

HIGHLIGHTS

Gambusia habitat restored in Big Bend

The Big Bend mosquitofish (*Gambusia gaigei*) is a federally endangered species whose only habitat in the wild is a few warm-water springs at Rio Grande Village in Big Bend National Park (Texas). A remnant of a wetter climate, the tiny, live-bearing fish has endured despite severely limited natural habitat. Furthermore, use of the area for farming before the park was established and subsequent park development worsened the situation. Farmers established roads, constructed ditches for irrigation, and drained the natural spring-fed wetlands to create arable land; the Park Service paved roads, installed a picnic area and freshwater pipeline, and developed a right-of-way for maintenance of an electric power line. By the 1960s, park resource managers were aware of the mosquitofish's tenuous existence and constructed ponds that became the core of their habitat. Beavers helped in the 1980s by building a dam in the runoff channel, but the fish still relied upon the artificial habitat that was vulnerable to leaks, toxic spills, and malfunctioning water pumps.

Recognizing the need for self-sustaining habitat, resource managers applied for funding from the NPS Water Resources Division to restore eight acres of natural, spring-fed wetlands. The project began in 1999 with the removal of an asphalt road and picnic area and recontouring of soils to retain water (fig. 1). The pipeline, power line, and a maintenance facility were also relocated out of the wetland habitat. Aerial photos, detailed topographic mapping, and soil analysis were key to understanding the former extent of the wetlands and in determining suitable upland sites for this infrastructure.

Now in the revegetation phase, the habitat restoration combines plant propagation and transplanting techniques. The park elementary school operates a greenhouse to propagate native plants for restoration projects in the park. For this project, the students are growing primarily salt-tolerant wetland grasses. Transplants also include cottonwoods, willows, baccharis, and cattails. Park Service staff and additional volunteers, including Student Conservation Association aides, Boy Scouts, area students, and local river outfitter employees are carrying out the revegetation (fig. 2). Resource managers watch for and control encroaching nonnative species in the newly disturbed area and have already removed tamarisk, palm trees, buffelgrass, and rabbit's-foot grass. Thorny mesquite thickets in the wetland

area, another result of pre-park agricultural practices, are being returned to wetland grasses through active removal and prescribed burning by park fire management staff.

The final phase involves consultation with the Water Resources Division and the U.S. Fish and Wildlife Service's recovery team for Big Bend mosquitofish to consider further enhancements to the habitat. These include considering alternatives to the current practice of pumping water from mosquitofish habitat for domestic uses and mitigating the impact of several farm-era earthen berms that alter drainage in the area. The group will also consider creating an additional pond within the restored wetland.

The park has established two scientific projects to monitor and document restoration results. One uses vegetation and insect monitoring transects as indicators of change in wetland function. The other is a network of soil and surface water monitoring devices (i.e., piezometers) to demonstrate hydrologic change in the system.





Figure 2. Employees transplant native wetland grasses to the restoration site. These and other transplants restore organic matter to the soil and retain moisture. When inundated, the vegetation provides shade and shelter for the mosquitofish, and supports the fish's diet of aquatic insect larvae. With removal of drainage structures and return of wetland soil and plant function, areas of permanent standing water will increase and seasonally wet areas will become more persistent.



Figure 1. The habitat restoration at Big Bend began with the removal of an asphalt road and re-contouring of the land to retain warm-water spring runoff for the endangered Big Bend mosquitofish.

