

Deep in the Heart of Texas

by Luella P. Roberts



Bone Cave harvestman

Photo by Wyman Meinzer/USFWS

The biologically diverse Texas Hill Country, composed of a wide swath of the Edwards Plateau west of the Balcones Escarpment, is home to 9 endangered species (3 birds and 6 karst invertebrates), more than 70 other rare animal and plant species, and a wide diversity of common species. This wild and beautiful area, with its mild climate and usually plentiful water, is dominated by shallow topsoil overlying limestone deposits up to 10,000 feet (3,050 meters) deep. It is also home to more Habitat Conservation Plans (HCPs) than any other region of the United States.

Karst features are formed by the dissolution of calcium carbonate in limestone bedrock by mildly acidic groundwater. They can take the form of caves, sinkholes, cracks, and crevices that may or may not be interconnected. Most karst features are too small for humans to enter. Although some may contribute to the recharge of underground stream systems, most in this region are considered “dry” because they have little, if any, perennial water flow or small catchment areas for surface run-off. However, humidity is often near 100 percent in these karst features and the temperature is relatively constant. Because of the absence of light for photosynthesis, cave dwellers depend on food and energy in the form of invertebrates and other animals from the surface, animal droppings, and leaf litter washing in from the cave entrance. Cave crickets and harvestmen or “daddy longlegs” that live inside the caves during the day and feed outside the caves at night contribute important nutrients to the cave ecosystem. Raccoons and other

small animals that hide and den in the caves are also very important contributors. Raccoon feces provide a growth medium for bacteria and fungi that supports a minute prey species (spring-tails). Surface plant materials also provide buffers against temperature and moisture changes.

All six endangered karst invertebrates in the Texas Hill Country are troglobites that spend their entire existence underground and have adaptations to subterranean environments, including small or absent eyes and elongated appendages. The Tooth Cave spider (*Neoleptoneta myopica*) is a small, whitish, long-legged spider with obsolescent eyes. The Tooth Cave pseudoscorpion (*Tartarocreagris texana*) is a large, eyeless pseudoscorpion with elongated appendages. The Bee Creek Cave harvestman (*Texella reddelli*) is an orange daddy longlegs with an increased leg/body ratio and well developed eyes, while the Bone Cave harvestman (*Texella reyesi*) is long-legged, pale orange, and blind. The Kretchmarr Cave mold beetle (*Texamaurops reddelli*) is a small, long-legged, and shiny reddish-brown beetle without eyes. Also reddish-brown, the Tooth Cave ground beetle (*Rhadine persephone*) is more robust than other species of the subterranean group.

Historically, many cave entrances were blocked or covered to prevent injuries to livestock and eliminate hiding places for predatory animals. The greatest threat to these endangered karst invertebrates is habitat loss or degradation due to urban encroachment. Urban development in karst areas can cause caves to collapse or be filled in, change surface plant and animal communities,



Service biologist and landowner examine cave entrance

Photo by Luella Roberts/USFWS

and expose caves to contamination. Development can also alter drainage patterns, and increases in human population can expose caves to damaging exploration and vandalism.

Exotic plants or impervious cover often replace native vegetation near karst features. The absence of native plants may result in increased temperature and humidity fluctuations, lead to sediment build-up in caves, and promote infestations of non-native red fire ants (*Solenopsis invicta*), which prefer open areas where soils have been disturbed. Fire ants prey on karst invertebrates and the surface community food base upon which the karst species depend. The use of pesticides or fertilizers can also adversely effect or eliminate species when applied inappropriately. Additionally, changes in drainage patterns can cause flooding and the loss of air-breathing karst species, or can desiccate the cave by the diversion of water. Karst features with

low humidity levels are usually devoid of fauna, suggesting that humidity may be a key factor in the survival of these cave invertebrates.

Several HCPs in central Texas cover one or more of the endangered karst species. The Buttercup Creek HCP, for example, was developed for the protection of the Tooth Cave ground beetle. This tiny animal is endemic to only a few karst features within a small area near the City of Cedar Park in Williamson County. The Buttercup Creek HCP ensures that 12 separate cave preserve areas totaling 130 acres (53 hectares) and 2 greenbelt floodplain areas comprising 33 acres (13 hectares) will be protected and monitored in perpetuity. Many other species inhabiting these areas will benefit as well. Conservation measures include gating significant cave entrances, routine inspections and maintenance work, restrictions on recreational use of some areas (with no public access to the most

sensitive sites), vegetation management to control noxious non-native plants and excess growths of juniper, and control of fire ants. Any unforeseen circumstances, such as storm damage, vandalism, or wildfires at the cave preserves, will be addressed immediately to limit potential damage.

Karst ecosystems are a rich part of the biodiversity of central Texas that could have been lost without the protection provided for by HCPs and private landowner participation. The Service thanks the citizens of central Texas for their contributions to these conservation efforts.

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A cave entrance blocked with juniper branches to keep out unwanted visitors

Photo by Luela Roberts/USFWS

