Beyond Captive Propagation

by Mike Demlong

Shell of the Kanab ambersnail
Photo by Jeff Sorenson/Arizona Game and Fish Department

For native species like the black-footed ferret *(Mustela nigripes)*, California condor *(Gymnogyps californianus)*, and Mexican wolf *(Canis lupus baileyi)*, the role of zoos and aquariums in partnership recovery efforts seems fairly straightforward. Our roles include propagating animals for reintroduction to native habitats and interpreting the plight of these species and their ecosystems for our millions of visitors. But our efforts extend well beyond captive propagation and visitor awareness. Zoo and aquaria staff throughout North America also contribute to the recovery of native species by participating in habitat renovation, population surveys, basic research, control of non-native species, interpretive materials design, and maintaining genetic refugia. The Phoenix Zoo has been active in many of these areas, some examples of which follow:

Kanab Ambersnail

The Kanab ambersnail *(Oxyloma haydeni kanabensis)* is an endangered terrestrial mollusk with only three known populations, all in the American Southwest. Two populations inhabit privately owned wetlands in southern Utah, and the third lives at a large spring along the Colorado River in Grand Canyon National Park. Human activities such as groundwater pumping, commercial development, and livestock grazing potentially degrade the snail's habitat on private land, while large water releases from Glen Canyon Dam could threaten the Grand Canyon population. To promote the recovery of this snail and protect it from future human-related threats, the Kanab Ambersnail Working Group was formed. This is an informal group with diverse membership including Federal and State agencies, university researchers, and non-governmental facilities such as the Phoenix Zoo. In addition to recovery planning, zoo staff have been fortunate to participate in habitat and population surveys and the translocation of snails to new sites in the Grand Canyon.

One role of The Phoenix Zoo in supporting the recovery plan has been to create and maintain a refugia population. Although there are no plans to use the captive animals for future reintroduction, the option exists should a rare catastrophe eliminate the Grand Canyon population. Staff from the zoo and Arizona Game and Fish Department designed and created two outdoor refugia, complete with a dripping spring, host plants collected from the canyon, and the appropriate sandstone substrate. A public exhibit with interpretative information is scheduled to open in the fall of 2000.

Native Fish

The introduction of exotic sport fish and the diversion or impoundment of southwestern rivers has contributed to the extirpation, or some cases extinction, of many native fish species. The Phoenix Zoo grounds contain a series of artificial lakes, ironically filled decades ago with water diverted from a now dry river that once flourished with native fish species. In partnership with biologists from Arizona State University, the American Zoo and Aquarium Association's Freshwater Fish Taxon Advisory Group, the Fish and Wildlife Service (FWS), and the Arizona Game and Fish Department, zoo staff created

a plan to use one of the lakes as a refugium for endangered native fish.

The zoo's main lake was chosen due to its central location (a natural focal point for our visitors) and size (approximately 15 acre-feet). FWS fishery biologists assessed the lake and found it suitable as long-term habitat for a population of endangered bonytail chubs *(Gila elegans)* and razorback suckers *(Xyrauchen texanus)*. Our objectives were to create a genetic or broodstock refugium and to "head start" juvenile fish in a semi-natural environment. The plight of native fish in the wild and the zoo's role in their recovery are explained on large interpretive panels around the lake. Each of the panels displays life-size sculptures of the fish that inhabit the lake.

Before juvenile native fish were released, the exotic sportfish in the main lake were removed to other urban lakes. The lake was then drained and refilled with water filtered through a passive gravel bed to impede the reinfestation of sportfish. Approximately 200 bonytail chub and 5,000 razorback suckers reared at Dexter National Fish Hatchery and Willow Beach National Fish Hatchery were released into the lake in the summer of 1996. By the fall of 1998, some of the fish had reached a predator safe, sexually mature size and over 100 razorbacks were returned to their historic range in the Colorado River. Another release of fish head-started at the zoo is planned for this year.

In addition to bonytail chubs and razorback suckers, the zoo also maintains three other ponds for desert pupfish *(Cyprinodon macularius)* and Gila topminnows *(Poeciliopsis occidentalis)*. Although these species were originally established at the zoo as refugia or research populations, the pupfish and topminnow also provide the unexpected benefit of natural mosquito control for the zoo. Also, a small group of adult and juvenile pupfish will be moved to Cibola National Wildlife Refuge to establish another refugium population.

Southwestern Frogs

Many of the environmental issues that threaten native fish likewise affect native amphibians. Phoenix Zoo staff and volunteers are active partners in the conservation and management of four native southwestern aquatic frogs. Other partners include the FWS, Arizona Game and Fish Department, U.S. Forest Service, Department of the Army, Bureau of Land Management, The Nature Conservancy, and private landowners. Species of concern include the Tarahumara frog *(R. tarahumarae)* and the Chiricahua *(Rana chiricahuensis)*, northern *(R. pipens)*, and Ramsey Canyon leopard frogs *(R. subaquavocalis)*. The Tarahumara frog has been extirpated from the State and the other species are experiencing severe declines. The Phoenix Zoo's conservation efforts with leopard frogs are as diverse as the partnerships, and they range from recovery planning to captive rearing.

One conservation strategy the zoo has helped refine is a head-starting technique. Due to high predation and mortality of frog embryos and larvae, small portions of egg masses are removed from the wild and cared for at the zoo's Montane Anuran Conservation Center (MACC) until they metamorphose. The MACC was built from two

Staff from Dexter National Fish Hatchery releasing juvenile endangered fish, such as the razorback sucker (inset), into zoo's main lake

Above: Photo by Dick George/The Phoenix Zoo
Inset: USFWS photo

recycled ocean cargo trailers that have been fitted with air conditioning, banks of full-spectrum lighting, and a series of plastic pools with separate filtration and aeration systems. These buildings are treated as quarantine facilities and are cared for primarily by a group of volunteers known as "The Tadpole Taskforce." Frogs reared in the center are toe-clipped for future identification and returned to the original egg collection site. Survivorship from embryo to newly-developed frog at the facility is remarkable high, over 90 percent, and the staff have produced and released over 3,000 animals (as of spring 1999) to supplement severely declining wild populations. Thus far, at least two animals head-started at the zoo have reproduced at one release site.

Rearing frogs for wild release is only a small part of the zoo's effort to protect native frogs and their ecosystems. Staff and volunteers spend considerable time participating in population monitoring, habitat renovation, non-native species removal (e.g. bullfrogs), making community presentations, and recovery planning. Additionally, staff have made significant discoveries about captive husbandry, dietary needs, larval growth rates, stocking densities, and life support system design.

(Right) Phoenix Zoo volunteer releasing a head-started Ramsey Canyon leopard frog into Ramsey Creek on property owned by The Nature Conservancy
Photo by Teresa Azzato/The Phoenix Zoo

Our most important contribution to frog conservation is creating public awareness of the precarious plight facing amphibians locally and globally. We engage zoo visitors and the general public using color posters at environmental fairs, print and video media interviews, community presentations, behind-the-scenes tours of the conservation center, video production, and an interactive box of interpretive material available for loan to schools.

Whether it's a snail, fish, or frog, our nation's zoos and aquaria often do much more for wildlife than captive propagation. Just ask us!

An adult Ramsey Canyon leopard frog
Arizona Game and Fish Department photo

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