Amphibian Crisis

The Phoenix Zoo provides experiences that inspire people and motivate them to care for the natural world.
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The Origin of Amphibians

Amphibians occupy a class of vertebrate animals (Amphibia) that have adaptations and specializations enabling them to occupy nearly every habitat on earth. Most amphibians need water at some point during their development cycle, but the amount of water required varies between species. They undergo a remarkable transformation from water-breathing organisms to air-breathing organisms. Some amphibians emerge to live primarily on land after they metamorphose, while other species remain in the water, emerging onto land only briefly.

The first evidence of terrestrial vertebrates dates back to the Devonian period some 395-350 million years ago. It is believed that a form of lungfish gave rise to groups of animals that we now call amphibians. Present-day amphibians are categorized into three distinct clades (a related group of animals with a common ancestor); Caudata (Order Urodela), salamanders and newts, characterized by a long tail; Caecilians (Order Gymnophiona), legless amphibians, which are specialized for life underground; and frogs and toads (Order Anura), which have hind legs that are specialized for jumping.

Amphibians are quite adaptable, occupying most of the available habitats on the planet. Some amphibian species are completely aquatic, while others only go to water for reproductive purposes. They thrive in desert climates as well as tropical climates. One salamander species, the Siberian salamander (Hynobius keyserlingi), is able to survive -20˚F temperatures. There are however, no known marine amphibians.

With over 6200 amphibian species identified, amphibians have proven to be one of the most successful and diverse groups of organisms on the planet.

Indicators of a Problem

Characteristics responsible for amphibians’ success and diversity may also cause
them to be more sensitive to changes in the environment and their habitat. Even subtle shifts in water temperature or chemical composition can affect the development stages of many amphibians. Adults are also affected by climate changes and air quality as a result of the adaptations that allow respiration to occur through the skin. Amphibians that spend much of their adult life in or near water such as frogs and salamanders are particularly susceptible to waterborne diseases or toxins within the water. Because of their sensitivities amphibians are important indicators of local or global environmental shifts indicative of declining ecological conditions.

In the late 1970s, scientists began to detect declines in amphibian species. In some cases, there were reports of drastic reductions in the number of amphibians in local populations, as well as all-out disappearances of entire species. There were many discussions over the possible causes of the observed declines, such as climate change, habitat destruction, toxins, disease, introduced species, and ozone layer depletions. More recently, the largest contributing factors appear to be habitat changes and disease, in particular chytridiomycosis, a fungal disease believed to be largely responsible for amphibian declines worldwide. Regardless of the causes, the stark fact remains that nearly one-third of all known amphibian species is either threatened or known to be extinct. According to the International Union for Conservation of Nature (IUCN), over 100 amphibian species have gone extinct in the last 30 years, and many are missing and presumed extinct. Expected amphibian extinction rates based on historical guidelines should only be one or two extinctions every 250 years. Clearly, in order to have such a high percentage of a single class of animals threatened with extinction, something is wrong. Scientists began to work together to look more closely at amphibians in 1999 with the formation of the Declining Amphibian Populations Task Force. The DAPTF which has since merged into the IUCN Amphibian Specialist Group, was made up of scientists from IUCN’s Species Survival Commission. This group attempted to understand what was occurring within this important class of animals to cause such drastic declines. One revelation discovered by the DAPTF was that conventional strategies for conserving amphibians such as protecting species and habitats were not enough in the face of the multi-faceted factors affecting amphibian declines worldwide. Another revelation was that a great deal more needed to be understood about the ecology, conservation status, and biology of many amphibian species if we were to have any hope of stemming the tide of this decline.

**Assessment**

The IUCN completed the first worldwide assessment of amphibians in 2004. Some 650 scientists, located in 60 different countries, worked on this initiative, known as the Global Amphibian Assessment (GAA). Prior to the initiation of this project there were fewer than 1000 species of amphibians cataloged worldwide. As a result of the GAA efforts and awareness raised through this initiative, over 6200 amphibian species have been identified and much more is now known about their biology, and status worldwide. Unfortunately, this global assessment revealed that of the known amphibian species, over 1800 of them are considered threatened or known to be extinct.
Action

In 2005, the IUCN established the Amphibian Specialist Group, which acts to conserve biological diversity through the development of practical programs to conserve amphibians and their habitats globally. This group immediately convened an Amphibian Summit in Washington DC in 2005, sponsored by Species Survival Commission-IUCN and Conservation International, which resulted in the development of an Amphibian Conservation Action Plan (ACAP) — a document outlining strategies for addressing key issues affecting the world’s amphibians. The four key issues identified are:

1. Understanding the causes of decline.
2. Documenting amphibian diversity and how it is changing.
3. Developing and implementing long-term conservation programs.
4. Delivering emergency responses to crises.

Given the increasing concern about the state of amphibian populations worldwide, the Association of Zoos and Aquariums (AZA) and other organizations, including the Amphibian Ark and the European Association of Zoos and Aquaria (EAZA), proclaimed 2008: Year of the Frog. Year-long education and outreach programming aimed to raise awareness across the zoo and aquarium community. The annual “Party for the Planet” Earth Day activities developed in conjunction with the AZA Conservation Education Committee, Amphibian Taxon Advisory Group (ATAG), and others focused on the Year of the Frog theme. AZA staff biologist Shelly Grow and National Aquarium in Baltimore biologist Vicky Poole edited an extensive Amphibian Conservation Resource Manual that helped facilitate the work of AZA institutions interested in taking action on behalf of declining amphibian populations. At the same time, EAZA developed the “Amphibian Alarm” program, also in support of the Year of the Frog. In addition, a dedicated subset of AZA’s annual Conservation Endowment Fund (CEF) grant program supported amphibian research, conservation, and education projects in 2008 and 2009, further emphasizing the importance of urgent action on behalf of amphibians in the wild.

For more information about the projects supported by this fund, visit AZA amphibian conservation efforts.

In 2009, the AZA took on the host role for FrogWatch USA, a monitoring network that utilizes “citizen scientists” to collect and report data on frog populations throughout the U.S. AZA staff and volunteers are training zoo and aquarium personnel to train interested individuals in their communities to expand the FrogWatch data set.

Also in 2009, the Zoological Society of London hosted the first amphibian mini summit, which had amphibian conservationists and researchers attending from all over the world. One initiative that resulted from this meeting was the formation of the Amphibian Survival Alliance (ASA), which was developed to serve as a global, mutually supportive network of over 600 partners, coordinating conservation endeavors, scientific research and fundraising for amphibian conservation. The ASA will report on progress of the two priority initiatives identified during the mini summit. Tackling the devastating chytrid fungus is the Alliance’s first priority. Identified very recently, the fungus now infects amphibians in the Americas, Australia, Europe, Asia, and Africa. The group will investigate anti-fungal drugs to combat the deadly disease and explore resistance to the disease in captive-bred populations and in the wild. Protecting amphibian habitats is the group’s next priority. Habitat modification and destruction is considered the second leading cause of amphibian decline worldwide, and the ASA will work to identify critical habitats, and seek to develop ways of maintaining or improving habitats that have been severely modified or destroyed.

Left unchecked, the factors affecting amphibian species worldwide will result in a devastating blow to amphibian diversity and may signal a more serious underlying instability in environmental conditions that could have far-reaching effects. There is no single group of animals more greatly affected than amphibians as a result of disease, habitat destruction, environmental change, introduced species, and trade. The revelation that 32 percent of a single group of vertebrates is either threatened or extinct, and the rapidity of this development, has triggered a global initiative to find out how to stop and/or reverse this trend before it is too late.

There may be hope - the myriad of organizations now mobilized to address this issue is impressive, and research on how disease affects this group of vertebrates is in full swing. There have been some breakthroughs in our understanding of how disease is affecting amphibians, but in many cases, more questions than answers arise from these studies. In addition to understanding disease transmission and controlling the spread of chytrid, discovering ways to sustain habitats critical to amphibian species survival is essential to the success of this global initiative. The Phoenix Zoo is proud to support amphibian conservation in our state and throughout the world.

Aquatic Caecilian, Typhonectes natans — photo credit T. Sprankle.

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AZA-Accredited, US Government, and International amphibian conservation programs

ASSOCIATION OF ZOOS & AQUARIUMS

AZA and its member organizations support and/or manage many international amphibian programs.
A Chaotic and Complex World for Amphibians
What We Do To Help

Jeff Williamson—President Arizona Zoological Society

Thank goodness it has been a wet winter in Arizona. While the rain has been important, it comes on the heels of more than a decade of less than average rainfall and significantly warmer temperatures in our region. We can use all the moisture we can get, both to replenish watersheds and to support wildlife and plant communities throughout the state.

Recently a group from around the country met in Tucson to talk about the rapid changes in both human and natural systems that are progressing faster than we anticipated.

Cooperative Adaptive Management Network (CAMNet) looks at transitions in landscape composition and ecosystem function. It also encourages both social and physical sciences that inform policy makers and land managers about how to build resiliency into such systems so they can cope with the unprecedented change.

All of Arizona is arid. Our landscapes and the biomes they support are adapted to that aridity at a variety of elevations, water and temperature regimes. Those systems are tolerant within very narrow parameters and with limited capacity to absorb a variety of disturbances. These disturbances include water movement and its eventual gathering places. Others are heat, which affects evaporation, transpiration, stream flows, aquifer recharge, and the water available to support wildlife in the numbers and with the diversity important to long-term adaptation. Disturbances also include a myriad of non-native, or invasive, species that may out-compete and displace natives, thus transforming the living community. In fact, many biologists are concerned that the African buffel grass will become so pervasive in our desert landscape that it will enable hot fires from low elevations to reach the forest edge, endangering the Sonoran plant community that has not evolved with a fire tolerance.

The amphibians in our deserts and uplands (grass and forestlands) are dramatically affected by this complex set of relationships. The lakes, marshes, and riparian zones they evolved with are changing with the changes in weather, temperature, vegetative cover, and species composition, including invasive species.

Over the next three years, the Arizona Zoological Society will be working with the University of Arizona, Arizona Game and Fish Department, U.S. Fish and Wildlife Service, the Cienega Watershed Partnership, private land owners, The Nature Conservancy and other non-governmental organizations throughout the Sonoita Valley to learn even more about supporting stable and healthy populations of native amphibians in a world of rapid and complex change.

Cienega Creek is currently free of non-natives, but several other streams, rivers and water sources are not. A team of researchers will survey all waters in a series of watersheds and document the status of amphibian populations. They will develop a strategy to both purge the system of non-natives and to repopulate with native species.

They will also establish a monitoring system along with a strategy to adapt management practices across jurisdictions and disciplines. This strategy will respond to change in ways that retain the living systems’ integrity over time. This approach values simultaneously individual species within an ecology as well as the health of the whole community. Those managing the system understand that change is constant and often influenced by unobserved externalities. They also value these ecologies and their services enough to strive for improved knowledge, good science and creative management practices that strengthen the capacity to cope in support of quality of life.

[For more information about Landscape Conservation Systems, Cooperative Adaptive Management, Invasive Species, and some creative initiatives please refer to http://www.adaptivemanagement.net/rendezvous/2010-schedule]
Regional Conservation

While there are over 600 species of “true” frogs of the family Ranidae worldwide, just nine are found in Arizona. Interestingly, six of those are considered endemic species, which means these six are found nowhere else in the world other than in Arizona. The unique diversity of habitat types and ranges in elevations within Arizona contributes to the diversity of Arizona’s ranid frog species and makes our state a truly special place for people who care about frogs.

Over the last 30 years many populations of Arizona’s endemic frog species have declined and several species have been reduced to only a handful of known breeding populations. Arizona Game and Fish Department (AZGFD) biologists conduct statewide surveys to monitor existing frog populations and to search for new ones. Phoenix Zoo Conservation staff are now certified to assist with this effort. The following is a summary of Arizona’s endemic ranid frog species biology and their current status in the wild.

The Phoenix Zoo is expanding its reach by supporting important global conservation and research efforts.

Arizona’s: Ranid Frogs Biology and Status
Tara Sprankle, Phoenix Zoo Conservation Manager

Plains Leopard Frog
*Lithobates blairi*

Description - A small but stocky frog, plains leopard frogs are only 2-3 inches in length. They are usually light brown or dull green with the distinctive dorsal spots common to all leopard frogs. This species’ call consists of two or three guttural notes a second, sounding very much like a chuckle.

Range in Arizona - Restricted to two small populations in Cochise County.

Habitat - Found in prairie and desert grassland ecosystems between 4,000 and 6,000 ft in elevation.

Breeding - Reproduction occurs from March through October. 4,000-6,000 eggs are produced per egg mass.

Threats - In Arizona, the greatest threats to all ranid frogs are habitat alteration and fragmentation, the introduction of non-native species such as sport fish, crayfish and bullfrogs and a fungal disease (chytridiomycosis) that is causing amphibian species to decline in number or die out worldwide. Change in water quality has also contributed to declines statewide.

Status in Arizona - The plains leopard frog has the status of Wildlife of Special Concern, which makes it illegal to harm, harass or collect the species. Due to its extremely limited range and small population size, it may be the most endangered leopard frog in Arizona.

Illustrated by Couch, Karen J. U.S. - Credit Fish and Wildlife Service.

Relict Leopard Frog
*Lithobates onca*

Description - A medium sized frog only reaching 1.75 to 3.5 inches long. They can be gray, brown or green with greenish brown leopard spots. They look very similar and are closely related to the Lowland leopard frog. Their call sounds like a low throaty snore.

Range in Arizona - They are only found in the extreme northwest corner of the state in the Virgin River drainage.

Habitat - Relict frogs are usually found

Illustrated by Couch, Karen J. U.S. - Credit Fish and Wildlife Service.
near permanent streams, rivers, springs, ponds and wetlands in Mojave Desert scrub, below 2,000 ft in elevation.

**Breeding** - Little is known about the reproductive behavior of this species. Eggs have been found in February and November. Egg masses probably contain several hundred eggs.

**Threats** - As with other ranid frogs in Arizona the greatest threats are habitat alteration and fragmentation, as well as the introduction of non-native species such as sport fish, crayfish and bullfrogs. Its limited range and a reduced genetic variation also threaten this particular species.

**Status in AZ** - Wildlife of Special Concern and illegal to harm, harass or collect. It was once thought to be extinct but was rediscovered in 1991. Due to its small range and other threats, the possibility of extinction is high. 

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**Northern Leopard Frog**

**Lithobates pipiens**

**Description** - A medium-sized frog ranging from 2.5 to 4 inches long. Its distinctive “leopard” spots are often encircled by a lighter “halos” and it usually has one spot on its snout. The northern leopard frog’s call is a slow snore followed by chuckles and grunts. This is the most cold tolerant of all leopard frogs and it hibernates in deep water below the ice. Unlike some other leopard frogs, northern leopard frogs do not have external vocal sacs so their throats do not expand when they call.

**Range in Arizona** - The northern leopard frog once ranged across much of north and central Arizona, but has declined to little more than a handful of isolated populations at present.

**Habitat** - Northern leopard frogs inhabit the widest range of habitat types of any Arizona leopard frog. They are found in permanent lakes, cattle tanks, creeks and washes in Great Basin Desert scrub, plains, grasslands and conifer woodland. They are found between 3,100 and 9,200 ft. in elevation.

**Breeding** - Reproduction occurs from mid March to early June. Each frog is able to produce from 600 to 6,000 eggs each breeding season.

**Threats** - This species is affected by habitat alteration, fragmentation, and the introduction of non-native species. The occurrence of chytridiomycosis is always a possibility and if it occurs, it could be devastating to the species.

**Status in Arizona** - Northern leopard frogs have a status of Wildlife of Special Concern, due to dramatic declines across its range in Arizona. Currently, the western population of the northern leopard frog, which includes Arizona, is being considered as a possible candidate for listing under the U.S. Endangered Species Act.

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**Chiricahua Leopard Frog**

**Lithobates chiricahuensis**

**Description** - A medium-large frog that ranges from 2 to 5 inches in length. Like other leopard frogs, it has numerous dark spots across its back and sides. The base color is usually light green or brown. The call is a distinctive “snore,” a single continuous note lasting 1-3 seconds and repeated intermittently. This call can be given both above and below the water. Adults eat arthropods and invertebrates and may even take small vertebrates. They have been known to live as long as six to ten years in the wild.

**Range in Arizona** - Their range is divided into two populations. The northern population, extending from central Arizona south along the Mogollon Rim and into New Mexico and the southern population, which extends from south-central and southeastern Arizona into southwestern New Mexico and Sonora, Mexico.

**Habitat** - Chiricahua leopard frogs are found in semi-desert grasslands as well as evergreen and conifer woodlands and forests from 5,000 to 6,000 ft. They inhabit slow-moving creeks and cienegas, rocky pools in streams, stock tanks and ditches.

**Breeding** - Reproduction occurs from February through September, depending on the range. A individual egg mass can contain 300 to 1,500 eggs.

**Threats** - The Chiricahua leopard frog, or CLF, face threats from habitat alteration and fragmentation and introduced competitive species or predators. Chytridiomycosis has been found in this species, and should a large outbreak occur it could be a major threat to the recovery of this species.

**Status in Arizona** - The CLF is a Wildlife of Special Concern. In addition, due to declines from over 80% of its former range, it was listed as Threatened under the U.S. Endangered Species Act (ESA) in 2002. A federal recovery plan for this species was completed in 2005 and implemented in 2007. The recovery plan includes an active reintroduction and supplementation program as well as habitat protection and improvement strategies. Recovery actions have stabilized some of the populations in recent years but the species as a whole is still in need of help.
**Newly released Chiricahua Leopard frog — photo credit S. Wells.**

**Lowland Leopard Frog**  
*Lithobates yavapaiensis*

**Description** - The lowland leopard frog is among the smallest ranids in Arizona, reaching only 2 to 3 inches in length. It is usually brownish in color, but may be green as well. Usually there are no spots on the snout. Its call is a grating sound that is similar to rubbing your finger on a balloon. This species has been known to hybridize with the Chiricahua leopard frog in areas where their ranges overlap.

**Range in Arizona** - Lowland leopard frogs range from central and southeastern Arizona, mainly in Gila, Maricopa and Yavapai counties below the Mogollon Rim. Once found in California and New Mexico, it has since disappeared from both states and its status in northern Sonora, Mexico is unknown. It has declined considerably in southeastern Arizona.

**Habitat** - Lowland leopard frogs occupy desert scrub, grasslands, pinion juniper, conifer and evergreen woodland habitats. They are found along streams, rivers, ponds, springs, cattle tanks, wetlands and ditches between 480 and 5,960 ft. in elevation.

**Breeding** - Reproduction occurs from January to May. It is not known how many eggs are laid by each female during the breeding season, but biologists suggest the number is likely to be anywhere from several hundred to one thousand.

**Threats** - Habitat alteration and fragmentation the introduction of non-native species such as sport fish, crayfish and bullfrogs are the primary threats to this species.

**Status in Arizona** - Though it is considered a Wildlife of Special Concern, this species is likely the most stable native ranid species in Arizona.

**References:**


Arizona Game and Fish Department. 2002-2006 Rana ssp. Unpublished abstract, compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

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**Tarahumara Frog**  
*Lithobates tarahumarae*

**Description** - A medium-sized frog ranging in size from 2.5 to 4.5 inches in length. The color is brown or olive green with indistinct dark spots. Tarahumara frogs resemble a bullfrog more than leopard frogs but their eardrums are not as obvious and they are much smaller. Their call consists of a grating snore, lasting only about a second at a time and repeated often.

**Range** - The historic range in Arizona for this species was only in Santa Cruz County. The species is still found across the border in Mexico.

**Habitat** - Tarahumara frogs prefer permanent streams and plunge pools in rocky canyons in pine and oak woodlands at elevations of 1,500 to 6,000 ft.

**Breeding** - Reproduction occurs mainly in April and May but can occur during summer monsoons as well, resulting in egg masses containing approximately 600-1,800 eggs.

**Threats** - As with many amphibian species, threats include habitat alteration, fragmentation, and pressure in the form of predation or resource competition due to the introduction of non-native species, such as sport fish, crayfish and bullfrogs.

**Status in Arizona** - Tarahumara frogs are considered a Wildlife of Special Concern. This species had disappeared completely from the state in the early 1980s but has since been reintroduced in small numbers.

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**References:**


Arizona Game and Fish Department. 2002-2006 Rana ssp. Unpublished abstract, compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

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**Lowland Leopard frogs are among the smallest ranids in Arizona - photo credit Jim Rorabaugh.**

**Tarahumara frog had completely disappeared from the State in the early 1980s, but has been reintroduced in small numbers - credit Jim Rorabaugh.**

**Newly released Chiricahua Leopard frog — photo credit S. Wells.**
Amphibian Conservation at Phoenix Zoo

The Phoenix Zoo’s conservation mission—ex situ support of in situ conservation efforts locally, regionally and internationally—has been a guiding principle in our involvement with species conservation programs. We have been intensively involved with leopard frog conservation for over 15 years. Our first involvement was to answer the call in 1995 along with Arizona-Sonora Desert Museum (ASDM) to help recover the Ramsey Canyon leopard frog, abbreviated RCLF, by agreeing to receive egg masses, hatch out, raise, and release large tadpoles and young frogs to the wild. Although in 2004 genetic assessment determined that the RCLF was not a separate species from L. chiricahuensis, our efforts helped to stabilize the local population, and by 2001 wild-to-wild translocations were possible in the area.

As the RCLF population appeared to stabilize, we turned our attention to help offset the decline of the CLF, whose population had been diminishing in the wild. We began working on head-starting the Chiricahua leopard frog in 1998 when it was determined that its numbers were down nearly 80% from its historic range. In 2006, the Phoenix Zoo became more actively involved in head-starting CLF and in the development of the CLF recovery plan. We still meet each year with the CLF recovery team to identify areas that need augmentation and to decide how many egg masses we can accommodate in our facility. Egg masses are brought to Phoenix Zoo, hatched out, reared up to late stage tadpoles or sub-adult frogs, and then released back to predetermined locations. Zoo staff and volunteers participate in releases, field surveys, habitat improvement, and assessing and advising other facilities interested in head-starting.

Amphibian Studies at the Conservation Center

Thanks to intriguing results from last head-starting season, we are continuing our temperature study on CLF tadpoles this spring. The study looks at development rates of tadpoles in differing temperature settings in the head-starting lab, in an effort to reduce the development period and increase the number of young adult frogs released to the wild. Last year’s results from this study indicated that tadpoles reared in water kept at a constant temperature of 76F degrees developed at a much faster rate than tadpoles kept in tanks kept at 80 degrees. More interestingly though, we found that tadpoles reared in an ambient temperature averaging 75 degrees developed more slowly than the 80F degree temperatures or the 76F degree temperature group. We are repeating the study this season to determine if the results obtained previously can be replicated with the new group of tadpoles. If so, we may opt to maintain all of the lab’s tanks at 76F degrees to maximize development, if we are able to gauge whether maximizing development rates has no measurable negative effect on the resulting animals’ fitness overall.

Conservation Interns Luke McRoberts and David Szeto collect data as part of a tadpole development study.

Conservation Center staff participates in USFWS and AZGFD training to conduct CLF surveys.

Phoenix Zoo participation in leopard frog conservation efforts.

- **1995**: Phoenix Zoo with ASDM to help recover the Ramsey Canyon leopard frog, abbreviated RCLF, by agreeing to receive egg masses, hatch out, raise, and release large tadpoles and young frogs to the wild.
- **1998**: Began working on head-starting the Chiricahua leopard frog in 1998 when it was determined that its numbers were down nearly 80% from its historic range.
- **2001**: Wild-to-wild translocations were determined possible in the area.
- **2004**: Genetic assessment determined that the RCLF was not a separate species from L. chiricahuensis.
- **2006**: The Phoenix Zoo became more actively involved in head-starting CLF, and in the development of the CLF recovery plan.
- **2009**: We still meet each year with the CLF recovery team to identify areas that need augmentation and to decide how many egg masses we can accommodate in our facility. Egg masses are brought to Phoenix Zoo, hatched out, reared up to late stage tadpoles or sub-adult frogs, and then released back to predetermined locations.
Conservation Center News and Updates

Chiricahua Leopard Frog

The Conservation Center at the Phoenix Zoo received two CLF egg masses in April. These egg masses have since hatched out, resulting in over 2900 tadpoles. These tadpoles will be reared through the spring and summer and returned to the wild as late-stage tadpoles or young adult frogs in the late summer or early fall. The Phoenix Zoo is very proud to have received funds from a Resource Allocation Grant (RAC) through the US Forest Service to support this season’s head-starting program.

Springsnail Studies

We continue to maintain a population of about 200 Page springsnails, (Pyrгulopsis morrisoni) at the Conservation Center. We intend to conduct a study that measures activity levels during the daytime and at night in order to learn more about how to develop ideal husbandry conditions for these snails. One of our interns, Drew Pearson, is helping to collect data for this project. We hope to learn how to improve husbandry so that the snails will reproduce in a captive setting. Our ultimate goal is to provide captive-reared springsnails to augment the populations facing challenges in the wild.

Mount Graham Red Squirrel

Tamiasciurus hudsonicus grahamensis

We are awaiting the arrival of Mount Graham red squirrels so that we can begin a captive breeding program for this endangered species. There are only about 260 MGRS remaining in the wild. The Phoenix Zoo is working with USFWS to spearhead a captive breeding and release program in hopes of augmenting the wild population of this species.

Narrow-headed Gartersnake

Thamnophis rufipunctatus

We are holding five (two males and three females) narrow-headed gartersnakes at the Conservation Center. We are working with AZGFD to develop husbandry and captive breeding guidelines for this species. NHGS numbers are declining in the wild due to predation from crayfish, and reduction of appropriate diet due to increased populations of introduced fish species. In August of last year we received a wild-caught female who was gravid and gave birth to NHGS at our facility. We released seven of these offspring back to the wild, and just recently we transferred six of the remaining seven to Northern Arizona University, where they will be held until released to the wild. We kept one of the juvenile females to replace an adult that had died from an unknown ailment.

Springsnail Studies

Drew Pearson — ASU-SOLUR intern is studying springsnail activity patterns. Springsnails are only 1-4 mm in length.

Mount Graham Red Squirrel — Photo Credit John Koprowski.

Narrow-headed gartersnake image — Photo Credit T. Sprankle.
On June 7, we began construction of our new black-footed ferret breeding facility, which will be located directly behind the existing Conservation Center. Phoenix Zoo has been an active participant in this breeding program for over 17 years, producing nearly 400 ferrets. We are pleased to have begun work on the new building and look forward to receiving ferrets for breeding again in the fall.

Phoenix Zoo Conservation works with AZGFD and USFWS to maintain a population of about 800 desert pupfish on Zoo grounds. AZGFD is able to harvest offspring from this pond to repopulate areas in the field that pupfish once inhabited. We recently transferred 145 pupfish from our primary pond to a secondary pond located in the Zoo’s Arizona Trail and AZGFD biologist.

We introduced 145 Desert Pupfish into the newly renovated Arizona Trail pond this spring.

Get involved

Learn more about amphibian conservation efforts by following these links:

- **Amphibian Ark**
- **IUCN Amphibian Specialist Group**
- **Partners in Amphibian and Reptile Conservation (PARC)**
- **AmphibiaWeb**
  Provides a rich source of information on amphibian biology and conservation for more than 6,000 species that can be queried for taxonomic, distributional and specimen data.
- **The Center for North American Herpetology**
  Provides an authoritative checklist with images of the frogs and toads in the United States and Canada.
- **Frog Calls**
  Sponsored by the Chicago Herpetological Society, is an evolving webumentary that features video clips of calling frogs and interviews with scientists about frog issues, declining populations, evolution and conservation.

**Threatened amphibians of the world**

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Amphibians are facing an extinction crisis, but getting to the facts has been difficult. Threatened Amphibians of the World is a visual journey through the first-ever comprehensive assessment of the conservation status of the world’s 6,000 known species of frogs, toads, salamanders, and caecilians. All ~1,900 species known to be threatened with extinction are covered, including a description of threats to each species and an evaluation of conservation measures in place or needed.
According to the International Union for Conservation of Nature (IUCN) and the American Association for the Advancement of Science, at least one-third of the over 6200 known amphibian species are threatened with extinction, a rate higher than that for any birds or mammals. Major threats to amphibians include habitat loss or degradation and the rapidly dispersing infectious pathogen known as the chytrid fungus. Managed populations of amphibians may become the only conservation hope for many species faced with imminent extinction.

The loss of these species is not merely a crisis for amphibians, but also a potentially critical loss for human medical research, as well. Researchers around the world are studying amphibian secretions and their potential medical benefits, including antibiotics and possible cancer-fighting drugs. Some of this research has identified antimicrobial peptides in amphibian skin that may have potential as a treatment for HIV. This is just one example of how wildlife conservation projects illustrate how closely tied humans are to the natural world.

AZA-accredited zoos and aquariums have been integral in amphibian research for many years through the AZA’s amphibian Species Survival Plans. The Puerto Rican crested toad (Peltophryne lemur) is an excellent example of a successful conservation program. This species was close to extinction until the Puerto Rican Crested Toad SSP Program began a reintroduction program to successfully breed and release this species into its native habitat. Since then, the Wyoming Toad SSP, Panamanian Golden Frog SSP, Mississippi Gopher Frog PMP, Houston Toad PMP, and Texas Blind Cave Salamander PMP Programs have been established to enhance amphibian conservation efforts.

For over 15 years, the Phoenix Zoo has had a significant role in amphibian conservation through our Chiricahua leopard frog conservation program. After this year’s froglets are released, we will have head-started over 10,000 Chiricahua leopard frogs and released them back into their native Arizona habitats. Our success, along with work by our partners the US Fish and Wildlife Service and the Arizona Game and Fish Department, has helped stabilize many wild populations of the Chiricahua leopard frog and now has us in the position to pass along our knowledge as we work to train biologists in Sonora, Mexico in our head-starting and amphibian surveying techniques.

We plan to increase our involvement with this important project by dedicating more facility space to the rearing of Chiricahua leopard frogs and by holding a resident population in our Anuran Center and in the ranarium, a facility funded by a grant received from the US Fish and Wildlife Service Safe Harbor Agreements Program.

In addition to dedicating more space and effort at home at the Phoenix Zoo, we will continue to use our conservation grants program to seek ways to increase our contributions to worldwide amphibian research.