



US Fish & Wildlife Service

Nevada Fish and Wildlife Office

Preserving The Biological Diversity Of the Great Basin, Eastern Sierra & Mojave Desert

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Working to Conserve the Devils Hole Pupfish



Inside this issue:

Devils Hole Pupfish **2**

Amphibian Conservation **3**

- Columbia Spotted Frog
- Amargosa Toad
- Relict Leopard Frog

A message From The Field Supervisor **4**

The Devils Hole pupfish (*Cyprinodon diabolis*) was listed as endangered in 1967. This iridescent blue inch-long fish's only natural habitat is in the 93 degree waters of Devils Hole, which is a detached unit of Death Valley National Park. Although the cavern is over 400 feet deep, the pupfish are believed to spawn exclusively on a shallow 1,800 square foot rock shelf just under the waters surface. They are believed to have been isolated at Devils Hole for at least 600 years.

The Devils Hole pupfish, to our knowledge, has never occurred in large numbers. Since population surveys began in 1972, the population has never exceeded 553 individuals. This short-lived species (~1-year) has a natural high and low cycle, with the population in the fall being larger than that in the spring due to natural die-off during the winter months.

A 1975 Supreme Court decision, in favor of protection of the Devils Hole pupfish spawning habitat, reduced groundwater

pumping. At that time there were only 127 individuals. Although the water level in Devils Hole never recovered to pre-pumping levels however, populations of pupfish did increase.

In 1997, fall population surveys started to indicate a downward trend for unknown reasons. The population from 1997 to 2004 declined from an average of 275 individuals to 171 fish and in November 2005, to 84 individuals. Surveys conducted on April 2006, located 38 adult pupfish and surveys of a captive population at Hoover Dam Refuge yielded a total number of 29 individuals. Both populations were skewed heavily toward males.

Because of this continued decline, Management decisions regarding conservation efforts for the Devils Hole pupfish were elevated to the Regional Directorate level of the Fish and Wildlife Service, National Park Service, and Director of the Nevada Department of Wildlife. These decisions have been

Devil Hole Pupfish (continued)



Devils Hole location

carefully and deliberately discussed and debated prior to implementation. Full time staff from several agencies have been devoted to bring together expertise and establish emergency techniques to secure additional populations outside of the pupfish's natural habitat to prevent extinction.

Two propagation facilities have been established; one at Shark Reef at Mandalay Bay and another at Willow Beach National Fish Hatchery (Willow Beach NFH).

Biologists move hybridized pupfish from Point of Rocks (right) and male Devils Hole pupfish from Devils Hole (below) to Shark Reef at Mandalay Bay



A hybridized pupfish, a cross of the Devils Hole pupfish and the Ash Meadows Amargosa pupfish from Point of Rocks

Refuge, was used by biologists to establish transportation and propagation protocols for the pure strain of Devils Hole pupfish. In early May 2006, both of the new propagation facilities received 40 of these hybridized fish. Successful spawning and rearing of hybridized pupfish at both facilities is continuing.



In mid May 2006, two pure male Devils Hole pupfish were captured and transferred to Shark Reef at Mandalay Bay. Two pure female Devils Hole pupfish were transferred to that facility from Hoover Dam

Refuge for breeding purposes. The pupfish were selected from the two populations in order to maintain genetic diversity.

Although the transfer and propagation of the hybridized pupfish has been successful, the transfer of the pure Devils Hole pupfish has been

challenging. The pure Devils Hole pupfish did spawn, however, the eggs were not viable and both of the males died shortly after spawning. A decision was made to move two additional males from Hoover Dam and place them with the females since they appeared gravid. An additional loss of one of the females was reported in late June prior to being placed with the males. Biologists have not been able to determine the cause of the mortalities; these fish may have reached the end of their normal life span.

Devils Hole pupfish is a highly endemic species and only occurs naturally in one very small isolated system in the Mojave Desert. Narrow endemic species like the Devils Hole pupfish are at greatest risk of extinction since they do not have the flexibility to change locations or adapt to changing environments. Conservation biology principles suggest that small populations may not be capable of genetically maintaining themselves over a long period of time (i.e., may not be able to overcome the loss of genetic variability without human intervention).

Managers are now in a situation that can be compared to that of the California condor. They will be using a Structured Decision Making Process to determine all future Devils Hole pupfish conservation actions.

Agencies know that reversing the downward trend of Devils Hole pupfish will be difficult. The situation is compounded by the low numbers, skewed sex ratio, short lifespan of the Devils Hole pupfish, limited genetic diversity, and the difficulty of rearing them in captivity.

Amphibian Conservation Efforts In Nevada

Columbia Spotted Frog

In 2003, partners working to conserve the northeast and central Nevada populations of Columbia spotted frog signed a Conservation Agreement and Strategy for the spotted frog. These partners include the Bureau of Land Management (BLM), Nevada Department of Wildlife (NDOW), Nevada Natural Heritage Program, Service (Service), U.S. Forest Service (USFS), Nye County, and the University of Nevada Cooperative Extension (UNR). A conservation agreement and strategy is a tool that identifies actions that will be taken to reduce threats to a species and will help a species recover.

In 2004 the partners focused on habitat restoration and pond enhancement. A total of 22 new open water ponds in northwest Nye County were built to enhance vital habitat to better withstand drought conditions. A variety of designs were used to create breeding, rearing, and over wintering habitat.

In March 2006, Chad Mellison, Service Biologist, and the Central Nevada Spotted Frog Technical Team were presented with the USFS's 2005 Intermountain Region Rise to the Future Award for their work in the Collaborative Aquatic Resources Stewardship Category.



Columbia Spotted Frog
(*Rana luteiventris*) a candidate for listing under the Endangered species Act

Amargosa Toad

The Amargosa toad is found in southern Nye County along a 10-mile section of the Amargosa River. This biologically unique area supports a number of rare species and plants in addition to the toad.

In 2000, an Amargosa Toad Conservation Agreement and a Beatty Habitat Project was signed to protect the toad and its habitat and other species in the Beatty Area.

Listing of the Amargosa toad was

avoided by local conservation efforts. A working group including, BLM, the Service, NDOW, Nye County, The Nature Conservancy, Amargosa Conservancy, Nevada Natural Heritage Program, Beatty Habitat Committee, and the Audubon Society have tagged and released more than 4,800 toads have in the Oasis Valley. The natural flow of springs has also been restored and non-native species are being removed.



Amargosa Toad
(*Bufo nelsoni*)

Relict Leopard Frog

The relict leopard frog considered extinct in the 1950s, was rediscovered in 1991 at seven sites in three small areas in Nevada and Arizona.

A Conservation Team including the Service, NPS, BLM, BOR, EPA, Clark County, NDOW, Arizona Game and Fish, UNR at Las Vegas, UNR at Reno, and the Southern Nevada Water Authority, are looking for suitable natural areas to establish new populations that provide sufficient perennial surface water and are free of introduced predators. They

are also augmenting existing populations with captive-reared frogs. Efforts are underway now to establish refugia at the Service's Willow Beach National Fish Hatchery and various springs in Nevada and Arizona.

These partners signed a Conservation Agreement and Strategy for the relict leopard frog in 2005 to enhance existing habitat; develop new aquatic habitat; increase the number of individuals and populations; and monitor and conduct research.



Relict Leopard Frog
(*Rana onca*) a candidate for listing under the Endangered species Act



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A Message From The Field Supervisor

We are fortunate to have a number of partnerships in Nevada that have helped us to conserve Nevada amphibian species. Three of those conservation partnerships are highlighted in this issue.

We are however, at a critical time and face an extremely challenging situation with the Devils Hole Pupfish. The situation of the pupfish can be compared to the California condor, North Carolina red wolf and the Florida panther and we have some difficult decisions facing us as we try and reverse its decline.

I find myself in a situation that any manager devoting a life-time of conservation and protection of America's wildlife hopes they will never be faced with. Reversing the decline of the Devils Hole pupfish is difficult and the situation is compounded by the low numbers, short lifespan, and the difficulty of rearing them in captivity. However, I feel fortunate to be working with the scientists, the National Park Service, and the Nevada Department of Wildlife who share the responsibility and have devoted staff, time, and critical resources to help reverse the decline of this very important species. I am hoping the information provided in this issue will update you on the status of the Devils Hole pupfish and the conservation activities underway.

Sincerely,

Robert D. Williams

