

Chiricahua Leopard Frog Inches Towards Recovery

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Recovery – it is the most important part of endangered species conservation. For most species, considerable funding and staff resources are needed to overcome years of population declines and habitat degradation. Despite the limited resources available, and with a lot of help from our friends and partners, such as state wildlife agencies, federal land managers, ranchers and other private landowners, Turner Enterprises, Phelps Dodge Corporation, the Phoenix Zoo, Arizona-Sonora Desert Museum, the Fort Worth Zoo, Nature Conservancy, Sky Island Alliance, and universities, we have put together a recovery program for the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*). To augment the scarce funds available for recovery activities, we have engaged the Fish and Wildlife Service's Partners for Fish and Wildlife Program (see the story on page 36) and applied for grants from foundations. We and our very dedicated host of partners are slowly making progress towards the recovery of this species.

The Chiricahua leopard frog is a large, often green, spotted frog that historically was common in the mountains and high valleys of central and southeastern Arizona, west-central and southwestern New Mexico, and southward in the Sierra Madre Occidental and associated sky islands of northeastern Sonora and western Chihuahua, Mexico. We know of 469 historical localities. Declines were first noted in the early to mid-1970s, and today the species is only known to exist at about 41 localities in Arizona and 30 to 35 locali-

ties in New Mexico. Its status in Mexico is poorly known, but Chiricahua leopard frogs have declined to some extent there as well. The Mexican government lists it as *amenazada* (threatened).

The causes of the decline are not always clear, and several interacting factors are often at play, but experts on the Chiricahua leopard frog generally agree that predation by introduced species (especially American bullfrogs, sport fishes, and crayfish) and an apparently introduced fungal skin disease (chytridiomycosis) that is killing frogs and toads around the globe are the leading causes.

A Chiricahua leopard frog from the Pajarito Mountains in Arizona near the Mexican border.



Jim Rorabaugh

Other problems, such as loss and degradation of wetlands, recent catastrophic wildfires, drought, and contaminants, have contributed to the decline.

The Chiricahua Leopard Frog Recovery Plan was completed in early 2007. It was developed in an open process with a technical team that provided top-notch scientific expertise, while three stakeholder groups kept the process grounded in the social, economic, and nuts-and-bolts realities of achieving recovery on the ground. Key elements include protecting the remaining populations and habitats, establishing new populations, monitoring progress, research, public outreach, and adaptive management.

The primary threats – introduced predators and chytridiomycosis – are not easily addressed. We can control predators at small sites, but eliminating them from large, complex systems is often impossible with current technology. Except for taking precautions not to spread the disease ourselves, we are only beginning to understand how we might deal with chytridiomycosis. Some frog populations are persisting with the disease, especially at warmer and lower sites, and they could provide key insights into how to manage the disease. We are looking into several questions: are the frogs developing resistance to the disease, are there environmental factors allowing their persistence, or both? We

Duke Klein (Forest Service biologist), at left, and Mike Sredl (Arizona Game and Fish Department) build pond habitat for Chiricahua leopard frogs in the Tonto National Forest, Arizona.



Jim Rorabaugh

have experimented with eliminating the disease from habitats but are a long way from solving that problem. Our strategy for now has been to try to maintain the remaining populations and begin reestablishing populations and improving habitats in places where introduced predators and disease are absent or manageable. These reintroductions typically involve collecting egg masses from the wild, hatching the eggs and head-starting tadpoles at the Phoenix Zoo or other facilities, and releasing late-stage tadpoles or metamorph frogs. Limited wild-to-wild movements of egg masses and frogs, as well as captive propagation, have also been employed. We have honed our techniques and protocols over the past 12 years (see Tara Sprankle's following article), and most reestablishments now successfully result in breeding populations.

These recovery actions have been facilitated by 1) a special rule under section 4(d) of the Endangered Species Act that allows incidental take of frogs resulting from operation and maintenance of livestock waters on non-federal lands, 2) Safe Harbor Agreements with the Arizona Game and Fish Department and the Malpai Borderlands Group (a progressive group of conservation ranchers), and 3) programmatic grazing consultations with involved federal agencies on public lands. The 4(d) rule and Safe Harbor Agreements help us build trust with ranchers and private landowners, while the programmatic consultations provide a framework within which we can move forward on recovery with the Forest Service, Bureau of Land Management, and livestock grazing permittees. Artificial water sources developed for cattle have become important habitats for Chiricahua leopard frogs, so tools that help us work in partnership with ranchers are critical to recovery.

On Ted Turner's Ladder Ranch in New Mexico and at a high school in Douglas, Arizona, captive propagation and head-starting facilities are under construction. Thanks to the Arizona Game and Fish Department, Tonto

National Forest, and Phoenix Zoo, aggressive efforts to restore habitats and reestablish populations are rebuilding a metapopulation (a group of spatially separated populations that exchange individuals through immigration and emigration) of Chiricahua leopard frogs near Young, Arizona. Meanwhile, the Phoenix Zoo and the Arizona-Sonora

Combining outreach and recovery, students and their parents from Sierra Vista, Arizona, assist in a release of frogs that were head started at the Phoenix Zoo.



Jim Florabaugh



Elizabeth Slown

Anna Slown (left) and Hannah Jacobsen (right) model the Chiricahua leopard frog tattoo that was produced for outreach about this threatened amphibian.

Desert Museum near Tucson are cautiously breeding the last remaining frogs from the Coconino National Forest and the Santa Rita Mountains in Arizona for reestablishment at multiple sites. Major habitat restoration programs underway at two sites in southeastern Arizona and one in the bootheel of New Mexico will benefit Chiricahua leopard frogs and other imperiled wetland species. We are also working with Mexican partners to build capacity for amphibian conservation in northwestern Mexico. In August 2008, we will hold a workshop at a private reserve in northern Sonora owned by Naturalia (a Mexican conservation group) to instruct Mexican biologists on survey protocols and techniques for captive husbandry, propagation, and headstarting of amphibians.

Restoring an imperiled species is not an easy process, but with hard work from many partners, we are beginning to see how the Chiricahua leopard frog might one day be secure again. Recovery is still a distant destination, but the journey has begun.

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Giving Leopard Frogs a Head Start

by Tara Sprankle

Despite being one of the most arid states, Arizona is home to a wide variety of amphibians. There are 25 native species as well as a few introduced species. Unfortunately, populations of many of our native amphibians have declined dramatically. The primary threats include disease (chytridiomycosis, a fungal infection attacking amphibians around the world), habitat loss and fragmentation, and introduced predators such as bullfrogs, several crayfish species, and non-native sport fish. Because of these threats, all six species of Arizona's native leopard frogs are protected by the state

and one, the Chiricahua leopard frog (*Lithobates chiricahuensis*), is also listed at the federal level as threatened.

The Phoenix Zoo has been working with state and federal agencies and private groups for over 10 years to recover several species of native leopard frogs. These partnerships began in the late 1990s when native leopard frogs were experiencing dramatic declines. Some populations had dwindled to fewer than 100 animals.

Because of high mortality rates in the wild for eggs and small tadpoles, we decided to collect egg masses from the

Chiricahua leopard frog



Tara Sprankle

wild and rear them to large tadpoles or small frogs, life stages that provide a greater chance of survival when reintroduced. In the wild, only about five percent or fewer of the eggs in a mass survive to metamorphosis. In captivity, we have gone well beyond that and have had over 90 percent of an egg mass survive to be released as froglets or late-stage tadpoles. Releasing a large number of animals back into a site greatly increases the chance that more will survive to adulthood and reproduce. In the small, isolated populations in Arizona, releasing a large number of individuals at one time also helps ensure that the “founding population” contains as much genetic diversity as possible.

To that end, the zoo constructed the Montane Anuran Conservation Center as a temporary rearing facility for native amphibians. It was built from two insulated cargo carriers that were outfitted with air conditioning units, full spectrum lighting, and aquaculture tubs for rearing large numbers of tadpoles. The facility worked well for many years despite its limited amount of space. Recently, we have begun using a new system that uses smaller polycarbonate boxes stacked on shelves. These lower density containers allow us to more closely monitor the health of individual animals and make minor adjustments to captive conditions.

Our head-start planning cycle begins prior to the start of the field season. At

that time, the recovery teams identify donor and recipient sites for release of head-started individuals. Once the breeding season begins, volunteers and state and federal biologists monitor donor sites for breeding and spawning activity. Once they find an egg mass, they notify the zoo. Whole or partial egg masses are transported to the zoo and set up in a tank to hatch. Zoo staff then raise the tadpoles until they become large tadpoles or small metamorphs, at which time they are released back into the wild. Between 1995 and 2007, the zoo head-started over 7,000 tadpoles and frogs! This year, we will move into a new facility built on the zoo grounds called the Native Species Conservation Center (NSCC). The pur-

Staff from the Phoenix Zoo and the Forest Service release captive-produced frogs into the wild.



Tara Sprankle

pose of the NSCC is to head-start native Arizona species for release as well as to provide short-term housing for populations or individuals in jeopardy. The facility will also educate the public about local and global conservation issues. Moving into the NSCC will give us more space and flexibility as well as allow us to work with multiple populations of frogs at the same time.

Since 2001, some populations of the Chiricahua leopard frog have recovered enough that hundreds of egg masses have been laid in the wild. This increase allows us to shift towards the more natural approach of supplementing current populations by translocating wild egg masses or tadpoles rather than only releasing head-started captive stock. The number of ponds where Chiricahua leopard frogs

have become or are becoming established has increased four-fold. This project is a great example of how various government agencies and private groups can work together to help stabilize a declining population.

Although the Phoenix Zoo's primary contributions to southwestern frog conservation have been head-starting of egg masses, developing and improving captive husbandry techniques, and captively rearing frogs, members of the zoo staff have also participated in population surveys, habitat restoration, and presentations to educate the public about the plight of amphibians. In 2008, we plan to bring back the Tadpole Taskforce, a group of volunteers used in the early 1990s to help with the daily care of the tadpoles. Their help was invaluable, and

it gave interested people a way to become directly involved with conservation. We hope that the zoo's continued efforts will make a difference in the survival of the Chiricahua leopard frog as well as Arizona's other native amphibians.

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Chiricahua leopard frogs hatching at the Phoenix Zoo



Tara Sprankle