

**Tooth Cave Spider**  
**(*Tayshaneta myopica*=*Neoleptoneta myopica*)**  
**5-Year Status Review:**  
**Summary and Evaluation**



*Tooth Cave spider. Courtesy of Colin Strickland.*

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

**April 2025**

**5-YEAR REVIEW**  
**Tooth Cave Spider (*Tayshaneta myopica*=*Neoleptoneta myopica*)**

**1.0 GENERAL INFORMATION**

**1.1 Reviewers:**

**Lead Regional or Headquarters Office:**

Janess Vartanian, Fish and Wildlife Biologist, Southwest Regional Office, Albuquerque, New Mexico

**Lead Field Office:**

Nicholas Gladstone, Fish and Wildlife Biologist, Austin Ecological Services Field Office, Austin, Texas  
Michael Warriner, Supervisory Fish and Wildlife Biologist, Austin Ecological Services Field Office, Austin, Texas

**Cooperating Field Office(s):**

Not applicable

**Cooperating Regional Office(s):**

Not applicable

**1.2 Purpose of 5-Year Reviews:**

The U.S. Fish and Wildlife Service (Service or USFWS) is required by section 4(c)(2) of the Endangered Species Act (ESA) to conduct a status review of each listed species once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing as endangered or threatened is based on the species' status considering the five threat factors described in section 4(a)(1) of the ESA. These same five factors are considered in any subsequent reclassification or delisting decisions. In the 5-year review, we consider the best available scientific and commercial data on the species and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process including public review and comment.

**1.3 Methodology used to complete the review:**

The Service conducts status reviews of species on the List of Endangered and Threatened Wildlife and Plants (50 CFR 17.12) as required by section 4(c)(2)(A) of the ESA. The Service provides notice of status reviews via the *Federal Register* and requests information on the status of the species. Data for this status review were solicited from interested parties

through a *Federal Register* notice announcing this review on November 14, 2024 (89 FR 90030). No new information was received from this solicitation. The Austin Ecological Services Field Office conducted this review and considered both new and previously existing information from Federal and State agencies, municipal and county governments, non-governmental organizations, academic institutions, and the public. Primary sources of information used in this review were recovery criteria and guidelines from the Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas (Service 1994, amended 2019, pp. 5-9), Karst Preserve Design Recommendations (Service 2012, entire), Karst Preserve Management and Monitoring Recommendations (Service 2014, entire), scientific journals, and unpublished reports.

#### **1.4 Background:**

##### **1.4.1 FR Notice citation announcing initiation of this review:**

88 FR 1602, January 11, 2023

##### **1.4.2 Listing history:**

###### Original Listing

**FR notice:** 53 FR 36029

**Date listed:** September 16, 1988

**Entity listed:** Tooth Cave spider (*Neoleptoneta myopica*)

**Classification:** Endangered

###### Revised Listing, if applicable

**FR notice:** Not applicable

**Date listed:** Not applicable

**Entity listed:** Not applicable

**Classification:** Not applicable

##### **1.4.3 Associated Rulemakings:**

Not applicable

##### **1.4.4 Review History:**

Status reviews for the Tooth Cave spider were conducted in 1988 for the final listing of the species (53 FR 36029), 1994 for the Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas (Service 1994, entire), 2009 and 2018 for 5-year reviews (Service 2009, entire; 2018, entire), and 2019 for an amendment to the Recovery Plan for Endangered Karst Invertebrates in Travis and Williamson Counties, Texas (Service 2019, entire).

#### **1.4.5 Species' Recovery Priority Number at start of 5-year review:**

2C

#### **1.4.6 Recovery Plan or Outline**

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

**Date issued:** August 25, 1994

**Dates of previous plans/amendment or outline, if applicable:** August 28, 2019

## **2.0 REVIEW ANALYSIS**

Section 4 of the ESA (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of "endangered species" or "threatened species." The ESA defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The ESA requires that we determine whether a species meets the definition of "endangered species" or "threatened species" due to any of the five factors described below.

Section 4(a) of the Act describes five factors that may lead to endangered or threatened status for a species. These include: A) the present or threatened destruction, modification, or curtailment of its habitat or range; B) overutilization for commercial, recreational, scientific, or educational purposes; C) disease or predation; D) the inadequacy of existing regulatory mechanisms; or E) other natural or manmade factors affecting its continued existence.

The identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In assessing whether a species meets either definition, we must evaluate all identified threats by considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Service recommends whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

### **2.1 Distinct Population Segment (DPS) policy (1996):**

Not applicable; the Tooth Cave spider is an invertebrate.

## Updated Information and Current Species Status

### 2.1.1 Biology and Habitat

#### 2.1.1.1 New information on the species' biology and life history:

The Tooth Cave spider has been noted to exhibit clinal variation (e.g. greater to lesser expression) in troglomorphic traits (i.e., behavioral, morphological, and/or physiological adaptations to subterranean existence) with populations containing individuals with complete loss of eyes and pigment, reduced eyes and light pigmentation, or large eyes and dark pigmentation (Ledford et al. 2012, pp. 10, 90). This variability may represent localized adaptations to subterranean conditions and/or gene flow with closely related *Tayshaneta* species (Ledford et al. 2012, pp. 10, 92; Ledford et al. 2023, p. 6, B-7).

#### 2.1.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, birth rate, seed set, germination rate, age at mortality, mortality rate, etc.), or demographic trends:

No new information.

#### 2.1.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

Ledford et al. (2023, entire) assessed gene flow and genetic population structure of the Tooth Cave spider and a closely occurring congener, *Tayshaneta paraconcinna* (no common name). The latter *Tayshaneta* species is known from caves in Bell and Williamson counties and surface sites in Blanco, Burnet, Travis, and Williamson counties (Ledford et al. 2012, pp. 55-57, 92). Several locations for *T. paraconcinna* occur in close proximity to caves occupied by the Tooth Cave spider (Ledford et al. 2012, p. 92). Analyses revealed the existence of four genetic clusters (i.e., groups of genetically similar populations) for the Tooth Cave spider and two genetic clusters for *T. paraconcinna* (Ledford et al. 2023, pp. 6, B-6).

Varying degrees of potential gene flow were evidenced across multiple sites, including potential gene flow between surface and subterranean populations (Ledford et al. 2023, pp. 6, B-6-B-7). Strongly troglomorphic populations of the Tooth Cave spider at Jester Estates and Stovepipe Caves and a group consisting of North Root, Tooth Caves, and Tigh Pit C9 Sink did not display any evidence of gene flow (Ledford et al. 2023, pp. 6, B-6-B-7).

#### **2.1.1.4 Taxonomic classification or changes in nomenclature:**

Ledford et al. (2023, entire) examined the species boundaries between the Tooth Cave spider and *T. paraconcinna* using next-generation DNA analyses. Analyses revealed that individuals of those two species from sampled sites appeared to form a monophyletic (i.e., common ancestor and all descendants) group, *T. myopica*+*T. paraconcinna* (Ledford et al. 2023, pp. 5, B-1, B-3-B-4). That assertion was caveated given the existence of contrary phylogenetic relationships (i.e., paraphyletic; common ancestor and some but not all descendants) at two sites (Ledford et al. 2023, p. 5). Nonetheless, this study found that the phylogenetic boundary between the two *Tayshaneta* species was closer than expected. This reconfirmed earlier phylogenetic work on the species (Ledford et al. 2012, pp. 10, 90). No formal taxonomic changes were made by Ledford et al. (2023, entire) with both species remaining as valid taxa.

Ledford et al. (2023, p.7) proposed two hypotheses to resolve the species' taxonomy:

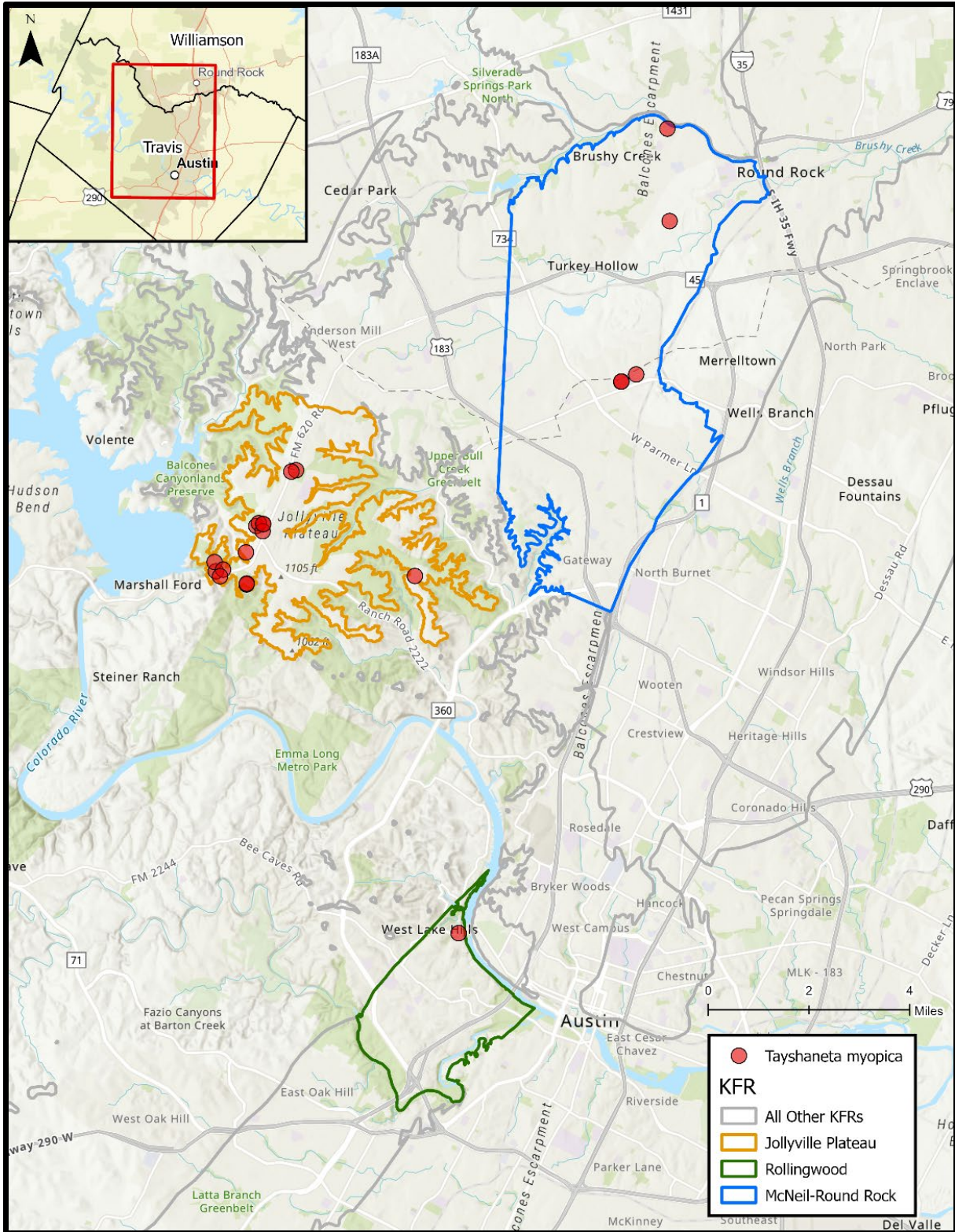
“In the first hypothesis, our prediction is that additional sampling from Fort Hood and surrounding localities in Bell County will show that *T. paraconcinna* is its own monophyletic group, sister to *T. myopica*. This would result in the maintenance of both species, although known locations for *T. myopica* would need to be updated to reflect this change. In the second hypothesis, our prediction is that with additional sampling we will detect increased signal for admixture and our confidence in isolation by distance (IBD) will improve. This would result in a much larger distribution for *T. myopica* to include all currently known *T. paraconcinna* populations. In either scenario, the distribution of *T. myopica* will increase to include both cave and surface populations. In our opinion, this is a strong argument to incorporate surface sampling protocols as part of inventory and monitoring efforts.”

#### **2.1.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, pollinator availability, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):**

At the time of the 2018 5-year review, Service records indicated that Tooth Cave spider occurred in at least 13 cave systems within the Jollyville Plateau and McNeil-Round Rock Karst Fauna Regions (KFRs) (Service 2018, p. 10). We currently have documented 21 caves with records of the Tooth Cave spider (Figure 1). Caves added for the species since the 2018 5-year review include Black-Cap, Gaping Maw, North Root, and Stovepipe Caves and Road H Void in the Jollyville Plateau KFR, Millipede and Monarch Caves in the McNeil/Round Rock KFR, and Under the Road Cave in the Rollingwood KFR. This follows a 2021 update to all KFR boundaries within Travis and Williamson Counties by

Veni and Jones (2021, pp. 28-37, 40, 45-46), which shifted the boundaries of the Jollyville Plateau, McNeil/Round Rock, and Rollingwood KFRs.

For this review, occurrence records of Tooth Cave spider at individual caves were assigned to a “cave cluster” if the center point of a cave occurred within 300 meter (m) radius (984 feet (ft)) another cave center point and each were occupied by the species. This method has previously been used to delineate hypothesized populations of other karst invertebrate species based on subsurface dispersal potential (Service 2022, p. 82). Both cave clusters and individual, non-clustered caves represent Tooth Cave spider populations. Using this methodology and updated cave coordinate data, occurrences were grouped into five cave clusters and five individual caves (Table 1).



**Figure 1.** Geographic distribution of Tooth Cave spider in Travis and Williamson Counties, Texas.

**Table 1.** Tooth Cave spider cave clusters and individual caves.

<b>Karst Fauna Region, Cave Cluster(s) or Individual Cave(s)</b>	<b>County</b>	<b>Ownership</b>
Jollyville Plateau, Cuevas (Tomen Park) Cave Cluster	Travis	Travis County
Jollyville Plateau, Lucas Tract Cave Cluster	Travis	Travis County / Private
Jollyville Plateau, Cortana Cave Cluster	Travis	City of Austin
Jollyville Plateau, Stovepipe Preserve Cave Cluster	Travis	City of Austin
Jollyville Plateau, Jester Estates Cave	Travis	City of Austin
Jollyville Plateau, Road H Void	Travis	Private
McNeil-Round Rock, McNeil High School Cave Cluster	Travis	Private
McNeil-Round Rock, Spike’s Goat Cave	Williamson	Private
McNeil-Round Rock, Monarch Cave	Williamson	Private
Rollingwood, Under the Road Cave	Travis	Private

**2.1.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

The population needs of the Tooth Cave spider are the factors that provide for a high probability of population persistence over the long-term at an occupied location (e.g., low degree of threats and high survival and reproduction rates). Since population estimates for the Tooth Cave spider are unavailable, nor do we know what reproductive rates sustain a healthy population, we applied measures of surface habitat elements (i.e., area of naturally vegetated open space, distance of cave entrance to nearest edge, and status of cave cricket foraging areas surrounding each cave (Taylor et al. 2007, pp. 2, 37, 43)) as surrogates to assess population resiliency. For a full discussion of this methodology, see Service (2022, pp. 82-86).

Cave crickets (Rhaphidophoridae) are important nutrient contributors in many cave ecosystems, including those of central Texas (Sharrat et al. 2000, p. 123; Taylor et al. 2004, pp. 9, 28, 31; Lavoie et al. 2007, p. 131). Some caves can contain hundreds to thousands of crickets, outnumbering many other karst invertebrates (Fagan 2007, p. 904). As the majority of caves in central Texas are smaller, drier (i.e., they lack streams and only rarely receive large inputs of water during storm events), and generally do not host large bat colonies (Taylor et al. 2005, p. 97; Taylor et al. 2007, p. 3), cave crickets are likely a primary mode of nutrient input in these cave systems (Taylor et al. 2004, pp. 28, 31; Taylor et al. 2005, pp. 97-98; Taylor et al. 2007, p. 3). For a full discussion of this methodology, see Service (2022, pp. 82-86).

For this review, we evaluated 2023 aerial imagery of areas surrounding occupied caves in ArcGIS for the following habitat elements: amount of open space with

natural vegetation contiguous with a cave entrance, distance of the cave entrance to nearest edge, and status of the cave cricket foraging area (Service 2022, p. 84). As we lack maps of every cave's footprint, cave entrances served as center-points for measurements.

We assigned each cave cluster and individual cave site to one of four resiliency categories, high, moderate, low, or impaired, based on values generated for each habitat element (Service 2022, pp. 85). We also noted any physically destroyed caves, if any, and assumed those caves would no longer support Tooth Cave spider populations. Finally, we noted whether a site possessed legally binding perpetual protection along with the amount of acreage protected, if that information was available.

Habitat elements at high and moderate resiliency sites provide the greatest probability for persistence of Tooth Cave spider populations and the associated karst ecosystem. However, a sites' continued status as high or moderate resiliency is dependent on the perpetuation of the needed surface and subsurface habitat elements. A cave cluster with a high or moderate resiliency designation may contain an individual cave or caves with lower resiliency, but if at least one cave in the cluster was potentially capable of supporting a high to moderate resiliency population, we assigned that higher resiliency category to the entire cluster. Low resiliency and impaired cave clusters and individual caves potentially lack habitat elements of sufficient quality to support persistent populations of Tooth Cave spider over the long-term.

Impacts to a cave's surface or subsurface drainage basin can be a significant source of stressors for Tooth Cave spider populations. To characterize habitat for a particular site, it is important to determine whether development activities are affecting drainage basins, altering either the quantity or quality of hydrologic inputs into the karst ecosystem. At this time, however, we do not have adequate assessments of drainage basins for most occupied sites. Therefore, we did not include an assessment of actual impacts to drainage basins in this evaluation. For these analyses, we assumed that larger tracts of open space were more likely to include intact drainage basins, particularly when the cave entrance was some distance from the edge. In using this approach, we recognize that drainage basin impacts may be occurring undetected even in high and moderate resiliency sites. Thus, it would be important to delineate and protect these areas in the future to ensure Tooth Cave spider persistence.

Based on our review, eleven individual caves (including four cave clusters) are currently of medium or high resiliency with potential to support Tooth Cave spider populations over the long-term. All other caves and cave clusters were assessed as having low resiliency or as impaired (Table 2).

**Table 2.** Current resiliency of Tooth Cave spider sites (cave clusters and individual caves) by karst fauna region.

Table 2a. Jollyville Plateau KFR.

<b>Cave Cluster or Individual Cave</b>	<b>Open Space Area ha(ac)</b>	<b>Distance of Cave to Nearest Edge m(ft)</b>	<b>Percent of Cave Cricket Foraging Area Impacted</b>	<b>Current Resiliency</b>
Cuevas (Tomen Park) Cave Cluster, Gallifer Cave	>40 (>100)	>120 (>395)	0%	High
Cuevas (Tomen Park) Cave Cluster, North Root Cave	>40 (>100)	>120 (>395)	0%	High
Cuevas (Tomen Park) Cave Cluster, Root Cave	>40 (>100)	>120 (>395)	0%	High
Cuevas (Tomen Park) Cave Cluster, Tight Pit Cave	>40 (>100)	>120 (>395)	0%	High
Cuevas (Tomen Park) Cave Cluster, Tooth Cave	>40 (>100)	<120 (<395)	0-25%	Moderate
Lucas Tract Cave Cluster, Geode Cave	>40 (>100)	<120 (<394)	25%-50%	Low
Lucas Tract Cave Cluster, LU-11 Cave	>40 (>100)	<120 (<394)	0%-25%	Moderate
Lucas Tract Cave Cluster, New Comanche Trail Cave	>40 (>100)	<120 (<394)	0%	Moderate
Lucas Tract Cave Cluster, Steiner Telephone Pole Cave	<3.6 (<9)	<120 (<394)	50%-75%	Impaired
Cortana Cave Cluster, Cortana Cave	>40 (>100)	>120 (>395)	0%	High
Cortana Cave Cluster, Black-Cap Cave	>40 (>100)	>120 (>395)	0%	High
Stovepipe Preserve Cave Cluster, Stovepipe Cave	16-40 (40-100)	>120 (>394)	0%	Moderate
Stovepipe Preserve Cave Cluster, Gaping Maw Cave	>40 (>100)	<120 (<394)	>25%	Low
Jester Estates Cave	<3.6 (<9)	<120 (<394)	50%-75%	Impaired
Road H Void	<0.4 (<1)	<120 (<394)	75%-100%	Impaired

Table 2b. McNeil-Round Rock KFR.

<b>Cave Cluster or Individual Cave</b>	<b>Open Space Area ha(ac)</b>	<b>Distance of Cave to Nearest Edge m(ft)</b>	<b>Percent of Cave Cricket Foraging Area Impacted</b>	<b>Current Resiliency</b>
McNeil High School Cave Cluster, McNeil Bat Cave	>40 (>100)	<120 (<395)	0-25%	Moderate
McNeil High School Cave Cluster, Millipede Cave	<0.4 (<1)	<120 (<394)	75%-100%	Impaired
McNeil High School Cave Cluster, Millipede Annex Cave	<0.4 (<1)	<120 (<394)	75%-100%	Impaired
Spike's Goat Cave	16-40 (40-100)	<120 (<394)	25%-50%	Impaired
Monarch Cave	16-40 (40-100)	<120 (<394)	25%-50%	Impaired

Table 2c. Rollingwood KFR.

<b>Cave Cluster or Individual Cave</b>	<b>Open Space Area ha(ac)</b>	<b>Distance of Cave to Nearest Edge m(ft)</b>	<b>Percent of Cave Cricket Foraging Area Impacted</b>	<b>Current Resiliency</b>
Under the Road Cave	<0.4 (<1)	<120 (<394)	75%-100%	Impaired

#### **2.1.1.7 Other:**

No new information.

#### **2.1.1.8 Conservation Measures:**

A Habitat Conservation Plan (i.e., 10(a)(1)(B) permit) was issued to the City of Austin and Travis County in 1996 for incidental take of two listed bird species and six listed karst invertebrates. The latter group included the Tooth Cave spider. The Habitat Conservation Plan required the establishment of a preserve system to protect habitat for the covered species. That preserve, the Balcones Canyonlands Preserve, encompasses over 13,355 ha (33,000 ac) in Travis and Williamson counties (Travis County 2025, unpaginated) and includes several tracts in the Jollyville Plateau KFR that host the Tooth Cave spider.

Specifically, the Balcones Canyonlands Preserve contributes to the current resiliency of Cortana Cave Cluster, Cuevas (Tomen Park) Cave Cluster, Lucas Tract Cave Cluster, and Stovepipe Preserve Cave Cluster in the Jollyville Plateau KFR. Along with the City of Austin and Travis County, a number of other entities are responsible for ownership and/or management of the parcels of land that compose the preserve including the Lower Colorado River Authority, Travis Audubon Society, The Nature Conservancy, and private landowners. All sites protected within the Balcones Canyonlands Preserve may not provide protections equivalent to karst fauna area criteria and guidelines.

There are currently no preserves in the McNeil/Round Rock Karst or Rollingwood KFRs supporting this species. The sites on the Balcones Canyonlands Preserve are located in areas of Travis County that have experienced substantial urban development. The protections provided by the preserve system have maintained large amounts of open space surrounding most of these caves and the integrity of cave cricket foraging habitat. Additional information is needed to determine if these sites meet karst fauna area criteria and guidelines.

### **2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms):**

#### **2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:**

The stressors that most influence Tooth Cave spider viability are habitat destruction and degradation that results from urban and suburban development. The range of the Tooth Cave spider falls within north-central and southern Travis County southern Williamson County. On the whole, both counties have seen significant human population growth and conversion of natural landscapes to exurban, suburban, and residential development. From 1970 to 2023, Travis County increased in human population from 295,516 people to 1,334,961 (U.S.

Census Bureau 2012, p. 9; Census Reporter 2023, unpaginated). Over that same time-period, Williamson County increased from 37,305 people to 671,191 people (U.S. Census Bureau 2012, p. 9; Census Reporter 2023, unpaginated). The human populations of both counties are expected to continue to grow into 2060, with a 75% increase for Travis County and a 176% for Williamson County (Texas Demographic Center 2022, unpaginated).

In response to the growing human population, urban, suburban, and exurban developments continue to expand within Travis and Williams counties. Housing units in Travis County increased from 100,882 units in 1970 to in 644,946 units in 2023 (U.S. Census Bureau 2012, p. 9; Census Reporter 2023, unpaginated). Williamson County housing units increased from 13,216 units in 1970 to 275,590 units in 2023 (U.S. Census Bureau 2012, p. 9; Census Reporter 2023, unpaginated). Census statistics do not fully capture land conversion, as continued installation of infrastructure projects and non-residential commercial development can be expected to follow establishment of new housing units. To quantify urban development within the geographic range of Tooth Cave spider our review used historical aerial imagery from the Texas Natural Resources Information System (TNRIS) database (TNRIS 2025, unpaginated) and the Annual National Land Cover Database (NLCD) Collection 1.0 Impervious Descriptor datasets (USGS 2024, unpaginated). The latter more recently released Geographic Information Systems (GIS) datasets discretize land cover type into three classes: road, urban non-road, and all other land types.

All annual datasets from the NLCD Collection were used in our review, ranging from 1985 (the year this species was first petitioned for federal listing) to 2023 (the most recent year for which data was available). These datasets were clipped to the currently defined boundaries of the Jollyville Plateau, McNeil-Round Rock, and Rollingwood KFRs. The total area of each class was summed within each KFR and within the immediate vicinity of each known occurrence of Tooth Cave spider. Each data type (i.e., historical imagery and the NLCD Collection) was evaluated in relation to the cave resiliency criteria to assess historical and contemporary resiliency categorization.

Urban land types (i.e., roads, urban non-roads) have increased within the total combined area of the Jollyville Plateau, McNeil-Round Rock, and Rollingwood KFRs (~33,130 acres (13,407 hectares)) from approximately 38% (~12,583 acres (5,092 hectares)) to approximately 64% (~21,131 acres (8,551 hectares)) from 1985 to 2023. Direct and collateral impacts to surface and subsurface habitat from urbanization have reduced Tooth Cave spider population viability and the species' long-term persistence. To date, the only high and moderate resiliency sites occupied by the Tooth Cave spider occur in the Jollyville Plateau KFR within the bounds of the Balcones Canyonlands Preserve. Only one medium resiliency cave occurs in the McNeil-Round Rock KFR, and the only known occupied site in the Rollingwood KFR is impaired.

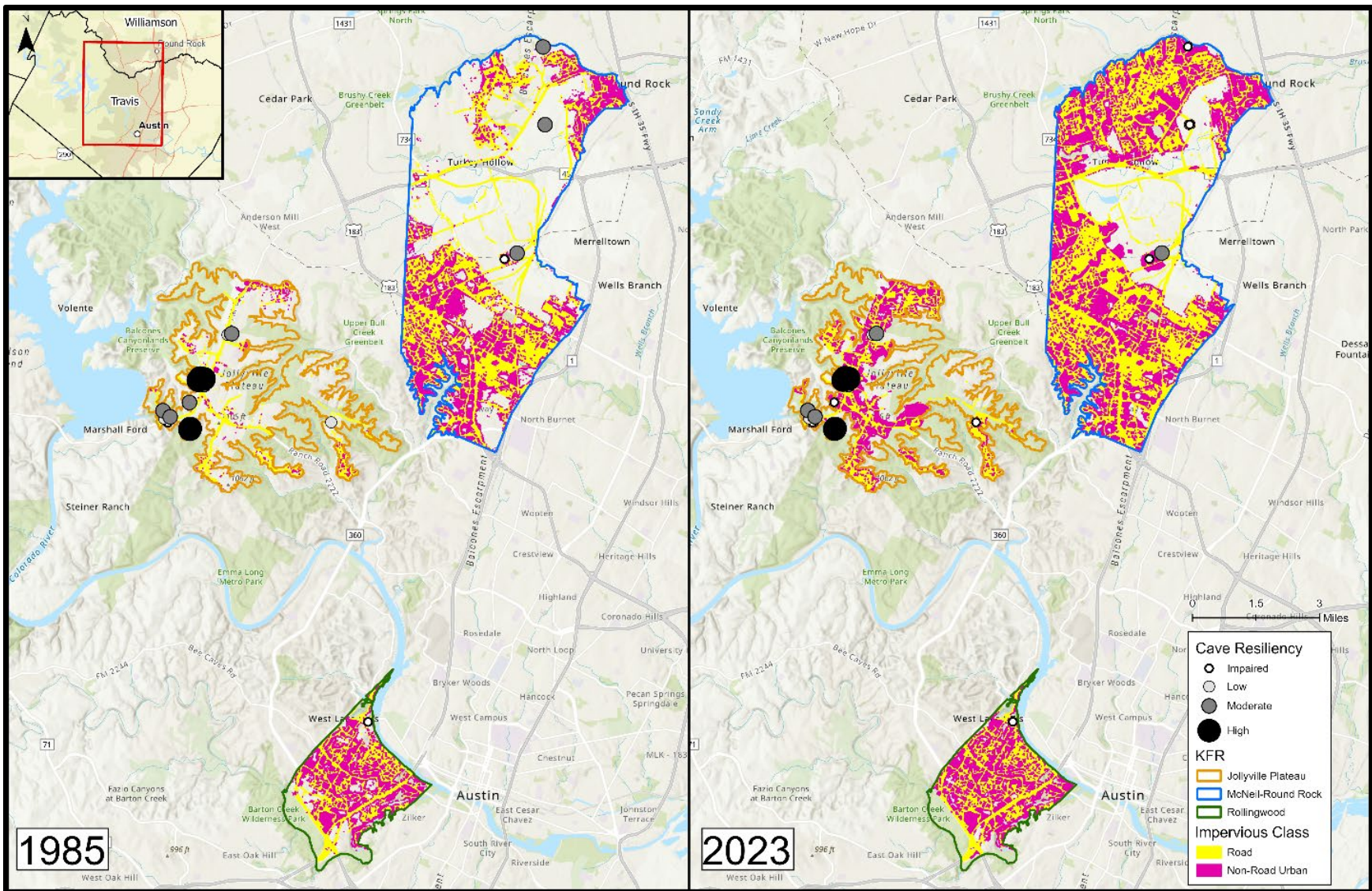


Figure 2. Tooth Cave spider cave resiliency in relation to urban land cover growth from 1985 to 2023.

**2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:**

No new information.

**2.3.2.3 Disease or predation:**

No new information.

**2.3.2.4 Inadequacy of existing regulatory mechanisms:**

No new information.

**2.3.2.5 Other natural or manmade factors affecting its continued existence:**

No new information.

## **2.4 Synthesis**

The Tooth Cave spider occurs at five cave clusters and five individual caves in Travis and Williamson counties. Of that total, two cave clusters are of high resiliency and two additional cave clusters are of moderate resiliency: all in the Jollyville Plateau KFR. Larger tracts of open space with natural vegetation surround these caves, providing higher quality cave cricket foraging habitat and greater potential for connectivity among karst features to support cricket populations. Persistence of Tooth Cave spider populations at these sites is dependent upon continued management and perpetual protection that maintains adequate open space, sufficient buffering from edge effects, intact foraging areas for cave crickets, and sufficient quantity and quality of water from intact drainage basins.

No high or moderate resiliency cave clusters or individual caves exist for the species in the McNeil/Round Rock or Rollingwood KFRs. Both Travis and Williamson Counties have experienced rapid population growth and development, which has resulted in loss and degradation of surface and subsurface habitats and is an ongoing stressor for the species. Open space with native vegetation has been reduced at low resiliency and impaired sites with tracts becoming increasingly fragmented and isolated from one another. These sites may be unable to support viable populations of the Tooth Cave spider over the long term. There are currently four cave clusters with potential to support viable Tooth Cave spider populations over the long-term in the Jollyville Plateau KFR, all of which fall within the bounds of Balcones Canyonlands Preserve.

The human populations of both counties are expected to continue to grow into 2060, with a 75% increase for Travis County and a 176% for Williamson County (Texas Demographic Center 2022, unpaginated). Such significant human population growth is projected to result in increased conversion of natural surface habitat to urban land uses through mid-century (Nowak and Greenfield 2018b, p. 170). If adequate protections are not enacted, land

clearing, residential and commercial construction, and installation of infrastructure will accompany this growth and degrade the resiliency of high and moderate resiliency sites over time. At this time, we do not recommend a change in listing status for the Tooth Cave spider.

### **3.0 RESULTS**

#### **3.1 Recommended Classification:**

No change is needed.

#### **3.2 New Recovery Priority Number (indicate if no change; see 48 FR 43098):**

No change (2C)

#### **Brief Rationale:**

Not applicable.

#### **3.3 Listing and Reclassification Priority Number, if reclassification is recommended (see 48 FR 43098):** Not applicable

**Reclassification (from Threatened to Endangered) Priority Number:** Not applicable

**Reclassification (from Endangered to Threatened) Priority Number:** Not applicable

**Delisting (Removal from list regardless of current classification) Priority Number:** Not applicable

#### **Brief Rationale:**

Not applicable

### **4.0 RECOMMENDATIONS FOR FUTURE ACTIONS**

- (1) Establishment of KFAs for the Tooth Cave spider within the Balcones Canyonlands Preserve.
- (2) Collection and molecular analyses of additional Tooth Cave spider and *T. paraconcinna* specimens from surface and subterranean sites across the species range to better define species relationships and genetic population structure. Surveys should also be conducted in adjacent KFRs to evaluate the potential occurrence of the species in those regions.

## 5.0 REFERENCES

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**U.S. FISH AND WILDLIFE SERVICE**

**5-YEAR REVIEW of Tooth Cave Spider (*Tayshaneta myopica*=*Neoleptoneta myopica*)**

**Current Classification:** Endangered

**Recommendation resulting from the 5-Year Review:**

No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** Not applicable

**FIELD OFFICE APPROVAL:**

**Lead Field Supervisor, Fish and Wildlife Service, Austin Ecological Services Field Office,  
Austin, Texas**

Approve \_\_\_\_\_