

Three Strikes but NOT OUT—An Endangered Species Continues to Hang on in Big Bend

By Gerard A. Hoddenbach

One of the more precariously balanced endangered species in existence, a small top-water minnow (*Gambusia gaigei*), still exists in West Texas' Big Bend National Park. This species, already three times previously reduced to a mere handful of individuals, is now receiving special management attention to provide for its survival in a natural environment.

Frederick M. Gaige, the noted University of Michigan biologist who first described numerous vertebrate species from the West-Texas area, collected a sample of a then-unknown fish in August 1928, from "... a marshy cattail slough fed by springs located close to the Rio Grande River at Boquillas, Brewster County, Texas ...". The next year, Dr. Carl Hubbs identified, described, and named those specimens in honor of Dr. Gaige as a new fish species, differing in a number of ways from its closely related parental stock (*Gambusia senilis*).

Twenty-six years passed before *Gambusia gaigei* would be collected again. Then, in 1954, it was again collected—this time from the same general locality as Gaige's original collection, but more specifically from Graham Ranch Warm Springs, a pond 20 feet wide, 40 feet long, 4 feet deep, but now obliterated by a modern campground development. Considerable confusion still exists regarding the exact spring from which Gaige collected the 1928 sample of Big Bend *Gambusia*, but even more confusion surrounds the question of how widely distributed the species originally was. Over the years, former natural springs and topographic features have been severely altered by floods on the Rio Grande and by human developments. However, it is crystal clear that today's entire, naturally surviving world population of *gaigei* exists only in a single, artificial warm-water pond ... and, that pond requires a continually running electric pump to maintain water flow and temperature regimes.

In 1956, the discovery of *Gambusia affinis*, catfish and perch in the Graham Ranch pond created the first clear potential for extinction of Big Bend *Gambusia*. *Gambusia affinis*, a common top-water minnow of the Southern states, and at least partially inter-specifically fertile with *gaigei*, potentially altering genetic makeup, is a species which outcompetes *gaigei* in calm water. Catfish and perch are both carnivorous predators. The already tenuous survival of *gaigei* in the pond was threatened. This clearly required the pond be seined to save as many individual Big Bend *Gambusia* as possible. The waters were then treated with rotenone (a fish poison) in what would eventually prove to be a futile effort to eradicate all remaining *affinis*. Only 25 *gaigei* were saved; 15 were placed in three nearby natural springs but, presumably, died within a short time; six others of the original group were stocked in an artificial pond near Panther Junction but two of the six died immediately and the other four and their progeny died during severely cold winter weather conditions in 1957; the last four of the original group of 25 were transported to laboratories of the University of Texas at Austin where they were maintained in an aquarium. The death of one of those aquarium housed fish reduced the total world population of *gaigei* to one female and two males. A severe crisis, indeed!

The three individuals surviving the winter in Austin

were returned to Big Bend during the spring of 1958, and placed in a pool specifically constructed for them. That single female and her young were quite prolific and, for a time, *gaigei* flourished and all seemed well. However, the *gaigei* pool became contaminated again by water overflowing from the nearby campground. Once again, *affinis* and carnivorous green sunfish were found in the *gaigei* pond and for a second time, only 15 *gaigei* were saved and transported to Austin, Texas. Two of that group died en route but 40 young soon born into the group increased the species' population number to 53. As additional insurance against catastrophe, 16 *gaigei* were flown to the University of Michigan and housed in laboratory aquaria.

The present artificial refugium pond in Big Bend, constructed in 1960, was filled with water from a nearby spring which historically had provided original *gaigei* habitat. Twenty of the 37 fish from the Austin laboratory population were transported to Big Bend in August 1960, and released into the new pond. When specialists determined a viable population existed in Big Bend, Michigan stocks were discontinued and the remaining 17 fish at Austin were moved to the Brackenridge Field Laboratory where they were continuously cultured for the next 15 years.

Again, in 1968, green sunfish were found in the refugium at Big Bend—probably placed there by well-meaning sport fishermen. Once the sunfish were removed, the *gaigei* population again temporarily flourished until another cold snap, in 1975-76, killed nearly all the fish in the Big Bend pond. The 17 remaining fish at Austin were sent to Big Bend to restock the pond, and, simultaneously, alterations were made to the pond to moderate the effect of winter temperatures and to combat the ever present problems of evaporation and falling water level. An electric pump was installed on another nearby (but lower elevation) warm spring to maintain a small but con-

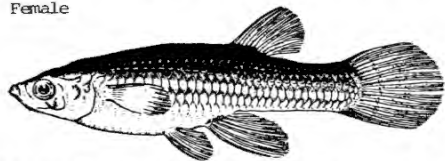


The trip starts here at Big Bend National Park, where Buddy Jensen of the U.S. Fish and Wildlife Service collects *Gambusia gaigei* for transport to the Dexter, New Mexico Fish Hatchery.

Male



Female



Seldom longer than 50mm, the small *Gambusia* is shown here about 1½ life size. The pictured fish is actually *Gambusia affinis*, the common southern U.S. form. The *gaigei* is separable from *affinis* only in the depth of the portion of body immediately in front of the tail. In the *gaigei*, that portion is larger than in the pictured *affinis*.

tinuous flow of water to the *gaigei* refugium pond. Additionally, the logistical problems which, at Austin, had long existed in culturing *gaigei* were resolved by moving the reserve and backup *gaigei* population to the National Fish Hatchery in Dexter, New Mexico.

The entire world population of *Gambusia gaigei*, already three times reduced to but a few surviving individuals, still comfortably lives in both Big Bend and Dexter refugia. Over the years, aquatic and climatic events have taken their tolls. Although complete restoration of the Dexter population has had to take place three times, it seems unlikely now that weather conditions will ever simultaneously be so bad at both locations that all existing *gaigei* perish. Still, an urgent need exists to establish *gaigei* in a naturally maintained habitat and as safe as possible from either man-induced or natural catastrophe.

Dr. Clark Hubbs of the University of Texas Department of Zoology, the U.S. Fish and Wildlife Service Office of Endangered Species, and the Southwest Regional Office of the National Park Service collaborated in 1977 to write the Habitat Management Plan for Big Bend *Gambusia*. Included within that plan are specific recommendations to:

- Remove the well house over the spring which furnishes water to the present refugium and restore conditions permitting a spring flow into a new channel.
- Establish *gaigei* in that channel from the present refugium pond.
- Once the stream population has been determined to be successful, eliminate the run-off channel so *gaigei* will be permitted to naturally occupy a spring-fed stream habitat.

Present problems regarding implementation of this plan involve tracing the spring aquifer to a higher elevation stratum, and then drilling a well to permit natural spring out-flow to run downhill from the well site. Studies, now in the initial stages, to do those things are pending. Upon their completion, *Gambusia gaigei* will once again exist in a natural and running water environment rather than as a caged zoo animal. Having already closely escaped total extinction three times, perhaps, at last, *gaigei* will be restored its own and unique place in our modern world.

Gerard Hoddenbach is the Regional Biologist and Endangered Species Coordinator for the Southwest Regional Office, P.O. Box 728, Santa Fe, New Mexico 87501.