

Tooth Cave Ground Beetle
(Rhadine persephone)

5-Year Review:
Summary and Evaluation

Southwest Region
U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
Austin, Texas

September 2008 5-YEAR REVIEW

Species reviewed: Tooth Cave Ground Beetle (*Rhadine persephone*)

1.0 GENERAL INFORMATION

1.1 Reviewers:

Lead Regional Office: Region 2 - Susan Jacobsen, Chief, Threatened and Endangered Species Division, 505/248-6641; Wendy Brown, Recovery Coordinator, 505/248-6664

Lead Field Office: Austin Ecological Services Field Office (AESFO)
Alisa Shull, 512/490-0057, extension 236

1.2 Methodology used to complete the review:

The U.S. Fish and Wildlife Service (USFWS) conducts status reviews of species on the List of Endangered and Threatened Wildlife and Plants (List) (50 CFR 17.12) as required by section 4(c)(2)(A) of the Endangered Species Act (Act) (16 U.S.C. 1531 et seq.). The Service provides notice of status reviews via the Federal Register and requests information on the status of the species. This review was conducted by Christina Williams from the Arlington Ecological Services Field Office (AESFO). This status review mostly relied on information summarized and cited in HNTB Corporation's (2005) "Summary of Information for Assessing the Status of the Tooth Cave Ground Beetle (*Rhadine persephone*)"; the draft Bexar County Karst Invertebrate Recovery Plan (draft Bexar RP) (USFWS 2008), which contains an appendix summarizing preserve design concepts and new research relevant to preserve design; the Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas (Travis and Williamson RP) (1994); and cave data contained within AESFO files.

As a basic first step in assessing whether caves containing Tooth Cave ground beetles (TCGBs) met the downlisting recovery criteria in the Travis and Williamson RP, we compiled a list of some basic characteristics (further described in section 2.2.3). While the Travis and Williamson RP discusses broad concepts regarding preserve design, the draft Bexar RP (2008) has an appendix that is an updated compilation of research to help more specifically delineate preserve boundaries that follow those basic concepts.

These preserve design principles and characteristics describe what is needed to protect each karst feature and its surrounding area. From the list of known TCGB locations, we identified those that had the highest likelihood of meeting these characteristics. Our determinations (discussed in section 2.2.3) for each of these characteristics were based on cave specific information found in the AESFO files and on cave location and parcel data found in the AESFO GIS database.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review: 70 FR 58191, August 16, 2005

1.3.2 Listing history

Original Listing

FR notice: 53 FR 36029

Date listed: September 16, 1988

Entity listed: Tooth Cave ground beetle (*Rhadine persephone*)

Classification: Endangered

1.3.3 Associated rulemakings: Not applicable

1.3.4 Review History: Agency status reviews for TCGB were conducted in 1988 for the final listing of the species (53 FR 36029) and in 1994 for the Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson counties, Texas (USFWS 1994). In addition, in 2005 HNTB Corporation (2005), under contract with Texas Turnpike Authority, prepared a report on the status of the species.

1.3.5 Species' Recovery Priority Number at start of 5-year review: 2C

1.3.6 Recovery Plan or Outline

Name of plan or outline: Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas

Date issued: 1994

Dates of previous revisions, if applicable: None

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate? No, so the DPS policy does not apply.

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria? Yes

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat? Yes

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)? Yes

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information: The Travis and Williamson RP only provides criteria for downlisting from endangered to threatened (USFWS 1994).

Criteria: The Tooth Cave ground beetle will be considered for reclassification from endangered to threatened when:

(1) Three karst fauna areas (if at least three exist) within each karst fauna region are protected in perpetuity. If fewer than three karst fauna areas exist within a given karst fauna region, then all karst fauna areas within that region should be protected. If the entire range of the TCGB contains less than three karst fauna areas, then all karst fauna areas where that species occurs should be protected and at least two karst fauna areas should exist and be protected for that species to be considered for downlisting.

There are seven karst fauna regions (adapted from the karst fauna areas in Figure 19 of Veni & Associates' 1992 report and reproduced in Figure 2 of the Travis and Williamson RP) in Travis and Williamson counties that are known to contain listed species. Of these, two regions contain the TCGB. These regions are delineated based on geologic continuity, hydrology, and the distribution of rare troglobites.

Karst fauna regions can be further subdivided into karst fauna areas. For the purposes of this plan, a "karst fauna area" is an area known to support one or more locations of TCGBs and is distinct in that it acts as a system that is separated from other karst fauna areas by geologic and hydrologic features and/or processes that create barriers to the movement of water, contaminants, and troglobitic fauna. Karst fauna areas should be far enough apart so that if a catastrophic event (for example, contamination of the water supply, flooding, disease) were to destroy one of the areas, that event would not likely destroy any other area occupied by TCGBs.

To be considered "protected", a karst fauna area must be sufficiently large to maintain the integrity of the karst ecosystem on which TCGBs depend. In addition, these areas must also provide protection from threats such as fire ants, habitat destruction, and contaminants.

(2) Criteria (1) has been maintained for at least five consecutive years with assurances that these areas will remain protected in perpetuity.

Brief summary of preserve design principles:

Regarding size and configuration of karst fauna areas (KFAs), the Travis and Williamson RP (USFWS 1994) provides some conceptual guidelines, including maintaining humid conditions, air flow, and stable temperatures in the air-filled voids. Also necessary are: maintaining an adequate nutrient supply; preventing contamination from surface and groundwater entering the ecosystem; controlling of the invasion of exotic species, such as fire ants; and allowing for movement of the karst fauna and nutrients through voids between karst features (USFWS 1994).

Additional scientific information and cave preserve design guidelines are presented in the draft Bexar RP and help to further define a protected KFA (USFWS 2008). According to these preserve design guidelines, protected KFAs should include the following: 1) surface and subsurface drainage basins of at least one occupied karst feature; 2) a minimum of 24 to 36 hectares (ha) (59 to 89 acres (ac)) of contiguous, unfragmented, undisturbed land to maintain native plant and animal communities around the feature, 3) a 105 meter (m) (345 feet (ft)) radius, undisturbed, from each cave entrance for cave cricket foraging, and 4) at least 100 m (328 ft), undisturbed, from the cave footprint to the edge of the preserve to minimize deleterious edge effects (USFWS 2008). Additionally, the draft Bexar RP outlines perpetual management, maintenance, and monitoring necessary for ensuring a high probability of species survival at each site (USFWS 2008). At a minimum, these activities should include: 1) controlling red imported fire ants (*Solenopsis invicta*); 2) installing and maintaining fencing; 3) installing, if necessary, and maintaining cave gates; and 4) monitoring cave invertebrates and the ecosystem upon which they depend (USFWS 2008).

Analysis regarding whether downlisting criteria may have been met:

There are 54 known TCGB locations (three of which have been destroyed) in Travis and Williamson counties, Texas (Tables 1 and 2). These locations are within two karst fauna regions (KFRs): Jollyville Plateau (17 caves) and Cedar Park (37 caves) (Map 1). The preserve design principles and perpetual management, maintenance, and monitoring guidelines listed above were applied to each TCGB cave to determine its possibility as being considered a protected KFA. Based on a review of available data, no TCGB cave currently meets this definition; however, with some additional data gathering and/or confirmation/implementation of certain management activities, we believe there is a high potential for at least three caves within each KFR to meet KFA status (downlisting criterion 1). If this information is gathered and a cave or cave cluster is determined to be a protected KFA, then an analysis of recovery downlisting criterion 2 can be conducted. Below is a discussion of those TCGB caves that currently have the highest potential to meet protected KFA status.

Jollyville Plateau KFR:

West Park – This City of Austin owned tract is part of the Balcones Canyonlands Preserve (BCP)¹ and contains Spider Cave (BCCP 2008)². The entrance and cave footprint are more than 105 m (345 ft) from any disturbance (ZARA Environmental 2006), and the tract containing the cave is more than 365 ha (900 ac). As part of management for the cave, the City of Austin maintains a ranch fence around the property, conducts quarterly site visits looking for human intrusion, surveys cave fauna annually, and treats fire ants (BCCP 2008). The City of Austin has delineated the surface drainage basin based on topographic maps, but onsite verification has not been completed (Hauwert 2008) and subsurface drainage has not been delineated, so we are unsure if they are included within the preserve.

Stovepipe – This City of Austin owned tract contains Stovepipe Cave and is part of the BCP (BCCP 2008). This 21 ha (52 ac) tract is connected to more than 202 ha (500 ac) of additional BCP land, and the cave entrance and footprint are more than 105 m (345 ft) from any disturbance (Elliott 1997). As part of management for the cave, the City of Austin maintains the perimeter fence, conducts quarterly site visits looking for human intrusion and fire ants, and surveys cave fauna annually (BCCP 2008). SWCA, Inc. (1993) delineated a “drainage area” of the cave which is similar to the City of Austin’s topographic map of the surface drainage (Hauwert 2008) and both are included within the tract. However, onsite verification of the surface drainage basin has not been completed, and the subsurface drainage basin has not been delineated, so we are unsure if they are included within the preserve.

Cuevas (Tomen Park) – This Travis County owned tract contains five TCGB caves (Kretchmarr, Kretchmarr Double Pit, Tardus Hole, Gallifer, and Two Trunks) and is part of the BCP (BCCP 2008). This cave cluster is within a tract that is 57 ha (142 ac) and is connected to greater than 405 ha (1,000 ac) of additional BCP land. Gallifer Cave is the only feature with the potential to meet all of the characteristics we were looking for; however, all of the features within this tract contribute to long-term viability and stability of the KFA. The entrance to Gallifer Cave is protected by a cave gate and perimeter fence and both the cave entrance and footprint are more than 105 m (345 ft) from any disturbance (BCCP 2008, Elliott 1997). However, the edge of the tract containing Gallifer Cave is within 76 m (250 ft) of the cave entrance. The adjacent tract is privately owned and undeveloped, and conservation efforts to preserve it are ongoing. As part of management for these caves, Travis County maintains fencing, conducts bi-annual site visits looking for human intrusion and fire ants, and surveys cave fauna annually (BCCP 2008). The surface and subsurface drainage basins have not been delineated, so we are unsure if they are included within the preserve.

¹ A system of preserves permanently set aside to conserve habitat for 8 endangered species (including TCGB) and 27 species of concern as part of a joint regional 10(a)(1)(B) incidental take permit, PRT788841, held by the City of Austin and Travis County. .

² The incidental take permit mentioned above also is referred to as the Balcones Canyonlands Conservation Plan (BCCP).

Four Points – This privately owned and managed 21 ha (52 ac) tract has been preserved for the benefit of TCGB and other endangered species (USFWS 1995) and is considered part of the BCP³. Four TCGB caves (Disbelievers, Jollyville Plateau, MWA, and Japygid) are on this tract (USFWS 1995), but only two (Jollyville Plateau and MWA) have the potential to meet the characteristics we were looking for. However, all of the features within this tract contribute to the long-term viability and stability of the KFA. The cave entrances and footprints for both caves are greater than 105 m (345 ft) from any future disturbance (Elliott 1997), and this tract is adjacent to more than 162 ha (400 ac) of BCP land. As part of management for these caves, a perimeter fence was installed and fire ants are treated at least twice a year (ACI 2003, 2004, 2005, 2006, 2007). The surface and subsurface drainage basins have not been delineated, so we are unsure if they are included within the preserve.

Cedar Park KFR:

Lime Creek – The City of Austin owned 202 ha (500 ac) Lime Creek tract is part of the BCP and contains two TCGB caves: Rolling Rock and Broken Arrow (BCCP 2008). The cave entrances and footprints for both caves are more than 105 m (345 ft) from the nearest disturbance (Elliott 1997). As part of their management of the caves, the City of Austin maintains fencing, conducts quarterly site visits looking for human intrusion and fire ants, and surveys cave fauna annually (BCCP 2008). The City of Austin has delineated the surface drainage basins for both caves based on topographic maps, but onsite verification has not been done (Hauwert 2008). Rolling Rock and Broken Arrow caves are likely part of separate KFAs, since they are each located on the top of plateaus, they are more than 1.6 kilometers (1 mile) apart, and a canyon separates them. Subsurface drainage basins have not been delineated, so we are unsure if they are included within the preserve

Discovery Well – This tract is owned by the Texas Department of Transportation (TXDOT) and contains Discovery Well Cave. This 43 ha (106 ac) tract was set aside for the benefit of TCGB, and the cave entrance and footprint are more than 105 m (345 ft) from any disturbance (USFWS 2001, PBS&J 2005, USFWS 2005). As part of perpetual management of the cave, the gated cave entrance is monitored, fire ants are treated several times a year, and annual monitoring of TCGBs and the cave ecosystem are conducted (PBS&J 2005, TXDOT 2004). The surface and subsurface drainage basins have not been delineated, so we are unsure if they are included within the preserve.

2.3 Synthesis

According to recovery downlisting criterion 1 in the Travis and Williamson RP, three KFAs within each KFR should be protected. Protected is defined as sufficiently large to maintain the integrity of the karst ecosystem on which the species depends. These areas must also provide protection from threats such as fire ants, habitat destruction, and contaminants. Recovery downlisting criterion 2 requires at least five consecutive years

³ If preserves are established within the BCCP acquisition boundaries, they are considered part of the BCP and contribute to the total acreage of the preserve system (Rose Farmer, Travis County, pers. comm. 2008).

of a cave meeting protected KFA status and that perpetual protection of these areas be in place. Since the TCGB was listed in 1988, there have been significant steps towards protecting TCGB caves and meeting the downlisting criteria.

Within the Jollyville KFR there are currently four caves or cave clusters (Spider, Gallifer, Jollyville Plateau/MWA, and Stovepipe) within four tracts (West Park, Cuevas (Tomen Park), Gallifer, and Stovepipe) that have a high potential for meeting the definition of a protected KFA. With some additional field data gathered and/or implementation/confirmation of certain management activities, we should be able to make this determination. In total, there could be four protected KFAs within the Jollyville KFR, enough to meet recovery downlisting criterion 1.

Within the Cedar Park KFR there are currently three caves (Rolling Rock, Broken Arrow, and Discovery Well) within two tracts (Lime Creek and Discovery Well) that have a high potential for meeting the definition of a protected KFA. With some additional field data gathered and/or implementation/confirmation of certain management activities, we should be able to make this determination. In total, there could be three protected KFAs, enough to meet recovery criterion 1 for TCGB within the Cedar Park KFR.

If a cave is determined to be a protected KFA, then information relating to recovery criterion 2 should be gathered and/or implemented to meet downlisting status. The TCGB appears to be close to meeting the downlisting criteria and with additional information (outlined in section 4.0 Recommendations for Future Actions) we believe there is a high potential to achieve downlisting for this species. Until such time, we recommend TCGB's status as endangered remain the same.

3.0 RESULTS

3.1 Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (*Indicate reasons for delisting per 50 CFR 424.11*):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No change is needed**

3.2 New Recovery Priority Number: 8C

Brief Rationale: The Recovery Priority Guidelines (48 FR 43104) define high and moderate degrees of threat. High is defined as extinction being almost certain in the immediate future, and moderate is defined as the species not facing extinction if recovery is temporarily held off even if threats to the habitat still exist. Because of the significant steps toward recovery that have been made for the TCGB involving land protection, surveys of habitat and TCGBs, cave perimeter fencing, and treatment of fireants described above, we believe moderate now better describes the threat status of the species. Therefore, we recommend that the recovery priority number be changed from a 2C (high degree of threat) to an 8C (moderate degree of threat).

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS -

- Send letters to the City of Austin, Travis County, the Four Points tract owner, and TXDOT regarding our findings in this 5-year review and requesting their assistance in gathering additional information, including that listed in the next three bullets, on these or other TCGB caves.
- Determine the surface and subsurface drainage basins for: Spider, Gallifer, Jollyville Plateau, MWA, Stovepipe, Rolling Rock, Broken Arrow, and Discovery Well caves and determine if they are within the preserve boundaries. (Recovery Task 5.2)
- Confirm and/or implement control of red imported fire ants at: Spider, Gallifer, Stovepipe, Rolling Rock, and Broken Arrow caves. (Recovery Task 4.11)
- Confirm and/or implement monitoring of TCGBs and their cave ecosystem at MWA and Jollyville Plateau caves. (Recovery Task 7.2)
- Apply recovery criterion 2 to any caves that meet protected KFA status. (Recovery Task 7)
- Draft delisting criteria and reevaluate the status of the species in accordance with those criteria.

• **REFERENCES**

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW
Tooth Cave ground beetle (*Rhadine persephone*)**

Current Classification: endangered

Recommendation resulting from the 5-Year Review:

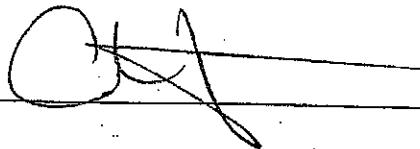
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed – except to Recovery Priority Number

Appropriate Listing/Reclassification Priority Number, if applicable: n/a

Review Conducted By: Christina Williams, Austin Ecological Services Office, Austin, Texas

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 8/11/08

REGIONAL OFFICE APPROVAL:

 **Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Region 2**

Signature Susan Jacobson Date 9.18.08

Table 1: TCGB Locations in the Jollyville Plateau Karst Fauna Region

Tract Name	Cave name	Size of tract with cave (acres)	Notes
West Park	Spider	900	Within the Balcones Canyonlands Preserve (BCP) and connects to >1,000 acres of additional BCP lands.
Stovepipe	Stovepipe	52	Within the BCP and connects to >500 acres of additional BCP lands.
Cuevas (Tomen Park)	Kretchmarr	142	Within the BCP and connects to >1,000 acres of additional BCP lands.
	Kretchmarr Double Pit		
	Tardus Hole		
	Gallifer		
	Two Trunks		
Four Points	Disbelievers	52	Permanently set aside to offset impacts to other caves on P-WB Joint Venture (Four Points) tract (incidental take permit PRT808694).
	Jollyville Plateau		
	MWA		
	Japygid		
Four Points	Twisted Elm	20	Permanently set aside as part of P-WB Joint Venture's (Four Points) incidental take permit (PRT808694); however, impacts to the cave were authorized and development is proposed to come within 50 feet of the cave entrance.
	Puzzle Pit	Destroyed	Destroyed as part of P-WB Joint Venture (Four Points) incidental take permit PRT808694.
Root	Root/North Root	.057	Entrance to cave owned by Travis County. Surrounded by a 47 acre tract of undeveloped land that is adjacent to >1,000 acres of BCP lands.
Tooth	Tooth/Russell	.632	Entrance to cave owned by Travis County. Surrounded by two tracks totaling 26.1 acres of undeveloped land. Both surrounding parcels are adjacent to >1,000 acres of BCP lands.
Unknown	Lamm	35	Incidental take of cave was authorized as part of construction of Canyon Creek subdivision (consultation 2-15-93-F-075). The setback around this cave is proposed to be 150 feet around the cave opening. Currently the cave is within a 35+ acre undeveloped tract and is adjacent to future planned development.
Unknown	Homestead	?	Location unknown - either between a dry cleaners and a parking lot in a small (<1 acre) grassy area, or currently under the footprint of a large retail store.

Table 2: TCGB Locations in the Cedar Park Karst Fauna Region

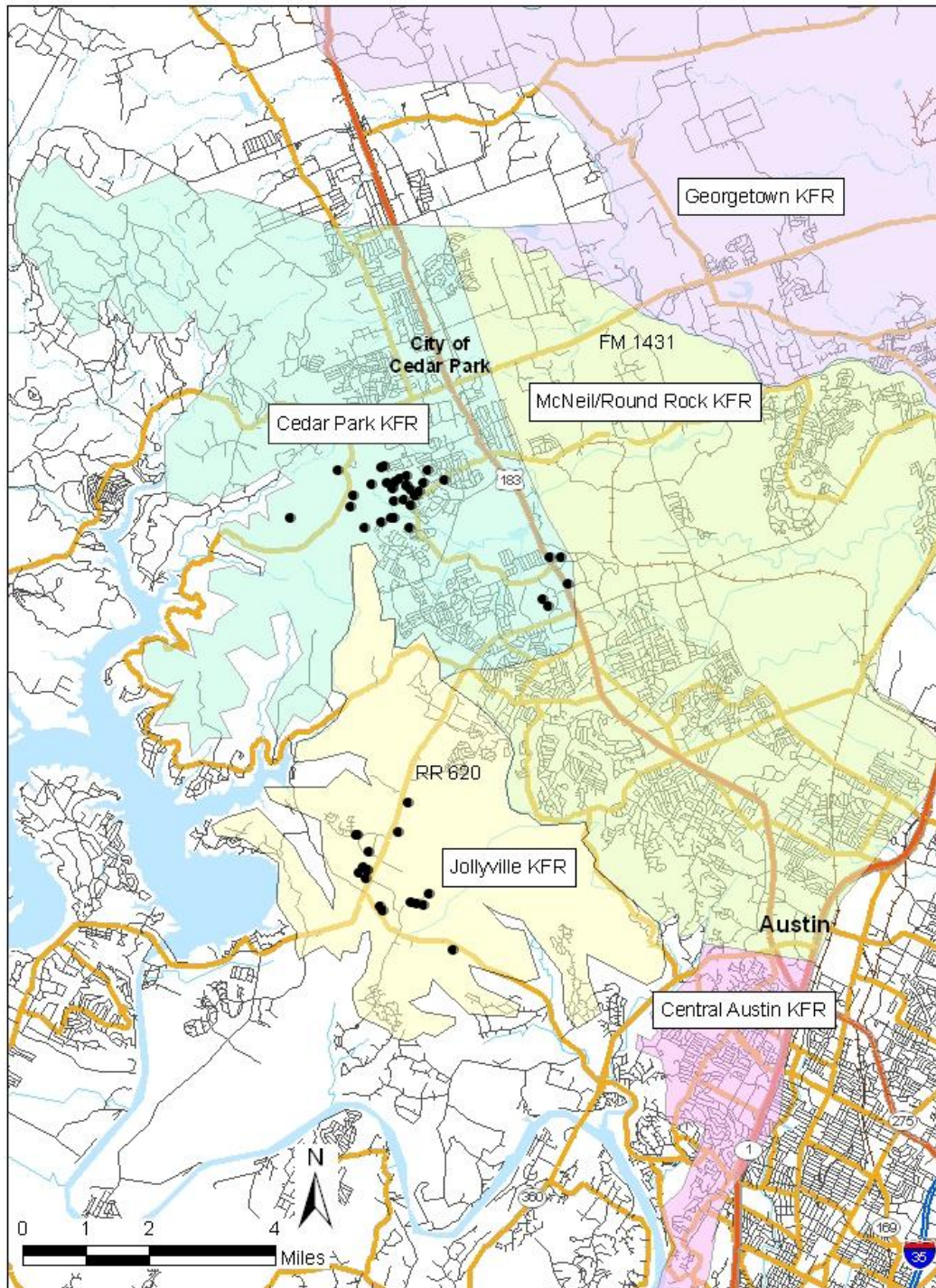
Tract Name	Cave name	Size of tract with cave (acres)	Notes
Lime Creek	Rolling Rock	500	Within City of Austin BCP Lime Creek tract and connects to >1,000 acres of additional BCP lands.
	Broken Arrow		
Discovery Well	Discovery Well	106	Set aside as part of construction Highway 183A consultation (2-15-97-F-416).
Big Oak	Big Oak	9.8	Set aside as part of construction for Highway 183A (consultation 2-15-97-F-416).
Unkown	Raccoon	4.2	Platted for commercial development, but adjacent to 300+ acres of undeveloped land.
N/A	Jug	Destroyed	Destroyed by construction of Highway 183A (consultation 2-15-97-F-416).
Lakeline	Lakeline	0.05	Set aside as part of Simon Properties (Lakeline Mall) incidental take permit (PRT762988); however, authorized to be impacted.
N/A	Lakeline Well Trap No. 6	Destroyed	Destroyed as part of Simon Properties (Lakeline Mall) incidental take permit (PRT762988).
Testudo Tube	Testudo Tube	26	Set aside as part of Simon Properties (Lakeline Mall) incidental take permit PRT762988.
Wilcox	A.J. & B.L. Wilcox	4.16	Within a tract owned by an adjacent quarry. An additional 4+ acres of undeveloped land is to the north, but otherwise bound by roads and development.
	Wilcox		
Buttercup Creek	Marigold	0.88	Surrounded by development.
	Primrose	1.5	Surrounded by development.
	Bluewater No. 2	6	Surrounded by development.
	Animal Canyon	8.3	Set aside as part of Lumbermen Investment Corp.'s (Buttercup Creek Subdivision) incidental take permit (PRT836384).
	Two Hole		
	Boulevard		
	Buttercup Creek	49.6	
	Convoluted Canyon		
	Hideaway		
	Illex		
	Nelson Ranch		
	Buttercup Blow Hole	23.1	
	Cedar Elm Sink		
	Good Friday		
	Pat's Pit		
Salamander Squeeze			
Stone Well No.1			
Stone Well No.2			

	Grimace	4.2	
	Whitestone Pit	10.9	

Table 2: TCGB Locations in the Cedar Park Karst Fauna Region continued

Buttercup Creek	May B A	4.6	Set aside as part of Lumbermen Investment Corp.'s (Buttercup Creek Subdivision) incidental take permit (PRT836384).
	Tree House	3.3	
	Harvestman	8.9	
	Pig Snout		
	T.W.A.S.A		
	Whitewater	5.9	

Map 1: Tooth Cave Ground Beetle (*Rhadine persephone*) Cave Locations and Karst Fauna Regions



Cave locations are not accurately represented and are for illustration purposes only.