



WILDLIFE NOTES

Silvery Minnow

The Rio Grande Silvery Minnow (*Hybognathus amarus*), a fish that once dominated a biological niche that spanned 3,000 meandering miles, is now federally endangered and occupies less than 200 miles (about 7%) of its historic range.

RANGE

The Rio Grande Silvery Minnow was once an abundant species in the Rio Grande basin from Colorado to Texas and into Mexico. In New Mexico, it was found in the Chama River, the lower Jemez River, most of the Rio Grande, and in the Pecos River from near Santa Rosa to its confluence with the Rio Grande.

In the last 150 years, both the Pecos River and the Rio Grande have undergone dam building, channel straightening, and removal of snags and aquatic plants. These changes reduced the rivers' complexity. Where the rivers once had floodplains, islands, side channels, shallow pools, eddies, and debris piles, they are now primarily straight, uniform channels. Dams split the remaining habitat into four separate areas. Due to the minnow's inability to swim upstream past the multiple dams, most of the remaining fish live in the short stretch of river between San Acacia Dam and Elephant Butte Reservoir. Sadly, this is the stretch that most often goes dry due to irrigation diversions.



HABITAT

The Rio Grande Silvery Minnow uses only a small portion of the available aquatic habitat: shallow low velocity eddies formed by debris piles, pools, braided stretches, oxbows and backwaters with silt bottoms. It avoids main channel runs, which are deep and swift. Thus, the species does not need a large quantity of water but it does need continuous flow.

DESCRIPTION

The Rio Grande Silvery Minnow is a small, relatively nondescript fish that rarely exceeds four inches in length. Its chunky, cylindrical body is greenish-yellow above, and cream-to-white below. The snout is rounded and overhangs the upper lip. It has small eyes and a small mouth.

DIET/FEEDING

Rio Grande Silvery Minnows eat algae and diatoms from the nutrient-rich silty bottoms of quiet stretches. They also pick up pollen, bacteria and organic debris while nibbling.



Biologists search for Silvery Minnows. Photo: USFWS

REPRODUCTION

Historically, spring runoff from mountain snowmelt, combined with increasing water temperatures, was the stimulus for reproductive activity. A male chases a receptive female, nudging and nipping at her abdomen, then wraps around her and squeezes her mid-section. The male and female release their sperm and eggs simultaneously, then let their fertilized semi-buoyant eggs drift downstream. Egg hatching time is rapid, 24-48 hours. Newly hatched larvae continue to drift passively for about 3 days, then their swim bladders develop and

they actively seek low velocity habitats and begin feeding on algae. Once they reach 11-12 months, they are ready for spawning. Maximum documented longevity in the wild is about 25 months but very few survive more than 13 months.

That was then. Now, with habitat degradation, the minnow's floating eggs have become its Achilles' heel. They often drift down the Rio Grande into the deep, inhospitable and predator-laden waters of Elephant Butte Reservoir. In some cases eggs or young may drift off into irrigation ditches, or down to dry stretches of the river during drought years.

CONSERVATION

Hybognathus amarus is the last of a reproductive guild of five broadcast-spawning minnow species that historically occupied the Rio Grande in New Mexico. The four other species no longer exist there; two of them no longer exist anywhere. In 1994, the Rio Grande Silvery Minnow was listed as endangered under the Endangered Species Act, and is also listed as endangered under New Mexico state law.

Formerly abundant, the species has suffered significant declines since the middle 1950s. During the 1960s, dams constructed on the Rio Grande and its tributaries altered historic flow patterns and sharp declines in Silvery Minnows were noted. Among other things, dams change water temperature, alter the natural flow regime (no spring runoff to cue spawning) and prevent the minnows from returning upstream to recolonize areas where the population has died out. The mid-1960s introduction of nonnative fishes, such as the Plains Minnow, also coincided with the Silvery Minnow's decline. Channel-

ization narrowed and sped up the rivers, degrading minnow habitat by eliminating the slow water and silty bottom they require. In 1996 the entire flow of the river was diverted for weeks for irrigation, which resulted in the deaths of over 10,000 minnows.

The remnant population has continued to decline, despite its 1994 listing as endangered. Numbers declined two to three orders of magnitude between 1993 and 2004.

In 2004 and 2005, the abundance of Rio Grande Silvery Minnows increased. This was partially due to the 60,000 fish that were stocked from captive breeding programs along with an increased number of days of high flows in 2004. To date, more than 600,000 Rio Grande Silvery Minnows have been released. Litigation as well as voluntary cooperation has resulted in some increase in flows. Several habitat restoration projects have already been completed.

However, no fish species has ever been successfully restored from captive populations alone without habitat improvements, and captive propagated fish show much lower levels of genetic diversity than the wild populations which themselves show alarmingly low diversity. The ability of a species to adapt and persist through time is much determined by the amount of genetic variation it has. Between 1987 and

2005, the dwindling numbers of Silvery Minnows showed a diversity decline of almost 20%. Even though there were many thousands of fish left, in terms of the diversity they passed on to future generations, in 2005 they were acting like fifty fish!

Although various conservation efforts are currently being carried out and numbers have increased in recent years, the threat of extinction continues. In addition to the goals of habitat restoration and minnow reintroduction, more efficient water management, voluntary water leasing by irrigators (forbearance) in time of drought, increasing both urban and agricultural water conservation, ensuring pollutants don't run off into the river, and establishing a permanent endangered species conservation water pool may be measures that can preserve the river and the minnow.

There is a saying in the Southwest: *agua es vida*, water is life. The Silvery Minnow is a reason for people to pay closer attention to man's effect upon the environment. If we value the Rio Grande, New Mexico's artery of life, then we must also value *Hybognathus amarus* for it tells us much about how we are treating the ecosystem. One of several meanings for the Latin *amarus* is bleak, dismal, or dreary. Let us hope this does not describe the future of this little fish.

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