

by Gordon Mueller and
Jeanette Carpenter

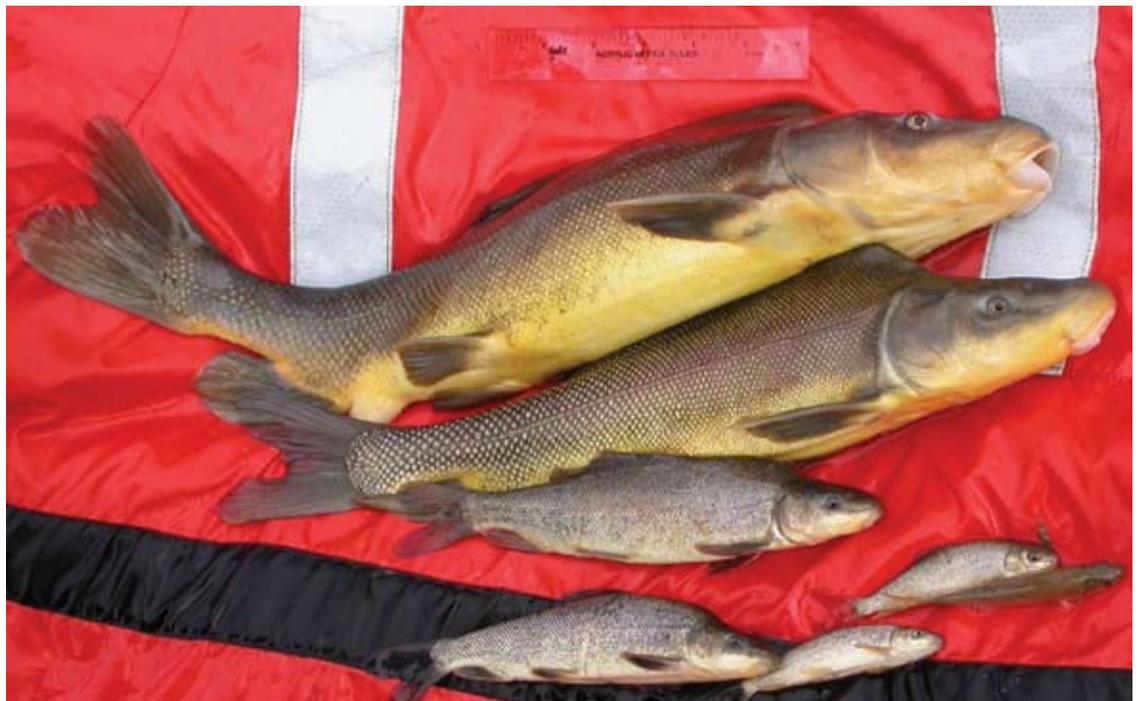
Bringing Back the Bonytail and the Razorback

A group of dedicated biologists are restoring two endangered fish species, the bonytail chub (*Gila elegans*) and the razorback sucker (*Xyrauchen texanus*), to portions of the Colorado River in the southwestern United States. Habitat alteration and the introduction of nearly 80 non-native species have brought these native fish to the brink of extinction. With their young being eaten by the introduced fish, none of the razorbacks or bonytails survive to replace adults as they die of old age. The last confirmed wild bonytail was captured two decades

ago, and fewer than 1,000 wild razorback suckers remain.

Since the early 1980s, nearly 1 million bonytail and 12 million small razorback suckers have been stocked into the river. Unfortunately, these young, small fish were preyed upon by channel and flathead catfish, sunfish, and black bass that were introduced for recreational purposes. Today, resource managers must stock large (at least 14 inches or 35 centimeters long) bonytail and razorback suckers simply to maintain their presence in the river system. Some younger fish

Three age classes of razorback sucker. The only measurable recruitment of razorback suckers has been in ponds where predators were absent. Shown here are two adults, two juvenile fish slightly more than a year old, and three fry only a few months old. The dorsal keel or "hump" forms as the fish mature.





USGS

Four age classes of Bonytail: Adult bonytail are streamlined fish built for swimming in powerful currents. Shown here is a large adult and three juveniles (ages 2 years, 1 year, and several months).

do survive and spawn, but their young continue to be eaten by the introduced fish.

Recognizing the imminent loss of these unique fish, a small group of biologists led by Tom Burke of the U.S. Bureau of Reclamation and Gordon Mueller of the U.S. Geological Survey (USGS) started a program in 1989 to save the razorback sucker in Lake Mohave, a 67-mile (108-kilometer) stretch of the Colorado River straddling the southern tip of Nevada and northwestern Arizona. Biologists from the U.S. Fish and Wildlife Service, National Park Service, Nevada Division of Wildlife, Arizona Game and Fish Department, and Arizona State University joined the effort, and this recovery work has now been expanded to the entire lower river.

One of the first steps in recovering these fish was to improve the survival rates of larval fish. Researchers discovered that razorback sucker larvae, like moths, are attracted to light. These fish spawn in late winter; so, before the wild larvae can be eaten by predators, volunteers venture out onto Lake Mohave with lights and small aquarium dip nets to capture them. Tom Burke, who has led this effort for more than a decade, explains: “We fondly refer to these ¼ -inch larvae as ‘two eyes and a wiggle.’” The larvae are then transported to the nearby Willow Beach National Fish Hatchery, where they are raised to at least 14 inches in length before being released. The approach of using wild-born fish is unique in that it maintains the

genetic diversity of the reservoir population; thus, these stocked fish originate from hundreds of wild parents rather than from a few dozen, which is usually the case with hatchery production.

The process of working with these species revealed other critical secrets about their biology. Fish and Wildlife Service biologist Chuck Minckley (now retired) discovered that both bonytails and razorback suckers spawned and produced young in an off-channel pond at Cibola National Wildlife Refuge, near Blythe, Arizona. Prior to this, biologists believed these fish required river conditions to successfully complete their life cycle. It soon became clear that both species are adaptable to varied environmental conditions. However, their young are completely defenseless against introduced predators. The key, then, was to separate the two.

Although recovery programs have been removing non-native fishes from the Colorado River for over a decade, it simply hasn’t been possible to reduce these predators to a level that will benefit native species. This and other problems led to the development of “A Conservation Plan for Native Fishes of the Lower Colorado River” (Minckley et al., 2003, in *BioScience* 53(3):219-234), which calls for the creation of a network

Gordon Mueller (USGS) shows off a bonytail chub.





Mitch Thorson (FWS) is pouring a bucketful of bonytail into the first sanctuary established for the species. When these fish spawned a month later, thousands of young were found enjoying their new home. These fish sanctuaries are the only place in the wild where bonytail young are surviving.

of isolated fish-rearing sanctuaries. Sanctuaries would allow for the repatriation of fish into floodplain habitats where they could grow to a size less susceptible to predation, while other work continues on minimizing or reducing threats to native fish recovery in the mainstem river.

“We speculated for years that these fish were totally dependent upon the river,” explains Mueller. “It turns out that these fish have the remarkable ability to thrive in both rivers and ponds. This suggests a survival strategy uniquely suited for the Colorado River, which historically was renowned for its severe flooding and prolonged droughts. The real beauty of this discovery is that, while we can’t control predators in the river, we can in small floodplain ponds.”

In 2005, with support from the Bureau of Reclamation, USGS scientists and agency partners began developing native fish sanctuaries in existing floodplain ponds in the Lower Colorado River basin. To date, 15 sanctuaries are in develop-

ment; of these, 12 have been stocked, and natural reproduction has been observed in two. USGS scientist Jeanette Carpenter is studying what makes these small communities tick. “We are finding that these sites vary considerably in terms of physical morphology, water quality, and aquatic communities,” says Carpenter. “We have a unique opportunity to study bonytail and razorback suckers in different types of environments throughout their life cycles, free of the impacts of introduced fish. From this research, we should learn which types of environment provide the optimal conditions for fish rearing, reproduction and survival.”

Thirty years of stocking the river has shown us what doesn’t work. We are finally making progress by reestablishing small, more manageable native fish communities. The information gained by these small successes will provide the information and experience needed to tackle larger and more complex recovery issues. These agency partnerships are essential to bring together the innovative thinking, expertise, and resources necessary to save these fish for future generations.

For further information on this project, the bonytail, and the razorback sucker, please visit www.fort.usgs.gov or contact Jeanette Carpenter at Carpenterj@usgs.gov or 303-445-2230. Gordon Mueller recently retired.