

2012 ANNUAL REPORT

PANAMA AMPHIBIAN RESCUE AND CONSERVATION PROJECT



A project partnership between: Africam Safari, Cheyenne Mountain Zoo, Houston Zoo, Smithsonian's National Zoological Park, Smithsonian Tropical Research Institute, Summit Municipal Park and Zoo New England.



MISSION

Our mission is to rescue and establish assurance colonies of amphibian species that are in extreme danger of extinction throughout Panama. We will also focus our efforts and expertise on developing methodologies to reduce the impact of the amphibian chytrid fungus (*Bd*) so that one day captive amphibians may be re-introduced to the wild.

VISION

The Panama Amphibian Rescue and Conservation Project will be a sustainably financed, Panamanian-led organization that has stemmed the tide of extinctions caused by amphibian chytrid fungus and other threats to amphibians. We will lead successful recovery programs for Panama's endangered amphibians and serve as an exemplary model that can be replicated to address the threat of chytridiomycosis to the survival of amphibians worldwide.

EXPEDITIONS

In 2012, we were not able to access Cerro Pirre, one of our priority target collection sites in the Darien region due to security concerns. The majority of new accessioned animals were *Bd* infected conservation-priority species from the Donoso area of central Panama taken in coordination with biologists from Minera Panama. We continued monitoring amphibian populations in central Panama, skin microbiota and *Bd* prevalence at Cerro Sapo in the Darien region, and several sites in the Chagres watershed of central Panama as part of an ongoing National Science Foundation-funded collaboration with Virginia Tech, Villanova and James Madison Universities. We also partnered with project *Atelopus*, a new monitoring effort led by collaborators at Tulane University and New Mexico Tech. This is the first systematic effort to visit all known historical *Atelopus* sites in western Panama that have been hit by chytridiomycosis to determine if any *Atelopus* populations managed to survive the disease wave. While the team was unable to find any surviving Panamanian golden frogs *Atelopus zeteki*, at a few sites they discovered a small number of surviving variable harlequin frogs *Atelopus varius*, a close relative of the Panamanian golden frog. These discoveries are significant, because if we can figure out how or why these few frogs have managed to survive areas alongside chytridiomycosis, it could help to inform strategies to recover frog populations.



Project Director, Dr. Roberto Ibáñez, swabbing a frog for *Bd* at one of our monitoring sites for *Atelopus limosus* in central Panama.



Director of EVACC, Heidi Ross, shows the growing amphibian collection to Rick Quintero visiting from the National Zoo.



EL VALLE AMPHIBIAN CONSERVATION CENTER

2012 was a significant year for EVACC with significant growth in staffing capacity and space. The hiring of three new positions brings the total of five full time staff caring for the amphibian collection. The extra hands were effective at growing insect food production capabilities, positioning us well for our 2013 goals to breed and substantially grow the captive collection. Space at EVACC was also increased substantially with the opening of an annex building funded by Minera Panama. This building increased animal holding capacity by 20 percent with two newly outfitted animal holding areas at ground level. A two-bedroom, one-bathroom apartment upstairs houses employees. The other major infrastructural issue addressed this year was the installation of a reverse osmosis filtration system that resolved longstanding water quality concerns.

EVACC houses about 500 adult at-risk frogs and continued breeding and rearing of offspring from eight of our 13 conservation priority species. The top breeding priority for this year was Panamanian golden frogs *Atelopus zeteki*, and we are pleased to report that several clutches of eggs were laid and are developing well. We also successfully bred variable harlequin frogs *A. varius*, Pirre harlequin frogs *A. glyphus*, and Limosa harlequin frogs *A. limosus*. Horned marsupial frogs *Gastrotheca cornuta* and banded horned tree frogs *Hemiphractus fasciatus* continue to reproduce well, as do crowned treefrogs *Anotheca spinosa*. We once again successfully bred lemur leaf frogs *Agalychnis lemur* after a few years without any captive reproduction. We published a paper on the conservation genetics issues and cryptic species in our captive collection at EVACC using DNA barcoding tools.

The project continued its education activities within the El Valle community and the amphibian exhibit continues to be a major attraction at the El Nispero Zoo, drawing around 100,000 visitors per year. Project staff lead tours and helped to coordinate the August 17th National Golden Frog Day celebrations and parade in El Valle. In recognition of their outstanding contribution to amphibian conservation, Edgardo Griffith and Heidi Ross were awarded the San Diego Zoological Society's Conservation Medal.





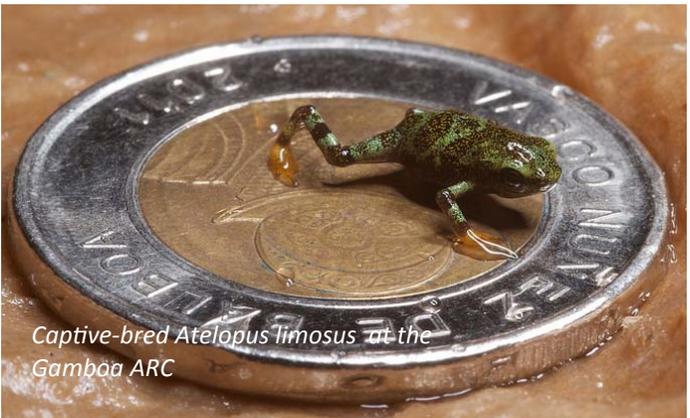
Matilde Perez at EVACC with a hand-full of captive-bred *Hemiphractus fasciatus*.



Captive-bred *Atelopus varius* at EVACC



Captive-bred *Gastrotheca cornuta* at EVACC. Photo: Edgardo Griffith.



Captive-bred *Atelopus limosus* at the Gambia ARC

GAMBOA AMPHIBIAN RESCUE CENTER

2012 was the year we started to move our facility from the Summit Municipal Park to its new site at the Smithsonian Tropical Research Institute's field station in Gamboa (STRI). Phase I installed seven shipping containers donated by Maersk line, underground electrical lines, a backup power generator, water supply and a facility to treat waste-water with ozone and UV before filtering it and sending it into the municipal sewer. Three containers are fully outfitted for amphibians and four more will require retrofitting in 2013. Phase II for the facility is scheduled to begin in 2013 and will involve the construction of a building containing office space for staff and visiting scientists, toilets, a laboratory space, a quarantine area and storage space.

This work would not have been possible without an extraordinary level of commitment and support from the Smithsonian's Office of Facilities, Engineering and Operations who have worked extremely hard the last year to help us get permits, environmental assessments, designs, inspections and supervision of contractors. This move to Gamboa will allow us to engage other STRI research scientists more effectively and the new location will make it much easier for volunteers who will be able to obtain reasonably-priced STRI housing within walking distance of the Gamboa ARC.

With the pending move, our primary collection focus this year was to maintain and grow our existing five conservation priority species. Highlights include the first captive breeding of the chevron patterned Limosa harlequin frogs *Atelopus limosus*. Our toad mountain harlequin frogs *Atelopus certus* and Pirre harlequin frogs *Atelopus glyphus* from the Darien region are doing well and we now have adult captive-bred frogs from at least two clutches for both species, positioning us well to breed our second captive-born generations in 2013. La loma treefrogs *Hyaloscirtus colymba* have been a more challenging species with steady loss of our founding animals due to attrition over the last year and it is unlikely that we will be able to continue our conservation efforts on this particular species. Our collaborators have noted *H. colymba* occurrence in all life history stages at *Bd* positive sites in western Panama which is a hopeful sign. Our undescribed robber frogs *Craugastor cf punctariolus* appear to be two male and two female individuals. We have not been able to locate any more individuals of this species so we do not have an adequate founding population. Nevertheless, these individuals call occasionally in their tanks and we will make a concerted effort to breed this species in 2013.



Amphibian Conservation staff with the Summit Zoo, left to right: Dr. Roberto Ibáñez, Jorge Guerrel, Angie Estrada, Rigoberto Díaz, Lanky Cheucarama



The casque headed tree frog (*Hemiphractus fasciatus*), is one of 11 species of highest conservation concern now being bred in captivity in Panama. Females carry eggs on their backs where the young complete development hatching out as miniature frogs. DNA barcoding data suggest that populations of *H. fasciatus* may comprise more than one taxonomic group. Photo: Edgardo Griffith.

RESEARCH

We continued with probiotics trials using four candidate bacterial species. Preliminary survival and *Bd* load data did not indicate a clear effect of any of the candidate probiotic bacteria, but we still need to further analyze swabs for bacterial community composition and skin metabolite production. We conducted genetic barcoding of EVACC species holdings to examine any potential cryptic species that would inform captive-breeding strategies. We also formally described two new frog species from central Panama.

Publications

Becker, Matthew H., Harris, Reid N., Minbiole, Kevin P. C., Schwantes, Christian R., Rollins-Smith, Louise, Reinert, Laura K., Brucker, Robert M., Domangue, Rickie J. and Gratwicke, Brian. Towards a Better Understanding of the Use of Probiotics for Preventing Chytridiomycosis in Panamanian Golden Frogs, *EcoHealth*, 8 (4) 501-506. 2012.

Crawford, A. J., C. Cruz, E. Griffith, H. Ross, R. Ibáñez, K. R. Lips, A. C. Driskell, E. Bermingham and P. Crump. 2012. DNA barcoding applied to ex situ tropical amphibian conservation program reveals cryptic diversity in captive populations. *Molecular Ecology Resources*. DOI:10.1111/1755-0998.12054.

Myers, C. W., R. Ibáñez D., T. Grant and C. A. Jaramillo. 2012. Discovery of the frog genus *Anomaloglossus* in Panama, with descriptions of two new species from the Chagres Highlands (Dendrobatoidea: Aromobatidae). *American Museum Novitates* 3763:1-19.

EDUCATION AND OUTREACH

Our primary education and outreach event is Panama's Golden Frog Day, designated a national holiday in 2010 through the efforts of local conservationist, Ana Lucrecia Arosemena, President of the Association for the Conservation of the Golden Frog. Now in its third year, we expanded celebrations to include a series of events between August 10-19 at a series of events in Panama City, Summit Municipal Park and Edgardo Griffith coordinated activities in El Valle de Anton. This year's celebration was the largest yet, drawing 30 volunteers to help run events that drew 2,400 participants, about half of which were school children. An aggressive media strategy resulted in stories carried by more than 60 local and international publications as far afield as China, and 10 television reports. This year drew our first commercial sponsor, the Rana Dorada Pub (www.laranadorada.com) who raised \$1,200 for amphibian conservation. The exhibit at EVACC in the El Nispero Zoo draws 100,000 visitors a year and plays a significant role in highlighting the importance of frogs to the Panamanian public, and we produced and distributed 2,000 new posters 'Anfibios de Panama.'

Online: We received more than 44,000 unique visitors to www.amphibianrescue.org in 2012, a 176percent increase from the previous year. This growth is likely due to the Spanish content from our recent translation efforts. These visitors from 124 countries around the world viewed 86,000 web pages. Our social media strategy focused on recruiting and establishing an online relationship with constituents. In 2012, we gained 1,200 new Facebook fans for a total of 5,700 followers. Of these, 2,000 are from Panama, vs. 1,800 from the USA. We grew our Twitter following 70% to 2,000 people.

Traditional media: We had 15 unique stories featuring our project in traditional media, including a front page article in the Washington post on Dec 31, 2012. Other highlights were a feature story on The Today Show and more than 60 Panamanian and international publications that covered Golden Frog Day.

Volunteer program: 50 volunteers, (half local, half international) assisted us with frog care at Gamboa and with Golden Frog Day celebrations in 2012. We welcomed 15 volunteers who spent two weeks or more at EVACC including professionals and academics from Toronto Zoo, Roger Williams Park Zoo, Henry Doorly Zoo, Vancouver Aquarium and McGill University.



Panama's National Golden Frog Day celebrations at Summit Municipal Park, El Valle de Anton and Punta Culebra

FINANCIAL REPORT FOR CALENDAR YEAR 2012

	FUNDING SOURCE	Expenses
EVACC Staff & Supplies	<i>Houston Zoo and EVACC donors</i>	\$ 78,150
Gamboa facilities & containers		
	<i>Friends of the National Zoo</i>	\$ 16,806
	<i>Africam Safari</i>	\$ 17,877
	<i>USAID</i>	\$ 40,968
	<i>SCBI and donors</i>	\$ 48,070
	<i>Zoo New England</i>	\$ 45,950
	<i>Cheyenne Mountain Zoo</i>	\$ 43,368
	<i>STRI and donors</i>	\$ 3,000
Gamboa Staff Salaries		
	<i>USAID</i>	\$ 41,844
	<i>Cheyenne Mountain Zoo</i>	\$ 20,000
	<i>Zoo New England</i>	\$ 20,000
	<i>STRI</i>	\$ 24,156
Supplies & Expeditions		
	<i>Zoo New England</i>	\$ 5,520
	<i>USAID</i>	\$ 8,455
Education		
	<i>NSF</i>	\$ 15,000
Cure research & sperm freezing		
	<i>USFWS</i>	\$ 29,000
	<i>SCBI and donors</i>	\$ 10,179
SCBI staff salary and travel		
	<i>SCBI and donors</i>	\$ 106,997
	<i>USAID (exhibit design)</i>	\$ 2,942
		\$ 578,282



Kids celebrating Golden Frog Day at the Summit Municipal Park

Donors

In addition to the contributions from project partners, we are grateful to the following donors who have made additional contributions to the project directly or via the Houston Zoo: Anele Kolohe Foundation, Baton Rouge Zoo, Bay and Paul Foundation, Buffalo Zoo, Cleveland Metroparks Zoo, Greenville Zoo, Hogle Zoo, Anne Keiser, Oregon Zoo, Oklahoma City Zoo, Shared Earth Foundation, Susan and Frank Mars, Maersk Line, Minera Panama, La Rana Dorada Pub, Riverbanks Zoo, Sedgwick County Zoo and the U.S. Fish and Wildlife Service.

Online Contributions

Our sincere thanks to the following individuals who contributed \$25 or more online:

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Staff

Lead Scientist & International Coordinator - Dr. Brian Gratwicke

Project Director, Panama - Dr. Roberto Ibáñez

Technical Staff - Lanki Cheucarama, Rigoberto Díaz, Angie Estrada, Nancy Fairchild*, Jorge Guerrel, Mahudy Díaz*, Estefany Illueca*

El Valle Amphibian Conservation Center Director – Heidi Ross

Technical Staff – Matilde Pérez*, Lisandro Vásquez, Dalina Cosme

Lavalin/ Minera support staff – Diana Troetsch, Abileth González, Edgardo Griffith

Steering Committee

Frank Camacho, Managing Director *Africam Safari*

Bob Chastain, President and CEO *Cheyenne Mountain Zoo*

Rick Barongi, Executive Director *Houston Zoo*

Steve Monfort, Director *Smithsonian Conservation Biology Institute*

Eldredge Bermingham, Director *Smithsonian Tropical Research Institute*

John Linehan, President and CEO *Zoo New England*

Implementation Committee

Jose Alfredo Hernández Díaz *Africam Safari*; Dr. Della Garelle *Cheyenne Mountain Zoo*; Paul Crump*; Peter Riger, & Heidi Ross *Houston Zoo*; Dr. Brian Gratwicke *Smithsonian Conservation Biology Institute*, Matthew Evans *Smithsonian's National Zoological Park*; Dr. Roberto Ibáñez *Smithsonian Tropical Research Institute*; Dr. Eric Baitchman *Zoo New England*

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Katie Borremans* *Cheyenne Mountain Zoo*; Cindy Hoffman* *Defenders of Wildlife*; Brian Hill* *Houston Zoo Inc.*; Lindsay Renick Mayer* *Smithsonian's National Zoological Park*; Beth King *Smithsonian Tropical Research Institute*; Brooke Wardrop *Zoo New England*.

(* =alumni).



2012 Volunteers

We are grateful to the following volunteers for their generous assistance: Lydia Attard, Trace Hardin, Isaac Powell, Michelle Reeves, Kris Rossing, Darren Smy, Edith Sonntag, Samuel Sucre, Karen Wang, Arcelys Pittí, Aicia Sanson, Alexabeth Robinson, Alexis Robles, Alison Date, Amanda Lea, Ana de Diaz, Ana Gabriela Castillo, Ana Martinez, Anayansi Castillo, Andrew D Smejdir, Dania Coco, Delisa Membache, Digna Caicedo, Eric Gauthier, Erica Wrona, Giancarlo Thurber Boaventura, Ginina Cunningham, Jennifer Finley, Jesse Delia, Jose Fernando Guaimin, Juan Diego Arevalo, Katherine Gomez, Kristyn McCoy, Krystel Del Rosario, Laura Bravo Valencia, Lou Perotti, Luke Linhoff, Meghan Still, Nahir Cabezon, Natay Adkins, Nikolai Ibanez, Norman Greenhawk, Richard Anderson, Rigoberto Diaz, Rigoberto Jair Diaz, Robert Ibanez Jr, Sangie Estrada, Shanta Deva, Shawna Cikanek, Synnøve Nes, Tiffany Gonzalez, Tom Mason, Trace Hardin and Ximena Bernal.

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