2009 Annual Report

Panama Amphibian Rescue and Conservation Project

2009 ANNUAL REPORT

Mission

Our mission is to rescue amphibian species that are in extreme danger of extinction throughout Panama. Our efforts and expertise are focused on establishing assurance colonies and developing methodologies to reduce the impact of the amphibian chytrid fungus so that one day captive amphibians may be re-introduced to the wild.

Vision

Panama's rich diversity of amphibians is an important natural treasure with significant cultural, ecological, economic, biomedical and intrinsic values and we will focus our efforts and resources to safeguard them for future generations.

THE POWER OF PARTNERSHIPS

In early 2008, a scientific paper warned that the amphibian chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) had jumped the Panama Canal and was spreading eastwards. The scientists authoring the paper predicted that the spread of the fungus would lead to a devastating loss of amphibian biodiversity—just as it had throughout the rest of the mountainous Neotropics. It was clear that eastern Panama was the last remaining stronghold of many Neotropical frog species that had already been decimated elsewhere. After consulting with a range of experts, it became apparent that there simply was insufficient capacity in the conservation community to take the bold actions needed to save the incredible amphibians of eastern Panama. Zoos and aquaria had already demonstrated that researchers can take action to save amphibians by creating 'Amphibian Arks,' including a model project coordinated in western Panama by the Houston Zoo called the El Valle Amphibian Rescue and Conservation Center (EVACC). Edgardo Griffith, director of this center, informed us that his facility was nearly at capacity, filled with rows of tanks housing *Bd* refugees, mostly from western Panama. Mr. Griffith indicated that the highest priority was to focus on eastern Panama, including developing a new rescue center. Biff Bermingham, Director of the Smithsonian Tropical Research Institute (STRI), also recognized that there was a strong case for a large-scale intervention, and pledged the support of his organization.

Attendees of the Panama Amphibian Rescue and Conservation Project launch, May 11, 2009. From left: Jamie Clarke (Defenders of Wildlife), Biff Bermingham (STRI), Brian Gratwicke (NZP), Bob Chastain (Cheyenne Mountain Zoo), Amy Camacho (Africam Safari), Adrian Benedetti (Summit Park), John Linehan (Zoo New England), Steven Monfort (NZP).

In summer 2008, John Berry, then director of the Smithsonian's National Zoological Park, discussed the opportunity with Bob Chastain, director of the Cheyenne Mountain Zoo. Together they agreed that Panama's amphibians did not have the luxury of time for a large foundation to step in, but rather it was urgent for others to mobilize resources and action through partnerships. Cheyenne Mountain Zoo's initial pledge of $50,000 per year over a 3-year period was used as a challenge to other potential partners. Soon Zoo New England, Defenders of Wildlife and Africam Safari agreed to become matching partners. Welcoming the opportunity to increase the amphibian conservation capacity in Panama, the Houston Zoo also agreed to be a full project partner. They agreed to provide logistic and husbandry support, as well as advice based on years of local experience while continuing to direct financial support to the continued success of EVACC. On May 11, 2009, the following founding partners signed the Panama Amphibian Rescue and Conservation Project Memorandum of Understanding (MoU), collectively pledging more than $750,000 in cash and in kind support over three years: Africam Safari, Cheyenne Mountain Zoo, Defenders of Wildlife, Houston Zoo, Smithsonian Institution, Summit Municipal Park and Zoo New England. The MoU covered three complimentary actions: 1) the construction and operation of the new Amphibian Rescue Center at the Summit Zoological Park in Panama; 2) the ongoing operation of EVACC in western Panama (with the Houston Zoo as the main partner); and 3) the amphibian chytrid cure research program to be initiated at the National Zoo in collaboration with other research institutions.

Smithsonian Institution

Africam safari
PUEBLA-MÉXICO

CHEYENNE MOUNTAIN ZOO

ZOO NEW ENGLAND
Franklin Park Zoo ♦ Stone Zoo

HOUSTON ZOO

DEFENDERS OF WILDLIFE

PARQUE MUNICIPAL SUMMIT

anam

BUILDING THE FOUNDATION

Since the inception of the project, Dr. Brian Gratwicke has served as the project coordinator, and devotes his time in both the United States and Panama to coordinating and directing the many logistical, fundraising, conservation and research actions. In June 2009, STRI hired Dr. Roberto Ibáñez, Panama's leading amphibian researcher, to be the local project director. Dr. Ibáñez works with partners to: 1) assemble and train a team of employees in amphibian husbandry and research; 2) design a new *ex situ* facility; and 3) ensure that the rescue center was operational for amphibian collections within 12 months.

Installing the first of seven planned 'amphibian rescue pods' on the grounds of the Summit Municipal Park in Panama.

After a thorough evaluation of potential sites for the center, we decided to work with the Summit Municipal Parque, a progressive zoological organization located near Panama City. We commissioned designs for a new facility comprised of a central quarantine and administration building flanked by seven amphibian rescue 'pods.' A general election in Panama put a new political party into power, leading to a transition in directorship of the Summit Zoo that, in turn, caused some initial programmatic delays. However, by the end of 2009, the first 'rescue pod' was in place—a refurbished shipping container modified to house amphibians in a biosecure unit. We also began retrofitting two additional rescue pods that Maersk Line generously donated. Meanwhile, we completed blueprints for the main center complex.

By September 2009, we hired the first amphibian care staff and they were provided appropriate training opportunities. The first workshop, hosted by STRI and funded by *La Secretaría Nacional de Ciencia, Tecnología e Innovación* (SENACYT), trained 22 Panamanian scientists in the molecular methods of detecting chytrid. This workshop enabled us—for the first time ever—to perform quantitative chytrid analysis in Panama using the genetic laboratory maintained at STRI. This has been an enormous help in understanding how chytrid is spreading and how it affects amphibians. The second was an Amphibian Ark husbandry workshop that brought in a cadre of top amphibian care experts to train 10 participants on all aspects of obtaining and maintaining a living amphibian collection.

While we secured funding for the facilities and staffing under the original MoU, we faced a budget shortfall that would have limited the scope of the project. Fortunately, in November, we received a pledge from the Panamanian Government acting through the Autoridad Nacional del Ambiente (ANAM) to become a full project partner with a contribution of $50,000 per year for three years. This commitment will partly fulfill ANAM's responsibility (under recently passed Panamanian Government resolution AG-0467-2009) to implement a National Amphibian Conservation Plan. We spent the rest of 2009 writing additional proposals for funding. We are extremely grateful to the following external funders who have helped make this ambitious project possible: U.S. Fish and Wildlife Service, Shared Earth Foundation, Susan and Frank Mars, Anela Kolohe Foundation and the Wallace Foundation.

RACE AGAINST TIME

Chytrid spreads through Central America at an average rate of about 30 km per year, and yet researchers understand very little about how the disease is transmitted from site to site. At best, we are racing a clock that may have only four to 10 years left before most amphibians in this region become extinct. The urgency of this situation was illustrated by our very first rescue in November 2009. The plan was to collect frogs from healthy populations ahead of the advancing disease wave, but instead we arrived at Cerro Brewster at the peak of the epidemic. More than 70 percent of all frogs encountered were chytrid-positive, placing us in the middle of an emergency. Realizing that our capacity to house amphibians was small and our husbandry experience relatively new, we followed advice from our husbandry colleagues and focused on two species initially, *Atelopus limosus* and *Hyloscirtus colymba*, while our more experienced partners from EVACC collected additional priority species.

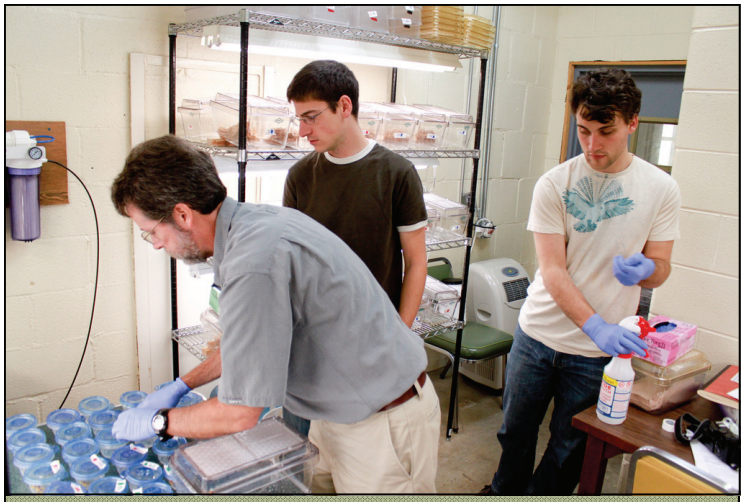
Zoo New England's Dr. Eric Baitchman, lead veterinarian for the project, bathes two Bd-infected *Atelopus limosus* in an anti-fungal solution.

Despite bathing the frogs with anti-fungal medicines under the capable veterinary supervision of Dr. Eric Baitchman from Zoo New England and Dr. Della Garelle from the Cheyenne Mountain Zoo, we still had high mortality rates for both rescued species. A second expedition was immediately planned to salvage surviving frogs from the site. By the end of 2009, the Amphibian Rescue Center had nine surviving *Atelopus limosus* and 33 *Hyloscirtus colymba*.

As these were our very first rescue animals and we had little data on species' natural diets and habitat requirements, we began by adopting husbandry protocols and setups for better-known surrogate species, including the Panamanian golden frog. We also consulted extensively with the EVACC staff who helped us develop protocols for dealing with quarantine and other critical set-up issues, such as maintaining sufficient food supply, high-water quality, adequate lighting and cool air temperatures. We are currently synthesizing the lessons we learned and observations we've made into a comprehensive husbandry protocol for the Center. Eventually, we will be able to produce a comprehensive husbandry manual specific to each rescued species.

HUNT FOR A CURE

Besides rescue, one of our top priorities is addressing a cure for this devastating disease. Finding a cure will allow us to re-establish populations of extinct amphibians in chytrid-positive areas from captive sources. The most promising lead in this field is from research by our colleague Dr. Reid Harris and associates from James Madison University. These investigators have found that augmenting the skin of mountain yellow-legged frogs and red-backed salamanders with certain anti-fungal bacterial species confers resistance to chytrid, at least in a laboratory setting. Working with Dr. Harris and Dr. Louise Rollins-Smith, one of the world's leading amphibian immunologists from Vanderbilt University, our partners have been exploring the replication of this promising approach using the anti-chytrid bacterium *Janthinobacterium lividium* and captive sibling-bred Panamanian golden frogs.



Dr. Reid Harris, Matt Becker and Rob Brucker set up the first probiotics trials at the Smithsonian Conservation Biology Institute in Front Royal, VA.

During the first evaluation, *J. lividium* failed to persist on golden frog skin and, therefore, did not protect the frogs from chytrid. Despite these initial negative results, we received exciting findings from our Panamanian collaborator showing that frogs surviving the chytrid 'wave' had much higher proportions of anti-chytrid bacteria living on their skin than frogs that had never been exposed to the fungus. This suggests that chytrid is a strong natural selection agent working on frog skin flora. *Psuedomonas fluorescens* is one of the particularly promising anti-chytrid bacterial species native to Panama and will be evaluated in 2010 for its curative potential. We conducted another field expedition in Panama in January 2010 looking for other species of potentially probiotic bacteria that might be able to persist on *Atelopus* skin. A graduate student from Dr. Harris' laboratory, who also leads studies of golden frogs at the National Zoo, will evaluate the bacteria for the strength of their anti-chytrid properties. Mr. Becker is registered as a Ph.D. student at Virginia Tech University.

Frogs really *are* cool!

The project has been resonating well with the public and the media. More than 40 independent news stories ranging from Science Magazine to the Washington Post and newswires, such as the Associated Press, featured the Panama Amphibian Rescue and Conservation Project in 2009. We have created a single virtual presence for the project that highlights all the partners' involvement equally on our website www.amphibianrescue.org. The website was visited an average of 650 times per month. This traffic has generated about $2,000 in public donations. The main vehicle for disseminating updates to the concerned public was through our Facebook fan page, which had 2,300 followers by the end of 2009, around 1,500 of which were from Panama, followed by the United

FINANCES: CALENDAR 2009

Income		
Cheyenne Mountain Zoo	$	50,000
Defenders of Wildlife	$	115,000
Houston Zoo *	$	19,300
Zoo New England	$	53,500
Online contributions**	$	2,030
Smithsonian National Zoological Park (NZP)**	$	93,070
Total	$	314,600
Expenditure/ Obligations		
Amphibian Rescue Pods	$	56,600
Salaries	$	60,000
Subcontract Summit Park	$	91,400
Supplies & Expeditions	$	26,940
NZP cure research, staff time and travel**	$	98,576
Total	$	333,516

* Houston Zoo's in-kind contribution to the project also includes $94,055 operational funding of EVACC, supplied in part through contributions from BREC's Baton Rouge Zoo, Buffalo Zoo, Cleveland Metroparks Zoo, Dickerson Park Zoo, Fresno Chaffee Zoo, Kuelthau Family Foundation, Little Rock Zoo, Oklahoma City Zoo, Roger Williams Park Zoo, Rosamond Gifford Zoo, Sedgwick County Zoo, Seneca Park Zoo, Toronto Zoo, Utah's Hogle Zoo.

** The Smithsonian's National Zoological Park is grateful to the following donors who collectively provided funding toward this project in this calendar year. These generous contributions have facilitated field expeditions, trained staff, facilitated cure research, travel and staff salaries.

Foundations and Corporations
Anela Kolohe Foundation
APL (shipping company)
Conservation International
Maersk Line
Shared Earth Foundation
Undersea Images, Inc.
Wallace Foundation

Individuals
Carolyn Boyer
Anne Clough
Cary J. Frieze
John Joseph
Whitney MacMillan
Susan and Frank Mars

Online contributions
David Barvenik
Allen Chartier
Janeen A. Costa
Gary Bamossy
Kenneth Faulstich
Adam Frosh
Brian Gratwicke
Kimberley Hoch
Rachel Karno
Pamela Kittler
Janet Kramer
Dennis Kuhfal
Jeff Levengood
Michelle Long
Barbara Mahler
Samantha Mozes
Michael Oberhausen
Michael Odsihoo
Nancy Post
Bob Sivinski
Eric Stubbs
Kathryn Weed
Claudia White
Kurt Wiel
Stanford Yukon

Steering Committee

Amy Camacho, Managing Director, *Africam Safari*
Bob Chastain, President and CEO, *Cheyenne Mountain Zoo*
Jamie Clarke, Executive Vice President *Defenders of Wildlife*
Rick Barongi, Executive Director *Houston Zoo*
Steven Monfort, Director, Smithsonian Conservation Biology Institute *Smithsonian's National Zoological Park*
Biff Bermingham, Director, *Smithsonian Tropical Research Institute (STRI)*
Nestor Correa, Director, *Summit Municipal Park*
John Linehan, President and CEO *Zoo New England*.

Implementation Team

Luis Carrillo, *Africam Safari*
Della Garelle, *Cheyenne Mountain Zoo*
Cindy Hoffman, *Defenders of Wildlife*
Paul Crump, Peter Riger *Houston Zoo*
Edgardo Griffth, *EVACC & Houston Zoo*
Brian Gratwicke, *Smithsonian's National Zoological Park*
Roberto Ibáñez , *STRI*
Nestor Correa, *Summit Municipal Park*
Adrian Benedetti, *Summit Municipal Park*
Eric Baitchman, *Zoo New England*

Staff

International Coordinator - Brian Gratwicke
Project Director, Panama - Roberto Ibáñez
Technical Staff
- Lanki Cheucarama
- Aracelys De Gracia,
- Jorge Guerrel
- Daniel Medina

Communications Team

Sean Anglum, *Cheyenne Mountain Zoo*
Cindy Hoffman, *Defenders of Wildlife*
Brian Hill and Edgardo Griffth, *Houston Zoo*
Karen Korpowski & Lindsay Renick Mayer, *Smithsonian's National Zoological Park*
Beth King, *STRI*
Brooke Wardrop, *Zoo New England*.

2009 Volunteers

Jeff Baughman
Bret Bement
Mark Combert
Matthew Evans
Jessica Hite
Kevin and Jamie Kratt
Hannah Koppelberger

Acknowledgements

We are grateful for significant assistance and advice from the following people in the design and execution of this project: Pamela Baker-Masson, Matt Becker, Fran Bernstein, John Berry, Ed Bronikowski, Rob Brucker, Andrew Crawford, Sharon Devine, Ron Gagliardo, Heidi Griffth, Virginia Griffth, Reid Harris, Kerry Kriger, Karen Lips, Warren Lynch, Dana Magliola, Kevin Minbiole, Joe Mendelson, Don Moore, Robin Moore, Cathi Morrison, Jim Murphy, Kevin Murphy, Luis Padilla, Lou Perotti, Allan Pessier, George Rabb, Geoff Reynolds, Miles Roberts, Louise Rollins-Smith, Oris Sanjur, Jennifer Sevin, Ed Smith, Ruth Stolk, Nicole Tarmon, Tim Walsh, Lisa Ware, David Wildt, Brad Wilson, Brian Wood-Thomas and Kevin Zippel.

PANAMA AMPHIBIAN RESCUE AND CONSERVATION PROJECT

International Coordinator
Dr. Brian Gratwicke
Smithsonian Conservation Biology Institute
National Zoological Park
PO Box 37012 MRC 5503
Washington, DC 20013-7012
Phone: +1 202 633 0257
email: gratwickeb@si.edu

Panama Project Director
Dr. Roberto Ibáñez
Smithsonian Tropical Research Institute
Apartado Postal 0843-03092
Panamá, República de Panamá
Phone: + 507 212-8222
Email : ibanezr@si.edu