshops, with reports uploaded to AArk's data portal (www.amphibianark.org/assessmentresults.htm) once they have been edited for wider distribution.

Since these workshops began in 2006, 38% of the world's amphibian species have been evaluated for their conservation needs in 23 workshops.



Participants of the Conservation Needs Assessment Workshop in the Dominican Republic, where the majority of amphibian species found in the Caribbean were assessed for their most pressing conservation needs.

Country/ region	Ark	Rescue	<i>In situ</i> Conserv- ation	<i>In situ</i> Research	<i>Ex situ</i> Research	Mass Prod- uction	Conserv- ation Educa- tion	Cryo- preserv- ation	None	Conserv- ation Research *	Total species
Argentina		6	18	40	20		34		86		154
Brazil		14	24	204	19		136		542		866
Chile		9	24	26	17	1	21		4		58
Colombia		13					13			54	209
Costa Rica	19	11				11	1			27	188
Cuba		3	45	9	41		34	3	1		62
Dominican Republic		4	29	8	17		20	4	2		45
Europe		8	3			1	17			9	109
Guatemala		34	42	58	12		12		37		142
Haiti		10	41	17	20		20	10	2		56
Hong Kong and Guangdong provinces		2					22			14	66
Indonesia				6	6	1	81		145		381
Jamaica		1	4	10	6		6	1	8		25
Japan			62	1	34		60				62
Madagascar		10	21				9			38	242
Malaysia		9					18				211
Mexico		127	5							60	364
North America and Puerto Rico	4	24	32				2			23	382
Panama	21	32					3				204
Peru		9				2	1			49	412
Puerto Rico		7	6	1	8		22	7	3		25
Southern Africa		4					15			20	231
Singapore		1	8	7	2		12	1	14		30
Sri Lanka		10	22	8	33		27		52		107
Thailand		1	96			1	27			21	147
Venezuela		8				1	1			32	69

*Amphibian Ark has facilitated 26 workshops to assess the conservation needs of amphibians.
To date, this includes 2,408 (38%) of the world's amphibian species.*



Students assembling an amphibian exhibit during a hands-on amphibian exhibit building practical at an Ex Situ Conservation Training Workshop in Indonesia. AArk provides guidance, support and training to organizations that currently maintain or plan to establish amphibian conservation programs in captivity.

After the conservation needs of each species have been assessed, amphibian conservationists use the results to see which species are most in need of resources or most easily helped. One of the main roles of the AArk in supporting implementation of the *ex situ* components of the ACAP is to provide guidance, support and training to organizations that currently maintain or plan to establish amphibian conservation programs in captivity. AArk recognizes that simply collecting amphibians and placing them in glass boxes does not automatically equate to conservation or rescue. To ensure the most effective use of captive amphibian populations for conservation purposes, AArk has been involved with the development of appropriate biosecurity and population management guidelines (www.amphibianark.org/husbandry_documents.htm), developing and implementing *ex situ* conservation training workshops (www.amphibianark.org/husbandryworkshops.htm), and hands-on assistance with specific husbandry, disease or other management problems via the Amphibian Veterinary Outreach Program (www.amphibianark.org/AVOP.htm).

Amphibian Ark staff and our partners, especially the Association of Zoos and Aquariums and the Durrell Wildlife Conservation Trust, have delivered 52 courses in 30 countries since 2004, and have trained over 1,725 students in amphibian biology, husbandry and conservation practices.

Amphibian Ark's Research Officer developed a series of documents and guidelines to help AArk partners to identify and manage a variety of research projects that support the ACAP goals. These documents form AArk's Amphibian Conservation Research Guide (www.amphibianark.org/science_research.htm).

Country	City	No. students	Coordinating partner
Argentina	Temaiken	25	DWCT/AArk
Australia	Sydney	18	ZAA
Bolivia	Copacabana	30	DWCT
Brazil	Bauru	30	SZB/AArk
Canada	Calgary	14	CAZA
Colombia	Cali	137	ALPZA/AArk
Dominican Republic	Santo Domingo	50	AArk/Toledo Zoo
Ecuador	Quito	180	Luis Coloma
France	Thoiry	20	Thoiry Zoo/DWCT
Germany	Dusseldorf/Cologne	120	VDZ/DGHT/WAZA
India	Various	320	ZOO
India	Kerala	21	DICE, ZOO, ANSA, CZA, AArk, WII
Indonesia	Bogor	25	SEAZA/AArk
Jersey	Jersey	38	DWCT/DICE
Latvia	Riga	11	Riga Zoo
Madagascar	Andasibe	12	Devin Edmunds/J Pramuk/ R Gagliardo
Malaysia	Kuala Lumpur	85	SEAZA/ZAA/AArk
Mexico	Puebla	35	Africam Safari/AArk
Nepal	Kathmandu	28	ZOO
Netherlands	Rotterdam/Antwerp	20	Rotterdam/ARTIS/Antwerp Zoos
New Zealand	Auckland	15	ZAA/Auckland Zoo
Panama	El Valle	10	AArk
Poland	Plock	20	EAZA
Portugal	Lisbon	15	Lisbon Zoo
Singapore	Singapore	15	Wildlife Reserves Singapore
South Africa	Johannesburg	27	AARK/DWCT/Chester Zoo
Spain	Barcelona	25	Barcelona/Fuengirola Zoos/AArk
Sri Lanka	Kandy	26	DWCT/AARK/Chester Zoo
Sweden	Hunnebostrand	15	Nordens Ark
Thailand	Korat	48	ZPA/AArk
USA	Detroit/Toledo	217	AZA
Venezuela	Valencia	73	ALPZA/AArk/AVZA
27	52	1725	

Amphibian Ex Situ Conservation Training Workshops since 2004

Forging partnerships for conservation

Given the obvious disparity in the global distribution of threatened amphibians and resources to save them, the AArk has endeavored to further facilitate international partnerships to rescue species. In 2009 AArk established an online partnership database called Frog MatchMaker (www.AArkFrogMatchMaker.com). This database currently contains details of 49 amphibian conservation projects from 23 countries on 4 continents, and aims to facilitate international partnerships between organizations that require funding to carry out their amphibian conservation programs and organizations that are in a position to provide funding or other support. Any amphibian conservation project can be included in the database, which can be searched by region, country, species, or by project type.



Range country partner	External partner(s)	Representative publication/website
Cali Zoo, Colombia	Zoo Zurich	Furrer and Corredor 2008
Chapultepec Zoo, Mexico	Toronto Zoo	www.torontozoo.com/Conservation/habitat.asp?pg=habitat
Dominica and Montserrat governments	Durrell Wildlife Conservation Trust, London, Chester, and Parken Zoos	www.zsl.org/conservation/regions/americas/caribbean-amphibian-conservation/capacity-building-in-dominica,230,AR.html
El Valle Amphibian Conservation Center, Panama	Houston Zoo et al.	Gagliardo et al. 2008,
Johannesburg Zoo, South Africa	Omaha Zoo	Van der Spuy and Krebs 2008
Summit Zoo, Panama	Panama Amphibian Rescue and Conservation Project	www.amphibianrescue.org
Universidad de Concepción, Chile	Zoo Leipzig, Chester Zoo	www.zoo-leipzig.de/index.php?strg=19_41_74andbaseID=74
University of Dar es Salaam	Wildlife Conservation Society, Toledo Zoo	www.wcs.org/new-and-noteworthy/kihansi-toad-exhibit.aspx
University of Hong Kong	Melbourne Zoo	Banks et al. 2008
Universidad. Peruana Cayetano Heredia, Peru	Denver Zoo	www.denverzoo.org/conservation/project46.asp
Institute of Ecology and Biological Resources, Vietnam	Cologne Zoo	Ziegler 2010
Zoo Amaru, Ecuador	Philadelphia Zoo	www.philadelphiazoo.org/phila/Conservation/Protecting-Wildlife/Protecting-Wildlife-Around-the-World/Andean-Amphibians.htm
Zoológico Nacional, Chile	Atlanta Botanical Garden	www.savedarwinsfrogs.org

International partnerships to share resources where they are most needed.



The Lemur Leaf Frog, Hylomantis lemur, was assessed as a species requiring rescue at an AArk conservation needs assessment workshop in Panama. The species has been very successfully maintained in the range country by the El Valle Amphibian Conservation Center (EVACC).

Tracking progress

Nearly 100 developing *ex situ* programs for priority rescue species are currently being tracked (www.amphibianark.org/ex_situ_programs.htm). These programs are striving to achieve the ideal program attributes consistent with AArk standards in husbandry, health care and population management. There is still much work to be done improving existing programs and initiating new programs for priority species not yet rescued. There are of course, many “model” amphibian programs that work in range country, maintain adequate biosecurity and have achieved consistent breeding success, and these are featured on our website (www.amphibianark.org/model-facilities.htm).



*Hiroshima City Asa Zoological Park in Japan is the most successful zoo in the world for breeding the Hanzaki (Japanese Giant Salamander, *Andrias japonicus*), and has a long-running program of working with local people to help conserve this species and its fragile environment. This species was assessed at an AArk workshop for both in situ conservation and ex situ research.*

Five years of donor support

We at the Amphibian Ark are extremely grateful to all of our donors who, no matter the amount of their donation, share the same enthusiasm for amphibian conservation. We could not function without the support of our institutional and individual donors who donate regularly to AArk, and are especially grateful to our sustaining donors who have committed their support through 2013 and beyond. These donors include Josie Lowman, the Andrew Sabin Family Foundation, Cleveland Metroparks Zoo, Denver Zoo, Nordens Ark, and Sedgwick County Zoo.

During our 2008 Year of the Frog Campaign, we received vital support from many institutions and individuals around the world. The European Association of Zoos and Aquaria (EAZA) member institutions worked together to spread the word about the amphibian extinction crisis and helped to raise over \$233,000 to support the Amphibian Ark.

In the last five years, individual and institutional donors have contributed a fantastic \$1.2 million to the AArk, and these donations have supported our core activities as well as helping amphibian conservation projects around the world.

Mrs. Gordon and Mrs. Carlson of Tremont Elementary School in Upper Arlington, Ohio, USA have been working with each of their 2nd grade classes since the Year of the Frog in 2008 on their “Go Green for Frogs” project. For this project, they have come up with all sorts of creative ways to learn about amphibians and amphibian conservation, and have been fundraising annually to support AArk. Some of their fundraising efforts have included bake sales, designing and selling “Go Green for Frogs” bandanas and bags, and read-a-thons. Recently, they held an Amphibian Olympics which combined various events (like an obstacle course, long jump, and speed race) with learning about amphibians and learning math and life science skills. They also produce and publish the “Go Green for Frogs Gazette” and their Pondcast series which can be found online: www.uaschools.org/index.aspx?NID=2061. To date, the students from Tremont Elementary School have raised a total of \$6,674.



Second grade students from Tremont Elementary School in Upper Arlington, Ohio, proudly wearing their “Go Green for Frogs” T-shirts. During the last three years, children at the school have raised over \$6,600 to support amphibian conservation projects.

Five years of model programs

Amphibian Ark considers that there are three steps which are vital in any good *ex situ* conservation program, especially those that might eventually involve release back into the wild: the program should be based within the range country; the population being managed should be housed in isolation from other populations occurring outside its range; and the species should be one that has been identified by an appropriate authority as legitimately needing to be in captivity.

Where possible, all amphibian programs that will ultimately result in reintroduction or translocation programs should be operated within the native range of the species. Maintaining these populations within the range country generally results in lower disease risks than programs that are located outside the native range of the species. This helps to reduce the risks of introducing non-native pathogens into the environment around the facility holding the amphibians, and the possibility of introducing novel local pathogens to amphibians that are collected and housed outside of the range country.

Lake Titicaca Frog, Universidad Peruana Cayetano Heredia, Lima, Peru

In 2007 the Denver Zoo formed a partnership with the Peruvian University Cayetano Heredia to help develop a conservation program, a breeding facility at the university and an education component to alert local people to the problems facing the Lake Titicaca Frog, *Telmatobius culeus*. This Critically Endangered species is declining precipitously primarily due to the effects of human consumption. A laboratory has now been created, and a group of these frogs is being maintained at the breeding facility.

The objectives for the remainder of 2011 are to continue surveying throughout the lake and into Bolivia. The university currently holds five frogs which were confiscated animals. These animals are being maintained to gain additional insight into the captive husbandry of the species.



Liem's Tinker Frog, Currumbin Sanctuary, Queensland, Australia



*Currumbin Sanctuary's converted shipping container, which houses their breeding program for the Liem's Tinker Frog, *Taudactylus liemi*, and has been covered with a giant photograph of local rainforest.*

In November 2009, amphibian biologists from Griffith University and staff from Queensland's Currumbin Sanctuary collected a small group of Liem's Tinker Frog, *Taudactylus liemi*, from the Eungella Rainforest. This species is endemic to Queensland and the collected animals formed the nucleus of a captive breeding program for the species, the first such program to have been initiated in Queensland. The animals are housed in a temperature-controlled breeding facility inside a converted shipping container.

This breeding program is jointly funded by Currumbin Wildlife Sanctuary and Griffith University, as well as funding from Dreamworld's Conservation Fund, the Chicago Board of Trade (CBOT) Endangered Species Fund, and the Zoo and Aquarium Association (Wildlife Conservation Fund) which awarded the program \$14,000, raised during Amphibian Ark's Year of the Frog campaign.

Amphibian breeding station, Institute of Ecology and Biological Resources, Hanoi, Vietnam

In partnership with the Institute of Ecology and Biological Resources in Hanoi, Vietnam, the Cologne Zoo in Germany has established an amphibian and reptile breeding station, with a focus on captive breeding and research of Vietnamese amphibians. In-country research enables breeding and husbandry protocols to be developed and documented, to be better prepared in the event that large-scale rescue programs are required for local amphibian species.

The facility is also involved in captive breeding species that are in demand within the pet trade, to reduce the collection of animals from the wild. The sale of frogs into the pet trade also provides an income that helps to support the running costs of the breeding station.

Fourteen species have been bred at the station, including a number of threatened species. Some species have been transferred to zoos in Europe, where they have been established as additional assurance populations.



Kihansi Spray Toad, Toledo Zoo, Ohio, USA, Bronx Zoo, Ohio, USA and University of Dar es Salaam, Tanzania



Technicians from the amphibian propagation center at the University of Dar es Salaam, with Alyssa Borek, the Bronx Zoo's primary Kihansi Spray Toad keeper.

During the construction of a hydroelectric dam in Tanzania, the Kihansi Spray Toad, *Nectophrynoides asperginis*, was discovered in December 1996 in the unique waterfall spray wetlands of the Kihansi Gorge. The toad's entire range was limited to about two hectares in the spray created by the Kihansi falls, perhaps making this the smallest known distribution of any vertebrate species. This habitat was threatened by the diversion of water flowing into the Gorge by the dam in 1999 and the number of toads dwindled precipitously. To prevent extinction 499 Kihansi Spray Toads were transferred to the United States by the Bronx Zoo to create ex situ assurance populations. The captive toads were distributed between several American zoos, including the Toledo Zoo, Toledo, Ohio.

In 2000, attempts were made to restore the habitat in the Gorge by installing an extensive irrigation system and toad numbers rebounded. Unfortunately, there was a crisis in 2003 when the entire population collapsed and the toad was last seen in the Gorge in 2004. How-

ever, the captive population later thrived and has become the foundation for a reintroduction effort. In 2010 and 2011, biosecure facilities for the species were developed at the University of Dar es Salaam and at the Kihansi Gorge in Tanzania.

Several hundred Kihansi Spray Toads have been repatriated back to these facilities in Tanzania and have been successfully maintained and reproduced. The reintroduction of toads into the gorge is expected to occur in 2012 following some final prerelease experiments. Currently there are about 6,000 Kihansi Spray Toads isolated in biosecure facilities at the Bronx and Toledo Zoos that are producing offspring to support this reintroduction effort.



A very successful program for the Harlequin Frog, *Atelopus varius*, was established at the El Valle Amphibian Conservation Center (EVACC), in Panama in 2006. This is an example of an AArk “model” program, with wild-caught founders reproducing in captivity, and offspring being released back into the wild. The progress of released animals is monitored by EVACC staff.

**Where possible,
all amphibian
programs that will
ultimately result
in reintroduction
or translocation
programs should be
operated within the
native range of the
species.**

El Valle Amphibian Conservation Center, El Valle de Anton, Panama

The El Valle Amphibian Conservation Center (EVACC) was established within the Nispero Zoo in El Valle de Anton, Panama in 2005, with the support of funding from Houston Zoo and other institutions. Since that time, twelve priority species of amphibians have been bred at the Center, which now features a large amphibian exhibit area for zoo visitors. The Center displays the cultural icon and national symbol for wildlife conservation, the Panamanian Golden Frog, *Atelopus zeteki*, which is nearly extinct in the wild.

In mid-2011, the first releases took place, of frogs that were bred at the Center. Juvenile Harlequin Frogs, *Atelopus varius* were released in Central Panama, in the same location where the founder animals were collected, up to three years prior. Many of the species that are housed at EVACC have not previously been bred in captivity, and the research being carried out at the Center will benefit many other threatened species.

AArk Seed Grant

Since its inception in 2009, the AArk Seed Grant program has annually given away \$5,000 competitive grants designed to fund small start-up rescue projects for species that cannot currently be saved in the wild. Successful proposals reflect AArk values, including:

- focusing on species whose threats cannot be mitigated in nature in time to prevent their extinction and who therefore require *ex situ* intervention to persist
- working with species within their native range country
- involving range-country biologists
- adhering to recommended biosecurity standards for *ex situ* programs
- linking *ex situ* programs to *in situ* conservation
- involving partnerships to maximize the likelihood of the program's long-term sustainability.



We are very grateful for the generosity of the past and current donors who support the AArk Seed Grant Program: the Andrew Sabin Family Foundation, Chester Zoo, Ronna Erickson, the European Association of Zoos and Aquariums, Josie Lowman, Wildlife Conservation Society and Woodland Park Zoo.

To date, nine recipients have been awarded AArk Seed Grants, totaling \$33,837.

2009 - Establishing a captive breeding facility for Malagasy Amphibians - Association Mitsinjo (\$4,972)

Association Mitsinjo is a community-run organization founded by villagers in Andasibe, Madagascar, and is seeking a total of US \$98,302 to create a captive breeding facility for threatened Madagascar amphibians. Ultimately, this facility will maintain captive amphibian populations to help ensure the continued survival of species at the greatest risk of extinction. AArk funds have been used to purchase supplies for live food production and equipment for field work. The real benefit from financially supporting this project however, is the ability to demonstrate solid backing from AArk on applications to leverage future funding opportunities. This project has also gathered support from the Wildlife Conservation Society and the Woodland Park Zoo. In early 2011, AArk and Woodland Park Zoo staff visited to help with basic husbandry training for staff of the facility.



A common species in the Andasibe area of Madagascar, Boophis pyrhus is being bred at the Mitsinjo breeding and research facility to gain experience to facilitate rescue operations for more threatened species should the need arise.

2010 - Maud Island Frog Habitat – Orana Wildlife Park, New Zealand (\$3,564)

Orana Wildlife Park is developing a state of the art habitat for the Nationally Endangered New Zealand Maud Island Frog, *Leiopelma pakeka*. Housing these frogs will support the aims of the Department of Conservation Native Frog Recovery Plan through conservation advocacy, provision of an assurance population, research, refining husbandry techniques for the species and ultimately breeding for release to the wild.



The habitat will be a nocturnal display providing an assurance population of Maud Island Frogs, allowing refinement of techniques to enable captive breeding of the species, and ultimately allowing breed-for-release programs to supplement surviving colonies in situ. The refinement of these techniques is also essential to the Department of Conservation's aim of securing and breeding Hamilton's Frog, *Leiopelma hamiltonii*, in captivity and could potentially lead to breeding this species for release back to the wild.

Significant progress has been made on the Maud Island Frog Habitat, with the facility now approximately 65% complete. However, progress was halted early in 2011 due to the devastating 6.3 magnitude earthquake that struck Christchurch in February.

2010 - Conservation of the Cuban Long-nosed Toad (\$5,000, funded by Chester Zoo)

The Cuban Long-nosed Toad, *Peltophryne longinasus*, is the first amphibian species in which chytrid fungus has been found in Cuba, and the species is currently evaluated as Endangered in the IUCN Red List. The main threats to the species are the historical loss of suitable habitats and the very limited range of distribution.



Ex situ and *in situ* conservation efforts are necessary to avoid species extinction, due the critical danger that chytrid fungus represents for amphibians. Preliminary experiences with the captive breeding of the toad exist and may represent a good starting point for a long-term captive program. Funding from the AArk Seed Grant is supporting for the following purposes:

- developing a facility for *ex situ* conservation of this species in Cuba
- monitoring wild populations of this species and co-occurring frogs, in order to assess the impact and spread of chytrid fungus, the habitat health and quality, and to gather basic information on the biology of the species for long-term conservation.

New data derived from this project will offer the opportunity to complete a practical handbook about the biology and captive management of the species.

2010 - Conservation actions for native and threatened amphibians of the Colombian Caribbean region – Fundación Botánica y Zoológica de Barranquilla (\$3,000)

The amphibian biodiversity of Colombia's Caribbean region is rich, but most species are threatened to some degree. Fundación Botánica y Zoológica de Barranquilla, as the only zoo in the region, is contributing to the conservation of amphibians via a holistic amphibian conservation project that includes:

- an amphibian exhibition and education program
- *ex situ* conservation via captive-breeding program of two local, endangered amphibians; *Allobates wayuu* (classified as

Vulnerable) from Makuira National Natural Park and *Colostethus ruthveni* (classified as Endangered) from Sierra Nevada de Santa Marta

- educational activities at the zoo and at localities where endangered amphibians are found and by monitoring the health of several amphibian populations.

Both species were assessed during the AArk species prioritization workshop for Colombian species in 2007, and were recommended for captive breeding programs. The other aim of the project is to raise awareness about amphibians, the threats they are facing and the actions that can be taken to protect them both in the wild and at the zoo.



2010 - Frogs and toads from south-eastern Colombia: Jewels of nature that our grandchildren should know – Jonh Jairo Mueses-Cisneros (\$575)

Colombia has one of the highest amphibian diversities in the world; and south-eastern Colombia, with nearly 290 amphibian species, contributes 40% of this diversity. However, in spite of this high diversity, the conservation efforts toward this imperilled group are very scarce. From 2004, successful *in situ* conservation projects have been carried out in the region, focusing on species of special concern. Current efforts are being directed towards the implementation of responsible *ex situ* conservation programs for amphibians, accompanied by a detailed environmental education plan involving local people and the construction of legal policies to guarantee the survival of these species and their habitat.



The funds from the AArk seed grant, and matching funds from the Philadelphia Zoo in the amount of \$600, have been used to train two members of the team in amphibian husbandry techniques and rearing of feeder insect colonies at internationally recognized *ex situ* institutions: Balsa de los Sapos, at Pontificia Universidad Católica del Ecuador, in Quito and Centro de Conservación de Anfibios Mazán, in Cuenca.

The interns learned a great deal during their experience, and this led to improved designs of the future Centro de Reproducción de Anfibios del Suroccidente Colombiano, and an updated budget to reflect a much more realistic scenario. After this internship, biosecurity protocols were established and are ready for the Centro de Reproducción.

2010 - Bolivian amphibian initiative – Museo de Historia Natural Alcide d'Orbigny (\$1,700)

This project is focusing on the Bolivian High-Andes where very few studies have been carried out, and where several events such as habitat loss, pollution, global warming and the lethal fungal pathogen *Batrachochytrium dendrobatidis* are causing local and global extinctions. In addition to other High-Andes amphibians, many of which are threatened, this project is working with the poorly-known aquatic frogs of the genus *Telmatobius*.

The Bolivian Amphibian Initiative has already created the first captive breeding facility for endangered Bolivian Andean amphibians. This first step allowed aquariums with filtering systems and other related water quality equipment to be installed, in order to house the different species.





The Titicaca Water Frog, *Telmatobius culeus*, is one of the five species of the genus *Telmatobius* that is being maintained by the Bolivian Amphibian Initiative at the Museo de Historia Natural Alcide d'Orbigny in Bolivia.

The goals of the project are to:

- provide information regarding ecological requirements, breeding periods and activity, population status estimation, determination of the presence of *Bd* fungus in both species
- develop *in situ* capacity building with local community members and to train young Bolivian biologists in amphibian work
- increase awareness about amphibian crisis in local communities and the general public through activities, exhibitions and different media within the communities and in the Museum
- set up a captive breeding facility in the Museo de Historia Natural Alcide d'Orbigny with two species of *Telmatobius* for research and education purposes.

Recently the facilities were increased with the support of the US Fish and Wildlife Service and at the moment the Museum has a container with more than 45 aquariums in a system that will maintain the controlled temperature and habitat requirements of the species being held. At the moment the facility maintains five species of *Telmatobius* from several localities of Bolivia.

2011 - Captive breeding of the Canasí Frog from Cuba – Museo Nacional de Historia Natural de Cuba (\$5,000)

The Amphibian Ark Conservation Needs Assessments for Cuban amphibians that was undertaken in April 2011 concluded that the Canasí Frog, *Eleutherodactylus blairhedgesi*, is the highest priority Cuban species for *ex situ* conservation



action. The species is listed as Critically Endangered in the IUCN Red List, and threats are not expected to be reversed in time to avoid extinction in the wild.

This frog is a local endemic to the north coast of Havana and is currently affected by increasing impacts of crude oil mining and the development of tourism. The AArk Seed Grant funding will support two purposes:

- to develop a facility for *ex situ* conservation of *E. blairhedgesi*
- to monitor wild populations of this species to gather basic information on its biology and threats.

This project is expected to develop the first action plan to protect the species through a combination of *ex situ* and *in situ* strategies, and it will facilitate the publication of several aspects of the species' natural history and new protocols for *ex situ* conservation.

2011 - *Ex situ* management of five extant species of *Atelopus* in Ecuador – Centro Jambatu de Investigación y Conservación de Anfibios/Fundación Otonga, Ecuador (\$5,000)

This project aims to save five extant species of harlequin frogs *Atelopus* in Ecuador from extinction, through *ex situ* breeding and management. Most harlequin frogs went extinct and most of the extant are Critically Endangered (based on IUCN criteria) throughout their distribution. Given the threats this genus faces, *in situ* management is not enough to save the species, and at this point, *ex situ* management is an urgently needed proactive solution to save extant species from extinction.

Previous efforts to captive breed *Atelopus* have been relatively minor and unsuccessful, except for *A. zeteki*. Some of these efforts have failed because they relied on the spontaneous breeding of amplexant pairs kept under laboratory conditions. Previous experience shows that breeding under such circumstances rarely occurs. Thus, the objectives and activities of this project are directed to finding additional founders, adequately equipping the *ex situ* facilities for the program, and performing assays of assisted reproduction (using hormones) of *A. sp.*, *A. elegans*, *A. spumarius*, *A. balios*, and *A. nanay*, on the basis of successful previous essays with two of the species.



2011 - Conservation of *Scinax alcatraz* – Fundação Parque Zoológico de São Paulo, Brazil (\$5,000)



Scinax alcatraz is a tree frog, endemic of Alcatrazes Island and is listed as Critically Endangered in the IUCN Red List. Part of the island belongs to the Brazilian Navy, and it is used as a target practice by navy ships. This practice often causes spot fires on the island and consequently destroys bromeliads, the habitat of the *S. alcatraz*. For this reason the establishment of an *ex situ* breeding program, as well as maintaining a viable population in captivity, is necessary and urgent.

The founders were collected during the rainy season and have been placed in a captive biosecure breeding facility (a modified shipping container), inside of Fundação Parque Zoológico de São Paulo facilities. The funds provided via the AArk Seed Grant are being used for husbandry materials. Along with the captive program, constant monitoring of the species in the wild will be conducted to enable the investigation of possible

population declines, and if necessary, the genetic and sanitary viable population of *S. alcatraz* maintained in captivity will be ready for possible supplementation or reintroduction.

Supporting other ACAP partners

Since species can only be truly saved in the wild, and rescued animals can only be released after threats are understood and mitigated, the AArk's plan to successfully conclude programs is to support fellow ACAP partners who address those issues.

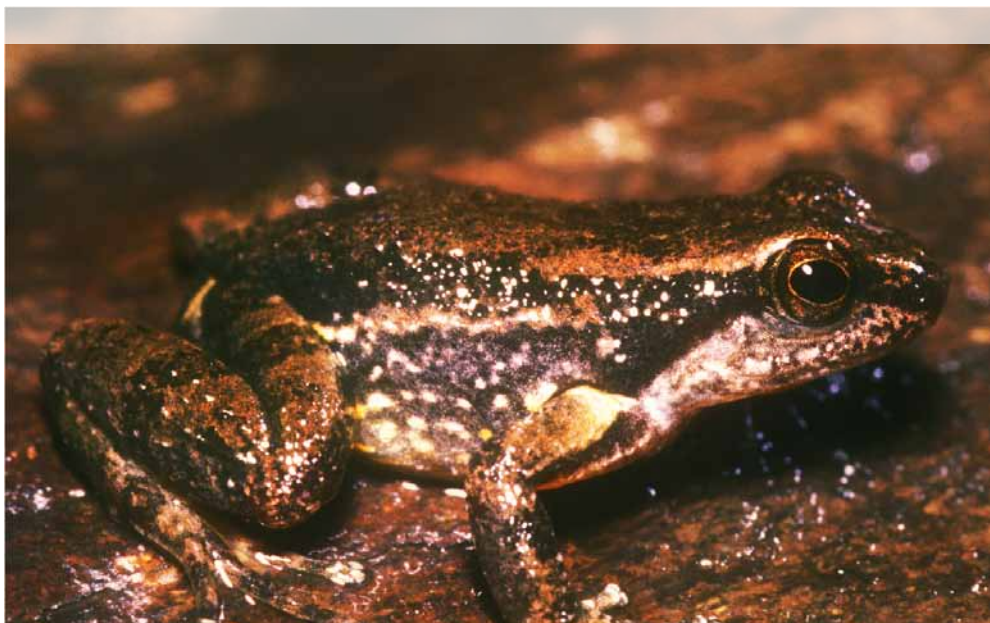
To that end, some activities of the AArk community benefit all ACAP partners. The AArk's role in raising awareness has already been discussed; this work has created a more receptive environment in which all ACAP partners can fundraise. In addition, the *ex situ* community offers over two dozen grants that are not generally limited to *ex situ* activities and are therefore open to all ACAP partners (see www.amphibianark.org/funding.htm). Furthermore, if the ACAP is being executed properly and collaborative partnerships are formed across multiple disciplines and communities, then each can count each other's resources as in-kind support to leverage additional funds.

The AArk has also been able to help field partners raise funds (over \$20,000 to date for Venezuela) by auctioning the naming rights of new species.

To date, four new species names have been auctioned, raising almost \$25,000 for two Venezuelan field biologists. This money will support their ongoing fieldwork, primarily assessments and systematic studies, as called for in the ACAP.

Donor	Recipient	Species name	Amount	Publication status
Jason Speer	Enrique La Marca	<i>Mannophryne speeri</i>	\$8,585	Published
Roberta Snyder	César L. Barrio-Amorós	<i>Anomaloglossus verbeeksnyderorum</i>	\$6,290	Published
Anna Vranos	César L. Barrio-Amorós	<i>Pristimantis xxx</i>	\$4,675	In press
Ronna Erickson	César L. Barrio-Amorós	<i>Aromobates xxx</i>	\$5,000	In press
		Total	\$24,550	

Funds raised by auctioning the naming rights for newly discovered species.

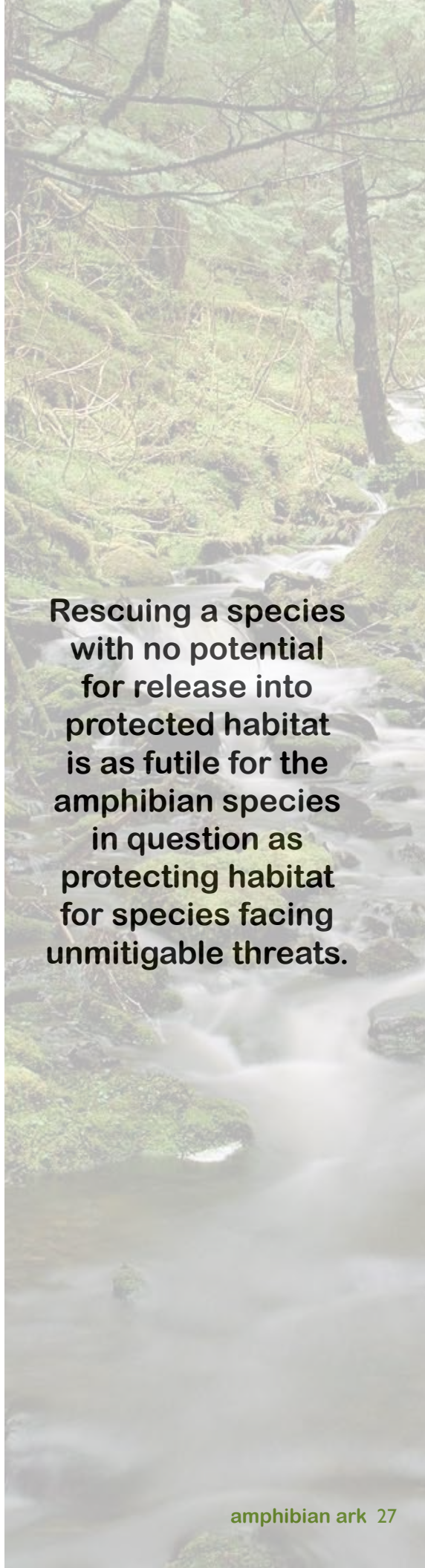


Mannophryne speeri, named by AArk partner Enrique LaMarca for AArk supporter Jason Speer. The auction of the naming rights for this newly-discovered species raised ~\$10,000 for Dr. LaMarca's field research in Venezuela.

The Amphibian Ark community can help other ACAP partners by providing animals that are surplus within managed rescue populations for important research on ACAP priorities (see www.amphibianark.org/mailman/listinfo/animalsforacap_amphibianark.org). Some zoos and aquariums are prevented from supplying animals for research purposes by their respective animal disposition policies, but many are not, and these sorts of collaborations have resulted in some important research into toxicology and disease research.

Furthermore, while assessing the status of species in the wild is not in itself a priority for *ex situ* partners, many comprehensive rescue programs are supporting *in situ* specialists or conducting surveys themselves, generating data that are useful in conservation assessments, including discovery and description of new species. Often these assessment efforts aim to determine the distribution of populations within a target species and partners simultaneously conduct phylogenetic analyses to determine which populations are distinct and require independent management.

Finally, although identification and protection of key habitat areas is not a focal area of the *ex situ* community, these *in situ* and *ex situ* efforts can and must complement each other. For example, when *in situ* ACAP partners secure key habitat areas for a particular amphibian species, AArk partners should focus on assessing and addressing the *ex situ* needs of those species. Protecting the habitat of a species is futile if that species is going to succumb to threats that ignore park borders. For example, while the Alliance for Zero Extinction and partners purchased and protected key habitat in Sierra Nevada de Santa Marta Colombia (www.amphibians.org/ASG/Colombia.html), the Barranquilla Zoo began looking for support to initiate a rescue program for *Colostethus ruthveni* (www.amphibianark.org/Colostethus_ruthveni.htm), a species predicted to be negatively impacted by chytrid fungus. The reverse also applies: if *ex situ* partners have been able to rescue a particular species that does not occur in a protected area, collaboration should occur with *in situ* partners to protect habitat. Rescuing a species with no potential for release into protected habitat is as futile for the amphibian species in question as protecting habitat for species facing unmitigable threats. This sort of complementary collaboration should be a priority for *ex situ* partners and is another channel for their resources to benefit their *in situ* partners.



Rescuing a species with no potential for release into protected habitat is as futile for the amphibian species in question as protecting habitat for species facing unmitigable threats.



Key amphibian habitat has been purchased and protected in Sierra Nevada de Santa Marta Colombia.

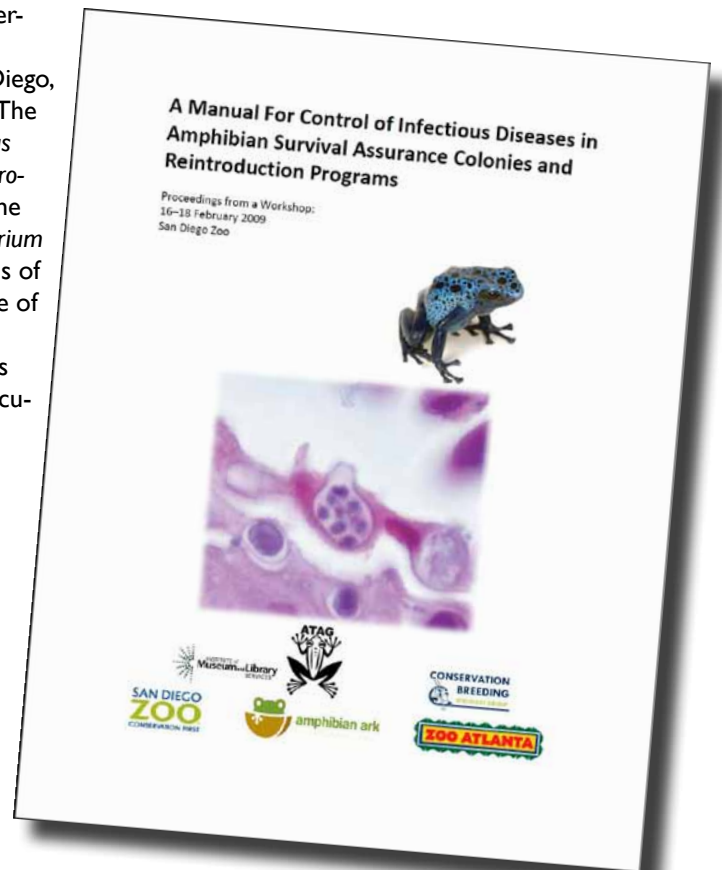
Advisory Groups

Several advisory groups have been established to assist with management issues that require extra consideration. An AArk Population Management Advisory Group was established and one of its first tasks was to write the *AArk Amphibian Population Management Guidelines* (www.amphibianark/population_management_guidelines.htm) to assist captive program managers to begin with an appropriate number of founder animals and to make sure that maximum genetic diversity is maintained in their captive populations. These guidelines were developed during a two-day workshop that was held in San Diego in December 2007, which included 16 amphibian and population management experts from 13 institutions.

Another significant aspect of amphibian husbandry that is often overlooked is biosecurity and disease prevention. AArk's Biosecurity Advisory Group met for three days in February 2009, also in San Diego, to discuss a wide variety of aspects relating to amphibian diseases. The proceedings of that workshop form *A Manual for Control of Infectious Diseases in Amphibian Survival Assurance Colonies and Reintroduction Programs* (www.amphibianark.org/disease.htm). It is well-known that the disease chytridiomycosis, caused by the chytrid fungus *Batrachochytrium dendrobatidis*, is responsible for the deaths of hundreds of thousands of amphibians, both in the wild and in captivity. This disease is only one of several that affect amphibians, making biosecurity and disease prevention among the most important aspects of *ex situ* programs. This manual provides best practices for amphibian quarantine and biosecurity facilities, as well as information about diagnostic testing and disease treatment and control.

An Amphibian Biobanking Workshop was co-hosted in 2010 by the Zoological Society of London (ZSL) and the European Xenopus Resource Centre in Portsmouth and was attended by over 30 delegates from 8 different countries. Two days of talks and discussions at ZSL provided a considerable amount of background information for a biobanking strategy document for amphibian conservation, which is currently being compiled by members of AArk's Biobanking Working Group.

The aim of this document is to provide advice for the wider community, e.g. which species and samples should be biobanked; how and what data should be recorded; what other aspects should be considered when biobanking, such as sample, individual and species differences, genetics and disease; what are the existing and promising biobanking/assisted reproductive technologies not yet applied to amphibians, etc. The first drafts of the protocols are now available on AArk's biobanking data portal, <http://aark.portal.isis.org/Biobanking/>.



The next five years

In the first five years of post-metamorphosis, Amphibian Ark has accomplished a great deal in furthering the *ex situ* aspects of the Amphibian Conservation Action Plan. As the Amphibian Survival Alliance begins to move the other aspects of the ACAP (research, assessment and others) forward, Amphibian Ark will continue to increase global capacity to rescue into captivity those amphibians on the brink of extinction. Specifically, we hope to expand our reach more regionally in the next five years, incorporating more Amphibian Ark staff on the ground in numerous regions around the world, working to build local programs, managed by local stakeholders who are trained and supported by Amphibian Ark.

We will also increase our efforts in the area of reintroduction, release, translocation and head starting to tie *ex situ* work with *in situ* partners and programs. Captive programs should be thought of as temporary measures to safeguard species and to avoid these species going extinct in glass boxes contained in a biosecure laboratory. We must link these programs with plans to move them back into nature as quickly and safely as feasible. This will enable us to better realize our founding vision of “Amphibians safe in nature.”



Since 2009, the Sustainable Prisons Project has been working with Washington Department of Fish and Wildlife and Cedar Creek Correction Center to raise endangered Oregon Spotted Frogs, *Rana pretiosa*. In 2010 the correction centre came together with Oregon Zoo, Woodland Park Zoo and NW Trek to release frogs into the wild in a collaborative effort to stabilize the native populations.



The Amphibian Survival Alliance

The Amphibian Conservation Action Plan (ACAP), drafted in 2005, outlined steps to understand and halt the unparalleled amphibian conservation crisis, but implementation progress has been slow and uneven. This is due primarily to a lack of coordination and of funding. To address these problems and implement the ACAP more thoroughly, the Amphibian Survival Alliance (ASA) has been formed. The ASA is to become the unifying name and face of global amphibian conservation of all kinds, and the Amphibian Ark will continue its work as the *ex situ* component within this structure.

The Amphibian Specialist Group (ASG) of the IUCN Species Survival Commission, a network of more than 600 of the world's leading amphibian biologists, will provide scientific advice to the ASA. The ASG will also facilitate the assessment of the conservation status of amphibian species for the IUCN Red List, and assist in the development of national and regional amphibian conservation action plans to support and guide the ASA's work.

An ASA Executive Director and Chief Scientist have been hired and these staff will work with Alliance members and its Board of Directors to develop and monitor ASA strategies, to coordinate response activities on several issues, to promote the conservation case, and to secure necessary financial and other resources.

AArk organization

The AArk is a joint effort of three principal partners: the World Association of Zoos and Aquariums (WAZA), the IUCN/SSC Conservation Breeding Specialist Group (CBSG), and the IUCN/SSC Amphibian Specialist Group (ASG). The functions of the AArk are overseen by an Executive Committee, which comprises representation from each of the three parent organizations.

The members of the current Executive Committee are:

- Dr. Chris West (Executive Committee Chair) - WAZA
- Dr. Onnie Byers - CBSG
- Dr. Phil Bishop – ASA

The Executive Committee oversees the Steering Committee, which itself brings together representatives from the entire AArk stakeholder community. The Steering Committee is the AArk's primary conduit for sharing information quickly throughout our global network, and for seeking direction from our stakeholders on AArk's strategic directions.

The AArk Steering Committee currently has twenty-one members, including thirteen representatives of regional/national zoo associations, three from the private sector, and one each from communities for academia, aquariums, botanical gardens, ISIS, and natural history museums.

The current members of the Steering Committee are:

- African Association of Zoos and Aquaria (PAAZAB): Dave Morgan
- Asociación Latinoamericana de Parques Zoológicos y Acuarios (ALPZA): Andrea Caiozzi
- Asociación Mesoamericana de Zoológicos y Acuarios (AMACZOOA): Yolanda Matamoros
- Association of Zoos and Aquariums (AZA): Shelly Grow
- Botanic Gardens Conservation International (BGCI): David Galbraith
- Canadian Association of Zoos and Aquariums (CAZA): Greg Tarry
- Chinese Association of Zoological Gardens (CAZG): Zhang Gaofeng
- European Association of Zoos and Aquaria (EAZA): Gerardo Garcia
- Euro-Asian Regional Association of Zoos and Aquariums (EARAZA): Evgeny Ryboltovsky
- International Aquarium Forum (IAF): Paul Van den Sande
- Museums: Andrew Gray
- International Species Information System (ISIS): Nate Flesness
- Japanese Association of Zoos and Aquariums (JAZA): Kaszushi Kuwabara
- Private sector Australia: Gerry Marantelli
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- Private sector USA (TWI): Ron Skystad
- South Asian Zoo Association for Regional Cooperation (SAZARC): Sally Walker
- South East Asian Zoos Association (SEAZA): Mirza D. Kusri
- Sociedade de Zoológicos do Brasil (SZB): Raquel von Hohendorff
- Zoo and Aquarium Association (Australasia): Susan Hunt
- Other: David M. Green



AArk staff

The AArk staff is comprised of four individuals:

- Kevin Zippel – Amphibian Program Director
- Ron Gagliardo – Training Officer
- Kevin Johnson – Taxon Officer and Communications and Development Officer
- Elizabeth Townsend – Administrative Assistant

Ron's position is part-time and together with some workshop expenses is funded through a gift made by Josie Lowman. We'd like to acknowledge the generosity of the IUCN Conservation Breeding Specialist Group (CBSG) for donating 25% of Elizabeth's time to the Amphibian Ark, and the support of Woodland Park Zoo for hosting Ron's position.

Over the past five years, several other staff have been a part of the AArk team. These include Lisette Pavajeau (Communications and Development Officer), Richard Gibson (Taxon Officer, supported and hosted by the Zoological Society of London and Chester Zoo), Robert Browne (Research Officer, supported and hosted by the Royal Zoological Society of Antwerp), Carlos Martinez-Rivera (Taxon Officer for Latin America, supported and hosted by the Philadelphia Zoo) and Leslie Dickie (Year of the Frog Global Campaign Manager, supported and hosted by the Zoological Society of London).



Kevin Zippel



Ron Gagliardo



Kevin Johnson



Elizabeth Townsend

Thanks also go to the Zoo and Aquarium Association (Australasia) and Zoo Atlanta for their support in hosting AArk staff.

Support from our associates

Amphibian Ark staff are incredibly fortunate to also have a large group of professional associates who regularly offer their services to support our amphibian conservation work. Collectively, the following people have contributed many hundreds of hours of their time to share their expertise and help with workshop facilitation, instructing at training courses and chairing advisory groups. We'd like to sincerely thank all of these people, and their respective institutions for their support of our associates.

- Danny Beckwith (private) - Graphic design, video production
- Luis Carrillo (Zoofari)- Assessment facilitator, consulting veterinarian
- Paul Crump (Houston Zoo) – Assessment facilitator
- Gerardo Garcia (Durrell WCT) – Husbandry workshop instructor
- Richard Gibson (Auckland Zoo) – Taxon management officer
- Kristin Leus (CBSG) – Co-chair of Population Management Advisory Group
- Rhiannon Lloyd – Biobanking officer
- Gerry Marantelli (ARC) – Husbandry workshop instructor
- Michael McFadden (Taronga Zoo) – Husbandry workshop instructor
- Joe Mendelson (Zoo Atlanta) – Scientific advisor
- Andy Odum (Toledo Zoo) – Husbandry workshop instructor
- Allan Pessier (San Diego Zoo) – Chair of Biosecurity Advisory Group, consulting veterinarian
- Jenny Pramuk (Woodland Park Zoo) - Husbandry workshop instructor
- Mike Ready (private) – Husbandry workshop instructor
- Sam Rivera (Zoo Atlanta) – Consulting veterinarian
- Ollie Ryder (San Diego Zoo) – Chair of the Biobanking Advisory Group
- Kristine Schad (AZA) – Co-chair of Population Management Advisory Group
- Micky Soorae (IUCN RSG) – Chair of Re-introduction Advisory Group
- Brad Wilson (private) – Consulting veterinarian, Husbandry workshop instructor

What can you do to help?

Addressing the amphibian extinction crisis represents the greatest species conservation challenge in the history of humanity. We need your help and support to work with us in this huge task!

There are many ways in which you can help to achieve our aims:

Join the AArk as a Subscribing Member, which is completely free, at www.amphibianark.org/membership.htm. As a member of the AArk, you'll receive our quarterly electronic Amphibian Ark Newsletter (www.amphibianark.org/newsletter.htm) which is available in English and Spanish, and you'll be showing your support for global amphibian conservation. The AArk currently has 6,000+ Subscribing Members.

Make a donation at www.amphibianark.org/donations.htm – **Your donations work!** In the last five years, individual and institutional donors have contributed a fantastic \$1.2 million to the AArk, and these donations have supported our core activities as well as helping amphibian conservation projects around the world.

Help raise funds – find out some of the many ways that school students and community groups can raise funds to contribute towards amphibian conservation via our Fundraising web page at www.amphibianark.org/fundraising.htm.

Sign up for an Amphibian Ark Credit Card at www.amphibianark.org/aark-shop/aark-credit-card/ – a convenient way for people who support Amphibian Ark to fund our work. And it fits in your wallet!

Check us out on Facebook at www.facebook.com/Amphibian-Ark/ – over 900 friends now like our new Facebook page, where they share their thoughts on amphibians, and receive up-to-date information about AArk activities and amphibian conservation projects.

Check out our FrogMatchMaker site at www.FrogMatchMaker.com – **it's where frogs meet their princes!** Help us to facilitate international partnerships to rescue species, by checking out our conservation partners who are looking for support for their projects. You might be able to offer amphibian husbandry expertise, equipment or funding to ensure the success of their conservation work.

Consider using the new Amphibian Ark internet search toolbar from www.goodsearch.com/toolbar/amphibian-ark – once added to Internet Explorer or Firefox, each time you search the internet or shop at more than 1,300 stores a percentage of your purchase will automatically be donated to Amphibian Ark – at no cost to you (and you may even save money as the toolbar provides coupons and deals as well!). The toolbar also has a Yahoo! powered search box and each time you search the internet, about a cent is donated to Amphibian Ark.



Our donors

We are extremely grateful to all of our donors, all of whom share the same enthusiasm for amphibian conservation. Our work is only possible due to the generous support of our donors, and we are especially grateful to our sustaining donors who have committed their support through 2013 and beyond. These donors include Josie Lowman, the Andrew Sabin Family Foundation, Cleveland Metroparks Zoo, Denver Zoo, Nordens Ark, and Sedgwick County Zoo.

Our sincere thanks are offered to all the donors who have supported us over the past five years:

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\$25,000 - \$50,000

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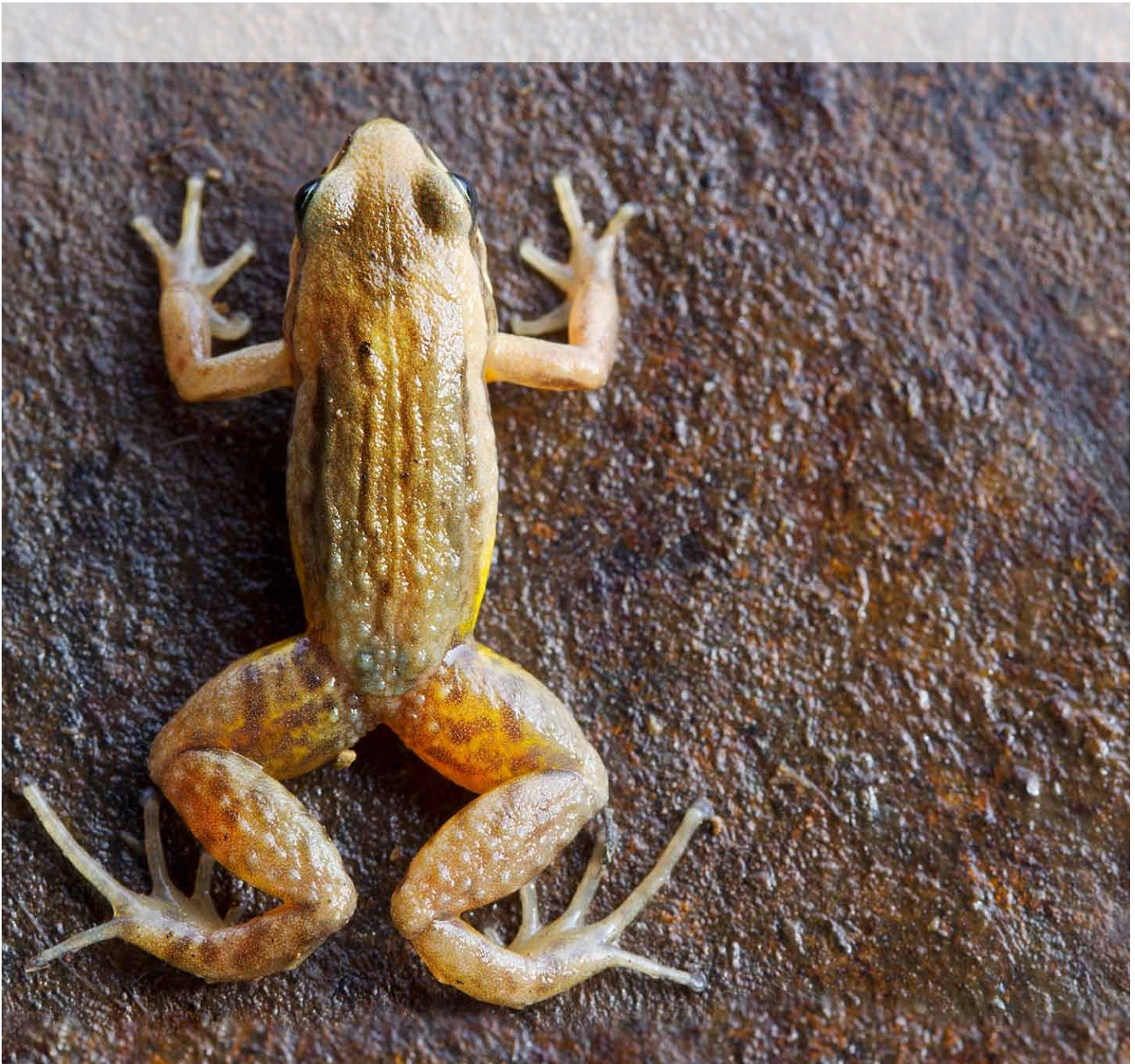
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Zoo Amaru in Cuenca, Ecuador is involved with nine established conservation programs for amphibians from nearby Cajas National Park and the surrounding region. One of these species, Boulenger's Rocket Frog, *Hyloxalus vertebralis*, has bred in captivity and is considered to be an AArk "model" program.

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Captive programs should be thought of as temporary measures to safeguard species. To avoid these species going extinct in glass boxes in a biosecure laboratory we must link these programs with plans to move them back into nature as quickly and safely as feasible.

