Field Trip To Railroad Valley, Nevada

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The personal need or commitment to work with endangered fish can be approached from various points of view. It is at best a moral platform that should be taken by each of us. It is also a respectful endeavor, something that can be given back to nature with tangible results (Meltzer, 1995). These solutions, procedures and information passed to us from documented experiences become a tool. A tool that can be used to lessen the results of a shrinking natural habitat. This communication of working with conservation should also translate in a positive way when the amateur approaches the professional for clarification. Supervised work projects led by knowledgeable government, academic personnel and amateur groups can heighten one's understanding of captive fish being bred for conservation purposes.

The experience and opportunity of working in the field with some of the most endangered fish in North America is hard to convey. The Great Basin area of Nevada and the plight of its native fish fauna is well documented. From a scientific perspective, they represent one of the most striking examples of evolutionary change now to be found on our planet (Bunnell, 1970).

The destruction of the habitat, outlined by Doug Warmolts (1991), comes from many sources. Warmolts states this environment has suffered from the disturbances of man. He goes on to list that several enterprising companies and individuals have tried to use the land for agriculture, developments, mining, and cattle.

Antique water is pumped from the underground water table to meet these needs, thus lowering its level and threatening all surface waters which are fed from the same source. The over-taxed system is subject to drying up, pollution and complete destruction of the fragile ecosystem. In conjunction

The Railroad Valley Springfish is endemic to seven thermal springs in Railroad Vally, Nevada.

with the added effects of non-native introductions, the increased pressure on the natives has successfully wiped out entire populations of spring fish at various sites. This continues to be a re-occurring problem for professional fish managers.

Management recommendations for the spring fish that inhabit this region include annual monitoring of the fish population and habitat conditions (Williams & Williams, 1989). This strict supervision of species habitat and need of increased manpower in the field prompted the Nevada Division of Wildlife (NDW), Region III, Las Vegas, NV, to implement the use of amateur volunteers in this endeavor.

Don Greig, Bay Area Killifish Association (BAKA) conservation liaison, and Jim Heinrich, NDW, have worked out a schedule of supervised field trips and work projects that help meet the goals of in-situ maintenance for the springfish and restoration of various habitats. Bi-annually the BAKA funds and organizes a project to assist in this work, setting up three to five day field trips that produce sound standardized data used by the professional community in the management of various fish populations within Nevada. This is the fourth year that BAKA has worked at these seven spring locations in the Great Basin area. There are three activities that BAKA assists with; the population survey and elimination of exotic and competitive predatory fish (bass, mollies, mosquito fish, and convict cichlids).

The following field observation is but a brief overview of the Fall, 1994 conservation trip. The species of concern being the Railroad Valley springfish (*Crenichthys nevadae* Hubbs), found naturally only within the confines of Railroad Valley, Nye County, Nevada (Baugh & Brown). Several locations in this valley were observed by the team, including Big Spring, North Spring and Hay Corral Spring on Lockes Ranch closely adjacent to Highway 6 . With the bulk of the work being to ascertain the present population of the Railroad Valley springfish that were introduced into the outflow of Chimney Hot Springs, in 1978 to aid survival of this threatened species (Williams & Williams, 1989). The Railroad Valley springfish is reported by Williams, to be endemic to seven thermal springs in Railroad Valley, Nevada. Williams further states that native populations of Railroad Valley springfish are threatened by channelization and diversion of springflows and grazing of riparian areas by livestock. Introduced fish are competing with native fish stock at various locations.

These field trips help build an ethic in the casual volunteer and foster awareness of the standardized scientific approach. With the two-fold benefit of providing important field data and man hours to complete tasks in conjunction with the NDW in managing projects that might not be accomplished with the limited resources available. Education of the effects of habitat degradation is an intricate part of protecting these fish. The authors were pleased to take part in this survey and thank both the state of Nevada and the Bay Area Killifish Association in providing this opportunity to learn and experience working with a species in such dire straights.

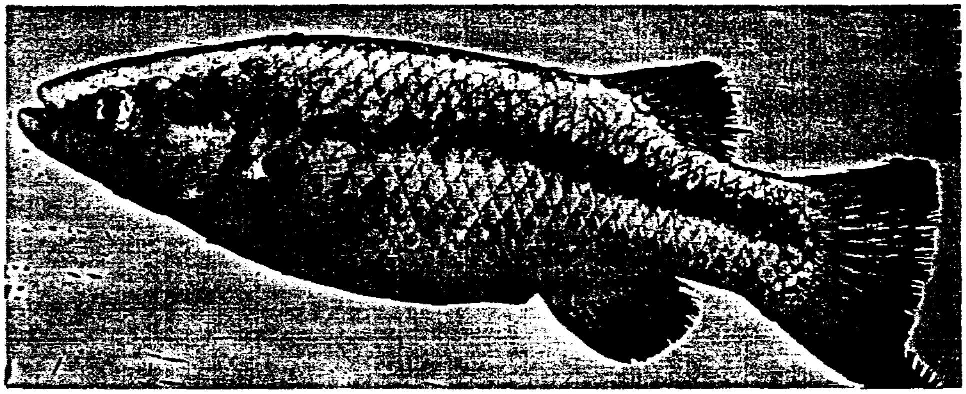
Desert Springs

Aquatic fauna and flora cannot survive without water. Therefore it is unusual to find aquatic organisms in the desert. However, many of the world's deserts contain springs which provide relatively permanent sources of fresh water. Many of these springs are inhabited by a variety of unique fish, invertebrates and other fauna. Desert springs have allowed many plants and animals to survive and flourish despite such dry conditions. Thus, much of the fauna is often considered relictual. Due to their relatively small size, isolation, and the fact that they contain few species, springs are considered to be relatively simple ecosystems; this makes them excellent sites for studying energy flow through ecosystems. Unfortunately, the long-term survival of desert springs and their associated fauna is under serious threat around the world. The future of desert springs in North America appears unpromising.

Why should we be concerned with fishes in desert springs? Most desert springs fish species are not found in any other habitat type. Consequently, many of these fishes have developed unique adaptations. One example is the ability of a pupfish (*Cyprinodon pachycephalus*) and a gambusia (*Gambusia sp.*) to breed and survive at temperatures as high as 113°F! In most cases, individual fish species are endemic to one or a few springs and are found nowhere else. This isolation provides evolutionary biologists with excellent opportunities to study local processes of speciation and evolution.

Springs have several characteristics that distinguish them from other freshwater habitats. Springs do not rely primarily on rainfall; their water comes from underground. Springs occur in two general types. Small springs may form a stream without a significant head pool. Larger springs generally create a pool. The inlet source of such springs can usually be seen easily. Often it is a large cave-like hole in the spring's bottom, through which the source water emerges. The water usually leaves the pool via a small stream, typically feet wide and 1feet deep in smaller springs and up to 10 feet wide and feet deep in larger springs. Depending on the terrain, the outflow may break up after a distance, forming a swamp or cienega representing the terminus of the outflow. Water may be hot or cold, depending on its source. Spring water tends to have a very consistent salinity, temperature and hardness; changes in these measurements only occur gradually along the gradient of the stream. The quantity of water emerging from the ground is also usually constant, even during dry seasons. Consequently, springs, so long as they keep flowing, are more stable then riverine habitats.

Fishes were observed easily by walking along the outflow channels or by sitting still and watching a



White River springfish (C. baileyi) a close relative to the Railroad Valley springfish (C. nevedae).

site. Dip nets and bait traps were used for collecting. *C. nevadae* is presently a member of the family Goodeidae (Mexican livebearers), although it was once considered to be in the family Cyprinodontidae (pupfishes). It is a small species which grows to around 2-2.5 inches. It has a small mouth used for feeding on small invertebrates and algae, which are usually common along the edges and on the bottoms of springs.

Their morphology is generally typical of an ambush predator. They display a moderately deep body with smallish, rounded anal and dorsal fins, placed well back on the body, and a rounded caudal fin. This finnage makes it difficult for *C. nevadae* to maintain stability in a current, as it is not hydrodynamically efficient. However it would allow them to wait near the edge of a current, watching for prey items that are dislodged and washed downstream. When food drifts past, they can dart out, grab it and return to their post. Certainly they have no problem negotiating strong currents for short periods; we observed them doing this. They lack pelvic fins, which are often found in fishes living in shallow environments, particularly springs.

Sexually active males are brightly colored, with golden sides and a broken or spotted black line running horizontally along the middle of the flanks. Since the golden color of the male is used to attract females to spawn in their territories, only spawning or guarding males show this color. Females lack the golden color. The dorsal surface tends to be dark, while the lower surface is silvery. The fishes avoid predation from birds, etc, by having a dark dorsal surface so that they are difficult to see from above. They tend to dart into the substrate or algae to hide when disturbed.

Lack of Predators

These fish don't really have any aquatic predators to worry about due to the small, isolated nature of their habitat. When exotic predators are introduced, *C. nevadae* have no behavioral or physical adaptations to avoid them, so they get gobbled up. They tolerate a broad range of temperatures (we measured on-site temperatures of from 94.7-64°F). This capacity allows them to exploit most of the upper section of the spring, where two of their main food items, cyano-bacteria (blue-green algae) and algae grow.

Threats to Springs

Unfortunately, human encroachment has negatively impacted most of the springs we visited. This includes damming spring outflows to form pools. Most outflows visited had been diverted into channels. It appeared that different channels were used on different occasions, resulting in desiccation of whatever was present in the channel when it got diverted. Cattle grazing is a major problem. They tend to destroy the spring outflow channels and foul the water. This creates high bacteria and ammonia levels which can reduce the fishes' resistance to disease or kill them directly. A few spring heads had been fenced to keep stock out. However, most of the lower outflows were grazed. Fencing springs also creates problems. When grazing pressure is removed, the spring heads tend to become clogged with vegetation, causing the loss of fish habitat. Some springs have also been affected by excessive groundwater pumping. For example, Chimney Hot Springs ceased flowing once, killing the *C. nevadae* population which had to be reintroduced (Williams & Williams, 1989).

Introduced fish are also a major problem. The following species were recorded from some springs: goldfish, mosquitofish, shortfinned mollies, swordtails, channel catfish, European carp, and guppies. *C. nevadae* have not experienced competition from co-existing fishes for thousands of years. This makes them particularly susceptible to displacement by introduced species. Introduced male poecilids disturb native fishes by constantly chasing them, trying to mate with them. Poeclid young tend to occupy the same habitats as young *C. nevadae* and may eat their eggs and fry. Large introduced predators prey heavily on other smaller species.

Amateur volunteers can interact with professional recovery strategies. As a non-professional it is not difficult to admire fish for aesthetic reasons. When feelings of Eco-helpfulness develop, affiliating with conservation projects promotes a feeling of oneness with nature. When weapply standardization, scientific model, and proper technique, everyone benefits. The data which is standardized, can give a benchmark for future results, but most importantly the amateur becomes a participant versus a reflection from a glass tank at a major public aquarium.

Sanctioned conservation projects are limited, but the desire to make a difference is not. There are differences that are going to separate the scientific community from hobbyist. Type of organization, longevity to task, and precise standardized records are but a few. However, affiliating with Conservation Working Groups (CWG's) similar to the Bay Area Killifish Association, can be beneficial. The endeavor can work towards increasing habitat, captive stock and creating a volunteer specialist for conservation, not unlike any municipal volunteer fire fighter. The amateur can be well equipped with skills and certification to assist in professionally supervised recovery projects. The hobbyist contributes, respectfully, to the remainder of our limited resources and our appreciation of fish.

For information on the Spring field trip to Nevada contact BAKA, Don Greig, 1675 Calle Ranchero, Petaluma , CA 94954 or telephone 1-707-762-2680.

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