

# Leading-edge Science for Imperiled Bonytail

by Craig Springer

The grasslands of southeastern New Mexico, known mostly for cattle, crops, and an occasional UFO crash report, seem an unlikely place for leading-edge biotechnology. But the little town of Dexter, essentially a service center for ranchers and farmers, is host to a state-of-the-art National Fish Hatchery and Technology Center. Good water led to the center's founding in 1931, and game fishes were the focus then, but since 1990 its primary mission has been technology development for managing rare fish species such as the bonytail chub (*Gila elegans*).

The bonytail chub is one of the most imperiled vertebrates in North America. The not-so-gentle hand of nature has shaped the body of this fish over eons to fit its environment. A keel on its nape and a tightly fusiform body have allowed it to prevail in the harshest of conditions: turbulent and turbid water that is warmed by the intense southwestern sun. It was built for survival in a region where life can be a continuing struggle. The bonytail chub occurred historically throughout the Colorado River and its main tributaries, but its range has been reduced to a few larger channels of the Colorado River system and to lower parts of the Virgin River in Nevada. Changes in stream flows and water temperatures, direct loss of free-flowing habitat due to inundation by reservoirs, blockage of migration routes, and the introduction of non-native fishes are the primary factors responsible for the species' decline.

The bonytail hangs on, if only by a thread. That thread is a lifeline cast at the technology center. Scientists there have developed a brood stock, a captive population of adults, to produce off-

spring that ultimately will make their way back into the wilds of the Colorado River and its many large tributaries, which comprise the fish's native habitat.

"With so few adults left in the world, it is of paramount importance that scientific principles guide bonytail chub management," says U.S. Fish and Wildlife Service geneticist Connie Keeler-Foster. Toward that end, she has employed leading-edge technology to manage the bonytail chub stock on the genetic level. The center's laboratory was recently equipped with a DNA sequencer, an apparatus that allows her to identify individual fish by their genes.

The work can be likened to fingerprinting. Knowing the genetic makeup of the entire brood stock, essentially having a pedigree chart, permits the center scientists to selectively pair up males and females for mating. And therein lies the crux for survival, the strands in the thread. Picking mates that are most genetically divergent produces offspring that are more fit to face the rigors of life in the wild. "Mates well suited for each other may produce young that are less prone to disease," notes Keeler-Foster. "They themselves are more likely to reach adulthood and produce their own young in the wild. And that's what we want."

The end product, a reproducing population in the wild, is far removed from the day-to-day work of the technology center. But having sound science is the first step in conserving a species that stares extinction squarely in the face.

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**The Dexter facility is unique. It's one of 70 hatcheries operated by the Fish and Wildlife Service around the country, but is the only one dedicated entirely to the conservation of endangered fish.**



**Injecting bonytail chub for spawning**  
Photo by Peter J. Carboni/USFWS



**Bonytail chub**  
Photo by Craig Springer/USFWS