



United States Department of the Interior

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Wayne A. Lea
Chief, Regulatory Branch
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Consultation # 2-15-F-2002-0453

Dear Mr. Lea:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the Brushy Creek Municipal Utility District's (BCMUD) proposed raw water transmission capacity facilities between Lake Georgetown and the City of Round Rock, Williamson County, Texas (Permit Application Number 200300581) and its effects on the federally listed Bone Cave harvestman (*Texella reyesi*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*). Your December 12, 2003, request for formal consultation was received on December 17, 2003.

This Opinion is based on information provided in the August 2003 Environmental Assessment; the September 11, 2003, preconstruction notification; and the January 2004 and March 2004 Biological Evaluations. This Opinion is also based on meetings, emails, and telephone conversations between individuals from the Corps of Engineers (Corps), Paul Price and Associates, Inc., and the Service. A complete administrative record of this consultation is on file at this office.

Consultation History

In April and June 2002, Paul Price of Paul Price Associates, Inc., requested information regarding threatened and endangered species potentially occurring within the proposed project area for the Lake Georgetown intake and pipeline project. The Service responded in June 2002 and provided information regarding the potential for the project to impact listed karst invertebrates and/or the endangered golden-cheeked warbler (*Dendroica chrysoparia*).

On August 14 and 29, 2003, the Service received copies of an Environmental Information Document, "Georgetown Lake Regional Raw Water Diversion Facilities", and a Draft Environmental Assessment, "Georgetown Lake Regional Raw Water Diversion Facilities Plan." The Service responded to these documents in a November 25, 2003, letter. We agreed that the portions of the proposed project occurring on the Corps' property at Lake Georgetown were not



likely to adversely affect listed species potentially occurring in Williamson County. However, the Service was concerned that the portions of the project occurring off of the Corps' property might impact the golden-cheeked warbler, the Bone Cave harvestmen, or the Coffin Cave mold beetle (*Batrisodes texanus*).

In a December 10, 2003, letter, William Fickel, Jr. of the Corps, reiterated that the portion of the proposed raw water diversion facilities to be constructed on the Corps' Lake Georgetown property would either not affect or not adversely affect any listed species in the proposed project area. He noted, however, that there was a potential for the portions of the project occurring off of the Corps' property to affect the Bone Cave harvestmen, the Coffin Cave mold beetle, and the Tooth Cave ground beetle. However, these portions would be subject to consultation during the Corps section 404 process authorizing impacts to waters of the U.S.

In a December 11, 2003, letter, Paul Price provided information regarding the potential for the proposed project to impact the Georgetown salamander (*Eurycea naufragia*), a candidate species potentially occurring in the project area. He determined that the proposed activities would not impact this species.

In a December 12, 2003, letter, the Corps Regulatory Branch determined that authorization of the proposed activities in waters of the U.S. occurring off of the Corps' property may affect the endangered Coffin Cave mold beetle, Bone Cave harvestmen, and the golden-cheeked warbler and requested initiation of formal consultation. The Service concurred with this determination and initiated formal consultation in a January 15, 2004, letter.

The Service and Paul Price met on January 20, 2004, to discuss additional information needs in order to complete the consultation. The Biological Evaluation of the BCMUD Surface Water Supply Project was received on January 27, 2004. Additional information regarding the presence of caves with listed species was received February 4, 2004, and a supplement to the Biological Evaluation was received February 10, 2004, documenting several adjustments to the pipeline alignment.

The Service notified the Corps in a March 11, 2004, email that the draft Opinion would not be transmitted by the 90th day as the consultant indicated that there were additional documents forthcoming.

In a March 16, 2004, telephone call, Paul Price indicated that the final karst management plan documenting the protective elements of BCMUD's proposal would be forthcoming. In addition, Mr. Price stated that the Chisolm Trail Special Utility District would no longer be connecting to the BCMUD pipeline. Additional information on locations of caves and karst features in the project area was provided in a March 16, 2004, Biological Evaluation, and the karst management plan was provided on April 8, 2004. Also on April 8, 2004, the Service received additional information from Paul Price and Associates correcting some of the cave and karst feature information.

The Corps revised their determination of the potential for the project to adversely affect the Coffin Cave mold beetle and the golden-cheeked warbler in an April 26, 2004, letter. They determined that the proposed project would not affect the Coffin Cave mold beetle and would not adversely affect the golden-cheeked warbler. The Service concurred with this latter determination in an April 27, 2004, letter.

In a May 10, 2004, letter, the Service notified the Corps that, due to additional information provided by the applicant, the anticipated delivery date for the draft Opinion would be May 15, 2004. The Service missed this date due to the need to analyze additional detailed project information provided by Paul Price and Associates.

The Service delivered a draft Opinion to the Corps on June 5, 2004. In July 13, 2004, and August 18, 2004, letters the BCMUD provided additional clarification with regard to the scope and timing of the proposed protection of Snowmelt Cave.

BIOLOGICAL OPINION

Description of the Proposed Action

Project Description

BCMUD proposes developing a diversion and raw water transmission capability to supply its almost completely developed, existing service area. Formerly utilizing groundwater, its wells are no longer operated as a result of a July 1998 sewage spill that contaminated this supply. BCMUD currently contracts for treated water from the City of Round Rock. This present water contract expires in 2006, and the City of Round Rock has informed BCMUD that the contract will not be renewed.

The proposed BCMUD intake and pipeline on the Corps' property would be located on the south shore of Lake Georgetown adjacent to, and east of, the existing city of Round Rock intake facilities on the spillway peninsula. Facilities designed for a peak day diversion rate of 10 million gallons per day (MGD) will be required. The intake structure will consist of three sloped, 30-inch (76-centimeter) pump cans laid on the reservoir bottom, each equipped with a 5 MGD pump. The raw water transmission line will be a single 24-inch (61-centimeter) line laid parallel to the existing Round Rock easement leading to a new electrical control building to be constructed adjacent to the existing Round Rock facilities. The pipeline will then be constructed using open cut methods, and will include placing the line under the existing, paved dam road after which it will exit the Corps' property near the Cedar Breaks Park entrance on the south side of the property.

The proposed BCMUD raw water pipeline will then run south from the Corps property to a new water treatment facility 13 miles (21 kilometers) away (Figure 1). The initial pipeline diameter of 24 inches (61 centimeters) would be maintained for about 7.4 miles (11.9 kilometers) and then be reduced to 16 inches (41 centimeters) after crossing the topographic high near FM 2243. The

trench for the pipeline will be approximately 4-6 feet (1 – 2 meters) deep and 6 feet (3 meters) wide. The new water treatment plant will be constructed on approximately 22 acres (8.9 hectares) of BCMUD property south of FM 1431 (Figure 1). An additional 3 miles (5 kilometers) of 24-inch (61-centimeter) waterline will then be constructed to create two treated water mains: one that will deliver water from the treatment plant to the east side of the north service area and one that delivers water to the north side of the south service area.

From the edge of the Corps' property, the pipeline will mainly cross private property, except for Williamson County Park and a small park owned by the City of Round Rock, located south of FM 1431. The right of way is most often located adjacent to fence lines, and with few exceptions, such as river corridors, the proposed pipeline is routed across level to gently sloping, upland, live oak park, most of which is presently used for cattle grazing or is subdivided into suburban-rural residential tracts.

The proposed pipeline would have a 50-foot (15-meter) wide permanent easement and an additional, adjacent 20-foot (6-meter) temporary construction easement. Construction activities within this easement would include: (1) the movement of heavy equipment for trenching and transport of pipeline, (2) trenching activities including storage of the excavated materials, (3) movement of personnel, (4) water treatment plant construction, and (5) construction of the intake and electrical service structures. The construction easement will be narrowed as necessary to minimize impacts to sensitive areas, such as stream crossings and other wetlands, karst features, and mesic woodlands. Public road and major stream crossings will utilize below ground or aerial crossing methods. The preferred below-ground method is horizontal directional drilling, in which a tunnel is drilled under the stream or other crossing and the pipe is pushed through as the drilling progresses.

The proposed activities will disturb soils and vegetation to a greater or lesser extent within approximately 150 acres (61 hectares) of construction easement and will cross 21 jurisdictional waters of the U.S. (0.84 acres [0.33 hectares]). Of these 21 waters, two pasture wetlands, a pond, and 15 intermittent stream crossings would be disturbed. Two perennial streams (South Fork San Gabriel River and Brushy Creek) and one intermittent stream (Middle Fork San Gabriel River) would not be disturbed during construction as boring/tunneling or aerial suspension methods would be used at these crossings.

Conservation Measures

Planning

Comparative evaluations of potential environmental effects among the alternatives considered were included in the initial feasibility study and conceptual planning stage of this water supply project. Those considerations were reflected in, for example, the selection of the intake location and configuration on Georgetown Lake and the general route traversed by the raw water pipeline. Other environmental considerations are addressed in the Environmental Assessment prepared by the Corps based on material provided by BCMUD.

Although pipeline route selection was largely determined by the willingness of landowners to provide easements, heavily wooded areas and known sensitive environmental features (e.g., closed canopy woodland, springs, and karst features) were avoided to the extent possible. Surface surveys of all alternative facility locations were conducted to document the environmental resources present and to identify critical features. The locations of karst features in the vicinity of all planned construction activities have been mapped and the status of each with respect to endangered species and inclusion in a preservation or management plan ascertained. The pipeline has been routed away from surface openings identified during the field surveys. Likewise, the locations of other species of concern (including federally listed species) and their habitat needs have been considered in planning facility locations and future management options. By constraining the pipeline and other facility locations to grasslands and open woodlands to the extent possible, disturbance to the nesting habitats of the golden-cheeked warbler and black-capped vireo will be avoided.

Construction

The intake on Georgetown Lake will be located in an area that lacks features known to be attractive to fish populations (for example, significant aquatic vegetation or pronounced physical structure, such as inundated channels, cliffs, or overhangs) and that has been previously disturbed by water intake construction. To minimize potential entrainment of juvenile fish, the intake will be constructed with intake screen openings no larger than 0.25 inches (0.64 centimeters), and intake velocities will be limited to no more than 0.5 feet/second (0.01 meter/second) at the screen face.

Construction of the proposed intake on Georgetown Lake and the water treatment plant on Great Oaks Drive require the preparation of Edwards Aquifer Protection Plans to avoid adverse impacts to groundwater quality. While water pipelines are specifically exempted from this requirement by Texas Commission on Environmental Quality (TCEQ), the following management guidelines listed below will be incorporated into the relevant construction documents to assure that adverse impacts to karst habitats will be avoided or minimized:

- (1) Where vegetation removal or grading is expected to occur up-gradient of karst openings:
 - A continuous silt barrier will be installed along the right-of-way boundary, and perennial vegetation will be established in these areas following construction and before removing any silt barriers. The Corps manager at Georgetown Lake has requested the revegetation utilize a mixture of native plants. Where facility easements are on private property, the landowner may specify the type of vegetative cover to be used; otherwise BCMUD will use a native mixture for revegetation.
 - Use of any hazardous or toxic substances (herbicides or pesticides) will be minimized.
 - Construction vehicles and equipment will be inspected regularly (e.g., daily) for leaking fuel, lubricating oil, and hydraulic fluids.
 - Vehicle fueling and maintenance activities will be limited to areas away from the pipeline and water treatment plant construction areas.

- A written contingency plan for cleaning up spills of hazardous and toxic substances will be available.

(2) In the event that a subterranean void is encountered during construction, protection from adverse impacts that may result from contact with surface ambient conditions or from subsequent slumping of, or drainage through, the trench backfill material will be accomplished by the following measures:

- Upon discovery, voids/caves will be immediately covered to prevent desiccation and temperature fluctuations due to exposure. This may include covering with a tarp, sandbags, or other waterproof materials.
- With the exception of significant features that may be held open as much as 48 hours in order to determine the potential for listed species to be present, all voids/caves encountered during pipeline excavation will be “walled off” using natural materials to prevent exposure to the outside elements within 24 hours following discovery. Natural materials will include rocks and pebbles found in the area grouted together using a brick-mortar substance (or comparable substance). Natural materials will not include metal or plastic of any kind. The “wall” will be designed to resemble as closely as possible the existing conditions within the cave prior to excavation and will be structurally sturdy enough to prevent the trench fill from entering the cave. Significant features are those that have a depth (distance from excavated entrance to the back) greater than the width of the excavated opening, a floor depth of more than three feet (0.9 meters) below the ground surface, and have an estimated volume of at least 10 cubic feet (0.3 cubic meters).
- Where voids/caves are divided by the construction of the trench, a small conduit to maintain the connection will be constructed using natural materials. This will allow any species present to traverse between the voids/caves during their normal life activities, such as searching for food.
- When working around open voids, particular caution will be exercised to avoid spilling oil, grease, or any other foreign substance on the ground. The crew will also take care not to deposit anything into the voids/caves or collapse the trench, which could adversely impact species within these karst features.
- A summary report that includes the date encountered, GPS location, size, and orientation of each significant void, a description of the method used to re-isolate the void, and the date accomplished will be prepared for submission to the Service and the Corps.

Operation

BCMUD will continue the protection and management of Beck Ranch Cave, Broken Zipper Cave, Beck Rattlesnake Cave, O’Connor Cave, and Joint Effort Cave, and will assume responsibility for karst preserve management on the Sendero Springs property following the preserve establishment and management guidelines in the Sendero Springs Karst Management Plan (Service consultation # 2-15-2000-I-1138). BCMUD will also protect and manage Snowmelt Cave using the same criteria as in the management plans for the existing BCMUD service areas and Sendero Springs. Permanent right-of-way maintenance on the raw water pipeline corridor south of FM 2243, the water treatment plant site, and the treated water lines

will be restricted to mechanical means (no use of herbicides or pesticides) to avoid impact to karst biota.

Protection of Snowmelt Cave will entail a conservation easement placed on approximately two acres (0.8 hectares) of land encompassing all of the area within 164 feet (50 meters) from the cave opening with the exception of the CR 176 easement and a small area north of a currently existing fence line, which separates the property where Snowmelt Cave occurs from a low density residential subdivision to the north. This area includes all of the mapped extent of the cave and the surface drainage area. BCMUD will complete negotiations with the landowner and initiate operation of the preserve by December 31, 2004. BCMUD will also contact Williamson County to request that no pesticides be used within 328 feet (100 meters) of the cave entrance.

Species Description and Status

Bone Cave harvestman

Description

The Bone Cave harvestman, Class Arachnida (arachnids), was originally described in 1992 (Ubick and Briggs 1992). Prior to 1992, it was considered to be the Bee Creek Cave harvestman (*Texella reddelli*), its nearest relative. It is now distinguished as a separate species due to the absence of retinas in *T. reyesi* while *T. reddelli* has well-developed retinas. Because the Bone Cave harvestman was considered to be the Bee Creek harvestman before Ubick and Briggs' redescription and five localities of the Bone Cave harvestman were included with the Bee Creek harvestman at the time the Bee Creek harvestman was listed as endangered on September 16, 1988 (53 FR 36029), the Bone Cave harvestman is considered to be listed as endangered. Critical habitat has not been designated for this species.

The Bone Cave harvestman is known from Travis County north of the Colorado River to northern Williamson County, Texas. It is a small (1.52- to 2.79-millimeter [0.06 to 0.11 inch]) troglobitic, blind, pale orange, long-legged harvestman that is associated with moist karst habitats (Campbell 1995). It is often found under rocks and other debris.

Life History

There is little specific information on the life history and habitat requirements of the Bone Cave harvestman. This is largely because troglobites (animals that complete their life cycle underground and exhibit adaptation to the subsurface environment such as absence of eyes) are subterranean, inconspicuous, and difficult to study (Mitchell and Reddell 1971; Chandler 1992). However, we know that the Bone Cave harvestman is an obligate cave dweller whose continued existence depends on the ecological stability of the karst environments in which it is found. Although there is little specific information available on its microhabitat requirements, its macrohabitat requirement (caves and possibly interstitial spaces associated with caves) is clearly defined.

In general, troglobites, such as the Bone Cave harvestman, require stable, mild temperatures, and constant, high humidity (Barr 1968; Mitchell 1971a). The temperatures in caves are typically the average annual temperature of the surface habitat and vary much less than the surface environment (Howarth 1983; Dunlap 1995). Relative humidity in a cave is typically near 100 percent for caves supporting troglobitic invertebrates (Elliott and Reddell 1989). Many of these species have lost the adaptations needed to prevent desiccation in a drier habitat (Howarth 1983) or the ability to detect and/or cope with more extreme temperatures (Mitchell 1971a). In areas where karst features are extensive, caves may be connected to other subterranean habitats to constitute a single functioning system. During periods of dryness or temperature extremes, the troglobites may retreat into the interstitial spaces, where the physical environment is more stable (Howarth 1983).

Because of low levels of sunlight in caves, karst ecosystems depend on surface plant and animal communities for nutrient input. These ecosystems receive nutrients from the surface in the form of leaf litter and other organic debris that washes or falls into the caves, tree and other vascular plant roots, and the feces, eggs, and/or dead bodies of animals that forage on the surface and bring nutrients into the cave (Barr 1968; Poulson and White 1969; Howarth 1983).

The surface plant community supports the karst ecosystem function both directly and indirectly. Dead and decaying plant material can fall or be washed into caves. Root masses reaching cave openings through soil and rock fissures may also provide direct nutrient input to shallow caves (Howarth 1983, 1988). A survey of 21 caves on the Edwards Plateau revealed that roots of six species reached caves (Jackson *et al.* 1999). Indirectly, the plant community supports cave ecosystem dynamics by providing the habitat matrix used by surface animal communities that contribute nutrient input to the karst ecosystem, including habitat needed for food, forage, and shelter by mammals, invertebrates, amphibians, and reptiles. When plant species composition is altered, subsequent changes also occur in animal communities (Lovejoy and Oren 1981; Harris 1984; Mader 1984; Thompson 1985; Lovejoy *et al.* 1986; Yahner 1988; Fajer *et al.* 1989; Kindvall 1992; Tschardtke 1992; Keith *et al.* 1993; Hanski 1995; Lindenmayer and Possingham 1995; Bowers *et al.* 1996; Hill *et al.* 1996; Kozlov 1996; Kuussaari *et al.* 1996; Turner 1996; Mankin and Warner 1997; Burke and Nol 1998; Didham 1998; Suarez *et al.* 1998; Crist and Ahern 1999; Kindvall 1999).

In addition to providing nutrient input, the surface plant community buffers the karst ecosystem from changes in the temperature and moisture regimes, pollutants entering from the surface (Biological Advisory Team 1990; Veni and Associates 1988), and other factors such as sedimentation from soil erosion.

With respect to nutrient input to the karst ecosystem, the cave cricket (*Ceuthophilus* sp.) is a particularly important nutrient component (Barr 1968) found in most caves in Texas (Reddell 1966). It is a troglaxene (a species that regularly inhabits caves for refuge, but normally returns to the surface to feed), and it forages on the surface at night and lays eggs and roosts in caves during the day. A variety of troglobites, and their prey species, are known to feed on cave

cricket eggs (Mitchell 1971b), feces (Barr 1968; Poulson *et al.* 1995), and/or on the adults and nymphs directly (Elliott 1994). Recent research indicates that cave crickets generally forage within 50 meters (164 feet) from karst features, and have been observed up to 60 meters (197 feet) (Elliott 1994) from karst features. They are scavengers or detritivores, feeding on dead insects, carrion, and some fruits, but do not feed on foliage. Cave crickets are sensitive to temperature extremes and drying. Mice (*Peromyscus spp.*) and fire ants (*Solenopsis invicta*) (Elliott 1993; Elliott 1994) are documented predators of cave crickets in Texas.

The harvestman (daddy longlegs) (*Leiobunum townsendi*) is another widespread troglodene commonly found in Texas caves (Reddell 1965). It and other surface invertebrates may enter caves and help contribute nutrients. These troglodenes are typically leaf litter and soil dwelling species, flying species, or stream species in caves with flowing water (Reddell 1965, 1966).

Raccoons (*Procyon lotor*) are also ecologically important in many cave communities. The presence of bones and droppings in hundreds of Texas caves indicates raccoons are frequent cave inhabitants, using them for nests and sources of water (Reddell 1967). Their feces provide a rich medium for the growth of fungi and, subsequently, potentially localized population blooms of several species of springtails (*Collembola* undetermined), which are prey to other troglodites. The Bone Cave harvestman has been observed feeding on fungi growing on the dead body of a raccoon (Elliott 1994).

Native mice (*Peromyscus*), other small mammals, and several species of reptiles and amphibians are also common in many caves (Reddell 1967; Reddell 1999) and likely introduce nutrients into karst ecosystems in a similar manner. In low densities, mice provide a source of nutrients for karst ecosystems. However, mice prey on crickets and other invertebrates, and their presence in high densities could be detrimental to the karst ecosystem (Davis and Schmidly 1994).

Population Dynamics

Population estimates for any of the listed karst species are not currently available due to their rarity, inaccessibility, and secretive habits. Generally, no more than one or two individuals of each species are seen on a visit to a cave and often none are observed, even in caves where they are considered relatively abundant (USFWS 1994). Thus, current mark recapture methods are of little use with such small populations.

Status and Distribution

Veni & Associates (1992) divided Travis, Williamson, Hays, and Burnet counties into 11 karst faunal areas based on geologic continuity, hydrology, and the distribution of 38 rare trogloditic species. After omitting areas where listed species do not occur and combining the McNeil and Round Rock areas, the Service described eight of these areas as the karst fauna regions (KFRs) where listed species are likely to occur (Figure 2).

Veni and Associates (1992) also mapped four zones in Travis and Williamson counties indicating areas with different likelihoods of having extensive cave development and listed species. The boundaries are matched to known outcrops of cavernous limestone garnered from numerous geologic maps and studies and to hydrologic boundaries extrapolated from the elevations of cave passages compared to surface water divides. Zone 1 includes areas in the Edwards Group limestones that are known to contain listed species. Zone 2 comprises areas that have a high probability of suitable habitat for listed species or other endemic fauna. Zone 3 probably does not contain listed species or their habitat, and Zone 4 consists of noncavernous rock and thus does not contain caves or other karst features. Together, Zones 1 and 2 comprise about 55,000 acres in Travis County and about 100,000 acres in Williamson County (Figure 2).

Within these karst forming areas, one of the main threats to the Bone Cave harvestman is loss of habitat as a result of urban development activities (53 FR 36029). The Travis/Williamson County species occur in an area that is undergoing continued urban expansion at a rapid rate, and few caves are adequately protected. Most of the known species' localities occur adjacent to or near developed areas (residential subdivisions, schools, golf courses, roads, commercial and industrial facilities, etc.) or in areas that are proposed for development. Unless proper protective measures can be devised, urban development may lead to the filling in or collapse of caves, alteration of drainage patterns, alteration of surface plant and animal communities, and increased contamination and human visitation. Ranching activities may also lead to the filling of cave entrances. Ranchers sometimes fill over cave entrances to prevent cattle and goats from falling in or to eliminate hiding places for predators (USFWS 1994).

The Bone Cave harvestman is the most wide spread species of the seven listed karst invertebrates occurring in Travis and Williamson counties. It has been found in the North Williamson County, Georgetown, McNeil/Round Rock, Cedar Park, Jollyville, and Central Austin KFRs. The recovery plan for the Bone Cave harvestman recommends the protection of at least three karst fauna areas (KFA) within each KFR in order to achieve recovery of the species (USFWS 1994). In the KFRs where there are less than three KFAs, all of the KFAs containing the Bone Cave harvestman should be protected. A KFA is an area known to support one or more locations (caves or clusters of caves) of a listed species and is distinct in that it acts as a system that is separated from other KFAs by geologic and hydrologic features and/or processes that create barriers to the movement of water, contaminants, and troglobitic fauna.

The recovery goal for Bone Cave harvestman is the preservation of at least three KFAs in each of the Jollyville, McNeil/Round Rock, Georgetown, and North Williamson County KFRs, and all of the KFAs within the Cedar Park and Central Austin KFRs. As the Service has not delineated separate KFAs as of this time, an appraisal of the status of this species generally deals with numbers of caves known to support the Bone Cave harvestman. At the time of listing, the Bone Cave harvestman was known to occur in 69 caves (60 confirmed and 9 tentative) from northern Travis to northern Williamson County. To date, it has been documented as occupying or potentially occupying over 180 caves. At least 125 of these caves have been confirmed to contain the Bone Cave harvestman. The other caves where the status of the Bone Cave harvestman is uncertain (1) have been documented to contain habitat that is suitable to support

the Bone Cave harvestman but the cave has not been adequately surveyed for the species, (2) intact adult specimens were not collected, or (3) the individual specimens removed from the cave have not been examined by a qualified systematist for positive identification.

In the North Williamson KFR, at least 34 caves are known to be occupied by the Bone Cave harvestman and 14 caves may potentially contain the species. At least three of the occupied caves are protected in two separate preserves with management plans. Fifteen of the occupied and nine of the potentially occupied caves receive some degree of protection as they occur in a variety of open space areas within the Sun City development west of Georgetown. One occupied cave in this KFR occurs in a backyard in an area developed as a residential subdivision and one potentially occupied cave has been filled. The status of 15 of the occupied caves and 4 of the potentially occupied caves is unknown at this time.

The Georgetown KFR is known to contain at least 25 caves occupied by the Bone Cave harvestman, with another two potentially supporting the species. Seven of the occupied caves in this KFR have been impacted by development or roads to various extents. Six of the occupied caves occur in two areas that have been preserved and have a management plan. One occupied cave is a commercial establishment with daily tours of it available to the public. The remaining occupied caves are thought to occur in developed areas. There are two occupied caves that occur in as yet undeveloped areas. Of the two caves that potentially support the species, one is located in one of the preserves mentioned above and the status of the other is unknown.

In the McNeil/Round Rock KFR, there are at least 50 caves known to contain the Bone Cave harvestman and over 20 that potentially contain this species. At least 10 occupied and 3 potentially occupied caves occur in several different areas that received at least some degree of protection and are under management plans. At least 17 occupied and six potentially occupied caves occur in areas that are as yet undeveloped. At least four occupied caves and one potentially occupied cave have been filled or impacted by development. The status of the remaining caves is unknown.

The Cedar Park KFR has one occupied cave in a small setback in the middle of a commercial development. The other two caves that potentially supported the Bone Cave harvestman have been destroyed.

In the Jollyville KFR, at least six occupied caves and one potentially occupied cave have been protected and are under management plans in several different areas. One occupied cave was destroyed as a result of development, and the status of the rest is unknown.

There are only two known occupied caves in the Central Austin KFR. One of these is protected and has a management plan and the status of the other is unknown.

Analysis of Affected Species

The proposed project occurs within the North Williamson, Georgetown, and McNeil/Round Rock KFRs. Approximately 136 acres (55 hectares) of Karst Zones 1 and 2 are located within the temporary and permanent ROW for the project. Approximately 1.8 miles (1.3 kilometers) of the pipeline would be constructed in Zone 3 areas coinciding with the floodplain of the South Fork San Gabriel River between the North Williamson and Georgetown KFRs, and the flood plain of Brushy Creek.

Environmental Baseline

Status of the Species Within the Action Area

The Service considers the action area to be the proposed pipeline ROW and an additional 500 feet (150 meters) to either side. Project specific karst investigations were conducted in several phases. The Texas Speleological Society was contacted for information on locations of documented caves or other karst features found on the Georgetown, Leander, and Round Rock USGS 7.5-minute quadrangle maps within approximately 1,000 feet (305 meters) of the pipeline corridor. In addition, a karst feature survey was performed by Jackson Harper within a two hundred foot corridor along the BCMUD proposed route for the raw water supply pipeline. Cave investigations, excavations of karst features, and species sampling were conducted by Peter Sprouse.

At least 60 known features, such as small sinks and caves, occur in the vicinity of the proposed project; however, only thirty karst features were present within 500 feet (150 meters) of the pipeline route. With the exception of Gold Mine Cave, all of these occur south of FM 2243. Eighteen of the 30 karst features are not believed to contain endangered species habitat, one (Gold Mine Cave) was not investigated due to access constraints, and eleven of these features were recognized as being potential habitat for federally listed karst invertebrates (Brown Cave, Millennium Cave, Mongo Cave, Little Demon Cave, Rock Ridge Cave, Snowmelt Cave, Through Trip Cave, Vug Cave, Wild West Cave, Wilco Cave, and Zapata Cave).

Sixteen of the karst features noted in the study of the project area occur within the Millennium and Wilco karst preserves owned by the Williamson County Karst Foundation and are located within the Williamson County Park. Six of these caves are reported to host the Bone Cave harvestman (Millennium Cave, Mongo Cave, Little Demon Cave, Rock Ridge Cave, Wild West Cave, and Wilco Cave) and one contained potential habitat (Through Trip Cave).

Two other caves in the project area also contain the Bone Cave harvestman. One, Snowmelt Cave, is within 100 feet (30 meters) of the proposed pipeline and the other, Zapata Cave, occurs 400 to 600 feet (120 to 180 meters) away from the pipeline.

Factors Affecting Species Environment Within the Action Area

Georgetown Lake and the BCMUD service area are located in central Williamson County at the interface of the Edwards Plateau Ecoregion to the west and the Blackland Prairie Ecoregion to the east. These ecoregions largely coincide, respectively, with the Balconian and the Texan biotic provinces and the Cross Timbers and the Blackland Prairie vegetational areas. The landscape of central Williamson County, where Georgetown Lake, the proposed pipeline and treatment facility, and the BCMUD service area are located, consists primarily of a mosaic of flat to gently rolling upland juniper-live oak parks and savannas in bluestem grassland, except where cattle grazing or pasture improvement has resulted in replacement by weedy or domestic grasses. Significant slopes are present flanking the larger stream valleys (e.g., the South San Gabriel River).

Although ranchland grazing has been the historic primary land use in central Williamson County, population and commercial growth along the IH 35 corridor and new residential construction west of Georgetown and Round Rock are transforming this portion of Williamson County into an urban zone. The project will pass through several residential subdivisions.

In one part of the project area, the pipeline route parallels a fenceline adjacent to property owned by a quarry. Some of these areas have been cleared of woody vegetation and may at some future date be subject to ground disturbance from mining activities. No information is available as to whether occupied caves occur within the quarry property.

Of the occupied caves in the action area, the caves contained within the Wilco and Millenium karst preserves will be protected and managed in perpetuity by Williamson County in conjunction with maintenance of their park. Snowmelt Cave, whose footprint extends under County Road 176, occurs in an otherwise rural setting. Zapata Cave has been impacted by residential development, although it occurs within a small set aside area. Long term management for this cave, along with some other caves in the subdivision, will be taken over by the BCMUD.

In addition to these impacts, some of the cave openings have likely been modified to allow for easier human access and the entrance to Gold Mine Cave has been equipped with an inclined track at the entrance. However, these impacts are considered minor and not likely to have significantly degraded the caves.

Effects of the Action

As listed karst invertebrates are rare and elusive, an appraisal of impacts to these species tends to focus on impacts to cave features known to contain listed species. This includes impacts to the cave entrance, its hydrologic drainage area (both surface and subsurface drainages), a minimum foraging area (typically believed to be 164 feet [50 meters]) for endemic cave crickets, and a minimum intact area to provide terrestrial ecosystem functions and buffers from edge effects.

The proposed project will remove or disturb surface vegetation from approximately 150 acres (61 hectares) within the pipeline ROW and water treatment plant construction area, and will result in 6-8 acres (2-3 hectares) of subsurface disturbance from trenching along the proposed pipeline corridor. Although the pipeline corridor and the area within 200 feet (61 meters) of this was surveyed for karst features, the possibility exists that there are features whose surface expression is either outside the area surveyed or was so small as to escape detection. In the past, projects have impacted caves with listed species in areas where a karst feature survey did not detect any significant openings. In addition, occupied caves have been mapped in Williamson County that exceed a mile or more in length.

The applicant has committed to implement protection measures discussed in the project description in order to avoid and minimize most of the impacts to known occupied karst features. Thus, for the caves known to contain the Bone Cave harvestman, the Service expects only minor short term effects to the cave ecosystems from the vegetation clearing proposed by the applicant. Effects would include changes in the cave cricket foraging areas and the potential for increasing colonization by fire ants in the disturbed areas. The Service also expects minor long term effects from the trenching to include small changes in the subsurface hydrologic regime as small crevices and conduits that may transport water to cave environments outside the project area are bisected and filled.

In addition, because the pipeline will traverse almost 13 miles (21 kilometers) of known karst forming geology, the Service anticipates that additional karst features that were not detected during the karst feature survey would likely be impacted by the proposed project. The Service anticipates take of individual Bone Cave harvestman where these invertebrates are present within caves bisected during the trenching process. Individual karst invertebrates present in or near the trench would be killed by falling rock and sediment. Harm in the form of habitat destruction would result from (1) changes in hydrology where sediment blocks water infiltration to various portions of the cave and (2) increases in fire ant numbers from disturbance of vegetation and soils. Potential short term effects to cave cricket foraging areas associated with these caves may also occur.

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The rapid growth of Williamson County, due to the economic expansion of the Austin metropolitan area, will continue to result in impacts to karst habitats and caves containing listed species. Williamson County has experienced steady growth in the 1990's. According to the 2000 U.S. Census, the population increase from 1990 to 2000 was approximately 79.1 percent. The 2000 population count was 249,967, up from 139,551 in 1990. This trend is expected to continue. According to the Texas Water Development Board, the projected population for

Williamson County in 2020 is 523,038. It is likely that more development will occur within the action area.

CONCLUSION

After reviewing the current status of the Bone Cave harvestman, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the Bone Cave harvestman. No critical habitat has been designated for the Bone Cave harvestman. Therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the BCMUD, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the BCMUD to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or BCMUD must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

The Service anticipates take of the Bone Cave harvestman will be difficult to detect because of its small size and the inaccessibility of much of its habitat to researchers. The Service usually measures the status of karst invertebrate species populations, such as the Bone Cave harvestman, based on the number and location of discrete occupied caves and their condition. The Service

anticipates take of Bone Cave harvestman in any occupied caves bisected by the pipeline. The incidental take is expected to be in the form of killing of individuals occupying areas directly adjacent to the trenching and harm due to habitat alteration. The proposed action should not lead to the complete loss of any caves as habitat for the Bone Cave harvestman.

Discussion of Take

The distribution and numbers of karst species such as the Bone Cave harvestman are largely unknown. Sampling for these species is imprecise as are population estimates. Taking of the species in the form of killing or harassment is difficult to impossible to observe and document. Thus, the analysis used in calculating the amount or extent of take anticipated and the effect of the take will remain difficult until more refined information on species distribution and numbers is available.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Bone Cave harvestman:

1. Determine whether subsurface voids encountered during trenching provide suitable habitat for listed species and then implement actions contained in the management guidelines detailed in element (2) of the Conservation Measures in the project description for minimizing/avoiding adverse impacts to listed karst species.
Justification: This will minimize the effects of disturbance of these caves. This would also make it more likely that they would become part of a regional plan for protection of the Bone Cave harvestman.
2. Control fire ants within the ROW south of FM 2243 until the disturbed area is revegetated. Justification: Since vegetation and soil disturbance can encourage proliferation of imported fire ants, this will minimize impact of fire ant predation and competition on the Bone Cave harvestman.
3. Prevent contamination of karst habitat from vehicle fueling and maintenance activities. Justification: This will avoid and minimize the potential for fueling or maintenance activities to result in unintentional spills in any karst habitats that could affect occupied areas.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures

described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

- (1) The following terms and conditions are necessary to implement Reasonable and Prudent Measure number 1:
 - (a) Prior to closing any subsurface voids (see project description for description of methods for closure), a qualified geologist or karst biologist familiar with endangered species habitat, preferably an individual holding a valid 10(a)(1)(A) permit, should determine whether the void contains suitable habitat for listed invertebrate species utilizing the draft Service Section 10(a)(1)(A) Karst Invertebrate Survey Guidelines.
 - (b) If time permits and conditions are adequate, as outlined in the Service's draft Section 10(a)(1)(A) Karst Invertebrate Survey Guidelines, determine whether the void contains listed invertebrate species. Utilize techniques that do not require widening the opening into the void.
 - (c) Implement management guidelines for minimizing/avoiding impacts to listed karst species in the Conservation Measures in the project description.
- (2) The following terms and conditions are necessary to implement Reasonable and Prudent Measure number 2:
 - (a) Within 164 feet (50 meters) (the approximate cricket foraging radius) of the footprint of any karst features that support listed invertebrates and/or cave crickets, fire ant control is restricted to the use of boiling water.
 - i) Boiling or near-boiling water should be poured directly onto the fire ant mounds. Sufficient boiling water should be used that the mound collapses in on itself; this should typically be 1-4 gallons. These treatments are best done during early to mid-morning when the queen(s) and larvae are likely to be near the top of the mound (Vinson and Sorensen 1986). During long periods of drought or cold, the queen(s) and larvae will most likely be deep within the mound, making them more difficult to eradicate (Vinson and Sorensen 1986).
 - ii) Mounds should not be disturbed before treatment as this will cause the ants to move the queen(s) and larvae to deeper locations within the mound or to a remote location. Small amounts (1-2 teaspoons) of detergent may be added to the boiling water; this may help the water penetrate the soil.
 - (b) More than 164 feet (50 meters) from any karst feature supporting listed invertebrates and/or cave crickets, either boiling water or chemical baits (such as Amdro or Logic) may be used.
 - i) The bait should be placed out in mid-morning and all uneaten bait should be removed by sunset. This is intended to limit the possible exposure of cave crickets that may be foraging beyond 164 feet (50 meters) from being exposed to the chemicals and bringing those chemicals back into the cave ecosystem. Because baits should be removed at the end of the day, they should be placed in containers appropriate to allow fire ant access but that will allow baits to be removed at the end of the day.
 - ii) The ground should be dry with no rain forecast for that day because the baits are not suitable to be picked up by foraging ants when they become wet.

- iii) Baits should be placed out in the midmorning and temperatures for the day should be between 70°F and 95°F so that the ants will be active and foraging and because the baits are quickly degraded at high temperatures and lose their effectiveness.
 - iv) Baits should not be placed directly on mounds because the ants will only recognize the baits as food some distance from their mound and may confuse the bait with building material if found on the mound (Vinson and Sorensen 1986). Baits should be placed at least 1-3 feet (0.3-0.9 meters) away from any mound.
 - v) Baits should also be spread out across the area to control any mounds that may be inconspicuous.
- (c) Greater than 500 feet (152 meters) from any karst feature supporting listed invertebrates and/or cave crickets, baits may be “broadcast”.
- i) No more than 1.5 pounds (40 kilograms) of bait per acre may be used.
 - ii) Broadcast baits should not be used if the presence of imported fire ants has not been verified within the previous year.
- (3) The following terms and conditions are necessary to implement Reasonable and Prudent Measure number 3:
- (a) Designate vehicle fueling and maintenance sites outside of karst forming habitat prior to project commencing. Alternatively, utilize parking lots or other impervious surfaces where spills are not likely to be able to access karst forming rock.
 - (b) Require all contractors to utilize these sites for all vehicle fueling and maintenance activities.
- (4) Reporting Requirements: Provide the Service with the locations, habitat conditions, and names of karst survey personnel for each void encountered that contain suitable habitat.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends implementing the following actions:

- Work with the Williamson County Karst Foundation and landowners in Williamson County to identify and preserve additional karst faunal areas.

In order for the Austin Fish and Wildlife Service Office to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

Re-initiation-Closing Statement

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Sec. 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this biological opinion, please contact Jenny Wilson at (512) 490-0057, extension 231.

Sincerely,

/s/ Robert T. Pine

Robert T. Pine
Supervisor

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Figure 1. Project Location

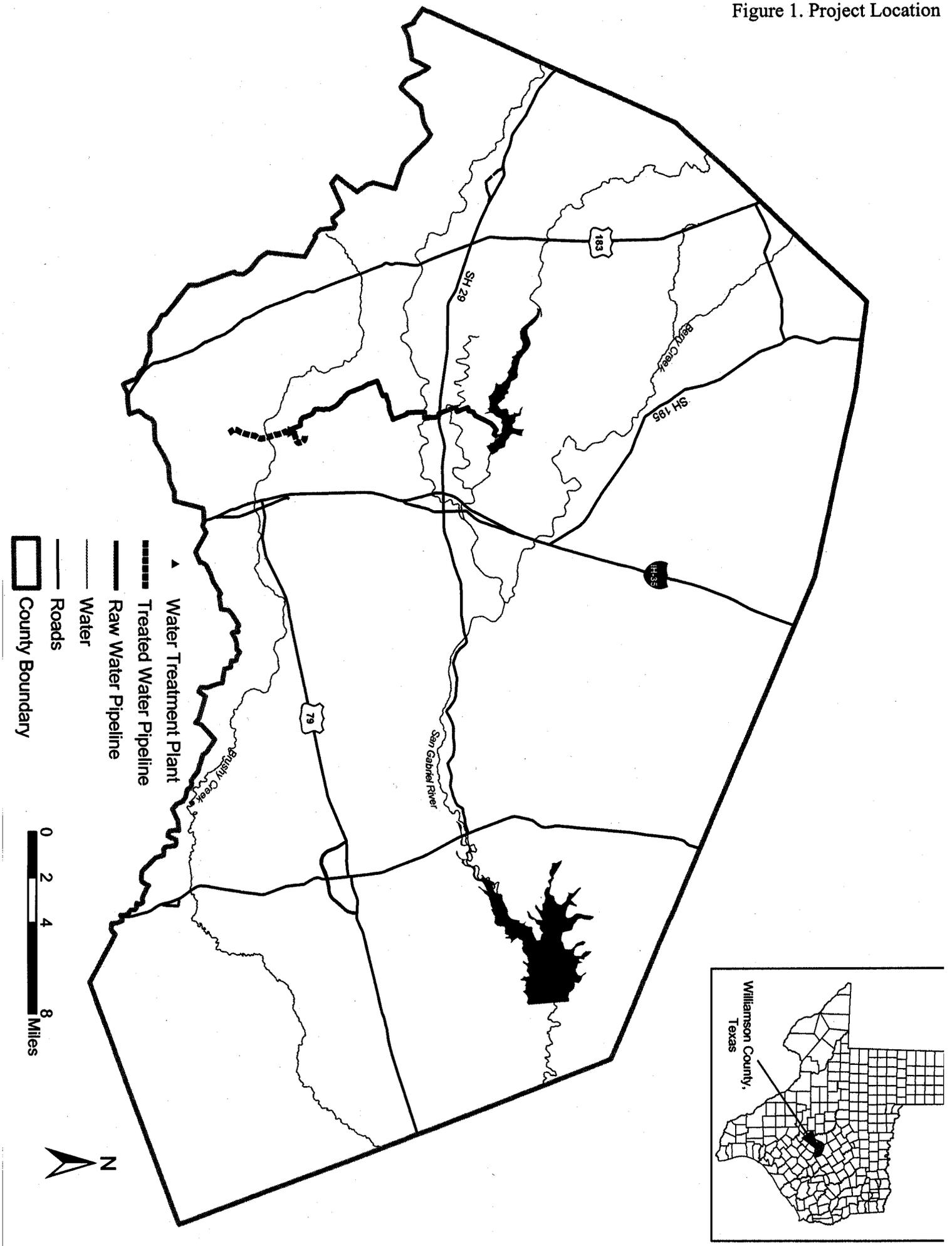


Figure 2. Karst Faunal Regions

