

AMPHIBIAN CONSERVATION
2010 Highlights and Accomplishments



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Introduction

In 2008, AZA made a long-term commitment to global amphibian conservation that focused on increasing the capacity of AZA-accredited zoos and aquariums to respond to threats facing amphibians, to create and sustain assurance populations of threatened amphibians, and to increase public awareness of and engagement in amphibian conservation.

With the support and hard work of directors, curators, keepers, and partners, AZA-accredited zoos and aquariums maintained their commitment, and in 2010, saw conservation progress and successes both locally and around the world. This report features some of the successes in citizen science, research, field work, the creation of assurance populations, and successes in conservation breeding.

AZA congratulates all members for their on-going efforts and dedication. Learn more about how to get involved in amphibian conservation by contacting any of the authors listed in this report or the Amphibian TAG Chair, Diane Barber (dbarber@fortworthzoo.org).

By: Shelly Grow, AZA Conservation Biologist (sgrow@aza.org)

This report is available on the AZA Web site at: <http://www.aza.org/amphibian-news/>. Submissions included in this report were solicited in December 2010 through emails sent to the AZA Amphibian Taxon Advisory Group-related listserv.

Cover photo: Oregon spotted frog, credit Michael Durham, Oregon Zoo

FrogWatch USA Opens Local Chapters

By Shelly Grow, Association of Zoos and Aquariums

FrogWatch USA is an AZA citizen science program that encourages community stewardship by training volunteers to listen and report the breeding

FrogWatch USA™ calls of frogs and toads in their communities. In

2010, AZA began providing materials that allow facilities to open their own Chapter of FrogWatch USA. Chapters can be branded by the facility and tailored to meet the community's needs. Chapters engage people in science and conservation and empower each volunteer to do more.

Opening a FrogWatch USA Chapter contributes to amphibian conservation, links *ex situ* programs to *in situ* conservation, and promotes AZA-accredited zoos and aquariums within their local community. Chapters also support a national network of



Roger Williams Park Zoo's FrogWatch USA Chapter was featured on the local news and is available on YouTube

FrogWatch USA Chapters and volunteers that together, like other citizen science programs, provide large scale, long term data.

In 2010, four FrogWatch USA Chapter Coordinator Training

Sessions were held at: the AZA Mid-Year Meeting (Virginia Beach, Va.); the AZA Annual Conference (Houston, Texas); the AZA Regional Communications Meeting (Asheville, NC); and the Florida Reptile and Amphibian Working Group Meeting (Jacksonville, Fla.). AZA thanks the Western North Carolina Nature Center and Jacksonville Zoo for hosting two of these trainings; Jeff Hall (North Carolina Wildlife Resources Commission), Jaime Gonzalez (Katy Prairie Conservancy, Texas), and Paul Moler (Florida Fish and Wildlife Conservation Commission) for providing training about local amphibians; Peggy Sloan (North Carolina Aquarium at Fort Fisher) for helping develop the training; and the Florida Association of Zoos and Aquariums (FAZA) for providing support for the Jacksonville training.

Additional Chapter Coordinator Training Sessions will be offered in 2011; dates and locations are still to be determined. Online training will be available, beginning in early 2011. Learn more at: www.aza.org/professional-development/.

Learn more about FrogWatch USA and opening a local Chapter at: www.aza.org/frogwatch/.

AZA recognizes the following 18 facilities for opening local FrogWatch USA Chapters in 2010:

- Birmingham Zoo, Birmingham, Ala.
- Sequoia Park Zoo, Eureka, Calif.
- Cheyenne Mountain Zoo, Colorado Springs, Colo.
- Brevard Zoo, Melbourne, Fla.
- Zoo Miami, Miami, Fla.
- St. Augustine Alligator Farm Zoological Park, St. Augustine, Fla.
- Howard County Dept. of Recreation & Parks, Md.
- Detroit Zoological Society, Detroit, Mich.
- Saint Louis Zoo, St. Louis, Mo.
- North Carolina Aquarium at Fort Fisher, Kure Beach, NC
- Jenkinson's Aquarium, Point Pleasant Beach, NJ
- Metro Parks, Serving Summit County, Akron, Ohio
- Lehigh Valley Zoo, Schnecksville, Penn.
- Roger Williams Park Zoo, Providence, RI
- Chattanooga Zoo, Chattanooga, Tenn.
- Knoxville Zoo, Knoxville, Tenn.
- San Antonio Zoo, San Antonio, Texas
- Oglebay's Good Zoo, Wheeling, W.Va.

FrogWatch USA to Benefit from NSF Grant

Excerpt from National Geographic Society Press Release 29 Oct.

The National Science Foundation (NSF) has awarded a \$2.7 million, five-year grant to the National Geographic Society (NGS) to launch a major initiative that will engage the public in scientific research about the world around them. In this project, NGS will develop and evaluate a Web-based software platform called FieldScope to support citizen science projects involving geographic data.

The development of an Internet-based technology infrastructure has remained an obstacle for citizen science project organizers. Each organization has to develop its own database, entry tools, and tools for displaying and/or analyzing data. The development of this infrastructure can be a serious technical and financial challenge. Through this project, the NGS will provide organizations with tools to launch citizen science projects inexpensively on the Web.

The FieldScope platform will support community geography projects where participants collect observations and analyze them for geographic patterns and will meet the needs of projects whose goals include providing science-learning experiences to participants. Using state-of-the-art geographic information systems (GIS) and social networking technologies, FieldScope will allow participants to upload data to a communal database, display, interpret, and analyze the community's data and discuss their findings with the other members of the community.

NGS will work with two "testbed partners" currently running community geography projects: Project BudBurst, run by the National Ecological Observatory Network (NEON) and FrogWatch USA, run by the Association of Zoos and Aquariums.

Citizen Science

A Citizen Science Training Model for Investigating the Presence or Absence of Amphibian Chytrid Fungus in Amphibian Populations

Article and photos by Tiffany Vanderwerf, Buffalo Zoo

In November 2009, the Buffalo Zoo received a generous AZA's Conservation Endowment Fund (CEF) grant for a project titled, "A Citizen Science Training Model for Investigating the Presence or Absence of Amphibian Chytrid Fungus in Amphibian Populations." The goals of the project



were to: 1) develop and pilot test a workshop series and on-line manual aimed at teaching citizen scientists how to identify amphibians native to New York State and test amphibians

for the presence or absence of the amphibian chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*); 2) begin to determine the presence or absence of *Bd* in several Western New York watersheds; and 3) use the results of the project to leverage additional funding for investigating the presence or absence of *Bd* across New York State.

Twelve citizen scientists were recruited through a partnership with the University at Buffalo's Environmental Science Interdisciplinary Degree Program and the Zoo's docent population. The Roger Tory Peterson Institute helped in the development of the training curriculum and online manual. Consultations with the New York State Department of Environmental Conservation resulted in the selection of four study sites

Following training in early 2010, citizen scientists successfully collected a total of 77 samples from a variety of native amphibian species for analysis. Three of the study sites contained *Bd* positive frog and salamander species. *Bd* was found in American toads (*Anaxyrus americanus*), leopard frogs (*Lithobates pipiens*), spring peepers (*Pseudacris crucifer*), western chorus frogs (*Pseudacris triseriata*), eastern newts (*Notophthalmus viridescens*), and red-backed salamanders (*Plethodon cinereus*). Overall, the project demonstrated that it is feasible to train citizen scientists adequately using this training model to identify, capture, and swab amphibians for *Bd* testing. The hope is that this model will enable scientists to expand human resources to test large areas efficiently and quickly for the presence or absence of *Bd*.



SSP Conservation

Habitat Construction in Puerto Rico

Article and photos by Diane Barber, Fort Worth Zoo

In May 2010, the Fort Worth Zoo's exhibit construction team built a 6,000-gallon concrete breeding pond for the critically endangered Puerto Rican crested toad (*Peltophryne lemur*) in a remote section of the Mangillo Grande protected area on the southern coast of Puerto Rico. The team, including Zoo Director Mike Fouraker, worked in partnership with Puerto Rico's Department of Natural Ecological Resources (DNER) to build the pond using a matching grant from the U.S. Fish and



Bob Johnson (Toronto Zoo) and Lynn Koscielny (Cleveland Metroparks Zoo)

Wildlife Service (FWS). Fort Worth Zoo Curator of Ectotherms and AZA Puerto Rican crested toad SSP Coordinator Diane Barber consulted

with FWS and DNER to select the site during a previous trip. SSP partners Bob Johnson (Toronto Zoo) and Lynn Koscielny (Cleveland Metroparks Zoo) also traveled to Puerto Rico to help with the pond construction.

The pond was engineered to fill with water during the rainy, wet season, a prime breeding time for the toads, but only to hold enough water to allow the toads to lay eggs, hatch, and morph from tadpoles to toadlets before the water evaporates during the many dry periods that exist in this habitat. This design lessens the time period that the pond can be utilized for breeding by predators such as the invasive marine toad (*Rhinella marina*).



Fort Worth Zoo staff helping with pond construction

The project has already seen some success. Tropical depressions that moved across Puerto Rico in July filled the pond. DNER biologists have reported that the pond was utilized by Puerto Rican crested toads in the area, and that breeding attempts were successful.

The SSP plans to assist partners in 2011 by helping install fencing, educational graphics, and native plants around the pond. Funds for the project not covered by the FWS grant have been generously provided through donations to the SSP by several member institutions, including the Detroit Zoological Society, Toronto Zoo, Disney's Animal Kingdom, Jacksonville Zoo and Gardens, Toledo Zoo, Milwaukee County Zoo, Sedgwick County Zoo, and Buffalo Zoo.

Panamanian Golden Frog SSP

By Vicky Poole, National Aquarium in Baltimore

Photos by Edgardo Griffin, EVACC

In 2010, Panamanian Golden Frog SSP's *Atelopus Conservation Trust* small grant program awarded \$10,000 to the El Valle Amphibian Conservation Center (EVACC) through the Houston Zoo to outfit a cargo container (pod) at the Nispero Zoo/EVACC in El Valle, Panama. Once completed, this pod will be utilized as a dedicated breeding and isolation facility exclusively for Panamanian golden frog (*Atelopus zeteki*) with the hope that offspring produced there will be the basis for any future reintroduction program should the amphibian chytrid fungus (*Bd*) no longer be a threat to their survival in the wild.



Assurance Populations and Conservation Breeding

Dusky Gopher Frogs: A World's First is Accomplished

Excerpts from Memphis Zoo Press Release 26 Oct 2010

Collaboration between the Memphis Zoo and Omaha's Henry Doorly Zoo resulted in the largest number of dusky gopher frog (*Lithobates sevosus*) tadpoles ever bred in captivity. Over 1,400 tadpoles hatched in October after researchers carried out an *in vitro* fertilization (IVF) for the critically endangered species. Nearly 100 of these tadpoles were from Omaha female gopher frogs' eggs fertilized with sperm that had been collected non-invasively from dusky gopher frogs at the Memphis Zoo and shipped to Omaha overnight to be used for the IVF. This transfer of non-invasively collected sperm for IVF was a world-first for amphibians.

The case of the dusky gopher frog is grim. Though this species historically lived in many coastal areas of Mississippi, Alabama, and Louisiana, the U.S. Fish and Wildlife Service estimates that only 100 remain in the wild, with almost all residing in a single pond in Mississippi. Their habitat has been threatened by residential and forestry development, fire suppression, and the decline of gopher tortoises, whose burrows the frogs use for shelter.

Despite numerous attempts since 2001 to replicate natural environmental cues to induce breeding, no natural reproduction has occurred in captivity. It has only been over the past few years, as assisted reproductive technologies such as in IVF and hormone stimulation have been adapted for dusky gopher frogs, that the captive breeding program has begun to experience success.

The ability to transfer chilled amphibian sperm between zoos for IVF has huge implications for improving the genetic diversity of frog and toad captive assurance colonies without the stress of moving individual animals among facilities. By conducting fertilizations in a petri dish, scientists can divide and fertilize a single female's egg mass with sperm from numerous male frogs to insure a greater level of genetic diversity.

"Although the transfer of sperm between institutions for artificial insemination is regularly practiced in mammals, the technology has never before been used to reproduce endangered amphibians through IVF and represents a conservation milestone," said Dr. Andy Kouba, director of conservation and research for the Memphis Zoo. "With support from grants by the Institute of Museum and Library Services and Morris Animal Foundation, the Memphis Zoo is developing assisted breeding technologies and a genetic resource bank for many of the countries most endangered amphibian species."

The Coqui Conservation Initiative

By Jennifer Stabile, Central Florida Zoo & Botanical Gardens

Due to a variety of environmental pressures over the last several decades, many endemic species of coqui frogs (*Eleutherodactylus* spp.) have become subjects of conservation concern in Puerto Rico. Captive breeding programs can help secure and propagate threatened species of coqui for future repatriation projects and studies. Since 2006, Proyecto Coquí (PC) and the Central Florida Zoo & Botanical



Foto por R. L. Joglar Copyright © 2001 Proyecto Coqui

Gardens (CFZBG) have collaborated on successful captive breeding projects for several species of coqui. The Coqui Conservation Initiative (CCI) expands this program

to include several endangered species of coqui in need of captive propagation support, and to develop staff training opportunities at both institutions. CFZBG has established a secure environment to work with multiple species of concern, including *E. locustus*, *E. richmondi*, and *E. wightmanae*. Initial founder stock for the program has been provided by Dr. Rafael Joglar, professor at the University of Puerto Rico—Rio Piedras and collaborator with PC. PC and CFZBG are working together to develop captive husbandry and breeding techniques for future assurance colonies of these species.

Ambystomid Salamanders & Ornate Chorus Frogs

By Scott Pfaff, Riverbanks Zoo and Garden

In 2010, Riverbanks Zoo and Garden was successful in the captive reproduction of two species of Ambystomid salamanders - Mabee's salamander (*Ambystoma mabeei*) and the marbled salamander (*A. opacum*). The Mabee's salamanders were collected as larva and reproduction was achieved when they were approximately one-year old. A small colony of the Flatwoods salamander (*A. cingulatum*) was also established, a species federally listed as threatened. This species was also collected as larva. So far, growth rates for the Flatwoods salamanders have been significantly less than for the other three species of Ambystomid salamanders reared from the larval stage, but the salamanders appear to be thriving.

Riverbanks established an assurance population of ornate chorus frogs (*Pseudacris ornata*). This species of Hylid has experienced significant population declines in parts of its range. The goal of this program is to establish captive husbandry parameters and managed reproduction techniques, as well as gather life history data. The frogs, collected as tadpoles in April 2010, attained adult size by the fall of 2010 and are showing signs of reproductive behavior.

Assurance Populations and Conservation Breeding

The Wildlife Conservation Society/Bronx Zoo Amphibian Propagation Center

By Lauren Augustine, Valorie Titus, and Drew Foster, Wildlife Conservation Society/Bronx Zoo
Photos by Julie Larsen Maher, WCS

In response to global amphibian declines, the Bronx Zoo has recently constructed an Amphibian Propagation Center, an off-exhibit facility with four large, custom-designed, biosecure rooms. The first species in residence at the Propagation Center was the eastern hellbender (*Cryptobranchus alleganiensis*). Hellbender eggs collected from the Allegheny River drainage basin were hatched at the



Buffalo Zoo, and 40 of the larval salamanders were brought to the Bronx Zoo in July 2010 (see article by P. Danielewicz, p 12). This headstart project is a collaborative effort between the Bronx

and Buffalo Zoos and the New York State Department of Environmental Conservation. To date, the salamanders are thriving in their new home and zoo staff eagerly await their reintroduction.



A second room will soon house one of the few remaining populations of the extinct-in-the-wild Khansi spray toad (*Nectophrynoides aspergenis*). The Bronx and Toledo Zoos have worked closely together on a long-term breeding project for this species (see article by A. Borek et al., p. 12). The Propagation Center will also house a variety of Madagascan frogs. The Bronx Zoo intends to increase its reproductive efforts with many of these unique species in this new facility. As part of this effort, the Herpetology Department will develop standardized husbandry and breeding protocols for all of the species with which the Department is working. Through science and careful study, staff will gain a better understanding of these species, enabling them to aid in conservation efforts better if and when their expertise is needed. Department staff look forward to utilizing this space and furthering their amphibian conservation efforts.

Panama Amphibian Rescue and Conservation

By Lindsay Renick Mayer, National Zoological Park
Photos courtesy of the Panama Amphibian Rescue and Conservation Project

The Panama Amphibian Rescue and Conservation Project, which includes nine partnering organizations, made tremendous headway in 2010. The partners secured three new shipping containers donated by Maersk and APL that the project will use



as biosecure rescue pods at the Summit Zoo in Panama (see photo of inside shipping container).

Researchers ventured through the Panamanian rain forest and

successfully rescued a number of priority species ahead of the amphibian chytrid fungus (*Bd*) wave, including the toad mountain harlequin frog (*Atelopus certus*) and the Pirre harlequin frog (*A. glyphus*). During these expeditions, rescue project scientists also discovered what they believe are three new frog species—a *Pristimantis* with a bright red belly uncharacteristic for rain frogs (earning it the nickname “red tomato”), another *Pristimantis* that is larger than any known in the region, and what appears to be a *Craugastor* that has unique skin folds on its arms and feet that distinguish it from other closely related species.

The rescue project also began to propagate some of the species it is safeguarding, including the lowland color-form of the Limosa harlequin frog (*Atelopus limosus*), the toad mountain harlequin frog (*A. certus*) and the La Loma tree frog (*Hyloscirtus colymba*—see photo). Although the La Loma tree



frog is notoriously difficult to care for in captivity, the Panama Amphibian Rescue and Conservation Project was pleased to be the first to reproduce this species. Because species-specific requirements are unknown, biologists are especially vigilant in monitoring the metamorphs during the first few critical and

delicate months of a frog’s life. As project researchers break new ground, they are learning and perfecting new breeding and rearing techniques.

Project partners include: Africam Safari, Panama’s Autoridad Nacional del Ambiente, Cheyenne Mountain Zoo, Defenders of Wildlife, El Valle Amphibian Conservation Center, Houston Zoo, the Smithsonian Institution, Summit Municipal Park, and Zoo New England.

Assurance Populations and Conservation Breeding

***Acris blanchardi* Reproduction at Binder Park Zoo**

By Chris Tabaka, Lisa Duke, and Chris Gertiser, Binder Park Zoo

Blanchard's cricket frogs (*Acris blanchardi*) are listed as threatened in the state of Michigan. Binder Park Zoo has been working with the diminutive taxa for the past three years, work that has included successful captive feeding trials to induce metamorphosis in wild caught tadpoles as well as display of the animals to help educate the public. Attempts have also been made to reproduce the adults in captive conditions at the Zoo's facility. After previous attempts to induce breeding failed to produce ova in May 2010, extraordinarily, tadpoles were found in the Zoo's naturalistic exhibit tank in early October. Staff feel this breeding event occurred due to the increased humidity after a thorough cleaning as well as the ambient room temperature being slightly higher after the air conditioning was turned off from the summer. To replicate natural field breeding season conditions, the temperature of the room was increased to 76° F and ambient humidity was increased to 40 - 50%. The adults were heard calling more after these efforts but only a total of seven tadpoles were visualized. The tadpoles were fed Hikari algae wafers and sinking algae tabs. They were also seen eating the brown algae that grew naturally in the exhibit. Attempts to move several tadpoles to different setups did not result in any successful metamorphosis. The remaining tadpoles were left in their exhibit tank. Three tadpoles made it to having various degrees of four limbs as well as tail absorption but did not make it past that stage. Zoo staff was unable to replicate the prior successful metamorphosis method found in clinical feed trials due to the out of season breeding event. Staff are currently pursuing further trials to reproduce the captive adults as well as to determine the limiting factor (e.g., UVB, water quality, nutrition) in the tadpoles' development.



© Chris Gertiser, Binder Park Zoo

Amphibian Conservation in Madagascar

By Jennifer Pramuk, Woodland Park Zoo and Devin Edmonds, Amphibian Care

Photos by Devin Edmonds, Amphibian Care

Madagascar is ranked 12th in amphibian species richness and is considered one of the highest priority countries for amphibian conservation by the IUCN



Mantella aurantiaca

Amphibian Specialist Group (ASG) and Amphibian Ark. Habitat destruction and over-harvesting are the greatest factors contributing to this dramatic decline. The imminent threat of amphibian chytrid fungus (*Bd*), which has not yet been detected in

country, is also of tremendous concern. With more than one quarter of the island's amphibian species threatened with extinction, international efforts are underway to help prevent further loss of Madagascar's frog diversity. With the generous financial assistance of the AZA Conservation Endowment Fund, the Wildlife Conservation Society, and the Amphibian Ark, the community-run Malagasy organization Association Mitsinjo has constructed a captive breeding facility in Andasibe, east-central Madagascar. This facility will maintain assurance colonies of threatened amphibians to safeguard against current threats as well as any future introduction of *Bd*.

Despite the recent political unrest in Madagascar and related delays in commencing the project, much progress has been made in the past year including the construction of a 215 m² captive breeding facility in Andasibe and training local people on amphibian husbandry techniques; vivarium building; culturing of



feeder insects; and techniques for monitoring *Bd*. This is the first in-country captive breeding and amphibian conservation project of its kind and project leaders hope that it will

become a center for training and education in an area of Madagascar that contains tremendous amphibian diversity and endemism. This project also has begun to develop additional value-added components including collaborative efforts with the ASG which have focused on local and country-wide *Bd* testing as a first line of detection for the disease in Madagascar.

Assurance Populations and Conservation Breeding

Critically Endangered Haitian Frogs at Home in Philadelphia

By Jason A. Bell, Philadelphia Zoo

2010 was significant year for *ex situ* amphibian conservation at the Philadelphia Zoo. In July, the Zoo received 22 *Eleutherodactylus caribe* from Haiti. This critically endangered frog is endemic to a very small area of the Tiburon Peninsula, in southwest Haiti. Not long after arrival in Philadelphia, the male frogs' whistle calls could be heard. The first evidence of successful reproduction was discovered in early September when an 1/8" froglet was discovered. The Zoo subsequently hatched out a total of 27 individuals successfully.



Eleutherodactylus caribe, © Lynn Turner

In October, the Philadelphia Zoo increased its amphibian conservation efforts exponentially by bringing in a total of 153 individuals representing nine species of critically endangered Haitian frogs. This group is maintained in a newly designed and constructed amphibian facility on Zoo grounds. The facility is equipped with automatic misting systems, continuous reverse osmosis water supply, and dedicated HVAC system for climate control, just to name a few of the amenities. Of the nine species that arrived in October, *Eleutherodactylus amadeus* and *E. bakeri* have laid eggs that were still developing at the close of 2010.



© Carlos C. Martínez Rivera (landscape); Jurgen Hoppe (frogs)

Amphibian Conservation Center - Mazán Forest, Ecuador

By Carlos Martínez Rivera, Philadelphia Zoo

The Amphibian Conservation Center - Mazán Forest is a holistic conservation program located inside the Mazán Forest adjacent to the Cajas National Park in the Andean Mountains near the city of Cuenca, Ecuador. It was created by the local Zoo Amaru, with help from the Cajas National Park, to save four critically endangered amphibian species. The Philadelphia Zoo provides all of the financial support for the project and is the main scientific collaborator engaged in research, captive breeding, and management of wild populations.

The species the project is working to save are (see photos below, top to bottom, respectively): the



green Cajas harlequin toad (*Atelopus exiguus*); the black Cajas harlequin toad (*A. nanay*); the Andean rocket frog (*Hyloxalus vertebralis*); and the San Lucas marsupial frog (*Gastrotheca pseustes*).



The existing populations of these species are no longer viable in the wild and will disappear soon if no action is taken. Assurance colonies for three of these species have been established at an in-range, *ex situ* breeding center in Mazán Forest.



In 2010, species survival plans were designed for each of these species, including guidelines for *in situ* research and eventual re-introduction, and the health and number of wild populations is continuously monitored. Goals for 2011 are to: 1) Identify and mitigate the specific causes of the population collapse for these four species; 2)



Supplement existing wild populations and re-introduce animals to appropriate historic sites where the species has been extirpated via the ark/rescue *ex situ* conservation program; 3) Monitor the existing populations along with the newly established populations to observe their progress in the wild; and 4) work with Philadelphia Zoo's Education department to create an education program to increase awareness of the amphibian extinction crisis and to engage local people directly in gathering data and conserving these critically endangered species. Efforts will also be made to inform and engage in the Philadelphia Zoo area.

© Top - Teresa Camacho, second—Ernesto Arbeláez, third and bottom—Carlos C. Martínez Rivera

Assurance Populations and Conservation Breeding

Research, Breeding, and Education in Peru

By Tom Weaver, Denver Zoo

Denver Zoo, along with international and local partners, is involved in ongoing research and outreach focused on the Lake Titicaca Frog (*Telmatobius culeus*). The Zoo helped establish a *Telmatobius* Captive Breeding Program and Laboratory at the Universidad Peruana Cayetano Heredia in Lima, Peru and a breeding population at the Huachipa Zoo in Lima. In the next year or two,



© Tom Weaver, Denver Zoo

Denver Zoo plans to help establish additional facilities at the lake in partnership with Proyecto Especial del Lago Titicaca (PELT) and Universidad Nacional del Altiplano. These labs will help partners learn more about the captive husbandry of this critically endangered frog and support the creation of an assurance population. In December, through a collaborative effort with project partners, the Huachipa Zoo and Universidad Peruana Cayetano Heredia, Lake Titicaca frogs were successfully bred in captivity using confiscated frogs, and tadpoles



© James Garcia

are being raised. Denver Zoo and project partners plan to build a rescue center at the Universidad Nacional del Altiplano for frogs confiscated from and near the lake.

Denver Zoo helped create and participates in a national awareness campaign to decrease consumption of Lake Titicaca frogs and address other threats, like pollution and global warming. As part of this campaign, Denver Zoo supported the opening of an amphibian crisis center at Lima's Huachipa Zoo in 2010, where Lake Titicaca frogs can be seen on exhibit. The exhibit includes important messaging about the frog's status and threats to their survival.

In December 2010, Denver Zoo supported a stakeholders' meeting for all parties interested in working on conserving the Lake Titicaca Frog. This three-day workshop, facilitated by the IUCN's

Conservation Breeding Specialist Group, reviewed current knowledge of the species and involved participants working in small groups and larger plenary sessions to draft a conservation action plan with specific recommendations for actions focused on recovering the species.

In 2011, project partners will begin pilot studies for a mark and recapture population survey, DNA sampling to understand the taxonomy of the genus, and research on the prevalence of the amphibian chytrid fungus (*Bd*). Along with this research, partners will initiate efforts to increase local awareness in Puno, Peru about the plight of the Lake Titicaca frog.

Breeding of Rare Mountain Chicken Frogs

Excerpt from Detroit Zoological Society Press Release 3 Nov 2010

A rare amphibian that was once served as a dinner entrée in some parts of the world has been bred at the Detroit Zoo. Three mountain chicken froglets were born in October, marking the second time the Zoo has bred the species since it began working to preserve it in 2000.

"It is very exciting and significant that we have bred these unusual frogs, as they are extremely difficult to breed. They are simply fascinating, from their behavior to their size," said Detroit Zoological Society Curator of Amphibians Marcy Sieggreen.

The mountain chicken frog (*Leptodactylus fallax*) is one of the largest frog species, with adults growing up to eight inches long and weighing up to two pounds. Although once abundant in six of the Caribbean islands, the species is now confined to just Dominica and Montserrat. The frog was commonly hunted by islanders for food and is said to taste like chicken, which is how it got its name.

Hunting, habitat loss, and disease from the amphibian chytrid fungus (*Bd*) have wiped out the majority of the mountain chicken frog population. The Detroit Zoo is one of only five U.S. zoos that provides a home to the species. "Preserving the mountain chicken frog in a captive environment such as our National Amphibian Conservation Center will play a crucial part in protecting it from extinction," said Sieggreen.



© Becky Johnson, Detroit Zoological Society

Field Surveys and Research

Northern Leopard Frog Conservation in Alberta

By Jill Hockaday and Dr. Doug Whiteside, Calgary Zoo

For several years, the Calgary Zoo's Centre for Conservation Research and Animal Health Centre have been working on northern leopard frog (*Lithobates pipiens*) conservation in Alberta, using metapopulation modelling to insure effective conservation of northern leopard frogs and conducting surveillance for emerging diseases.

The northern leopard frog has been declining in Alberta and the Pacific Northwest for unknown reasons. Attempts to stop this decline have been unsuccessful and it is widely accepted that a better understanding of the ecology of this species is needed.



© B. Jones, Calgary Zoo

Sparsely distributed over a broad geographical range, northern leopard frogs can be difficult to detect in some habitats, making accurate population counts difficult. Using intensive field work and highly focused science, zoo researchers have been surveying prairie wetlands across 90,000 km² of Southern Alberta since 2009. Data from repeat surveys of 69 sites, and associated measurements of water quality and climatic conditions, are being used to quantify northern



© J. Hockaday, Calgary Zoo

leopard frog population dynamics under highly variable conditions. This research will help determine whether and to what extent the leopard frogs are declining in the province, identify key habitats, find the best conditions to survey in and determine the amount of management necessary to ensure the long term survival of northern leopard frogs in Alberta and the Pacific Northwest.

Emerging diseases may have a role in this decline, and by partnering with the Fish and Wildlife division of Alberta Sustainable Resource Development and the Alberta Conservation Association, province-wide surveillance for two notable diseases was conducted: for chytridiomycosis, caused by the amphibian chytrid fungus (*Bd*), and ranavirus. Over a three year period, amphibians from 90 sites were

non-invasively sampled utilizing PCR to assess for the presence, and to define the geographical and temporal distribution, of these diseases. At positive sites, surveillance is being carried out for clinical disease and to identify environmental factors potentially associated with such sites. Ongoing pathology of moribund or deceased amphibians is also being carried out to monitor for other potential emerging diseases. Results indicate *Bd* is widespread in the province with approximately 43% of sites yielding a positive test result and that it is found on the skin of the majority of Alberta's amphibian species at those sites. Ranavirus has a very low prevalence. This data is important for guiding translocation or reintroduction efforts for leopard frogs, and provides a greater understanding of the potential causes of amphibian morbidity and mortality in the province.

The Eastern Hellbender in West Virginia

Article and photo by Joe Greathouse, Oglebay's Good Zoo

The Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) is the largest salamander in the Western Hemisphere, growing up to 30" in length, and is considered to be rare or endangered in each of the states within its range. Staff at Oglebay's Good Zoo have been conducting surveys for this species in local streams and rivers since 2005 and became the first zoo or aquarium in the world to hatch eggs from this species in 2007.

During 2010, zoo staff surveyed the streams and rivers that this species historically inhabited throughout West Virginia and collected information about the current status of those habitats. Hellbenders were



found at only 12 of 23 historic sites during these surveys. Zoo staff will analyze the data from the sites where hellbenders were present and compare that data to the sites where hellbenders were not found. A site that did not yield any hellbender captures and that had the most similar habitat attributes to the sites where hellbenders were found will be chosen as a translocation site for several of the juveniles raised from the eggs that were hatched at the zoo in 2007. Zoo staff will track these individuals at the release site with radio telemetry equipment from 2011-2012 to determine if this conservation technique will be useful for reintroducing populations of this species throughout its range and for increasing the species' numbers in the wild.

Reintroduction and Head-Starting

Recovery Team Works to Help the Hellbender in New York

Article and photo by Penny Danielewicz, Buffalo Zoo

In Fall 2009, the Buffalo Zoo joined New York State's Hellbender Recovery Team. Members of this team include New York State's Department of Environmental Conservation, U.S. Fish and Wildlife Service (FWS), the Seneca Nation Deputy Conservation Officers, universities, the New York Department of Transportation, the Bronx Zoo, and other specialists. The team's objectives are the same for each watershed that hellbenders inhabit in New York, and are to: 1) Protect current and future hellbender populations, 2) Manage and research aspects directly related to hellbenders and their well-being, 3) Provide hellbenders with quality habitat through management and research, and 4) Increase public and agency awareness about hellbenders in an effort to aid in their protection.

A head-starting opportunity was born out of objective 1 and the Buffalo Zoo was contracted as the hatching facility. The FWS applied to the State Wildlife Grants Program under the management and restoration category and this award money was integral to launching the head-starting program.

In October 2009, 744 hellbender eggs were brought to the zoo for hatching. All but 70 eggs and 74 larvae survived, making the overall survival rate much greater than expected. The Buffalo Zoo was rearing 600 larvae before moving 40 to the Bronx Zoo and 20 to Ross Park Zoo.

The release of the hellbenders in 2013 will occur in appropriate extant and extirpated sites to bolster a perceived lack of recruitment in wild populations. Hellbender genotyping conducted at Buffalo State College may help put the head-started population into a larger geographical context. Habitat restoration in the streams started in Summer 2010 with the placement of large flat rocks to allow for natural weathering. Monitoring the tagged hellbenders in the streams will provide valuable information about habitat usage and survivorship.

These efforts will increase knowledge about the eastern hellbender and will inform other regional efforts to protect and conserve this species.



The Repatriation of a Tiny Toad

By Alyssa Borek, C. Drew Foster, and Valorie Titus, Wildlife Conservation Society/Bronx Zoo

The Kihansi spray toad (*Nectophrynoides asperginis*) is a recently discovered (1996) diminutive toad species from a single microhabitat in Tanzania. Part of what makes them so unusual is that they are live-bearing amphibians with an extremely small distribution. Their total range was



© Julie Larsen Maher, WCS

restricted to the wetland meadows created by the spray from a large waterfall in the Kihansi Gorge. The diversion of water from the Kihansi Falls by a hydroelectric power dam, which commenced operation in 1999, led to disastrous results for the wetland habitat. This and other complicating factors, such as amphibian chytrid fungus (*Bd*), led the Kihansi spray toads to be classified as extinct in the wild in 2005. The threat to the toads was anticipated and in 2000, scientists from the Wildlife Conservation Society, at the invitation of the Tanzanian government, brought 499 toads to the United States to establish an assurance population.

Over the last decade, the Bronx and Toledo Zoos have worked tirelessly to perfect husbandry techniques, and the Tanzanians recently have constructed a state of the art biosecure facility at the University of Dar es Salaam. The Tanzanians have also worked to re-create the wetland habitat in the Kihansi Gorge using an artificial misting system. In 2010, 100 toads were returned to Tanzania where they have been doing very well and successfully breeding in the propagation facility. The repatriation of the toads is a monumental event and the first step in the eventual reintroduction of the Kihansi spray toads to the Gorge.

Hongera vyura wa Kihansi kwa kufika salama na Karibuni nyumbani! (*Congratulations on your safe arrival and welcome home Kihansi Spray Toads!*)

Reintroduction and Head-Starting

The Chiricahua Leopard Frog Head-starting and Release Program

Article and photos by Tara Sprankle, The Phoenix Zoo

The Chiricahua Leopard Frog Head-starting and Release Program is one of the flagship efforts of the Phoenix Zoo's Conservation and Science Center.



2010 was a banner year, marked by celebration of the release of the 10,000th head-started frog. In fact, over 1,700 frogs

were released this season, bringing the total to 11,654 frogs released since the program began in 1995.

Chiricahua leopard frogs (*Lithobates chiricahuensis*) are federally listed as threatened and are found in pockets of Arizona, New Mexico, and Sonora, Mexico. The Phoenix Zoo is an active partner in the recovery program for this species, working closely with the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Arizona Game and Fish Department, and private landowners.

Wildlife biologists bring wild Chiricahua leopard frog egg masses to the Phoenix Zoo's Conservation and Science Center each spring, where the eggs hatch out and grow into large tadpoles and froglets in the head-starting lab. The resulting animals are released in pre-determined locations based on where augmentation is most needed. In the wild, only 5-10% of the eggs laid survive to adulthood; the Zoo's average survival rate is over 60%, with a record year of 90% survivorship.

Over the length of this program, Phoenix Zoo staff and their volunteer "Tadpole Task Force" have committed well over 15,000 hours to head-starting and to assisting with field surveys and habitat improvement. Project costs average about \$75,000 annually, which has come almost entirely from the Phoenix Zoo's operating budget.

At the AZA Annual Conference in 2010, the Association recognized the success of the Zoo's Chiricahua leopard frog program with a **Significant Achievement in North American Conservation** award.

The Phoenix Zoo Board, staff, and volunteers are proud of their contributions to this multi-agency effort and are eager to continue playing an essential role in the recovery of this beautiful frog.



Reintroduction and Head-Starting

Mountain Yellow-legged Frog Breeding and Reintroduction

San Diego Zoo Press Release

In 2010, San Diego Zoo Institute for Conservation Research marked several milestones in its efforts to save the endangered Southern California mountain yellow-legged frog (*Rana muscosa*) from extinction. The species had diminished to about 150 adults living in nine high-elevation streams in the San Jacinto, San Gabriel, and San Bernardino mountain ranges.

At the start of 2010, San Diego Zoo scientists tested the effect of hibernation on breeding success by



© Ken Bohn, San Diego Zoo

placing half of a colony of 53 frogs in near-freezing temperatures in a laboratory to simulate the winter conditions of high-elevation streams. In the spring, only the frogs that had

been placed in hibernation laid eggs, demonstrating the clear benefit of cold temperatures.

Later in 2010, the Southern California mountain yellow-legged frog was reintroduced into its native habitat for the first time. Forty fertile eggs and 36 tadpoles that resulted from the breeding success in the lab were released at Hall Canyon in the San Jacinto Mountains. The frogs had not been seen at that site in more than 50 years.

A goal of the tadpole release was to determine the best reintroduction methods for the species, including the use of acclimation cages.



© Jeff Lemm, San Diego Zoo—acclimation

Researchers placed half of the tadpoles into cages in the stream and released the other half directly into the stream. Previous studies on other frog species have shown that cages can restrict a tadpole's growth. Would the ability to keep the tadpoles fed and safe from predators in these cages outweigh the potential for slower growth? While researchers were unable to count enough of the free-swimming tadpoles this year to measure the difference between the groups, they

hope to answer the question as more tadpoles are released. The caged tadpoles experienced a 100%

survival rate during three months of monitoring and tested negative for the amphibian chytrid fungus (*Bd*).

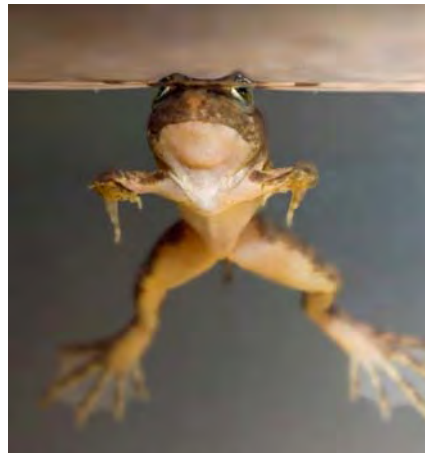
The progress the San Diego Zoo has made in collaboration with its partners to understand the ecology of the Southern California population of mountain yellow-legged frog inspires hope for the future of this beautiful and amazing amphibian.

The U.S. Geological Survey, U.S. Fish and Wildlife Service, California Department of Fish and Game, U.S. Forest Service, and the University of California play instrumental roles in guiding conservation efforts for this species. The San Diego Zoo's research is also partially funded by the nonprofit Association of Zoos and Aquariums through the Conservation Endowment Fund (CEF).

Oregon Spotted Frog Reintroduction Project

Article by David Shepherdson, Oregon Zoo

Oregon spotted frogs (*Rana pretiosa*) are listed as an endangered species in Washington State and are a candidate for listing under the United States Endangered Species Act. This species is threatened by loss of wetland habitat, non-native invasive species such as the bullfrog, and introduced amphibian chytrid fungus (*Bd*). For over twelve years, the Oregon Zoo has worked with Washington Department of Fish and Wildlife (WDFW) to monitor the largest



© Michael Durham, Oregon Zoo

remaining population of Oregon spotted frogs at Conboy Lake National Wildlife Refuge near Trout Lake, Wash. In fall 2007, the Oregon Zoo joined Woodland Park Zoo, Northwest Trek, Point Defiance Zoo & Aquarium, WDFW, the U.S. Fish and Wildlife Service, and Joint Base Lewis

McChord to develop a captive rearing and re-introduction program for these frogs. Oregon Zoo, Northwest Trek, and the Woodland Park Zoo, as well as other members of the Northwest Zoo and Aquarium Association (NWZAA) are partners involved in restoring this species and other Northwest natives. Recently a unique new partner, the Clear Creek Correctional Center, joined the program and is also rearing frogs for release.

In 2010, a total of 1346 frogs were released at the wetland habitat site on Joint Base Lewis McChord.

Reintroduction and Head-Starting

Conserving the World's Largest Amphibian: Reintroduction and Translocation of the Chinese Giant Salamander into the Wild

By Andy Kouba, Memphis Zoo

At up to 1.8 meters in length, the Chinese giant salamander (*Andrias davidianus*) is the world's largest amphibian. It diverged from all other



© Jen Germano, Memphis Zoo
Photo of graduate student Michelle Martin

amphibian lineages 170 million years ago and represents the very root of the amphibian tree of life. Once widespread in the mountain tributaries of the Pearl, Yellow, and Yangtze Rivers in central/southern China, the giant salamander is now listed as critically endangered by the IUCN, having suffered an 80% population decline since the 1950s due to habitat destruction, water pollution, and over-exploitation for its meat and body parts. A huge farming industry has developed over the last ten years to meet consumer demand, but although captive breeding has the potential to relieve harvesting pressure on wild populations, the potential spread of disease and ongoing capture of wild individuals to supplement farms present major threats. In order to achieve governmental certification status for the legal sale of salamander meat, farms must release a portion of their animals back to the wild to support conservation and population growth. This translocation is typically coordinated by the provincial Fisheries Department and individual breeding farms, but the burden of monitoring these released animals is the responsibility of scientists associated with regional Universities and Research Institutes.

In 2009, a partnership was established between Dr. Zhang Hong-Xing of the Shaanxi Institute of Zoology, Dr. Andy Kouba of the Memphis Zoo, and Dr. Scott Willard of Mississippi State University to monitor nearly 10,000 giant salamanders that will be released into Shaanxi Province between 2010-2011. Additional AZA partners on this project

include the Los Angeles Zoo, Fort Worth Zoo, and Omaha's Henry Doorly Zoo. The specific aims of the partnership will be to monitor dispersal, habitat selection, disease prevalence, and population structure of giant salamanders released into the wild.

Ultimately, this study will culminate in a spatial habitat model using GIS mapping, that will be beneficial for future releases and translocations, assessing key regional stronghold areas, understanding habitat fragmentation threats or habitat linkages, and helping to direct aquatic restoration projects. The interdisciplinary nature of the proposed research will foster teaching and learning environments by collaborators at all levels while broadening graduate students' encounters among various disciplines and careers (e.g. zoos, government, and academia). Moreover, international exchanges of junior investigators, keepers, and students between the U.S. and China will provide a valuable experience early in their professional career. Lastly, this project represents a positive model for the conservation of China's aquatic ecosystems that works with local industry, which is perhaps the only hope for biodiversity in many cases. Project leaders hope that this will serve as an example to inspire other conservation initiatives across China.