BIODIVERSITY FROM CAVES AND OTHER SUBTERRANEAN HABITATS OF GEORGIA, USA

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Abstract

We provide an annotated checklist of species recorded from caves and other subterranean habitats in the state of Georgia, USA. We report 281 species (228 invertebrates and 53 vertebrates), including 51 troglobionts (cave-obligate species), from more than 150 sites (caves, springs, and wells). Endemism is high; of the troglobionts, 17 (33 % of those known from the state) are endemic to Georgia and seven (14 %) are known from a single cave. We identified three biogeographic clusters of troglobionts. Two clusters are located in the northwestern part of the state, west of Lookout Mountain in Lookout Valley and east of Lookout Mountain in the Valley and Ridge. In addition, there is a group of troglobionts found only in the southwestern corner of the state and associated with the Upper Floridan Aquifer. At least two dozen potentially undescribed species have been collected from caves; clarifying the taxonomic status of these organisms would improve our understanding of cave biodiversity in the state. Conservation concerns related to species found in Georgia caves are significant, with fourteen species (including 13 vertebrates) considered “High Priority Species” under the Georgia State Wildlife Action Plan, many of these species have additional state or federal protections. In addition, 17 invertebrate troglobionts (33 % of those known in the state) are considered “Critically Imperiled” by NatureServe. Several biologically important caves are not protected, these are an important conservation concern. However, remarkably, around one third of all caves in the state are on protected lands, including seven of the eight caves known to host ten or more troglobionts.

Introduction

Caves and karst in Georgia are limited to two geologically distinct and disconnected regions in the northwestern and the southwestern corners of the state (Culver et al., 2003; Hobbs, 2012). In northwestern Georgia, caves occur in the Appalachian Valley and Ridge physiographic province and along the escarpments of Sand Mountain and Lookout Mountain of the Cumberland Plateau. Caves in the northwest formed in carbonate sedimentary rock units that date to the Paleozoic era (i.e., Cambrian to Mississippian periods, from 400 to 350 million years old). These units have been folded and faulted during mountain building episodes associated with the southern Appalachian Mountains. In Georgia, Lookout Mountain divides the caves of Appalachian Valley and Ridge into two distinct groups — those west of Lookout Mountain in Lookout Valley, and those east of Lookout Mountain. In southwestern Georgia, caves are known from the Dougherty Plain, also known as the Lime Sink region of the Coastal Plain province, in Eocene- to Oligocene-aged (about 25 million years old) carbonate rocks that lie above the underlying Upper Floridan Aquifer. In total, 670 caves have been documented in Georgia (Georgia Speleological Survey, 2018). Twenty-six caves are more than 1 km in length, and four caves are more than 5 km long (Georgia Speleological Survey, 2018). The highest cave density occurs in the northwestern part of the state, with 247 and 186 caves known from Walker and Dade counties, respectively. No other county has more than 40 documented caves (Georgia Speleological Survey, 2018).

The first review of subterranean biodiversity in Georgia reported 130 species of invertebrates from 29 caves (Holsinger and Peck, 1971). Twenty-seven of those caves were in northwestern Georgia, and two caves were in the Gulf Coastal Plain. Franz et al. (1994) reviewed cave biodiversity in Florida, including records for a handful of sites in southwestern Georgia. A second major review of cave biodiversity in Georgia (Reeves et al., 2000) identified 173 invertebrate taxa from 47 caves. As more caves have been biologically investigated, the number of troglobionts (cave-obligate species) known from Georgia has increased from 24 to 27 (Holsinger and Peck, 1971) to 50 (Niemiller et al., 2019).
Since the Reeves et al. (2000) review, numerous studies have added to our knowledge of subterranean biodiversity in Georgia. Biological surveys of Georgia caves have continued (Buhlmann et al., 2001; Reeves and McCreadie, 2001; Campbell et al., 2011, 2012; Jensen and Ozier, unpublished). Phylogeographic studies and taxonomic revisions have included taxa from Georgia caves (e.g., Niemiller et al., 2008, 2011; Shear, 2010; Ledford et al., 2011; Leray et al., 2019). Additional studies have reported behavioral information for species found in caves (Camp and Jensen, 2007; Disney and Campbell, 2011; Carver et al., 2016), and others have improved our understanding of the distribution of specific troglobionts in Georgia, such as the Southern Cavefish (Typhlichthys subterraneus; Niemiller et al., 2016) and the Dougherty Plain Cave Crayfish (Cambarus cryptodytes; Fenolio et al., 2017). This wealth of new information, as well as the results of our work in caves and wells in Georgia, encouraged us to review biodiversity of caves and other subterranean habitats across the state.

**Methods**

We conducted faunal bioinventories of caves and wells in nine counties of Georgia on more than 350 visits between 2000 and 2019. Many of these caves had never been bioinventoried. Bioinventories primarily consisted of visual encounter surveys for cave life in terrestrial, riparian, and aquatic habitats. Searched areas of caves included entrance areas starting at the drip line, accessible walls and ceilings, ledges, mud banks, rimstone pools, streams, and talus slopes. These surveys systematically traversed the cave, from the entrance to the farthest extent of the cave explorable by the research team. Search effort included examining and overturning rocks, detritus, organic debris, and other cover, as well as searching through stream cobble. At some sites we supplemented visual encounter surveys with baited traps and bulk samples of organic debris (including leaf litter, guano, and rodent nests) that were brought to the laboratory and placed on Berlese-Tullgren funnels to extract invertebrates.

We only field-identified common, more tractable invertebrate species. In all other cases, we collected invertebrate specimens and identified them in the laboratory using available taxonomic literature. We outsourced identification to experts for taxa with which we had insufficient taxonomic knowledge. For birds and mammals, we field-identified taxa by direct observation of individuals by sight or sound without capture or through taxonomically reliable indirect observations, such as visual identification of mammal scat or footprints left in mud. Where possible, we took voucher photographs of birds and mammals. For amphibians, fishes, and reptiles, we made a concerted effort to capture each observed individual to confirm its identification and obtain a voucher photograph with the specimen in hand. For some vertebrates, we collected tissue samples and voucher specimens. Depending on the extent of the cave system, surveys were done by two to five surveyors, with a search effort of two to 12 person-hours per cave visit.

We searched for additional records of Georgia subterranean fauna in the scientific literature, biodiversity databases, unpublished government reports, unpublished technical reports, unpublished specimen identification catalogs of taxonomists, and museum accession records. Scientific literature sources included peer-reviewed journals, books, proceedings, theses, and dissertations. We also reviewed caving organization newsletters. Biodiversity database sources we directly queried included the Georgia Department of Natural Resources biodiversity database and the Bat Population Data Project (https://my.usgs.gov/bpd/). We queried all records for Animalia from the Global Biodiversity Information Facility (GBIF, https://gbif.org), a data aggregator of specimen databases and museum collections (including VertNet, http://www.verbnet.org). Our GBIF search comprised 214,566 unique records from 272 datasets hosted in 20 countries of preserved animal specimens from a geographic polygon containing Georgia (http://www.gbif.org, 2019). We parsed the downloaded data through iterative searches for all taxa having specimen collections from subterranean features (e.g., caves, mines, springs, and wells) (Supplementary Text S1), georeferenced each record to confirm its location within the state, and reviewed each record to confirm that it was found in a subterranean feature, as opposed to on the surface in the vicinity of a subterranean feature.

Cave data—including descriptions, locations, and maps—are maintained by the Georgia Speleological Survey (GSS; http://gss.io.caves.org/). For each cave we report the cave name and alphanumeric code (‘cave number’) in current use by GSS. Associating a record from the literature with a cave in the GSS database was generally straightforward, even in cases where a single cave has been referred to by more than one name in the past. In cases where we could not confidently identify the cave associated with an occurrence record, we included these data in the list of records (Supplementary Table S2) but excluded them from georeferencing. Due to the sensitivity of cave data, we refer to caves only by their cave number, cave name, and county. We recommend readers contact GSS or the corresponding author for information on particular cave systems. Locality and name data for springs in Georgia are in the public domain and maintained in a searchable database (USGS, 2019).

The annotated list includes the scientific name, authority, ecological classification, common name, and conservation status for each species. Taxonomic nomenclature primarily followed the Integrated Taxonomic Information System (https://itis.gov/), supplemented by taxon-specific sources such as the World Spider Catalog (https://wsc.nmbe.ch/),
Bellinger et al. (1996-2019), and Harvey (1990, 2013). Where available we included common names. Ecological classifications of subterranean organisms (cavernicoles) have been proposed by several authors (e.g., Barr, 1968; Sket, 2008; Culver and Pipan, 2009). Following Niemiller et al. (2016), we used terminology from Barr (1968) with clarification from Sket (2008) and Culver and Pipan (2009) to indicate species found in terrestrial (troglo-) versus aquatic (styg-) habitats. Four primary ecological categories were used: troglobiont (TB) or stygobiont (SB) (synonyms: troglobite or stygobite, respectively), troglophile (TP) or stygophile (SP) (synonym: eutroglophile), trogloxene or stygoxene (TX or SX) (synonym: subtroglophile), and accidental (AC) (synonym: trogloxene, sensu Sket, 2008). We also used two secondary ecological categories: edaphic (ED) for soil-dwelling animals not typically considered cavernicoles, and symbiont (SY) for commensals and parasites. Troglobionts and stygobionts are obligate cavernicoles that typically exhibit morphological, physiological, and behavioral adaptations for living in subterranean habitats and that have few or no records from surface habitats. Troglophiles and stygophiles frequent subterranean habitats and can complete their life cycles within caves but also may occur in surface habitats. Trogloxenes and stygoxenes use subterranean habitats seasonally, or for only a portion of their life cycles, but also rely significantly on surface habitats. Accidentals are species found in caves only by accident, such as by falling into a pit or being washed into a cave during a flood. When available, we relied on ecological categories assigned to taxa by earlier authors (e.g., Holsinger and Peck, 1971; Reeves et al., 2000; Buhlmann, 2001; Niemiller et al., 2016). With many species, these categories have necessarily been subjectively inferred by previous authors due to lacking or nonexistent natural history data, which is especially true with invertebrates. We altered categories in cases where it was justified by new ecological or morphological data.

When available, the conservation status of each species, based on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (http://www.iucnredlist.org [accessed January 12, 2019]) and NatureServe (http://www.natureserve.org [accessed January 12, 2019]), is included to provide a better understanding of the distribution and biogeography of subterranean organisms in Georgia, and to aid in the future conservation and management of this unique fauna. The status of a species according to the U.S. list of threatened and endangered species under the Endangered Species Act is included (http://www.fws.gov/endangered), as well as if a species is included on the list of rare animals in Georgia (https://georgiabiodiversity.org/natels/element_lists.html). Seven IUCN (International Union for the Conservation of Nature, 2012) Red List categories are recognized on a continuum of increasing extinction risk: Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild, and Extinct. Critically Endangered, Endangered, and Vulnerable are considered Threatened categories. NatureServe conservation status ranks are based on a one to five scale, from most to least at risk of extinction (Faber-Langendoen et al., 2012): 1 (Critically Imperiled), 2 (Imperiled), 3 (Vulnerable), 4 (Apparently Secure), and 5 (Secure). Two additional ranks associated with extinction exist: H (Possibly Extinct) and X (Presumed Extinct). Status ranks are assessed at three geographic scales: global (G1–5), national (N1–5), and state (S1–5). At the global scale, a Questionable rank qualifier (Q) can be used to denote uncertainty in the conservation status rank (e.g., G2Q). Taxa not ranked at the Global or State levels were noted as “GNR” or “SNR”, respectively. Ranks at the global and state scales are given in the text when available, and in Tables 1, 2, and S3.

Results

Our annotated list includes records from 142 georeferenced sites in Georgia (121 caves and 21 wells or springs) and several non-georeferenced sites, totaling 281 described species (228 invertebrates and 53 vertebrates). Of these, 51 are troglobionts. In addition to the many new records we report here, we also provide a summary of all confirmed records of subterranean faunal biodiversity in Georgia. Our summary includes the first review of vertebrates in caves in Georgia and new occurrence records for many invertebrate species. We also highlight potentially new, as yet undescribed species that have been reported in literature or that we collected. With these data, we discuss conservation issues related to cave biodiversity in Georgia. Note that, in this paper, we limit our discussion to fauna (i.e., Kingdom Animalia); data on cellular slime molds and fungi from Georgia caves are presented in Reeves et al. (2000).

The Annotated List summarizes Tables S2 and S3 and, for many species, adds additional commentary on ecology, distribution, and systematics. The source for each record reported in the Annotated List is indicated in Table S2. With a few exceptions, we omitted records not identified to the genus or species level from the annotated list, although those records are included in Table S2. In cases where two or more studies reported a particular genus from a cave, but not all studies identified those specimens to the species level, we only included the more specific record in the Annotated List. Not all records could be identified to species level. Those at coarser taxonomic resolution were due to lack of available taxonomic expertise, lack of specimens of required maturity or sex necessary for identification, or, in some cases, may represent undescribed species. Further commentary related to many of these taxa can be found in Holsinger and Peck (1971), Reeves et al. (2000), and Buhlmann (2001). New records reported in the literature for the first time are indicated with an asterisk.
Annotated List of Fauna from Caves and other Subterranean Habitats of Georgia

Phylum Annelida
Class Clitellata
Order Branchiobdellida
Family Branchiobdellidae

Genus Octolasion

Octolasion tyrtaeum (Savigny, 1826) (ED) Woodland White Worm
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Boxcar Cave (GDD69)*; Howards Waterfall Cave (GDD34)*; Morrison Cave (GDD86); Walker Co.: Horseshoe Cave (GWK12).

Comments: This species has also been reported from caves in Georgia, Illinois, Missouri, North Carolina (Peck and Lewis, 1978; Reynolds, 1994; Reeves and Reynolds, 1999; Reeves et al., 2000).

Order Opisthobranchia
Family Lumbricidae

Genus Aporrectodea

Aporrectodea trapezoides (Dugès, 1828) (ED) Southern Worm
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Boxcar Cave (GDD69)*; Howards Waterfall Cave (GDD34)*; Morrison Cave (GDD86); Walker Co.: Horseshoe Cave (GWK12).

Comments: This species has also been reported from several caves in Georgia, Illinois, Missouri, North Carolina (Smith & Gittins, 1915) (ED) An Earthworm

Genus Bimastos

Bimastos tumidus (Eisen, 1874) (ED) An Earthworm
Localities: Bartow Co.: Kingston Saltpeter Cave (GBT11).

Bimastos zeteki (Smith & Gittins, 1915) (ED) An Earthworm
Localities: Dade Co.: Cemetery Pit (GDD64).

Genus Dendrobaena

Dendrobaena octaedra (Savigny, 1826) (ED) Octagonal-tail Worm
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Boxcar Cave (GDD69)*; Howards Waterfall Cave (GDD34)*; Morrison Cave (GDD86); Walker Co.: Horseshoe Cave (GWK12).

Genus Dendrodrilus

Dendrodrilus rubidus (Savigny, 1826) (TP) European Barkworm
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Boxcar Cave (GDD69)*; Howards Waterfall Cave (GDD34)*; Morrison Cave (GDD86); Decatur Co.: Climax Cave (GDC36); Gordon Co.: Rusty Cave (GGO297)*; Grady Co.: Maloys Waterfall Cave (GGR27)*; Walker Co.: Spooky Cave (GWK14).

Genus Lumbricus

Lumbricus rubellus Hoffmeister, 1843 (ED) Nightcrawler
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Byers Cave (GDD66); Howards Waterfall Cave (GDD34)*; Morrison Cave (GDD86).

Genus Octolasion

Octolasion tyrtaeum (Savigny, 1826) (ED) Woodland White Worm
Localities: Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Johnsons Crook Cave (GDD17).

Comments: This species has been reported from Georgia, Illinois, Missouri, North Carolina (Holsinger and Peck, 1971; Peck and Lewis, 1978; Reynolds, 1994; Reeves and Reynolds, 1999; Reeves et al., 2000).
Family Ctenidae
Genus Anahita
*Anahita punctulata* (Hentz, 1844) (AC) Southeastern Wandering Spider
Localities: Dade Co.: Hurricane Cave (GDD62)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Family Cybaeidae
Genus Calyymmaria
*Calyymmaria persica* (Hentz, 1847) (TP/TX) A Dwarf Sheet Spider
Localities: Chattooga Co.: Parkers Cave (GKH119); Dade Co.: Byers Cave (GDD66), Rusty’s Cave (GDD70); Walker Co.: Bible Springs Cave (GWK74), Four Kings Cave (GWK77)*, Mountain Cove Farm Cave No. 1 (GWK73).

*Calyymmaria* sp. (TP/TX) A Dwarf Sheet Spider
Localities: Dade Co.: Boxcar Cave (GDD69)*, Walker Co.: Bee Rock Cave (GWK123)*, Nash Waterfall Cave (GWK72).
Comments: This may be *C. persica* or another species.

Family Desidae
Genus Metaltellia
*Metaltellia simoni* (Keyserling, 1878) (AC) Hacklemesh Weaver
Localities: Grady Co.: Glory Hole Cave (GGR56)*.
Comments: This species is native to South America and introduced into the United States.

Family Hahniidae
Genus Cicurina
*Cicurina arcuata* Keyserling, 1887 (TP/AC) Curved Meshweaver
Localities: Floyd Co.: Cove Springs Cave (GFL18).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

*Cicurina pallida* Keyserling, 1887 (TP/TX) Pallid Funnel-web Spider
Localities: Randolph Co.: Griers Cave (GRA40).
Comments: Questionable identification; large southern range expansion if true.

*Cicurina* sp. (TP/TX) A Meshweaver Spider
Localities: Dade Co.: Byers Cave (GDD66).

Family Halonoprotocidae
Genus Cyclocosmia
*Cyclocosmia truncata* (Hentz, 1841) (ED) Ravine Trapdoor Spider
Localities: Walker Co.: Missing Evan Well Cave (GWK29)*.

Family H McNicholiiidae
Genus Hypochilus
*Hypochilus thorelli* (Emerton, 1875) (AC) Subterranean Sheetweb Spider
Localities: Dade Co.: Hurricane Cave (GDD62)*, Pettijohns Cave (GWD29).
Comments: Endemic to Georgia and known only from these sites in Walker County (Ledford et al., 2011).

Genus Ozarkia
*Ozarkia georgia* (Gertsch, 1974) (TB)
Localities: Dade Co.: Byers Cave (GDD66), Kilpatrick Cave (GDD67), Rusty’s Cave (GDD70).
Comments: Endemic to Georgia and known only from these sites in Dade County (Ledford et al., 2011).

Family Linyphiidae
Genus Anibontes
*Anibontes* sp. (TX/AC) A Sheetweb Spider
Localities: Chattooga Co.: Parkers Cave (GKH119)*.

Genus Anthrobia
*Anthrobia* sp. (TP/TX) A Sheetweb Spider
Localities: Bartow Co.: Kingston Salt peter Cave (GBT11).

Genus Bathypantes
*Bathypantes pallidus* (Banks, 1892) (TX) Pale Sheetweb Weaver
Localities: Dade Co.: Howards Waterfall Cave (GDD34)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Genus Centromerus
*Centromerus denticulatus* (Emerton, 1909) (TP) Toothy Spurred Sheetweaver
Localities: Walker Co.: Horseshoe Cave (GWK12).
Comments: This record from Holsinger and Peck (1971) is likely incorrect.

*Centromerus latidens* (Emerton, 1882) (TX) Elephant Spurred Sheetweaver
Localities: Bartow Co.: Davis Farm Cave (GBT222)*; Chattooga Co.: Parkers Cave (GKH119)*, Grady Co.: Maloys Waterfall Cave (GGR27)*; Polk Co.: White River Cave (GPO7)*; Walker Co.: Screech Owl Cave (GWK205)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Genus Mermessus
*Mermessus maculatus* (Banks, 1892) (TP) Spotted Harvester Money Spider
Localities: Bartow Co.: Busch Cave (GBT611), Davis Farm Cave (GBT222)*, Decatur Co.: Climax Cave (GDC36), Grady Co.: Maloys Waterfall Cave (GGR27).

Genus Neriene
*Neriene radiata* (Walckenaer, 1841) (AC) Filmy Dome Spider
Localities: Gordon Co.: Jack Crider Cave (GGO298)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Genus Phanetta
*Phanetta subterranea* (Emerton, 1875) (TB) Subterranean Sheetweb Spider
Localities: Dade Co.: Byers Cave (GDD66), Caboose Cave (GDD47)*, Howards Waterfall Cave (GDD34), Johnsons Crook Cave (GDD17), Morrison Cave (GDD86), Sittons Cave (GDD9), Floyd Co.: Cove Springs Cave (GFL18); Walker Co.: Cave Spring Cave (GWK94), Fricks Cave (GWK14), Harrisburg Cave (GWK85), Mouldy Bat Pit (GWK257)*, Pigeon Cave (GWK57).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: Widespread and common in caves across the Appalachians and Interior Low Plateaus (Miller, 2005). This species is known from more counties than any other troglobiont in eastern North America (Christian and Culver, 2001).

Genus Porrhomma
*Porrhomma cavernicola* (Keyserling, 1886) (TB) Appalachian Cave Spider
Localities: Bartow Co.: Kingston Salt peter Cave (GBT11).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: Widespread in caves of the southern Appalachians, extending to Indiana and Illinois. It is more common in caves in West Virginia and Virginia, and only occasionally encountered in caves in Tennessee, Alabama, and Georgia (Miller, 2005).

Family Lycosidae
Genus Pirata
*Pirata alachuus* Gertsch & Wallace, 1935 (AC) A Pirate Wolf Spider
Localities: Dade Co.: Wild Bills Dakota Cave (GDD596)*.

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**Pirata sp.** (AC) A Pirate Wolf Spider
Localities: Walker Co.: Horseshoe Cave (GWK12).

**Genus Pirata**

**Pirata insularis** Emerton, 1885 (AC) Lonely Wolf Spider
Localities: Grady Co.: Maloys Waterfall Cave (GGR27).

**Family Mysmenidae**

**Genus Maymena**

**Maymena ambita** (Barrows, 1940) (TP) Minute Cave Spider
Localities: Walker Co.: Ellisons Cave (GWK51), Horseshoe Cave (GWK12).

**Family Nesticidae**

**Genus Eidmannella**

**Eidmannella pallida** (Emerton, 1875) (TP) Pallid Cobweb Spider
Localities: Catoosa Co.: Crane Cave (GCZ80)*; Chattooga Co.: Sub-ligna Cave (GKH145)*; Dade Co.: Howards Waterfall Cave (GDD34); Decatur Co.: Climax Cave (GDC36); Floyd Co.: Cave Springs Cave (GFL18); Grady Co.: Maloys Waterfall Cave (GGR27)*; Randolph Co.: Griers Cave (GRA40).
Comments: This troglophilic species is widespread in North America, Central America, and the Caribbean (Gertsch, 1984).

**Genus Gauceclus**

**Gauceclus augustinus** Keyserling, 1884 (TP) A Cave Cobweb Spider
Localities: Decatur Co.: Climax Cave (GDC36); Houston Co.: Limerock Cave; Washington Co.: Tennial Caves (GWS20).
Conservation status: IUCN: Not Evaluated; NatureServe: G3G4 (SNR in Georgia).
Comments: This species is a troglophil and is common in caves from Florida to Texas, through Central America to Panama, and parts of the Caribbean (Gertsch, 1984).

**Genus Nesticus**

**Nesticus georgia** Gertsch, 1984 (TB) Georgia Cave Spider
Localities: Dade Co.: Case Cavern (GDD1), Sittons Cave (GDD9), unnamed cave near Trenton.
Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).
Comments: This eyeless spider is endemic to Georgia and is a member of the southern Appalachian radiation of *Nesticus* that includes numerous troglobiotic species (Gertsch, 1984; Hedlin, 1997). Some information regarding feeding and reproduction has been reported (Reeves, 1999; Carver et al., 2016).

**Nesticus sp.** (TB/TP) A Cave Cobweb Spider
Localities: Dade Co.: Rusty’s Cave (GDD70)*; Walker Co.: Anderson Spring Cave (GWK46), Fingerhore Cave (GWK259)*, Matthews Sink (GKW53)*, Moulzy Bad Pit (GKW257)*, Pteron Cave (GKW57), Bee Rock Cave (GWK123)*, Lula Falls Cave (GWK617)*.
Comments: These records represent at least two undescribed species. Records from Pigeon Mountain (Anderson Spring Cave, Matthews Sink and Pigeon Cave) are an undescribed eyeless species. Additional records from Pigeon Mountain (Fingerhore Cave and Moulzy Bad Pit) may also correspond to this species. The specimens from Lookout Mountain (Lula Falls Cave) have eyes and likely represent a second undescribed species. The affinity of the Rusty’s Cave record is unclear.

**Family Pholcidae**

**Genus Pholcus**

**Pholcus dade Huber, 2011** (TP) A Cellar Spider
Localities: Dade Co.: Byers Cave (GDD66), Sittons Cave (GDD9); Walker Co.: Fricks Cave (GWK14), Spooky Cave (GWK494).
Comments: Huber (2011) notes the Byers Cave specimen is tentatively assigned to this species.

**Pholcus lanieri** Huber, 2011 (TP) Lanier’s Cellar Spider
Localities: Dade Co.: Hurricane Cave (GDD62).
Comments: Known only from Hurricane Cave, the type locality (Huber, 2011).

**Pholcus sp.** (TP/ TX) A Cellar Spider
Localities: Bartow Co.: Ladds Lime Cave (GBT384-GBT389); Cataossa Co.: Chapmans Cave (GCR25)*; Dade Co.: Little Nicka Cave (GDD121)*; SSS Cave (GDD229)*; Floyd Co.: Cave Springs Cave (GFL18); Walker Co.: Zahnd Cave (GWK41)*.
Comments: Huber (2011) describes several new *Pholcus* species from Georgia.

**Family Salticidae**

**Genus Maevia**

**Maevia inclemens** (Walckenaer, 1837) (AC) Dimorphic Jumper
Localities: Walker Co.: Hickman Gulf Cave.

**Family Tetragnathidae**

**Genus Meta**

**Meta ovalis** (Gertsch, 1933) (TP) Cave Orbweaver
Localities: Dade Co.: Byers Cave (GDD66), Caboose Cave (GDD475)*, Goat Cave (GKW64), Howards Waterfall Cave (GDD34), Morrison Cave (GDD66), Sittons Cave (GDD9); Walker Co.: Fingerhore Cave (GWK259)*, Four Kings Cave (GWK77)*, Fricks Cave (GWK14), Hardsburg Cave (GKW85), Mountain Cave Farm Cave No. 1 (GKW73), Nash Waterfall Cave (GWK72), Pigeon Cave (GWK57), Rocky Cave (GWK496)*, Spooky Cave (GWK494).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: This species is widely distributed and found in many caves in the central and eastern United States.

**Family Theridiidae**

**Genus Achaearanea**

**Achaearanea* sp.** (TP) A Cobweb Spider
Localities: Dade Co.: Byers Cave (GDD66).

**Genus Cryptachaea**

**Cryptachaea portieri** (Banks, 1896) (TX) A Cobweb Spider
Localities: Dade Co.: Hooker Cave (GDD90)*; Walker Co.: Fricks Cave (GWK14).

**Genus Parasteatoda**

**Parasteatoda tepidariorum** (Koch, 1841) (TP) Common House Spider
Localities: Bartow Co.: Ladds Lime Cave (GBT384-GBT389); Cataossa Co.: Chapmans Cave (GCR25)*; Dade Co.: Sittons Cave (GDD9); Gordon Co.: Roberts Cave (GGO147); Polk Co.: White River Cave (GP07); Walker Co.: Bible Springs Cave (GWK74).

**Parasteatoda sp.** (TP/ TX) A Tangle Web Spider
Localities: Bartow Co.: Anthonys Cave (GBT175), Davis Farm Cave (GDD229)*; Walker Co.: Lofton Cave (GWK281)*.
Comments: This may be *P. tepidariorum* or another species.

**Family Theridiosomatidae**

**Genus Theridiosoma**

**Theridiosoma gemmosum** (Koch, 1877) (TX) Common Eastern Ray Spider
Localities: Walker Co.: Horseshoe Cave (GWK12).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

**Family Zoropsidae**

**Genus Liocranoides**

**Liocranoides gertschi Platnick, 1999** (TP) Gertsch’s Two-clawed Cave Spider
Localities: Dade Co.: Byers Cave (GDD66), Hurricane Cave (GDD62), Sittons Cave (GDD9); Walker Co.: Horseshoe Cave (GWK12).
Comments: The range of *L. gertschi* extends to northern Alabama (Platnick, 1999). Yancey et al. (2018) described egg sacs for *Liocranoides* from Tennessee.
Liocranoides unicolor Keyserling, 1881 (TB) A Two-clawed Cave Spider

Localities: Chattooga Co.: Parkers Cave (GKH119); Dade Co.: Byers Cave (GDD66), Morrison Cave (GDD86); Walker Co.: Bible Springs Cave (GWK74), Hickman Gulf Cave, Horsehoe Cave (GWK12), Mountain Cave Farm Cave No. 1 (GWK73).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: Platnick (1999) indicated that L. unicolor ranges no further south than central Tennessee; these records may correspond to L. gertschi or an undescribed species.

Liocranoides sp. (TB/TP) A Two-clawed Cave Spider

Localities: Bartow Co.: Davis Farm Cave (GBT222)*; Chattooga Co.: Parkers Cave (GKH119)*; Dade Co.: Case Cavern (GDD1)*, Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34)*, Kirchmeyer Cave (GDD196)*, Rusty’s Cave (GDD70)*, SSS Cave (GDD229)*; Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51)*, Fricks Cave (GWK14)*, Loffon Cave (GWK281)*, Pettijohns Cave (GWK29), Smartt Farm Cave (GWK124)*.

Comments: These records may be L. gertschi or an undescribed species.

Order Opiliones

Family Phalangodidae

Genus Bishopella

Bishopella laciniosa (Crosby and Bishop, 1924) (TP) Bishop’s Harvestman

Localities: Bartow Co.: Busch Cave (GBT611)*; Chattooga Co.: Crane Cave (GCG280)*; Chattaoga Co.: Blowing Springs Cave (GHK545), Parkers Cave (GKH119)*; Scoopins II Cave (GKH405)*, Subligna Cave (GKH415)*; Dade Co.: Byers Cave (GDD66), Caboose Cave (GDD475)*, Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34)*, Hurricane Cave (GDD62), Kirchmeyer Cave (GDD196)*, Limestone Caverns (GDD140)*, Lower Valley Cave (GDD136)*, Rusty’s Cave (GDD70)*, Sittsons Cave (GDD9); Floyd Co.: Cave Springs Cave (GFL18); Gordon Co.: Plainville Cave (GGO83)*; Rock Co.: West River Cave (GPO7); Walker Co.: Anderson Spring Cave (GWK46), Bee Rock Cave (GWK123)*, Bible Springs Cave (GWK74), Ellisons Cave (GWK51)*, Fricks Cave (GWK14)*, Harrisburg Cave (GWK85), Horsehoe Cave (GWK12), LittleJohn Cave (GWK280)*, Pettijohns Cave (GWK29), Smartt Farm Cave (GWK124)*.

Comments: This species is known from surface and cave habitats across the southern Appalachians (Hedin and Thomas, 2010).

Bishopella sp. (TP/TX)

Localities: Bartow Co.: Anthonys Cave (GBT175)*; Dade Co.: Case Cavern (GDD1), Sittsons Cave (GDD9); Walker Co.: Ellisons Cave (GWK51)*, Nash Waterfall Cave (GWK72), Pigeon Cave (GWK57).

Comments: These records may be B. laciniosa or an undescribed species.

Genus Crosbysella

Crosbysella spinturnix (Crosby and Bishop, 1924) (TP) A Harvestman

Localities: Decatur Co.: Climax Cave (GDC36); Gordon Co.: Rusty Cable Cave (GGO927)*; Grady Co.: Glory Hole Cave (GGR56)*, Maloys Waterfall Cave (GGR27).

Comments: This troglomorph has been reported from caves in Alabama, Arkansas, Florida, and Georgia (Crosby and Bishop, 1924; Goodnight and Goodnight, 1942; Peck, 1970; Holsinger and Peck, 1971; Peck, 1989; Graenig et al., 2011).

Family Sabaconidae

Genus Sabacon

Sabacon sp. (TP/TT) A Harvestman

Localities: Walker Co.: Goat Cave (GWK184).

Comments: This record may represent an undescribed species or one of two described species: S. cavicolens or S. jonesi. Sabacon cavicolens primarily occurs in rocky and forested cool surface habitat across the central and northeastern USA and in southeastern Canada (Koponen, 1995; Shear, 1975), but has also been reported from caves across its distribution, with confirmed records from Ontario, Canada (Peck, 1988), Arkansas (Shear, 1975; Peck and Peck, 1982), and Tennessee (Niemiller et al., unpublished data). Sabacon jonesi is known only from one cave in Madison County, Alabama (Goodnight and Goodnight, 1942). If our record from Goat Cave represents either of the previously described species, then it will represent a range extension and new state record.

Family Sclerosomatidae

Genus Leiochernes

Leiochernes sp. (TX) A Harvestman

Localities: Bartow Co.: Anthonys Cave (GBT175).

Comments: Several species of Leiochernes are known to use subterranean features to seek shelter. They often aggregate in large clusters of individuals (>100), either as overwintering populations, or presumably to seek daytime shelter during hot dry summer weather (e.g., Holmberg et al., 1984). Aggregations of Leiochernes are typically only found in shallow karst features or in the transition or entrance zones of caves. This clustering behavior has yet to be reported from a Georgia cave. Reeves et al. (2000) reported a single immature specimen collected from Anthonys Cave in May 1999, but did not note whether an aggregation of individuals was observed.

Order Pseudoscorpiones

Family Chernetidae

Genus Hesperochernes

Hesperochernes mirabilis (Banks, 1895) (TB) Southeastern Cave Pseudoscorpion

Localities: Chattooga Co.: Chickamauga Cave (GCZ106)*, Crane Cave (GCZ280); Chattooga Co.: Parker Cave (GKH119); Scoopins II Cave (GKH405)*; Dade Co.: Howards Waterfall Cave (GDD34)*, Johnsons Creek Cave No. 2 (GDD19)*, Kirchmeyer Cave (GDD196)*, Morris Spring Cave (GDD9); Dade Co.: Morrison Spring Cave (GDD110), SSS Cave (GDD229)*; Murray Co.: Major Pullims Cave (GMA3)*; Walker Co.: Battlefield Cave Spring (GWK203), Fricks Cave (GWK14), Hickman Gulf Cave (GWK204), Mountain Cave Farm Cave No. 1 (GWK73), Pigeon Cave (GWK57)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This species is distributed widely in northern Georgia caves. It is typically associated with bat guano, active rodent nests, and scat. Holsinger and Peck’s (1971) record from Johnsons Creek Cave (GDD17) was in error and repeated by Reeves et al. (2000); this record was based on specimen WM1347.01 in W.B. Muchmore’s collection, with original collection label “Johnson Creek Cave #2, 4.5 mi NE Rising Fawn” (Muchmore, unpublished data). A bioinventory of Johnsons Creek Cave (GDD17) on 25 June 2016 did not recover this species or find its typical habitat. The record from Battlefield Cave Spring (GWK203) was previously reported as “Cave Spring” and “Cave Spring Cave” (Holsinger and Peck, 1971; Reeves et al., 2000). Holsinger and Peck’s (1971) records for Pseudozaona sp. are here relegated to this species; Chelifer mirabilis Banks, 1895 was transferred by Hoff (1946) to Pseudozaona and then by Muchmore (1974) to Hesperochernes. Records in W.B. Muchmore’s catalog (unpublished data) identified as “Hesperochernes sp.” are here placed in H. mirabilis on the basis of ongoing work with this genus (Stephen, unpublished data). The last known collection in Georgia was in 2015 (this study); previously, the last published record from the state was collected in 1998 (Muchmore, unpublished data); Reeves et al., 2000).

Family Chthoniidae

Genus Aphрастochthonius

Aphрастochthonius sp. (?) A Pseudoscorpion

Localities: Dade Co.: Byers Cave (GDD66), Longs Rock Wall Cave (GDD101)*.

Comments: These records appear to represent undescribed species (Stephen, unpublished data). No described species of this genus are known to occur in Georgia.

Genus Aphрастochthonius

Aphрастochthonius minor Muchmore, 1976 (TX?) A Pseudoscorpion

Localities: Chattooga Co.: Parker Cave (GKH119); Dade Co.: Morrison Cave (GDD86).

Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SNR in Georgia).

Comments: This species is only definitively known from organic debris in entrance zones of one cave and one karst feature in Georgia. A se-
ries of females and nymphs (catalog number WM8548.01) that W.B. Muchmore (unpublished data) tentatively identified as “Apochthonius minor?” was reported by Lewis (2005) as A. minor from a cave in Van Buren County, Tennessee; the record may be A. minor or a species not yet described. All confirmed occurrences of this species are from the type series in Parker Cave and Morrison Cave that were collected in summer 1967 (Muchmore, 1976, unpublished data).

Apochthonius sp. (TX)? A Pseudoscorpion

Localities: Chattooga Co.: Parker Cave (GKH119).

Comments: From the same 1967 collections in the entrance of Parker Cave that recovered types for A. minor, Muchmore (1976, unpublished data) also identified two larger adult specimens to the genus Apochthonius (catalog numbers WM1270.01 and WM1275.01). These may represent undescribed species.

Genus Chthonius

Chthonius sp. (?) A Pseudoscorpion

Localities: Walker Co.: Horseshoe Cave (GWK12); Dade Co.: Howards Waterfall Cave (GDD34).

Comments: Of this globally distributed, diverse genus (264 species in Harvey (2013)), in eastern North America four species are known, of which two are native: C. paludis and C. virginicus. These records were reported by Reeves et al. (2000) from collections made in 1996, and are the only published occurrences of Chthonius in Georgia. They also appear to represent the first observations of this genus from a North American cave (Harvey, 2013; GBIF.org, 2019; Muchmore, unpublished data). Reeves et al. (2000) reported the records as C. paludis from Horseshoe Cave and C. virginicus from Howards Waterfall Cave. Both were identified by W.B. Muchmore, but in his catalog (unpublished data) he gave only tentative specific identifications. The Horseshoe Cave “C. paludis?” identification was based on a single female (catalog number WM8265.01) that Muchmore noted to be abnormally slender for this species. The “C. virginicus?” identification from Howards Waterfall Cave was based on a single nymph (catalog number WM8267.01). If these tentative identifications are correct, then each would represent large range extensions, new records of both species in Georgia, and new records of both species from caves.

Genus Kleptochthonius

Kleptochthonius magnus Muchmore, 1966 (TB) A Cave Pseudoscorpion

Localities: Walker Co.: Mountain Cove Farm Cave No. 1 (GK73).

Family Neobisiidae

Genus Lissocreagris

Lissocreagris subatlantica (Chamberlin, 1962) (TX) A Pseudoscorpion

Localities: Chattooga Co.: Parker Cave (GKH119).

Conservation status: IUCN: Not Evaluated; NatureServe: G2G4 (SNR in Georgia).

Comments: Lissocreagris sp. is known from five collection events, of which four are from within caves or in the entrance area of a cave. In Georgia it was collected from organic debris in the entrance of Parker Cave (Muchmore, 1969). It is a small, pale species, with two pairs of reduced eyes (Chamberlin, 1962). The last known collection in Georgia was in 1967 (Muchmore 1969, unpublished data).

Genus Microcreagris

Microcreagris (sensu lato) sp. (TP/TTX) A Pseudoscorpion

Localities: Walker Co.: Mountain Cove Farm Cave No. 1 (GW73).

Comments: Microcreagris sp. is a genus of which two are native: C. paludis and C. virginicus. These records were reported by Reeves et al. (2000) from collections made in 1996, and are the only published occurrences of Chthonius in Georgia. They also appear to represent the first observations of this genus from a North American cave (Harvey, 2013; GBIF.org, 2019; Muchmore, unpublished data). Reeves et al. (2000) reported the records as C. paludis from Horseshoe Cave and C. virginicus from Howards Waterfall Cave. Both were identified by W.B. Muchmore, but in his catalog (unpublished data) he gave only tentative specific identifications. The Horseshoe Cave “C. paludis?” identification was based on a single female (catalog number WM8265.01) that Muchmore noted to be abnormally slender for this species. The “C. virginicus?” identification from Howards Waterfall Cave was based on a single nymph (catalog number WM8267.01). If these tentative identifications are correct, then each would represent large range extensions, new records of both species in Georgia, and new records of both species from caves.

Genus Mundochthonius

Mundochthonius sp. (sensu lato) sp. A Pseudoscorpion

Localities: Chattooga Co.: Parker Cave (GKH119).

Comments: This species is known from the entrance zone of one cave and one surface locality in Alabama, and from organic debris in the entrance zone of Parker Cave (Muchmore, 1969). It was incorrectly listed as “Lissocreagris subatlantica” by Peck (1989). The species is small and pale, and has one pair of reduced eyes (Muchmore, 1969). The last known collection in Georgia was in 1967 (Holsinger and Peck, 1971; Muchmore, unpublished data). In transferring Microcreagris pumila into Minicreagris, Ćurčić (1989) misquoted Muchmore (1969) by listing an epigean Tennessee locality: the species is only known from Alabama and Georgia (Muchmore, 1969, unpublished data).

Genus Novobisium

Novobisium carolinense (Banks, 1895) (AC) A Pseudoscorpion

Localities: Dade Co.: Johnson Crook Cave (GDD71).

Comments: This record represents a range extension and the first report of this species from a cave. The species is widely distributed in the southeastern USA, where it is typically found in leaf litter. The only Georgia records were collected from the bottom of the pit entrance of Johnson Crook Cave in 1967 (this study). A trap set in the sink outside of Johnson Crook Cave in 1967 also collected an unidentified species of Novobisium (Muchmore, unpublished data).
Order Ixodida
Family Argasidae
Genus Ornithodoros
Ornithodoros kelleyi (Cooley and Kohls, 1941) (SY) A Bat Tick
Localities: Decatur Co.: Climax Cave (GDC36).
Comments: This tick was collected in guano piles by Reeves et al. (2000). The likely host was Myotis austroriparius.

Family Ixodidae
Genus Dermacentor
Dermacentor variabilis (Say, 1821) (SY) American Dog Tick
Localities: Dade Co.: Case Cavern (GDD1); Walker Co.: Pettijohns Cave (GWK29).

Order Mesostigmata
Family Laelapidae
Genus Laelaspis
Laelaspis sp. (TX/AC) A Mite
Localities: Walker Co.: Rocky Cave (GWK496).

Order Sarcoptiformes
Family Trombiculidae
Genus Euschoengastia
Euschoengastia pipistrelli Brennan, 1947 (SY) A Chigger
Localities: Dade Co.: Howards Waterfall Cave (GDD34); Walker Co.: Pettijohns Cave (GWK29).
Comments: These records were reported by Holsinger and Peck (1971).

Order Trombidiiformes
Family Rhagidiidae
Genus Rhagidia
Rhagidia sp. (SB) A Mite
Localities: Dade Co.: Case Cavern (GDD1); Walker Co.: Pettijohns Cave (GWK29), Spooky Cave (GWK494).
Comments: Reeves et al. (2000) collected a single specimen in 1995.

Class Malacostraca
Superorder Peracarida
Order Amphipoda
Family Crangonyctidae
Genus Crangonyx
Crangonyx antennatus Cope and Packard, 1881 (SB) Appalachian Valley Cave Amphipod
Localities: Catosa Co.: Crane Cave (GCZ80); Chattooga Co.: Chelsea Gulf Cave (GKH54); Dade Co.: Byers Cave (GDD66), Cemetery Pit (GDD64), Chambliiss Cave (GDD321), Howards Waterfall Cave (GDD34), Hurricane Cave (GDD62), Johnsons Creek Cave (GDD17), Rusty’s Cave (GDD70), Sittons Cave (GDD9), SSS Cave (GDD229), Upper Valley Cave (GDD135); Floyd Co.: Cave Springs Cave (GFL18); Walker Co.: Anderson Spring Cave (GWK46), Fricks Cave (GWK14), Gila Monster Cave (GWK379), Harrisburg Cave (GWK85), Horseshoe Cave (GWK12), Mountain Cave Farm Cave No. 1 (GWK73), Pettijohns Cave (GWK29), Spooky Cave (GWK494).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: This is a widespread stygobiotic species whose range extends through the Valley and Ridge from southwestern Virginia into northeastern Alabama. It is common in cave streams and pools (Zhang and Holsinger, 2003).

Genus Stygobromus
Stygobromus akerlyi Holsinger, 1978 (SB) Ackerly’s Cave Amphipod
Localities: Bartow Co.: Chert Chasm (GBT340); Floyd Co.: Cave Springs Cave (GFL18); Polk Co.: White River Cave (GOP7).
Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).
Comments: This report likely is a misidentification, as this species is not otherwise recorded east of the Cumberland Plateau (Zhang and Holsinger, 2003).

Genus Stygobromus
dicksoni Holsinger, 1978 (SB) A Cave Amphipod
Localities: Chattooga Co.: Chelsea Gulf Cave (GKH54); Dade Co.: Byers Cave (GDD66), Cemetery Pit (GDD64), Howards Waterfall Cave (GDD34), Johnsons Creek Cave (GDD17), Rusty’s Cave (GDD70); Walker Co.: Pettijohns Cave (GWK29).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: The range of this stygobite extends into adjacent north-eastern Alabama and southern Tennessee (Holsinger, 1978).

Stygobromus dougheartyensis, Cannizzaro and Sawicki, 2019 (SB) Dougherty Plain Cave Amphipod
Localities: Dougherty County.: Radium Springs (GDG39).
Comments: This species is also known from Jackson Co., Florida.

Stygobromus grandis Holsinger, 1978 (SB) Parkers Cave Amphipod
Localities: Chattooga Co.: Parkers Cave (GKH19).
Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SU in Georgia).
Comments: This stygobite is endemic to Georgia and known only from Parkers Cave (Holsinger, 1978).

Stygobromus minutus Holsinger, 1978 (SB) Pettijohns Cave Amphipod
Localities: Walker Co.: Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29).
Conservation status: IUCN: Not Evaluated; NatureServe: G2G3 (SU in Georgia).
Comments: This stygobite is endemic to Georgia and known only from these sites on Pigeon Mountain (Holsinger, 1978).

**Stygobromus sp. (SB) A Cave Amphipod**

Localities: Dade Co.: Boxcar Cave (GDD69), Caboose Cave (GDD475).

Comments: Reeves et al. (2000) suggest these records represent an undescribed species.

**Order Isopoda**

**Family Armadillidiidae**

**Genus Armadillidium**

**Armadillidium vulgare** (Latreille, 1804) (TX) Common Pill-bug

Localities: Walker Co.: Horseshoe Cave (GWK12).

Comments: This common surface species was introduced to Florida and is now widespread in North America.

**Family Asellidae**

**Genus Caecidotea**

**Caecidotea cyrtorhynchus** (Fleming and Steeves, 1972) (SB) A Cave Isopod

Localities: Walker Co.: Anderson Spring Cave (GWK46), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29).

Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SU in Georgia).

Comments: This stygobite is endemic to Georgia and known only from sites on Pigeon Mountain. The type locality is Pettijohns Cave.

**Caecidotea hobbsi** (Maloney, 1939) (SB) Hobbs Cave Isopod

Localities: DeKalb Co.: Spring on Walter Chandler Estate at Emory University.

Conservation status: IUCN: Not Evaluated; NatureServe: G2G3 (SNR in Georgia).

Comments: This stygobite is only reported from one site in Georgia. It is more commonly known from Florida (Steeves, 1964). This record may be in error, and likely represents C. putea instead (J. Lewis, pers. comm).

**Caecidotea nickajackensis** Packard, 1881 (SB) Nickajack Cave Isopod

Localities: Dade Co.: Johnsons Crook Cave (GDD17)*.

Conservation status: IUCN: Not Evaluated; NatureServe: GH (SNR in Georgia).

Comments: This species was presumed extinct after the flooding of Nickajack Cave in Marion County, Tennessee in the 1960s (Lewis, 2009) but was rediscovered in two caves near the junction of Tennessee, Alabama, and Georgia (Coleman and Zigler, 2015). This is the first record of the species in Georgia.

**Caecidotea putea** Lewis, 2009 (SB) Econfina Springs Cave Isopod

Localities: Cobb Co.: road cut spring, Kennesaw; Thomas Co.: Wells at Experimental Station, Metcalf.

Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).

Comments: This stygobite is known from only three widely-dispersed sites, including one in Washington County, Florida (Lewis, 2009).

**Caecidotea richardsonae** Hay, 1901 (SB) Tennessee Valley Cave Isopod

Localities: Bartow Co.: seep 1 mi NE of Adairsville; Chattooga Co.: Blowing Springs Cave (GKH54), Chelsea Gulf Cave (GKH54); Dade Co.: Byers Cave (GDD66), Cemetery Pit (GDD64)*, Howards Waterfall Cave (GDD34), Hurricane Cave (GDD62)*, Johnsons Crook Cave (GDD17), Lower Valley Cave (GDD136)*, Rusty’s Cave (GDD70), Sittons Cave (GDD9)*, SSS Cave (GDD229)*; Floyd Co.: Cave Springs Cave (GFL18); Walker Co.: Blowing Springs Cave No. 1 (GWK41), Horseshoe Cave (GWK12), Mountain Cave Farm Cave No. 1 (GWK73), Mountain Cave Farm Cave No. 1 (GWK73).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: Widespread species whose range extends through the Valley and Ridge from southwest Virginia to northeast Alabama (Lewis, 2009). Common in cave streams and pools.

**Caecidotea sp. (SB) A Cave Isopod**

Localities: Catoosa Co.: Chapmans Cave (GCZ25)*; Dade Co.: Longs Rock Wall Cave (GDD101)*; Mitchell Co.: USGS Well 11J012; Walker Co.: Ellisons Cave (GWK91).

Comments: The record from a well in Mitchell County was a female in the hobbsi species group (Fenolio et al. 2017).

**Genus Lirceus**

**Lirceus sp. (SP/SX) An Isopod**

Localities: Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Howards Waterfall Cave (GDD34)*; Walker Co.: Nash Waterfall Cave (GWK72).

Comments: These records are eyed, pigmented specimens. They are a species from the L. hargeri group that also occurs in Tennessee and Virginia (J. Lewis, pers. comm.).

**Family Cylisticidae**

**Genus Cyliscus**

**Cyliscus convexus** (De Geer, 1778) (TX) Curly Woodlouse

Localities: Bartow Co.: Anthonys Cave (GBT175); Dade Co.: Howards Waterfall Cave (GDD34), Morrison Cave (GDD86); Floyd Co.: Cave Springs Cave (GFL18); Walker Co.: Bible Springs Cave (GWK74), Cave Spring Cave, Horseshoe Cave (GWK12).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This species is common and known from caves ranging from Indiana to Virginia and Texas (Schultz, 1970).

**Family Ligidiae**

**Genus Ligidium**

**Ligidium elrodii** (Packard, 1873) (TX) A Woodlouse

Localities: Dade Co.: Limestone Caverns (GDD140)*; Walker Co.: Ellisons Cave (GWK51), Pigeon Cave (GWK77); Chattooga Co.: Chelsea Gulf Cave (GKH54).

Conservation status: IUCN: Not Evaluated; NatureServe: G4G5 (SNR in Georgia).

Comments: This species is widespread in eastern North America. A subspecies (Ligidium elrodii chattoogaensis) was described from Chelsea Gulf Cave by Schultz (1970).

**Family Trichoniscidae**

**Genus Amerigoniscus**

**Amerigoniscus curvatus** Vandel, 1978 (TB) A Terrestrial Cave Isopod

Localities: Walker Co.: Horseshoe Cave (GWK12).

Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SU in Georgia).

Comments: This troglobite is endemic to Georgia and known only from this site.

**Amerigoniscus georgiensis** Vandel, 1978 (TB) Georgia Cave Isopod

Localities: Walker Co.: Pettijohns Cave (GWK29).

Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SU in Georgia).

Comments: This troglobite is endemic to Georgia and known only from this site.

**Amerigoniscus proximus** Vandel, 1978 (TB) A Terrestrial Cave Isopod

Localities: Chattooga Co.: Chelsea Gulf Cave (GKH54); Dade Co.: Byers Cave (GDD66).

Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).

Comments: This troglobite is endemic to Georgia and known only from these sites.

**Amerigoniscus sp. (TB) A Terrestrial Cave Isopod**

Localities: Dade Co.: Case Cavern (GDD1), Johnsons Crook Cave (GDD17)*, Sittons Cave (GDD9). Walker Co.: Bible Springs Cave (GWK74), Mountain Cave Farm Cave No. 1 (GWK73).

Comments: These records may represent one of the described Amerigoniscus from Georgia or an undescribed species.
**Genus Mikttoniscus**
*Fabricius, 1798* (SP) Appalachian Brook Crayfish

Localities: Dade Co.: Hurricane Cave (GDD62)*, Twin Snakes Cave (GDD140); Calhoun Co.: Chickasawhatchee Swamp WMA Well #18, Chickasawhatchee Swamp WMA Well #6, Chickasawhatchee Swamp WMA Well #7; Calhoun Co.: USGS Well 10K005; Decatur Co.: Climax Cave (GDC36), USGS Well 09S520; Dougherty Co.: Albany Field Well #8, Chameleon Springs, Radium Springs (GDG39), USGS Well 13L012; Early Co.: USGS Well 08K001; Miller Co.: USGS Well 08G001; Mitchell Co.: USGS Well 10G313; Seminole Co.: USGS Well 06F001.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is also known from caves in Illinois, Indiana, Kentucky, and Tennessee (Lewis and Reid, 2007).

**Genus Cambarus**

**Cambarus bartonii** (Fabricius, 1798) (SP) Appalachian Brook Crayfish

Localities: Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Byers Cave (GDD66), Hurricane Cave (GDD62); Walker Co.: Mountain Cove Farm Cave No. 1 (GWW73).

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This is a widely distributed species that is occasionally reported from caves.

**Cambarus striatus** Hay, 1902 (SP) Ambiguous Crayfish

Localities: Chattooga Co.: Blowing Springs Cave (GKH54); Walker Co.: Bible Springs Cave (GWW74), Horseshoe Cave (GWW72).

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This is a widely distributed species that is occasionally reported from caves.

**Cambarus tenebrosus** Hay, 1902 (SP) Cavespring Crayfish

Localities: Dade Co.: Howards Waterfall Cave (GDD34), Hurricane Cave (GDD62).

Conservation status: IUCN: Least Concern; NatureServe: G5 (SNR in Georgia).

Comments: Reeves et al. (2000) reported this stygobite from these two Georgia caves. This species is common in caves in the Interior Low Plateau and occurs in the extreme northwestern part of the state (Niemiller et al., 2013).

**Cambarus sp.** (SP) A Crayfish

Localities: Dade Co.: Longs Rock Wall Cave (GDD101)*, Sittons Cave (GDD9); Walker Co.: Anderson Spring Cave (GWW48)*, Ellisons Cave (GWW51), Fricks Cave (GWW14)*, Pigeon Cave (GWW57), Roger Branch Cave (GWW204).

Comments: The records likely represent one or more of the species listed above.

**Class Maxillopoda**

**Order Cyclopoida**

**Family Cyclopidae**

**Genus Acanthocyclops**

**Acanthocyclops robustus** (Sars, 1863) (SP) A Copepod

Localities: Bartow Co.: Anthonys Cave (GBT175).

Comments: This species is also known from cave and surface sites in Indiana, Illinois, Kentucky, and Tennessee (Lewis and Reid, 2007).

**Acanthocyclops vernalis** (Fischer, 1853) (SP) A Copepod

Localities: Washington Co.: Tennille Caves (GWS20).

Comments: This species is also known from caves in Illinois, Indiana, Kentucky, and Tennessee (Lewis and Reid, 2007).

**Genus Eucyclops**

**Eucyclops coronae Reid, 1992 (SX) A Copepod**

Localities: Washington Co.: Tennille Caves (GWS20).

Comments: This species is also known from caves in Illinois, Indiana, Kentucky, and Tennessee (Lewis and Reid, 2007).

**Genus Megacyclops**

**Megacyclops donnaldsoni** (Chapuis, 1929) (SB) Donnaldson's Cave Copepod

Localities: Dade Co.: Cemetery Pit (GDD64).

Conservation status: IUCN: Not Evaluated; NatureServe: G3G4 (SNR in Georgia).

Comments: This species was first described from Donnaldson Cave in Lawrence Co., Indiana, but has been collected from caves in Kentucky and Tennessee and is considered a strict troglobiont (Lewis and Reid, 2007).

**Order Harpacticoida**

**Family Canthocamptidae**

**Genus Attheyella**

**Attheyella illinoisensis** (Forbes, 1882) (SX/AC) A Copepod

Localities: Walker Co.: Goat Cave (GWW184); Washington Co.: Tennille Caves (GWS20).

Comments: This species is also known from caves in Indiana (Lewis and Reid, 2007).

**Attheyella nordenskioldi** (Lilieborg, 1902) (AC) A Copepod

Localities: Dade Co.: Howards Waterfall Cave (GDD34); Walker Co.: Horseshoe Cave (GWW12).

Comments: This species is also known from springs and caves in Illinois and Indiana (Lewis and Reid, 2007).

**Attheyella pilosa** Chapuis, 1929 (SX) A Copepod

Localities: Chattooga Co.: Blowing Springs Cave (GKH54).

Comments: This species is also known from springs and caves in Indiana and Kentucky (Lewis and Reid, 2007).

**Genus Elaphoidella**

**Elaphoidella bidens** (Schmel, 1894) (AC) A Copepod

Localities: Washington Co.: Tennille Caves (GWS20).

**Class Ostracoda**

**Order Podocopa**

**Family Candonidae**

**Genus Pseudocandona**

**Pseudocandona sp.** (SY) An Ostracod

Localities: Dade Co.: Rusty's Cave (GDD70).
Comments: Reeves et al. (2000) collected two specimens in the cave stream at Rusty’s Cave.

**Family Cyprididae**  
**Genus Potamocypris**  
*Potamocypris* sp. (SY) An Ostracod  
Localities: Walker Co.: Horseshoe Cave (GWK12).  
Comments: This record was reported as *Potamocypris* cf. *fulva* by Reeves et al. (2000).

**Family Entocytheridae**  
**Genus Uncinocythera**  
*Uncinocythera warreni* Hobbs and Walton, 1968 (SB/SY) A Cave Ostracod  
Localities: Decatur Co.: Climax Cave (GDC36).  
Comments: This widely distributed springtail is found on a number of aquatic rocks in various states across North America (Christiansen, 1964). It is also known from northwestern Europe and northern Asia.

**Subphylum Hexapoda**  
**Order Collembola**  
**Family Arrhopalitidae**  
**Genus Arrhopalites**  
*Arrhopalites pygmaeus* (Wankel, 1860) (TP) A Springtail  
Localities: Barrow Co.: Kingston Salt peter Cave (GBT11).  
Comments: This springtail is usually white and lacks eyes, although some variation is known (Christiansen and Bellinger, 1998). It is known from just one cave in Georgia but ranges across middle Tennessee and northeastern Alabama.

**Family Entomobryidae**  
**Genus Lepidocyrtus**  
*Lepidocyrtus* sp. (TP) A Slender Springtail  
Localities: Barrow Co.: Mountain Cove Farm Cave No. 1 (GWK73).  
Comments: This may be *A. pygmaeus* or another species.

**Family Pseudodinella**  
**Pseudodinella christianseni** Salmon, 1964 (TB) Christiansen’s Cave Springtail  
Localities: Dade Co.: Case Cavern (GDD1), Cemetery Pit (GDD64), Chambiss Cave (GDD321), Ha-Ha Cave (GDD256), Howards Waterfall Cave (GDD34), Sittons Cave (GDD9), Upper Valley Cave (GDD135), Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Fricks Cave (GWK14), Goat Cave (GWK184), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Spooky Cave (GWK494).  
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: Reeves et al. (2000) reported this springtail from a drip pool. The status of *Lepidocyrtus* is uncertain and this report may in the future be attributed to a species of *Lepidosira* (Bellinger et al. 1996-2019).

**Genus Pseudosinella**  
**Pseudosinella sp.** (TB) A Cave Springtail  
Localities: Dade Co.: Case Cavern (GDD1), Cemetery Pit (GDD64), Chambiss Cave (GDD321), Ha-Ha Cave (GDD256), Howards Waterfall Cave (GDD34), Sittons Cave (GDD9), Upper Valley Cave (GDD135), Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Fricks Cave (GWK14), Goat Cave (GWK184), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Spooky Cave (GWK494).  
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: Reeves et al. (2000) collected this springtail from organ ic debris. It is also known from northwestern Europe (Bellinger et al., 1996-2019).

**Family Neelidae**  
**Genus Neelius**  
*Neelius murinus* Folsom, 1896 (TP) A Springtail  
Localities: Dade Co.: Howards Waterfall Cave (GDD34).  
Comments: Reeves et al. (2000) collected this springtail from organ ic debris. It is also known from northwestern Europe (Bellinger et al., 1996-2019).

**Family Tomoceridae**  
**Genus Pogonognathellus**  
*Pogonognathellus bidentatus* Folsom, 1913 (TP) Two-toothed Springtail  
Localities: Dade Co.: Case Cavern (GDD1), Cemetery Pit (GDD64), Chambiss Cave (GDD321), Ha-Ha Cave (GDD256), Howards Waterfall Cave (GDD34), Sittons Cave (GDD9), Upper Valley Cave (GDD135), Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Fricks Cave (GWK14), Goat Cave (GWK184), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Spooky Cave (GWK494).  
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: Reeves et al. (2000) collected this springtail from organ ic debris. It is also known from northwestern Europe (Bellinger et al., 1996-2019).
Pogonognathellus flavescens Tullberg, 1871 (TP) A Springtail
Localities: Dade Co.: Johnsons Crook Cave (GDD17); Walker Co.: Cave Springs Cave, Horseshoe Cave (GWK12).

Genus Anillus
Anillus sp. (TB?/ED) A Cave Ground Beetle
Localities: Dade Co.: Hurricane Cave (GDD62), Morrison Cave (GDD66). Comments: These small, eyeless carabid beetles occur in deep forest leaf litter and in soil. However, troglobites have been reported from several caves in the eastern United States (Sokolov et al., 2004).

Genus Atr anus
Atr anus pubescens (Dejean, 1828) (TP) A Ground Beetle
Localities: Dade Co.: Upper Valley Cave (GDD135); Decatur Co.: Climax Cave (GDC36); Walker Co.: Bible Springs Cave (GWK74).

Genus Elaphropus
Elaphropus ferrugineus (Dejean, 1831) (TP) A Ground Beetle
Localities: Decatur Co.: Climax Cave (GDC36).

Genus Harpalus
Harpalus pensylvanicus (De Geer, 1774) (AC) Pennsylvania Dingy Ground Beetle
Localities: Barlow Co.: Busch Cave (GBT611).

Genus Platynus
Platynus parmarginatus Hamilton, 1893 (AC) A Ground Beetle
Localities: Walker Co.: Spooky Cave (GWK494).

Genus Pseudanophthalmus
Pseudanophthalmus digitus Valentine, 1932 (TB) A Cave Beetle
Localities: Dade Co.: Byers Cave (GDD66), Cemetery Pit (GDD64), Johnsons Crook Cave (GDD17).

Pseudanophthalmus exiguus Barr, 1981 (TB) Tapered Cave Beetle
Localities: Walker Co.: Horseshoe Cave (GKW12).

Pseudanophthalmus fullerii Valentine, 1932 (TB) Fuller’s Cave Beetle
Localities: Dade Co.: Boxcar Cave (GDD69)*, Byers Cave (GDD66), Caboose Cave (GDD47)*, Cemetery Pit (GDD64), Waters Valley Cave (GDD34), Hurricane Cave (GDD62)*, Johnsons Crook Cave (GDD17), Lower Valley Cave (GDD136)*, Morrison Cave (GDD66), Sittons Cave (GDD9), SSS Cave (GDD229)*, Upper Valley Cave (GDD135).

Class Insecta
Order Coleoptera
Family Carabidae
Genus Anillus
Anillus sp. (TB?/ED) A Cave Ground Beetle
Localities: Dade Co.: Hurricane Cave (GDD62), Morrison Cave (GDD66). Comments: These small, eyeless carabid beetles occur in deep forest leaf litter and in soil. However, troglobites have been reported from several caves in the eastern United States (Sokolov et al., 2004).

Genus Pterostichus
Pterostichus relictus (Newman, 1838) (TX) A Ground Beetle
Localities: Dade Co.: Upper Valley Cave (GDD135).
Genus Rhadine
Rhadine caudata LeConte, 1863 (TP) A Ground Beetle
Localities: Dade Co.: Longs Rock Wall Cave (GDD101)*, Rusty's Cave (GDD70)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G3 (SNR in Georgia).

Rhadine larvalis LeConte, 1846 (TP) A Ground Beetle
Localities: Dade Co.: Byers Cave (GDD66).

Genus Sphaeroderus
Sphaeroderus stenostomus (Weber, 1801) (TX) A Ground Beetle
Localities: Grady Co.: Maloys Waterfall Cave (GGR27).

Tachys
Tachys sp. (TX) A Ground Beetle
Localities: Grady Co.: Maloys Waterfall Cave (GGR27).

Family Histeridae
Genus Marginotus
Marginotus egregius (Casey, 1916) (AC) A Clown Beetle
Localities: Walker Co.: Spooky Cave (GWK494).

Genus Leiodidae
Genus Catops
Catops gratiosus (Blanchard, 1915) (TP/TX) Round Fungus Beetle
Localities: Chattooga Co.: Parkers Cave (GKH119); Dade Co.: Johnsons Creek Cave (GDD17), Morrison Cave (GDD86), Johnsons Creek Cave No. 2 (GDD19); Walker Co.: Horseshoe Cave (GKW12), Mountain Cave Farm Cave No. 1 (GKW73).

Genus Nemadus
Nemadus hornii Hatch, 1933 (TP/TX) A Carrion Beetle
Localities: Dade Co.: Johnsons Creek Cave (GDD17), Johnsons Creek Cave No. 2 (GDD19); Decatur Co.: Climax Cave (GDC36); Walker Co.: Rocky Cave (GKW494).
Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SNR in Georgia).

Nemadus sp. (TP/TX) A Carrion Beetle
Localities: Dade Co.: Morrison Cave (GDD86); Walker Co.: Cave Springs Cave, Horseshoe Cave (GKW12), Mountain Cave Farm Cave No. 1 (GKW73).

Genus Prionochaeta
Prionochaeta opaca (Say, 1825) (TP/TX) A Carrion Beetle
Localities: Chattooga Co.: Blowing Springs Cave (GKH54); Walker Co.: Bible Springs Cave (GKW74), Cave Springs Cave, Horseshoe Cave (GKW12), Mountain Cave Farm Cave No. 1 (GKW73).
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Genus Ptomaphagus
Ptomaphagus cavernicola Schwarz, 1898 (TP) A Fungus Beetle
Localities: Decatur Co.: Climax Cave (GDC36); Grady Co.: Maloys Waterfall Cave (GGR27).
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).
Comments: This species has well-developed eyes and functional flight wings. It ranges from Mexico to Texas, the Ozarks, and the southeastern United States. It has been collected in forests and caves in southwestern Georgia (Peck, 1973, 1982).

Ptomaphagus fiskel Peck, 1973 (TB) A Cave Fungus Beetle
Localities: Walker Co.: Anderson Spring Cave (GKW46), Ellisons Cave (GKW51), Fingerhole Cave (GKW259)*, Kinda Pretty Cave (GKW258)*; Missing Evan Well Cave (GKW48)*, Mountain Cave Farm Cave No. 1 (GKW73), Mountain Cave Farm Cave No. 2 (GKW74), Pettijohns Cave (GKW29), Pigeon Cave (GKW57), Spooky Too Cave (GKW496).
Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).
Comments: This troglobite is endemic to Georgia. It has greatly reduced eyes and lacks flight wings. It is the only troglobitic Ptomaphagus known from east of Lookout Mountain in Georgia and is limited to caves along Lookout Mountain and Pigeon Mountain in Walker County (Peck, 1973; Leray et al., 2019).

Ptomaphagus whiteselli Barr, 1963 (TB) A Cave Fungus Beetle
Localities: Dade Co.: Byers Cave (GDD66), Case Cavern (GDD1), Cemetery Pit (GDD64), Hurricane Cave (GDD62), Limestone Caverns (GDD140), Morrison Cave (GDD86), Rusty's Cave (GDD70), Sittons Cave (GDD9).
Conservation status: IUCN: Not Evaluated; NatureServe: G2G3 (SNR in Georgia).
Comments: This species has greatly reduced eyes and lacks flight wings. It is limited to caves in Lookout Valley in Dade County and adjacent DeKalb Co., Alabama (Peck, 1973; Leray et al., 2019).

Ptomaphagus sp. (TB) A Cave Fungus Beetle
Localities: Dade Co.: Johnsons Creek Cave No. 2 (GDD19), Morrison Cave (GDD86); Walker Co.: Smartl Farm Cave (GKW124)*.
Comments: The records from Dade Co. are likely P. whiteselli; the record from Walker Co. is likely P. fiskel.

Genus Sciodrepoides
Sciodrepoides terminans (LeConte, 1850) (TX/AC) A Fungus Beetle
Localities: Walker Co.: Cave Springs Cave.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Family Staphylinidae
Genus Atheta
Atheta annexa Casey, 1910 (TP) A Rove Beetle
Localities: Bartow Co.: Yarbrough Cave (GBT30); Dade Co.: Morrison Cave (GDD86); Decatur Co.: Climax Cave (GDC36); Grady Co.: Maloys Waterfall Cave (GGR27); Walker Co.: Chickamagua Cave Spring Cave, Horseshoe Cave (GKW12), Mountain Cave (GDD64).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Atheta klagesi Bernhauer, 1909 (TP) A Rove Beetle
Localities: Dade Co.: Byers Cave (GDD66), Howards Waterfall Cave (GDD34).

Atheta lucifuga Klimaszewski and Peck, 1986 (TP) Light Shunning Rove Beetle
Localities: Walker Co.: Mountain Cave (GDD64).
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Atheta troglaphila Klimaszewski and Peck, 1986 (TP) A Rove Beetle
Localities: Dade Co.: Byers Cave (GDD66), Howards Waterfall Cave (GDD34); Walker Co.: Mountain Cave (GDD64).
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Atheta sp. (TP) A Rove Beetle
Localities: Chattooga Co.: Blowing Springs Cave (GKH54), Parks Cave (GKH119); Dade Co.: Byers Cave (GDD66), Johnsons Creek Cave (GDD17), Morrison Cave (GDD86); Walker Co.: Bible Springs Cave (GKW74), Cave Springs Cave, Horseshoe Cave (GKW12), Mountain Cave Farm Cave No. 1 (GKW73), Pettijohns Cave (GKW29).

Genus Batriasymmodes
Batriasymmodes speleaeus (Park, 1951) (TB) A Cave Ant-loving Beetle
Localities: Chattooga Co.: Blowing Springs Cave (GKH54), Chelsea Gulf Cave (GKH54); Dade Co.: Kirchmeyer Cave (GDD196)*; Walker Co.: Mountain Cave Farm Cave No. 2 (GKW74).
Conservation status: IUCN: Not Evaluated; NatureServe: G3G4 (SNR in Georgia).
Comments: This species is also known from caves in northeastern Alabama and central and eastern Tennessee. Although eyed, it was considered a troglobiont by Park (1960) and others, but a troglophile by Holsinger and Peck (1971).
**Batriasymmodes** sp. (TB/TP) An Ant-loving Beetle
Localities: Dade Co.: Howards Waterfall Cave (GDD34).

**Genus Batriodes**
**Batriodes lineaticollis** (Aubé, 1833) (TP) An Ant-loving Beetle
Localities: Dade Co.: Howards Waterfall Cave (GDD34)*; Limestone Caverns (GDD140)*; Walker Co.: Pigeon Cave (GWK57).

**Genus Creophilus**
**Creophilus maxillosus** (Linnaeus, 1758) (TP) Hairy Rove Beetle
Localities: Dade Co.: Howards Waterfall Cave (GDD34)*; Limestone Caverns (GDD140)*; Walker Co.: Pigeon Cave (GWK57).

**Genus Geodromicus**
**Geodromicus brunneus** (Say, 1823) (TX/AC) A Rove Beetle
Localities: Walker Co.: Bible Springs Cave (GWK74), Mountain Cove Farm Cave No. 1 (GWK73).

**Genus Lesteva**
**Lesteva pallipes** LeConte, 1863 (TP) A Rove Beetle
Localities: Bartow Co.: Chert Chasm (GBT340); Chattooga Co.: Blow Spring Cave (GSS94); Dade Co.: Hurricane Cave (GDD62) Walker Co.: Bible Springs Cave (GWK74), Mountain Cove Farm Cave No. 1 (GWK73), Rocky Cave (GWK496).

**Genus Philonthus**
**Philonthus cyanipennis** (Fabricius, 1792) (AC) A Rove Beetle
Localities: Walker Co.: Byers Cave (GDD66), Deans Pit (GDD273), Howards Waterfall Cave (GDD34); Walker Co.: Byers Cave (GDD66).

**Genus Oxypoda**
**Oxypoda** sp. (TX/AC) A Rove Beetle
Localities: Bartow Co.: Chert Chasm (GBT340); Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Hurricane Cave (GDD62) Walker Co.: Bible Springs Cave (GWK74), Mountain Cove Farm Cave No. 1 (GWK73), Rocky Cave (GWK496).

**Genus Quedius**
**Quedius erythrogaster** Mannerheim, 1852 (TP) A Rove Beetle
Localities: Dade Co.: Morrison Cave (GDD86), Harrisburg Cave (GWK85), Hickman Gulf Cave, Pettijohns Cave (GWK29).

**Genus Saeptophilus**
**Saeptophilus littoreus** (Linnaeus, 1758) (TP) A Rove Beetle
Localities: Walker Co.: Horseshoe Cave (GDD234).

**Genus Speleochus**
**Speleochus** sp. (TB) A Cave Rove Beetle
Localities: Dade Co.: Limestone Caverns (GDD140)*; Walker Co.: Pigeon Cave (GWK57).

**Genus Subterrochus**
**Subterrochus** sp. (TB) A Cave Rove Beetle
Localities: Walker Co.: Mountain Cave Farm Cave No. 1 (GWK73).

**Genus Tachinus**
**Tachinus fimbratus** Gravenhorst, 1802 (TX/AC) A Rove Beetle
Localities: Walker Co.: Pettijohns Cave (GWK29).

**Genus Xenota**
**Xenota** sp. (TP/AX) A Rove Beetle
Localities: Dade Co.: Deans Pit (GDD273), Johnsons Crook Cave (GDD17); Walker Co.: Horseshoe Cave (GWK12), Pettijohns Cave (GWK29).

**Family Trogidae**
**Genus Trox**
**Trox aequalis** Say, 1832 (TX) A Hide Beetle
Localities: Walker Co.: Fricks Cave (GWK14).

**Order Diptera**
**Family Calliphoridae**
**Genus Calliphora**
**Calliphora vicina** Robineau-Desvoidy, 1830 (TX) Blue Blow Fly
Localities: Dade Co.: Deans Pit (GDD273), Howards Waterfall Cave (GDD34); Walker Co.: Horseshoe Cave (GWK12).

**Calliphora vomitoria** (Linnaeus, 1758) (TX) Blue Bottle Fly
Localities: Dade Co.: Byers Cave (GDD66), Howards Waterfall Cave (GDD34); Walker Co.: Harrisburg Cave (GWK85).

**Family Cecidomyiidae**
**Genus Bremia**
**Bremia** sp. (TX/AC) A Gall Midge
Localities: Dade Co.: Sittons Cave (GDD9).

**Family Chironomidae**
**Genus Chironomus**
**Chironomus decorus** Johannsen, 1905 (AC) A Non-biting Midge
Localities: Washington Co.: Tennile Caves (GWS20).

**Genus Procladius**
**Procladius bellus** (Loew, 1866) (TX) A Midge
Localities: Bartow Co.: Busch Cave (GBT611).

**Genus Tanytarsus**
**Tanytarsus** sp. (TX) A Non-biting Midge
Localities: Bartow Co.: Busch Cave (GBT611).

**Family Culicidae**
**Genus Anopheles**
**Anopheles punctipennis** (Say, 1823) (TX) Spot-winged Malaria Mosquito
Localities: Dade Co.: Howards Waterfall Cave (GDD34), Hurricane Cave (GDD62); Walker Co.: Fricks Cave (GWK14), Horseshoe Cave (GWK12).

**Genus Culex**
**Culex territans** Walker, 1856 (TX) Northern Frog-biting Mosquito
Localities: Walker Co.: Horseshoe Cave (GWK12).

**Culex sp.** (TX) A Mosquito
Localities: Dade Co.: SSS Cave (GDD229)*.

**Family Dolichopodidae**
**Genus Lianculus**
**Lianculus genualis** Loew, 1861 (TX) A Long-legged Fly
Localities: Bartow Co.: Yarbrough Cave (GBT340).

**Genus Neurigonella**
**Neurigonella sombrea** (Harmston and Knowlton, 1945) (TX/AC) A Long-legged Fly
Localities: Dade Co.: Upper Valley Cave (GDD135).
Family Drosophilidae

Genus *Drosophila*

*Drosophila* sp. (TX/AC) A Fruit Fly

Localties: Dade Co.: Howards Waterfall Cave (GDD34).

**Family Heleomyzidae**

Genus *Amoebaleria*

*A. defessa* (Osten-Sacken, 1877) (TX) A Sun Fly

Localties: Bartow Co.: Busch Cave (GBT611), Kingston Salt peter Cave (GBT11), Catosa Co.: Crane Cave (GCC80)*; Chattoo Coa.: Parkers Cave (GKH119)*, Mogins II Cave (GKH405)*; Dade Co.: Byers Cave (GDD66), Caboose Cave (GDD475)*, Cemetery Pit (GDD64), Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34), Hurricane Cave (GDD62), Johnsons Crook Cave (GDD17)*, Kirchmeyer Cave (GDD196)*, Lime Stone Caverns (GDD140)*, Longs Rock Wall Cave (GDD101)*, Lower Valley Cave (GDD136)*; Morrison Cave (GDD86), Running Water Cave (GDD120), Rusty’s Cave (GDD70), Sittons Cave (GDD9), SSS Cave (GDD229)*, Upper Valley Cave (GDD135), Wild Bills Dakota Cave (GDD596)*; Floyd Co.: Airport Cave (GFL189)*, Cave Springs Cave (GFL18)*; Polk Co.: White River Cave (GPO7)*; Walker Co.: Harrisburg Cave (GWK85)*, Horse shoe Cave (GKW12), Little John Cave (GKW280)*, Mountain Cave Farm Cave No. 1 (GKW73), Pettijohns Cave (GKW29), Scrunch Owl Cave (GKW205)*, Smartt Farm Cave (GKW124)*.

Comments: This fly is common in caves of the eastern United States (e.g., Peck, 1995; Reeves et al., 2000; Lewis, 2005).

**Genus Heleomyza**

*Heleomyza brachypterna* (Loew, 1873) (TX) A Sun Fly

Localties: Walker Co.: Harrisburg Cave (GKW85), Mountain Cave Farm Cave No. 1 (GKW73).

**Genus Oecothea**

*Oecothea specus* (Alдрich, 1897) (TX) A Sun Fly

Localties: Bartow Co.: Busch Cave (GBT611), Kingston Salt peter Cave (GBT11), Catosa Co.: Chapmans Cave (GCC25)*; Chattoo Coa.: Parkers Cave (GKH119)*, Mogins II Cave (GKH405)*; Dade Co.: Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34)*, Johnsons Crook Cave (GDD17)*, Lime Stone Caverns (GDD140)*, Longs Rock Wall Cave (GDD101)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Wild Bills Dakota Cave (GDD596)*; Gordon Co.: Jack Crider Cave (GGC90)*; Polk Co.: White River Cave (GPO7)*; Walker Co.: Harrisburg Cave (GWK85)*, Horse shoe Cave (GKW12), Little John Cave (GKW280)*, Mountain Cave Farm Cave No. 1 (GKW73), Pettijohns Cave (GKW29), Scrunch Owl Cave (GKW205)*, Smartt Farm Cave (GKW124)*.

Comments: This fly is common in caves of the eastern United States (e.g., Peck, 1995; Reeves et al., 2000; Lewis, 2005).

**Family Muscidae**

Genus *Muscina*

*M. prolapsa* (Harris, 1780) (TX) A House Fly

Localties: Dade Co.: Sittons Cave (GDD9); Walker Co.: Horse shoe Cave (GKW12).

**Family Mycetophilidae**

Genus *Leia*

*Leia* sp. (TP/TX) A Fungus Gnat

Localties: Dade Co.: Sittons Cave (GDD9).

Genus *Rynosoma*

*Rynosoma* sp. (TP/TX) A Fungus Gnat

Localties: Dade Co.: Sittons Cave (GDD9).

Genus *Sciara*

*Sciara* sp. (TP/TX) A Fungus Gnat

Localties: Bartow Co.: Kingston Salt peter Cave (GBT11); Dade Co.: Byers Cave (GDD66), Howards Waterfall Cave (GDD34).
Family Simuliidae
Genus Simulium
Simulium saltus Stone and Jamnback, 1955 (TX) A Black Fly
Localities: Dade Co.: Johnsons Crook Cave No. 2 (GDD19).

Genus Simulium
Simulium pannassum Malloch, 1914 (TX) Dark Black Fly
Localities: Dade Co.: Johnsons Crook Cave No. 2 (GDD19).

Family Sphaeroceridae
Genus Leptocera
Leptocera caenosa (Rondani, 1880) (TP) A Lesser Dung Fly
Localities: Dade Co.: Howards Waterfall Cave (GDD34)*, Johnsons Crook Cave No. 2 (GDD19); Walker Co.: Fricks Cave (GKW14)*, Pettijohns Cave (GKW29).

Leptocera sp. (TP/TX) A Lesser Dung Fly
Localities: Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Byers Cave (GDD66), Johnsons Crook Cave (GDD17); Walker Co.: Bible Springs Cave (GKW74), Mountain Cove Farm Cave No. 1 (GKW73).

Genus Spelobia
Spelobia tenebrarum (Aldrich, 1897) (TB) Cave Dung Fly
Localities: Chattooga Co.: Chelsea Gulf Cave (GKH54); Dade Co.: Howards Waterfall Cave (GDD34), Johnsons Crook Cave (GDD17), Limestone Caverns (GDD140)*, Rising Fawn Exit Cave (GDD397), SSS Cave (GDD229)*, Wild Bills Dakota Cave (GDD596)*; Walker Co.: Horsecave (GKW12)*, Mountain Cove Farm Cave No. 1 (GKW73), Mountain Cove Farm Cave No. 2 (GKW74)*, Pettijohns Cave (GKW29).

Genus Tipulidae
Genus Dolichopeza
Dolichopeza tridenticulata Alexander, 1931 (TX) A Crane Fly
Localities: Dade Co.: Sittons Cave (GDD9), Upper Valley Cave (GDD135); Walker Co.: Horseshoe Cave (GKW12), Mountain Cove Farm Cave No. 1 (GKW73).

Family Gryllidae
Genus Corydalus
Corydalus cornutus ((Linnaeus, 1758) (AC) Eastern Dobsonfly
Localities: Dade Co.: Johnsons Crook Cave No. 2 (GDD19).

Order Hymenoptera
Family Braconidae
Genus Aspilota
Aspilota sp. (TX/AC) A Parasitoid Wasp
Localities: Bartow Co.: Yarbrough Cave (GBT30); Dade Co.: Byers Cave (GDD66), Deans Pit (GDD273), Howards Waterfall Cave (GDD34), Johnsons Crook Cave (GDD17), Rock Shelter Pit (GDD209), Sittons Cave (GDD9), Upper Valley Cave (GDD135); Walker Co.: Horseshoe Cave (GKW12), Mountain Cove Farm Cave No. 1 (GKW73).

Family Formicidae
Genus Myrmecina
Myrmecina americana Emery, 1895 (TX) American Little Ant
Localities: Dade Co.: Johnsons Crook Cave No. 2 (GDD19).

Order Lepidoptera
Family Erebididae
Genus Sciliopteryx
Sciliopteryx libatrix (Linnaeus, 1758) (TX) Herald Moth
Localities: Dade Co.: Howards Waterfall Cave (GDD34), Johnsons Crook Cave (GDD17), Johnsons Crook Cave No. 2 (GDD19); Walker Co.: Anderson Spring Cave (GKW46)*, Horsecove Cave (GKW12). Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This moth commonly overwinters in caves in the eastern United States.

Family Noctuidae
Genus Lophoteres
Lophoteres sp. (TX/AC) An Owlet Moth
Localities: Walker Co.: Fricks Cave (GKW14)*.

Order Megaloptera
Family Corydalidae
Genus Corydalis
Corydalis cornutus ((Linnaeus, 1758) (AC) Eastern Dobsonfly
Localities: DeKalb Co.: Nice Gneiss Cave (GDK329)*.

Order Odonata
Family Cordulegastridae
Genus Cordulegaster
Cordulegaster sp. (AC) A Goldenring Dragonfly
Localities: Washington Co.: Tnenile Caves (GWS20).

Family Gomphidae
Genus Progomphus
Progomphus obscurus (Rambur, 1842) (AC) Common Sanddragon
Localities: Washington Co.: Tnenile Caves (GWS20). Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Order Orthoptera
Family Gryllidae
Genus Eunemobius
Eunemobius sp. (TX/AC) A Ground Cricket
Localities: Chattooga Co.: Subligna Cave (GKH145)*.

Family Rhaphidophoridae
Genus Caeuthophilus
Caeuthophilus ensifer Packer, 1881 (TX) A Camel Cricket
Localities: Dade Co.: Byers Cave (GDD66), Howards Waterfall Cave (GDD34), Johnsons Crook Cave (GDD17), Morrison Cave (GDD86), Morrison Spring Cave (GDD110). Comments: This camel cricket is a forest species that has been collected in a few caves (Hubbell, 1936; Lewis, 2005). Within Georgia, it is apparently limited to Dade County.
**Cephalotus gracilipes** (Haldeman, 1850) (TX) Slender-legged Camel Cricket

Localities: Bartow Co.: Yarbrough Cave (GBT30); Dade Co.: Boxcar Cave (GDD66), Caboose Cave (GDD475)*, Case Annex Cave (GBT12), Hooker Cave (GDD90)*, Morrison Cave (GDD86), Morrison Spring Cave (GDD110), Sittons Cave (GDD9), Wild Bills Dakota Cave (GDD596)*, Gordon Co.: Jack Crider Cave (GGO298)*, Roberts Cave (GGO147), Rusty Cable Cave (GGO297)*, Steep Creek Cave (GGO326)*, Walker Co.: Anderson Spring Cave (GWK46), Bible Springs Cave (GWK74), Ellisons Cave (GWK151), Fingerhole Cave (GWK258)*, Fricks Cave (GWK14), Little John Cave (GWK280)*, Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Rocky Cave (GWK496)*, Smartt Farm Cave (GWK124)*.

Comments: This camel cricket is a forest species that enters caves. It ranges from New York to Florida (Hubbell, 1936).

**Cephalotus sp.** (TX) A Cave Cricket

Localities: Walker Co.: Mountain Cave Farm Cave No. 2 (GWK74)*.

Comments: This record may be *C. ensifer* or *C. gracilipes*.

**Genus Diastromma**

Diastromma asynorma Adelung, 1902 (TX) Greenhouse Camel Cricket

Localities: Catosa Co.: Chapmans Cave (GCZ25)*.

Comments: This species was introduced from Asia and recently reported to be common in and around homes in the eastern United States (Epps et al., 2014). This is the first report of the species in a cave in North America. Chapmans Cave is <100 m from a housing development, which may explain the presence of these crickets in the cave. Lavoie et al. (2019) reported an unknown cricket species with affinities to *Diastromma* from a cave in Pennsylvania, which highlights the need for monitoring of cricket populations to identify the spread of exotic species into cave habitats.

**Genus Euhadenoecus**

Euhadenoecus putaneus (Scudder, 1877) (TX) Puteanus Camel Cricket

Localities: Bartow Co.: Davis Farm Cave (GBT222)*, Dade Co.: Boxcar Cave (GDD69)*, Byers Cave (GDD66), Caboose Cave (GDD475)*, Case Annex Cave (GBT12), Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34), Johnsons Creek Cave (GDD17), Morrison Spring Cave (GDD110), Sittons Cave (GDD9), SSS Cave (GDD229)*, Wild Bills Dakota Cave (GDD596)*, Gordon Co.: Jack Crider Cave (GGO298)*, Roberts Cave (GGO147), Rusty Cable Cave (GGO297)*, Polk Co.: White River Cave (GPW70), Walker Co.: Anderson Spring Cave (GWK46), Big Springs Cave (GWK74), Cherokee Cave (GWK494), Ellisons Cave (GWK51), Fingerhole Cave (GWK258)*, Fricks Cave (GWK14), Mountain Cave Farm Cave No. 1 (GWK73), Pigeon Cave (GWK57).

Comments: This camel cricket is widespread across the Appalachians and portions of the Interior Low Plateau. It is a surface species that enters caves but generally does not penetrate to deep cave environments (Hubbell and Norton, 1978).

**Order Psocidea**

Family Liposcelididae

Genus Liposcelis

**Liposcelis decolor** (Pearman, 1925) (TP) A Booklouse

Localities: Bartow Co.: Kingston Salt peter Cave (GBT11); Walker Co.: Ellisons Cave (GWK51).

**Family Psyllipsocidae**

Genus Psyllipsocus

**Psyllipsocus ramburii** Say, 1821 (TP) A Barklouse

Localities: Bartow Co.: Yarbrough Cave (GBT30)*; Walker Co.: Case Annex Cave, Harrisburg Cave (GWK85).

**Order Siphonaptera**

Family Hystrichopsyllidae

Genus Ctenophthalmus

Ctenophthalmus pseudagyrttes Baker, 1904 (SY) A Flea

Localities: Walker Co.: Pettijohns Cave (GWK29).

**Order Trichoptera**

Family Hydropsychidae

Genus Diplectrona

**Diplectrona marianae** Reeves, 1999 (TX) A Caddisfly

Localities: Dade Co.: Johnsons Creek Cave No. 2 (GDD19).

Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SNR in Georgia).

Comments: This species was described in Reeves and Paysen (1999); it is endemic to Georgia and known only from the type locality, which was reported with the alternate name “Newsome Gap Spring Cave” (Reeves and Paysen 1999).

**Order Zygentoma**

Family Nicoletiidae

Genus Nicoletia

**Nicoletia sp.** (ED) A Silverfish

Localities: Baker Co.: Horseshoe Cave (GWK12).

Comments: Holsinger and Peck (1971) suggested this may be an undescribed edaphic species.

**Subphylum Myriapoda**

Class Chilopoda

Order Geophilomorpha

Family Geophilidae

Genus Arenophilus

**Arenophilus bipuncticeps** Wood, 1862 (TX/AC) Northern Short-clawed Centipede

Localities: Chattooga Co.: Blowing Springs Cave (GKH54).

**Order Lithobiomorpha**

Family Lithobiidae

Genus Lithobius

**Lithobius atkinsoni** Bollman, 1887 (TP) A Centipede

Localities: Randolph Co.: Griers Cave (GRA40).

**Genus Neolithobius**

Neolithobius voracirop Chamberlin, 1912 (TP) A Centipede

Localities: Decatur Co.: Climax Cave (GDC36).

**Genus Paltobius**

Paltobius sp. (TX/AC) A Centipede

Localities: Dade Co.: Morrison Spring Cave (GDD110).

**Genus Pampobius**

Pampobius sp. (TX/AC) A Centipede

Localities: Walker Co.: Cave Springs Cave.

**Genus Typhlobius**

Typhlobius caeus Bollman, 1888 (TX/AC) A Centipede

Localities: Walker Co.: Fricks Cave (GWK14).

**Order Scoleopodomorpha**

Family Cryptopidae

Genus Scoleoplectrus

**Scoleoplectrus sexspinosus** (Say, 1821) (TX/AC) A Centipede

Localities: Dade Co.: Johnsons Creek Cave (GDD17), Morrison Cave (GDD86); Walker Co.: Pettijohns Cave (GWK29).

**Class Diplopoda**

Order Callipodidae

Family Abacionidae

Genus Abacion

**Abacion magnus** (Loomis, 1943) (TX) A Crested Millipede

Localities: Bartow Co.: Kingston Salt peter Cave (GBT11); Davis Farm Cave (GBT222)*; Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Byers Cave (GDD66); Polk Co.: White River Cave (GPW70).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: The record from Kingston Salt peter Cave was reported as *A. lactarium* (Chamberlin, 1946), a species known from the Piedmont and Coastal Plain of the eastern United States, and likely represents a misidentification (Holsinger and Peck, 1971). The record from Davis Farm Cave, also known as Crystal Cave, was also reported as *A. lactarium* in GBIF (2019). We presume this record to be a misidentification of *A. magnus*. 

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Order Chordeumatida
Family Cleidogonidae
Genus Pseudotremia

Pseudotremia aequus Shear, 1972 (TB) A Cave Millipede
Localities: Dade Co.: Byers Cave (GDD66), Hurricane Cave (GDD62); Walker Co.: Pigeon Cave (GWK57).
Conservation status: IUCN: Not Evaluated; NatureServe: G1G2 (SNR in Georgia).
Comments: With the exception of the record from Pigeon Cave (in Walker County, east of Lookout Mountain), all known sites are west of Lookout Mountain in Dade County (plus one unpublished record from adjacent DeKalb County, Alabama). The Pigeon Cave record may have been confused with *P. eburnea*, which is known from Pigeon Mountain.

Pseudotremia eburnea Loomis, 1939 (TB) A Cave Millipede
Localities: Dade Co.: Byers Cave (GDD66), Case Cavern (GDD1), Cemetery Pit (GDD64), Cricket Cave, Howardsp Waterfall Cave (GDD34), Hurricane Cave (GDD62), Johnsons Crook Cave (GDD17), SSS Cave (GDD229)*, Upper Valley Cave (GDD135). Walker Co.: Ellisons Cave (GWK51), Fingerhole Cave (GWK25)*, Hickman Gulf Cave, Mountain Cove Farm Cave No. 1 (GWK73), Pettijohns Cave (GWK29), Spooky Cave (GWK494).
Conservation status: IUCN: Not Evaluated; NatureServe: G2G4 (SNR in Georgia).
Comments: Most records are from caves on the escarpments of Lookout Mountain in Walker and Dade counties. Two additional records (Nickajack Cave in Marion Co., Tennessee and Davidson Cave in Marshall Co., Alabama) are further west along the Tennessee River.

Pseudotremia fracta Chamberlin, 1951 (TP) A Millipede
Localities: Walker Co.: Bee Rock Cave (GWK123)*.
Comments: This species is known from surface and cave sites in eastern Tennessee and western north Carolina (Hoffman, 1981). This is the first record of the species in Georgia.

Pseudotremia sp. (TB/TP) A Millipede
Localities: Dade Co.: Howards Waterfall Cave (GDD34)*, Hooker Cave (GDD90)*, Morrison Cave (GDD86), Morrison Spring Cave (GDD110), Running Water Cave (GDD126), Sittons Cave (GDD9), Walker Co.: Bibble Springs Cave (GWK74), Harrisburg Cave (GWK85), Nash Waterfall Cave (GWK72), Pigeon Cave (GWK57)*.
Comments: These records include at least two undescribed species. Specimens from Howards Waterfall Cave are an undescribed species, and those from Hooker Cave represent a second undescribed species (W. Shear, pers. comm.). Buhlmann (2001) mentions other possibly unlisted populations of Pseudotremia.

Family Spiariaidae
Genus Spiaria
Spiaria sp. (TX) A Millipede
Localities: Chattooga Co.: Parkers Cave (GKH119).
Comments: Troglobiotic species in the genus are known but none from Georgia.

Family Trichopetalidae
Genus Scoterpes
Scoterpes austrinus Loomis, 1946 (TB) A Cave Millipede
Localities: Bartow Co.: Busch Cave (GBT611); Chattooga Co.: Chelsea Gulf Cave (GKH54); Dade Co.: Cemetery Pit (GDD64), Johnsons Crook Cave (GDD17), Morrison Cave (GDD86), Sittons Cave (GDD9), Upper Valley Cave (GDD135); Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Goat Cave (GWK184), Harrisburg Cave (GWK85), Horseshoe Cave (GWK12), Mountain Cove Farm Cave No. 1 (GWK73), Mountain Cove Farm Cave Farm No. 2 (GWK74), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Spooky Cave (GPO5).
Conservation status: IUCN: Not Evaluated; NatureServe: G3G4 (SNR in Georgia).
Comments: This troglobitic species is known from sites east and west of Lookout Mountain in northwestern Georgia and adjacent regions of northeastern Alabama (Shear, 2010). The record from Busch Cave (Bartow County) likely represents *S. nudus*, which Shear (2010) raised to species status after the record was reported by Reeves et al. (2000).

Scoterpes nudus Chamberlin, 1946 (TB) A Cave Millipede
Localities: Bartow Co.: Kingston Salt peter Cave (GBT11); Polk Co.: Deatons Cave (GPO5), White River Cave (GPO7).
Conservation status: IUCN: Not Evaluated; NatureServe: G3G4T1T2 (SNR in Georgia).
Comments: The troglobitic species is endemic to Georgia. It is geographically isolated from all other Scoterpes species and is known from three caves in the Etowah River Valley of Bartow and Polk counties (Shear, 2010). A record of *S. austrinus* from Busch Cave (Bartow Co.) is likely *S. nudus*.

Scoterpes willreavesi Shear, 2010 (TB) Reeves’ Cave Millipede
Localities: Dade Co.: Byers Cave (GDD66), Cemetery Pit (GDD64). Comments: This species is known from a few sites in Dade County, Georgia, and adjacent DeKalb County, Alabama (Shear, 2010).

Scoterpes sp. (TB) A Cave Millipede
Localities: Chattooga Co.: Scoggins II Cave (GKH405)*; Dade Co.: Case Cavern (GDD1), Howards Waterfall Cave (GDD34), Longs Rock Wall Cave (GDD101)*; “Saw Mill Cave, Rising Fawn”: Walker Co.: Bee Rock Cave (GWK123)*, Fricks Cave (GWK14), Pigeon Cave (GWK57), Smartt Farm Cave (GWK124)*.
Comments: These records represent females or juveniles that could not be identified to species.

Order Julida
Family Blaniulidae
Genus Blaniulus
Blaniulus guttulatus (Fabricius, 1798) (ED) Spotted Snake Millipede
Localities: Dade Co.: Howards Waterfall Cave (GDD34), Morrison Cave (GDD86).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: This is a soil-inhabiting species that was introduced from Europe. The name of this species is problematic as there is an unresolved homonymy with the species *Julus guttulatus* Bosc, 1792, which has also been placed in *Blaniulus*.

Family Zosteractinidae
Genus Ameractis
Ameractis satix Causeroy, 1959 (TB) A Cave Millipede
Localities: Dade Co.: Morrison Cave (GDD86).
Conservation status: IUCN: Not Evaluated; NatureServe: G2G4 (SNR in Georgia).
Comments: Holsinger and Peck (1971) reported this troglobiont from Georgia, but no new collections have been reported since then.

Order Platydessmida
Family Androgagnathidae
Genus Androgagnathus
Androgagnathus corticarius Cope, 1869 (TX) Cope’s Noodle Millipede
Localities: Floyd Co.: Cave Springs Cave (GFL18).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Order Polydesmida
Family Paradoxomatidae
Genus Oxidus
Oxidus gracilis (Koch, 1847) (TP) Greenhouse Millipede
Localities: Bartow Co.: Ladds Lime Cave (GBT384-GTB389); Calhoun Co.: Chapmans Cave (GCZ25)*, Crane Cave (GCZ26)*; Chattooga Co.: Scoggins II Cave (GKH405)*, Subligna Cave (GKH145)*; Dade Co.: Hooker Cave (GDD90)*, Howards Waterfall Cave (GDD34), Limestone Caverns (GDD140)*, Wild Bills Dakota Cave (GDD596)*; Decatur Co.: Climax Cave (GDC36); Floyd Co.: Cave Springs Cave (GFL18); Grady Co.: Maloys Waterfall Cave (GGR27); Polk Co.: White River Cave (GPO7)*; Washington Co.: Tennille Caves (GWS20); Walker Co.: Little John Cave (GWK280)*, Mountain Cove Farm Cave No. 2 (GWK74)*, Smart Farm Cave (GWK124)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: This is an exotic species native to Japan and is now commonly encountered in caves.
**Family Polydesmidae**  
**Genus Polydesmus**  
*Polydesmus sp.* (TX/AC) A Flatback Millipede  
Localities: Dade Co.: Creek Bed Cave.

**Family Xystodesmidae**  
**Genus Cherokia**  
*Cerokia georgiana* (Bollman, 1889) (AC) Georgia Flat-backed Millipede  
Localities: Walker Co.: Pigeon Cave (GWK57).  
Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

**Order Spirostreptida**  
**Family Cambalidae**  
**Genus Cambala**  
*Cambala hubrichti* Hoffman, 1958 (TP) A Millipede  
Localities: Bartow Co.: Anthony's Cave (GBT175); Chattooga Co.: Soggins II Cave (GKH405)*; Subligna Cave (GKH145)*; Dade Co.: Hurricane Cave (GDD62), Longs Rock Wall Cave (GDD101)*, Rusty's Cave (GDD70); Randolph Co.: Griers Cave (GRA40).  
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).  
Comments: This species ranges from Pennsylvania and Indiana to Florida and is commonly encountered in caves (Shelley, 1979).

*Cambala minor* Bollman, 1888 (TP) A Millipede  
Localities: Chattooga Co.: Parkers Cave (GKH119); Dade Co.: Missouri Cave (GDD86); Walker Co.: Horseshoe Cave (GWK12), Pettijohns Cave (GWK29).  
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).  
Comments: This species is known from surface and cave collections across the Tennessee Valley, the Ozarks, and adjacent regions (Shelley, 1979).

*Cambala ochra* Chamberlin, 1942 (TP) A Millipede  
Localities: Bartow Co.: Chert Chasm (GBT340); Walker Co.: Horsehoe Cave (GWK12), Rocky Cave (GWK496).  
Comments: This species is known from surface and cave records across the Tennessee River Valley and adjacent regions (Shelley, 1979).

*Cambala sp.* (TP) A Millipede  
Localities: Chattooga Co.: Chapmans Cave (GCZ25)*; Chattooga Co.: Blowing Springs Cave (GKH54); Dade Co.: Limestone Caverns (GDD140)*; Floyd Co.: Airport Cave (GFL189)*; Cave Springs Cave (GFL18); Walker Co.: Anderson Spring Cave (GWK46)*, Mountain Cove Farm Cave No. 2 (GKW74)*; Polk Co.: Deatons Cave (GPO5), White River Cave (GP07).  
Comments: Most of these records represent juveniles that likely are one of the four species listed above.

**Class Symphyla**  
**Family Scutigerellidae**  
**Genus Scutigerella**  
*Scutigerella sp.* (ED) A Garden Centipede  
Localities: Dade Co.: Johnsons Crook Cave (GDD17), Sittons Cave (GDD9); Walker Co.: Harrisburg Cave (GWK85).  
Comments: These soil-inhabiting arthropods are not well-represented from caves.
Genus Zonitoides

Zonitoides arboreus (Say, 1816) (TP/TX) Quick Gloss

Locality: Dade Co.: Longs Rock Wall Cave (GDD101)*; Decatur Co.: Climax Cave (GDC36); Grady Co.: Malois Waterfall Cave (GGR27); Walker Co.: Blowing Springs Cave (GWW41), Pettijohns Cave (GWW29).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This species is one of the most common and widespread land snails in North America. It is found in a variety of habitats, including several caves (Hubricht, 1964, 1985; Lewis, 2005)

Family Helicodiscidae

Genus Helicodiscus

Helicodiscus barri Hubricht, 1962 (TB) Raccoon Coil

Locality: Walker Co.: Smartt Farm Cave (GWW124)*; Chattooga Co.: Parkers Cave (GKKH119).

Conservation status: IUCN: Least Concern (Gladstone et al., 2018); NatureServe: G3 (SNR in Georgia).

Comments: This troglobiont is often found on woody detritus in damp cave environments (Hubricht, 1965; Dourson, 2010). It has been reported from several caves (Hubricht, 1964; Lewis, 2005).

Helicodiscus notius Hubricht, 1962 (TX) Tight Coil

Locality: Grady Co.: Malois Waterfall Cave (GGR27)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G5Q (SNR in Georgia).

Comments: This calciphilic species is often found around rocky outcrops and limestone-rich environments (Hubricht, 1985; Dourson, 2010). It has been reported from several caves (Hubricht, 1964; Lewis, 2005).

Helicodiscus paralleus (Say, 1817) (TX) Compound Coil

Locality: Decatur Co.: Climax Cave (GDC36).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This calciphilic species is often found around rocky outcrops and limestone-rich environments (Hubricht, 1985; Dourson, 2010). It has been reported from several caves (Hubricht, 1964; Lewis, 2005).

Family Oxychilidae

Genus Glyphyalinia

Glyphyalinia cryptomphala (Clapp, 1915) (TX) Thin Glyph

Locality: Chattooga Co.: Parkers Cave (GKKH119)*; Dade Co.: Upper Valley Cave (GDD135).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010).

Glyphyalinia indentata (Say, 1823) (TX) Carved Glyph

Locality: Walker Co.: Harrisburg Cave (GWW85).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010) and known from several caves (Lewis, 2005).

Glyphyalinia praecox (Baker, 1930) (TX) Brilliant Glyph

Locality: Bartow Co.: Anthonyus Cave (GBT175).

Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010) and known from several caves (Lewis, 2005).

Genus Glyphyalinia

Glyphyalinia rhoadsi (Pilsby, 1899) (TX) Sculpted Glyph

Locality: Washington Co.: Tennile Caves (GWW20).

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010) and known from several caves (Lewis, 2005).

Glyphyalinia sculpitilis (Bland, 1858) (TX) Suborb Glyph

Locality: Floyd Co.: Cave Springs Cave (GFL18)*; Dade Co.: Malois Waterfall Cave (GGR27)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G4 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010) and known from several caves (Lewis, 2005).

Glyphyalinia specus Hubricht, 1965 (TB) Hollow Glyph

Locality: Chattooga Co.: Parkers Cave (GKKH119); Dade Co.: Morrison Cave (GDD85); Walker Co.: Cave Springs Cave, Cherokee Cave (GWW94), Mount Cove Farm Cave, Pettijohns Cave (GWW29).

Conservation status: IUCN: Least Concern (Gladstone et al. 2018); NatureServe: G3 (SNR in Georgia).

Comments: This is a wide-ranging troglobiont found in dry leaf litter and on cave walls. Its distribution is suggestive of greater occurrence throughout Valley and Ridge (Gladstone et al., 2018).

Glyphyalinia wheatleyi (Bland, 1883) (TP/TX) Bright Glyph

Locality: Floyd Co.: Cave Springs Cave (GFL18)*; Dade Co.: Malois Waterfall Cave (GGR27)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This common forest snail is often found in damp leaf litter or along weedy forests (Hubricht, 1985). It is associated with limestone-rich environments (Dourson, 2010) and known from several caves (Lewis, 2005).

Family Philomyctidae

Genus Pallifera

Pallifera sp. (TX/AC) A Mantleslug

Locality: Dade Co.: Johnsons Crook Cave (GDD17)*.

Family Polygyridae

Genus Infectarius

Inflectarius rugeli (Shuttleworth, 1852) (TX) Deep-tooth Shagreen

Locality: Chattaoga Co.: Parkers Cave (GKKH119)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).

Comments: This species is primarily found in leaf litter, under logs, or in shaded mesic forest habitat, but can also be found in caves (Niemiller et al., unpublished).

Genus Mesodon

Mesodon sp. (TX/AC) A Globe Snail

Locality: Walker Co.: Anderson Spring Cave (GWW46).

Comments: Most Mesodon species can be found in forest habitats, under logs or in dense leaf litter. Some species (e.g., M. appressus, M. edentatus, M. sargentianus) are considered calciphiles, and are common near cave entrances (Hubricht, 1985; Niemiller et al., unpublished).

Genus Patera

Patera appressa (Say, 1821) (TP/TX) Flat Bladetooth

Locality: Dade Co.: Hooker Cave (GDD90)*.

Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in Georgia).
Comments: This species is associated with rocky outcrops, forest ra-
vines, disturbed habitats along roadsides, and limestone-rich environ-
ments. It is a common constituent of cave environments, though not
limited to subterranean habitat (Hubricht, 1964, 1985; Lewis, 2005;
Dourson, 2010).

*Patera perigrapta* (Pilsbry, 1894) (TP/TX) Engraved Bladetooth
Locality: Chattooga Co.: Parkers Cave (GKH119); Dade Co.: Byers
Cave (GDD66).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in
Georgia).
Comments: This species is associated with rocky outcrops, forest ra-
vines, disturbed habitats along roadsides, and limestone-rich environ-
ments. It also is a common constituent of cave environments, though
not limited to subterranean habitat (Hubricht, 1964, 1985; Lewis, 2005;
Dourson, 2010).

Genus *Typhlichthys*

*Typhlichthys subterraneus* Girard, 1859 (SB) Southern Cavefish
Genus *Typhlichthys*
Family Amblyopsidae
Order Percopsiformes
Class Actinopterygii
Phylum Chordata
or possibly undescribed species.
Comments: This species is the most commonly reported fish in caves
of the Interior Plateau and Appalachians karst regions (e.g., Cope and
Packard, 1881; Dearolf, 1956, 1959; Dourson, 2010). Several populations are thought to live year-round in
caves, with some exhibiting some degree of troglomorphy (Espinasa
et al., 2006).

*Triodopsis*

*Triodopsis* sp. (TX/AC) A Threetooth Snail
Locality: Dade Co.: Wild Bills Dakota Cave (GDD596)*.
Comments: *Triodopsis* snails occupy a diverse array of habitats, includ-
ing mesic forest leaf litter, rock outcrops, and urban areas (Hubricht,
1985). This genus has also been reported from several caves (Niemiller
et al., unpublished).

Family *Pristilomatidae*

Genus *Hawaii*

*Hawaii minuscula* (Binney, 1841) (TX) Minute Gem
Locality: Dade Co.: Howards Waterfall Cave (GDD34).
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in
Georgia).
Comments: This species is a habitat generalist, though often found in
disturbed habitats, such as greenhouses and gardens (Hubricht, 1985;
Dourson, 2010). It has been reported from several caves (Lewis, 2005;
Niemiller et al., unpublished).

Family *Strobilopsidae*

Genus *Strobilops*

*Strobilops texanus* Pilsbry and Ferriss, 1906 (AC) Southern Pinecone
Locality: Decatur Co.: Climax Cave (GDC36)*.
Conservation status: IUCN: Not Evaluated; NatureServe: G5 (SNR in
Georgia).
Comments: This species is associated with leaf litter and woody de-
tritus forested habitat (Hubricht, 1985). This is the first record from a
cave.

Phylum *Platyhelminthes*
Class *Trematoda*
Order *Neodermata*
Family *Kenkiidae*

Genus *Sphalloloplaena*

*Sphalloloplaena georgiana* Hyman, 1954 (SB) Georgia Cave Planarian
Locality: Dade Co.: Howards Waterfall Cave (GDD34).
Conservation status: IUCN: Not Evaluated; NatureServe: G1 (SNR in
Georgia).
Comments: This species is known only from the type locality at How-
ards Waterfall Cave (Hyman, 1954; Kenk, 1977)

*Sphalloloplaena* sp. (SB) A Cave Planarian
Locality: Dade Co.: Hurricane Cave (GDD62); Walker Co.: Anderson
Spring Cave (GWK46), Pettijohns Cave (GWK29).
Comments: These records may represent other sites for *S. georgiana* or
possibly undescribed species.

Phylum Chordata
Class *Actinopterygii*
Order *Perciformes*
Family *Amblyopsidae*

Genus *Typhlichthys*

*Typhlichthys subterraneus* Girard, 1859 (SB) Southern Cavefish
Locality: Chattooga Co.: Crane Cave (GCZ80); Dade Co.: Case Cavern
(GDD1); Limestone Caverns (GDD140), Longs Rock Wall Cave
(GDD101), Sittons Cave (GDD9).
Conservation status: IUCN: Vulnerable; NatureServe: G4 (S1 in Geor-
gia); listed as Endangered and considered a Species of Greatest Con-
servation Need in Georgia.
Comments: The record from Crane Cave is the first occurrence of this
species from the Appalachians karst region (Niemiller et al., 2016).
*Typhlichthys subterraneus* is a cryptic species complex (Niemiller et
al., 2012), and populations from Georgia along with a few populations in
Marion Co., Tennessee, are likely a distinct species.

Order *Scorpaeniformes*
Family *Cottidae*

Genus *Cottus*

*Cottus bairdii* Girard, 1850 (SP) Mottled Sculpin
Locality: Walker Co.: Fricks Cave (GWK14).
Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in
Georgia).
Comments: This species is thought to be common in caves (Dearolf,
1956; Poly, 2001), and cave records exists from the TAG region (Buhl-
mann, 2001; Huntsman et al., 2011; Venarsky et al., 2012). Some re-
cords of *C. carolinae* may actually represent this species, as both spe-
cies are very similar morphologically.

*Cottus carolinae* (Gill, 1861) (SP) Banded Sculpin
Locality: Dade Co.: Longs Rock Wall Cave (GDD101)*; Walker Co.: Fricks Cave (GWK14)*, Mountain Cove Farm Cave No. 2 (GKW74),
Roger Branch Cave (GKW204)*.
Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in
Georgia).
Comments: This species is the most commonly reported fish in caves
of the Interior Plateau and Appalachians karst regions (e.g., Cope and
Packard, 1881; Dearolf, 1956, 1959; Dourson, 2010). Several populations are thought to live year-round in
caves, with some exhibiting some degree of troglomorphy (Espinasa
et al., 2006).
**Family Hylidae**

**Genus Hyla**

*Hyla chrysoscelis* Cope, 1880 (TX/AC) Cope’s Gray Treefrog

Localities: Walker Co.: Pettijohns Cave (GWK29)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This treefrog may use caves for shelter during periods of drought, although most records are thought to be accidental occurrences. It has been reported from a few caves in Alabama and Tennessee (Lewis, 2005; Godwin, 2008; Niemiller and Miller, 2009).

*Hyla gratiosa* LeConte, 1856 (AC) Barking Treefrog

Localities: Walker Co.: Drag Fold Cave (GWK79)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

*Hyla* Genus

*Family Hylidae*

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

**Genus Pseudacris**

*Pseudacris crucifer* (Wied-Neuwied, 1838) (TX/AC) Spring Peeper

Localities: Dade Co.: Boxcar Cave (GDD69)*; Walker Co.: Pettijohn Cave (GWK29)*; Screech Owl Cave (GWK205)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This frog has been reported infrequently from caves (Black, 1971; Prather and Briggler, 2001; Godwin, 2008; Niemiller and Miller, 2009; Niemiller et al., 2016). It may seek refuge in caves during prolonged drought (Prather and Briggler, 2001).

*Pseudacris feriarum* (Baird, 1854) (AC) Upland Chorus Frog

Localities: Grady Co.: Waterfall Cave (GGR27)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This frog has been reported infrequently from caves (Black, 1971; Osbourn, 2005; Godwin, 2008; Niemiller and Miller, 2009; Niemiller et al., 2016).

**Family Ranidae**

**Genus Rana**

*Rana catesbeiana* Shaw, 1802 (TX) American Bullfrog

Localities: Dade Co.: Boxcar Cave (GDD69)*; Rusty’s Cave (GDD70)*; Walker Co.: Anderson Spring Cave (GWK46)*, Pettijohns Cave (GWK29)*; Washington Co.: Tennile Caves (GWS20)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is occasionally reported from caves with substantial aquatic habitat, particularly near entrances and the twilight zone (Barr, 1953; Niemiller and Miller, 2009; Niemiller et al., 2016).

*Rana clamitans* Lateille, 1801 (TX) Green Frog

Localities: Dade Co.: Longs Rock Wall Cave (GDD101)*; Decatur Co.: Climax Cave (GDC36)*; Grady Co.: Waterfall Cave (GGR27)*; Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Screech Owl Cave (GWK205)*; Washington Co.: Tennile Caves (GWS20)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is occasionally reported from caves with substantial aquatic habitat, particularly near entrances and the twilight zone (Barr, 1953; Buhlmann, 2001; Dodd et al., 2001; Camp and Jensen, 2007; Niemiller and Miller, 2009; Niemiller et al., 2016).

*Rana palustris* (LeConte, 1825) (TX) Pickerel Frog

Localities: Dade Co.: Hurricane Cave (GDD62)*; Longs Rock Wall Cave (GDD101)*, Sittons Cave (GDD9), Trenton Waterfall Cave: Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29)*, Pigeon Cave (GWK57), Roger Branch Cave (GWK204)*, Screech Owl Cave (GWK205)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in Georgia).

Comments: This species is regularly reported from caves near entrances and in the twilight zone (Cibuln and Middleton, 1983; Buhlmann, 2001; Camp and Jensen, 2007; Niemiller and Miller, 2009; Niemiller et al., 2016). The record for “Trenton Waterfall Cave” likely represents Howards Waterfall Cave.

*Rana sphenoeaphala* Cope, 1886 (TX/AC) Southern Leopard Frog

Localities: Grady Co.: Maloys Waterfall Cave (GGR27)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: Unlike other ranid frogs, this species is encountered infrequently in caves, but cave records exist from Tennessee (Lewis, 2005; Niemiller and Miller, 2009).

**Order Caudata**

**Family Ambystomatidae**

**Genus Ambystoma**

*Ambystoma tigrinum* (Green, 1825) (AC) Eastern Tiger Salamander

Localities: Walker Co.: Drag Fold Cave (GWK79)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S3S4 in Georgia); considered a Species of Greatest Conservation Need in Georgia.

Comments: Although this mole salamander spends much of its life underground in burrows, it is not associated with caves and karst.

**Family Plethodontidae**

**Genus Aneides**

*Aneides aeneus* (Cope and Packard, 1881) (TX) Green Salamander

Localities: Dade Co.: Byers Cave (GDD66)*; Case Caverns (GDD1)*, Howards Waterfall Cave (GDD34)*, Sittons Cave (GDD9)*; Walker Co.: Fricks Cave (GWK14), Lula Falls Cave (GWK617)*, Lula Falls Talus Cave*; Nash Waterfall Cave (GWK72).

Conservation status: IUCN: Least Threatened; NatureServe: G3S4 (S3 in Georgia); listed as Rare and considered a Species of Greatest Conservation Need in Georgia.

Comments: This species is occasionally reported around entrances of caves along the escarpments of the Cumberland Plateau, including Lookout Mountain and Pigeon Mountain. The type locality is “near the mouth” of Nickajack Cave in Marion Co., Tennessee.

**Genus Desmognathus**

*Desmognathus conanti* Rossman, 1958 (AC) Spotted Dusky Salamander

Localities: Habershon Co.: La Guarida del Diablo*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species has been reported infrequently in and around entrances of spring entrances and is rarely observed in the dark zone (Himes et al., 2004; Niemiller and Miller, 2009; Niemiller et al., 2016).

*Desmognathus ochoe Nicholls, 1949 (AC) Ocoee Salamander

Localities: Habershon Co.: La Guarida del Diablo*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

**Genus Eurycea**

*Eurycea cirrigena* (Greens, 1831) (TX) Southern Two-lined Salamander

Localities: Decatur Co.: Climax Cave (GDC36)*; Polk Co.: White River Cave (GP07)*; Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Mountain Cave Farm No. 2 (GWK74), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57); Washington Co.: Tennile Caves (GWS20)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species has been reported infrequently in and around entrances of spring entrances and is rarely observed in the dark zone (Himes et al., 2004; Niemiller and Miller, 2009; Niemiller et al., 2016).

*Eurycea guttolinea* Holbrook, 1838) (TX) Three-lined Salamander

Localities: DeKalb Co.: Nice Gneiss Cave (GDK329)*; Washington Co.: Tennile Caves (GWS20)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S4S5 in Georgia).

Comments: This species also has been reported from caves in Alabama and Mississippi (Cooper and Cooper, 1968; Himes et al., 2004).
**Eurycea longicauda** (Green, 1818) (TP/TX) Long-tailed Salamander

Localities: Chattooga Co.: Scoggins II Cave (GKH405)*, Subligna Cave (GKH145)*; Dade Co.: Hurricane Cave (GDD62)*, Longs Creekside Cave (GDD48)*, Lookout Mountain Spring Cave*, Sittons Cave (GDD9); Walker Co.: Anderson Spring Cave (GWK46), Bible Spring Cave (GWK74)*, Fricks Cave (GWK14), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), "small cave in rock quarry along Georgia Highway 136: 1.65 Highway miles West of Cooper Heights."

Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in Georgia).

Comments: This species is regularly observed in caves in the Appalachians and Interior Plateau karst regions (Buhlmann, 2001; Dodd et al., 2001; Lewis, 2005; Osbourn, 2005; Taylor and Mays, 2006; Camp and Jensen, 2007; Niemiller and Miller, 2009; Niemiller et al., 2016), although not as frequently as *E. lucifuga*.

**Eurycea lucifuga Rafinesque, 1822 (TP) Cave Salamander**

Localities: Bartow Co.: Anthony's Cave (GBT175)*, Chert Chasm (GBT340)*, Catossa Co.: Chapmans Cave (GCC25)*, Crane Cave (GCZ20)*, Chattooga Co.: Blowing Spring Cave (GKH54)*, Parkers Cave (GKH119)*, Scoggins II Cave (GKH405)*; Dade Co.: Boxcar Cave (GDD69)*, Caboose Cave (GDD475)*, Cave Cavern (GDD1)*, Cemetry Plot (GDD64)*, Chambiss Cave (GDD321), Hooker Cave (GDD90)*, Jeff's Hole Cave (GDD400)*, Johnsons Crook Cave (GDD17)*, Livingston Caverns (GDD140), Longs Rock Wall Cave (GDD101)*, Lower Valley Cave (GDD136), Morrison Cave (GDD86)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Trenton caves, Upper Valley Cave (GDD135)*, Wild Bills Dakota Cave (GDD596)*, Floyd Co.: Airport Cave (GFL189)*, Gordon Co.: caves near junction of Hwy.411 and Hwy.156 7.0 mi. N of Fairmount*, Ford Roberts Cave (GGO147)*, Murray Co.: Fincher Bluff Cave (GMA291)*, Polk Co.: Wise Cave (GPO6)*, Walker Co.: Anderson Spring Cave (GWK46), Bee Rock Cave (GWK123)*, Bible Spring Cave (GWK74)*, Cave Spring Cave*, Ellisons Cave (GWK51), Fingerhole Cave (GWK259)*, Goat Cave (GWK184)*, Harrisburg Cave (GWK85), Horseshoe Cave (GWK12)*, Kinda Pretty Cave (GWK258)*, LittleJohn Cave (GWK280)*, Missing Evan Well Cave (GWK488)*, Muddy Bat Pit (GWK257)*, Mountain Cave Farm Cave No. 1 (GWK73), Mountain Cave Farm Cave No. 2 (GWK74), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Branch Cave (GWK204)*, Screech Owl Cave (GWK205), Smartt Farm Cave (GWK124)*, Spooky Cave (GWK494)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in Georgia).

Comments: This is the most commonly observed salamander in caves in the Appalachians and Interior Plateau karst regions (Hutchinson, 1966; Buhlmann, 2001; Dodd et al., 2001; Niemiller and Miller, 2009; Camp and Jensen, 2015; Niemiller et al., 2016).

**Eurycea wallacei** (Carr, 1939) (SB) Georgia Blind Salamander

Localities: Decatur Co.: Climax Cave (GDC36); Dougherty Co.: Deep well in Albany; Radium Springs (GDS39).

Conservation status: IUCN: Vulnerable; NatureServe: G2 (S1 in Georgia); listed as Threatened and considered a Species of Greatest Conservation Need in Georgia.

Comments: The type locality for this neotenic stygobite is a well near Albany in Dougherty County. It is found in subterranean waters of the upper Floridan Aquifer in the Dougherty Plain of southeastern Georgia and adjacent northwestern Florida. *Eurycea wallacei* has been reported from seven sites, but only confirmed from Climax Cave in Decatur County and Radium Springs along the Flint River in Dougherty County (Means, 2005; Fenolio et al., 2013). There is an unconfirmed report from a spring cave in Baker County (Ben Martinez, pers. comm.).

**Genus Gymnophilus**

**Gymnophilus palleucus** McCrady, 1954 (SB) Tennesse Cave Salamander

Localities: Walker Co.: Fricks Cave (GWK14), Harrisburg Cave (GWK85).

Conservation status: IUCN: Vulnerable; NatureServe: G2G3 (S1 in Georgia); listed as Threatened and considered a Species of Greatest Conservation Need in Georgia.

Comments: Although wide-ranging throughout south-central Tennessee and northern Alabama (Godwin, 2000; Miller and Niemiller, 2008, 2012), this neotenic stygobite is known from only two caves in Georgia (Buhlmann, 2001; Godwin, 2008; Miller and Niemiller, 2012).

**Gyrinophilus porphyriticus** (Green, 1827) (TP) Spring Salamander

Localities: Dade Co.: Boxcar Cave (GDD69)*, Byers Cave (GDD66), Howards Waterfall Cave (GDD34)*, Hurricane Cave (GDD62)*, Johnsons Crook Cave (GDD17), Limestone Caverns (GDD140)*, Longs Rock Wall Cave (GDD101)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Wild Bills Dakota Cave (GDD596)*; Walker Co.: Anderson Spring Cave (GWK46), Ellisons Cave (GWK51), Gila Monster Cave (GWK379)*, Harrisburg Cave (GWK85), Mountain Cave Farm Cave No. 1 (GWK73), Mountain Cave Farm Cave No. 2 (GWK74), Nash Waterfall Cave (GWK72)*, Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Spooky Cave (GWK494)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S4 in Georgia).

Comments: This species is common in caves throughout its range (Brandon, 1966; Cooper and Cooper, 1968; Miller and Niemiller, 2008), including several caves in Georgia (Buhlmann, 2001; Camp and Jensen, 2007).

**Genus Plethodon**

**Plethodon glutinosus** (Green, 1818) (TP) Northern Slimy Salamander

Localities: Bartow Co.: Busch Cave (GBT611)*, Catossa Co.: Crane Cave (GCZ20)*, Chattooga Co.: Parkers Cave (GKH119)*, Scoggins II Cave (GKH405)*; Dade Co.: Case Cavern (GDD1), Cemetry Pit (GDD64)*, Chambiss Cave (GDD321), Hooker Cave (GDD90)*, Jeff's Hole Cave (GDD400)*, Johnsons Crook Cave (GDD17)*, Livingston Caverns (GDD140), Longs Rock Wall Cave (GDD101)*, Lower Valley Cave (GDD136)*, Morrison Spring Cave (GDD110)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Upper Valley Cave (GDD135)*, Wild Bills Dakota Cave (GDD596)*; Floyd Co.: Airport Cave (GFL189)*, Cave Springs Cave (GFL18)*, "Bear Bone Cave" (probably Silver Creek Cave) (GFL173)*, Polk Co.: White River Cave (GPD17)*, Walker Co.: Anderson Spring Cave (GWK46), Bible Spring Cave (GWK74)*, Ellisons Cave (GWK51), Fingerhole Cave (GWK259)*, Gila Monster Cave (GWK379)*, Horseshoe Cave (GWK12)*, Kinda Pretty Cave (GWK258)*, LittleJohn Cave (GWK280)*, Lofton Cave (GWK281)*, Missing Evan Well Cave (GWK488)*, Mountain Cave Farm Cave No. 2 (GWK74), Nash Waterfall Cave (GWK72), Pettijohns Cave (GWK29), Pigeon Cave (GWK57), Branch Cave (GWK204)*, Screech Owl Cave (GWK205), Slimy Slot Cave (GWK529)*, Smartt Farm Cave (GWK124)*, Spooky Cave (GWK494)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is a common inhabitant of caves throughout its range (Dodd et al., 2001; Lewis, 2005; Godwin, 2008; Niemiller and Miller, 2008, Niemiller et al., 2016), including Georgia (Buhlmann, 2001; Camp and Jensen, 2007).

**Plethodon petraeus** Wynn et al., 1988 (TP/TX) Pigeon Mountain Salamander

Localities: Walker Co.: Harrisburg Cave (GWK85), Nash Waterfall Cave (GWK72)*, Pettijohns Cave (GWK29), Screech Owl Cave (GWK205).

Conservation status: IUCN: Vulnerable; NatureServe: G2 (S2 in Georgia; listed as Rare and considered a Species of Greatest Conservation Need in Georgia.

Comments: This species is endemic to Georgia, specifically on the eastern slope of Pigeon Mountain in Walker County. Although primarily associated with rock outcrops and exposures in hardwood forest, *P. petraeus* can be found around the entrances of some caves (Wynn et al., 1988; Camp and Jensen, 2007).

**Plethodon serratus** Grobman, 1944 (TX) Southern Red-backed Salamander

Localities: Walker Co.: Anderson Spring Cave (GWK46), Fingerhole Cave (GWK259)*, Muddy Bat Pit (GWK257)*, Pettijohns Cave (GWK29).

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: Unlike some other *Plethodon* salamanders, this species has rarely been reported from caves (Buhlmann, 2001).
**Plitodon ventralis** Highton, 1997 (TP/TX) Zigzag Salamander complex

Localities: Dade Co.: Caboose Cave (GDD475)*; Case Caverns (GDD1)*; Daniel Cave, Hurricane Cave (GDD62)*, Howards Waterfall Cave (GDD34)*, Morrison Cave (GDD86)*, Rusty’s Cave (GDD70)*, Sittons Cave (GDD9)*; Walker Co.: Anderson Spring Cave (GKK46)*, Harrisburg Cave (GKK85), Hogjowl Cave*, Horseshoe Cave (GKK12)*, Pettijohns Cave (GKW29), Scruche Owl Cave (GKW205).

Conservation status: *Plitodon ventralis* - IUCN: Least Concern; NatureServe: G4 (S4 in Georgia); *P. dorsalis* - IUCN: Least Concern; NatureServe: G5 (SNR in Georgia).

Comments: *Plitodon dorsalis* and *P. ventralis* are closely related and difficult to distinguish morphologically. Some authors treat all populations in Georgia as *P. ventralis* (e.g., Camp, 2008); however, the contact zones between these two species have not been adequately delineated. Regardless, this complex is encountered regularly in caves (Buhlmann, 2001; Lewis, 2005; Camp and Jensen, 2007; Godwin, 2008; Niemiller and Miller, 2009).

**Genus Pseudotriton**

*Pseudotriton ruber* (Sonnini de Manconcourt and Latreille, 1801) (TP) Red Salamander

Localities: Dade Co.: Rusty’s Cave (GDD70); Walker Co.: Anderson Spring Cave (GKK46); Ellisons Cave (GKH51), Fricks Cave (GKK41)*, Harrisburg Cave (GKK85), Mountain Cove Farm Cave No. 2 (GKK74), Pigeon Cave (GKK37), Roger Branch Cave (GKW204)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is found frequently in the twilight zone and entrances of spring caves throughout the Interior Plateau and Appalachian karst regions (Buhlmann, 2001; Osbourn, 2005; Camp and Jensen, 2007; Miller et al., 2008; Niemiller and Miller, 2009; Niemiller et al., 2016). Reproduction in the dark zone of cave streams has been documented (Miller and Niemiller, 2005; Miller et al., 2008), including at Anderson Spring Cave in Walker County (Niemiller et al., 2006).

**Family Salamandridae**

**Genus Notophthalmus**

*Notophthalmus viridescens* (Rafinesque, 1820) (AC) Eastern Newt

Localities: Dade Co.: Lower Valley Cave (GDD136)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: Additional records of this species exist from caves in Alabama and Tennessee (Godwin, 2008; Niemiller and Miller, 2009).

**Class Aves**

**Order Accipitriformes**

**Family Cathartidae**

**Cathartes aura** (Linnaeus, 1758) (TX/AC) Turkey Vulture

Localities: Floyd Co.: Airport Cave (GFL189)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species nests on occasion at the entrances and within the twilight zones of caves (Coles, 1944; Lewis, 2005; Niemiller et al., 2016).

**Order Passeriformes**

**Family Tyrannidae**

**Genus Sayornis**

*Sayornis phoebe* (Latham, 1790) (TX) Eastern Phoebe

Localities: Catosa Co.: Chapmans Cave (GCG25)*; Chattooga Co.: Subligna Cave (GKH145)*; Dade Co.: Sittons Cave (GDD9)*; Walker Co.: Mountain Cove Farm Cave #2 (GKW74)*, Anderson Springs Cave (GKK46)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species commonly nests in the entrances and twilight zones of caves in the TAG region (Lewis, 2005; Godwin, 2008; Niemiller et al., 2013, 2016).

**Class Mammalia**

**Order Carnivora**

**Family Mustelidae**

**Genus Neovision**

*Neovision vision* (Schreber, 1777) (AC) American Mink

Localities: Walker Co.: Roger Branch Cave (GKW204)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This mustelid also has been observed near cave entrances infrequently in Tennessee (MLN, personal observation).

**Family Procyonidae**

**Genus Procyon**

*Procyon lotor* (Linnaeus, 1758) (TX) Raccoon

Localities: Catosa Co.: Chapmans Cave (GCH225)*, Crane Cave (GCH203)*, Chattooga Co.: Subligna Cave (GKH145)*; Dade Co.: Chambles Cave (GDD321), Ha-ha Cave (GDD256), Trenton Bone Cave (GDD16)*, Lapp Hole; Floyd Co.: Cave Springs Cave (GFL18)*; Walker Co.: Bee Rock Cave (GKK123)*, Fricks Cave (GKK14)*, Horseshoe Cave (GKK12)*, Smart Farm Cave (GKK124)*, Spooky Cave (GKK494)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: Evidence of this species (tracks and scat) is common in caves throughout the central and eastern United States.

**Order Chiroptera**

**Family Vespertilionidae**

**Corynorhinus rafinesquii** (Lesson, 1827) (TX) Rafinesque’s Big-eared Bat

Localities: Rabun Co.: Bascoms Cave.

Conservation status: IUCN: Least Concern; NatureServe: G3G4 (S3 in Georgia); listed as Rare and considered a Species of Greatest Conservation Need in Georgia.

Comments: This bat is considered rare in Georgia and has only been documented at one cave in the state.

**Genus Eptesicus**

**Eptesicus fuscus** (Palisot de Beauvois, 1796) (TX) Big Brown Bat

Localities: Floyd Co.: Osborn Cave (GFL220)*; Polk Co.: Deatons Cave (GPO5), White River Cave (GPO7); Walker Co.: Fricks Cave (GKK41)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: This species is observed frequently in TAG caves (Holliday, 2012; Flock, 2013, 2014; Niemiller et al., 2016), particularly in winter, but few records are known from caves in Georgia.

**Genus Lasiusir**

**Lasiusir borealis** Müller, 1776 (AC) Eastern Red Bat

Localities: Dade Co.: Byers Cave (GDD66); Polk Co.: Deatons Cave (GPO5).

Conservation status: IUCN: Least Concern; NatureServe: G3G4 (S3 in Georgia).

Comments: This forest-dwelling bat has been reported from caves infrequently (Mohr, 1952; Myers, 1960; Niemiller et al., 2016).

**Genus Myotis**

**Myotis auroriparius** (Rhoads, 1897) (TX) Southeastern Myotis

Localities: Decatur Co.: Climax Cave (GDC36); Grady Co.: Malays Waterfall Cave (GGR27); Lee Co.: Chokee Cave (GLE575); Washington Co.: Sandersville Cave (GWS399).

Conservation status: IUCN: Least Concern; NatureServe: G4 (S3 in Georgia); considered a Species of Greatest Conservation Need in Georgia.

Comments: This is the most common *Myotis* species in caves of southwestern Georgia.

**Myotis griseus** Howell, 1909 (TX) Gray Bat

Localities: Catosa Co.: Chickamauga Cave (GCG106); Chattooga Co.: Welcome Hill Cave (GKH163), Lowry Cave (GKH206); Dade Co.: Sittons Cave (GDD9); Polk Co.: Deatons Cave (GPO5), White River Cave (GPO7); Walker Co.: Anderson Spring Cave (GKK46), Fricks Cave (GKK14).

Conservation status: IUCN: vulnerable; NatureServe: G4 (S1 in Georgia); listed as Endangered under the U.S. Endangered Species Act; listed as Endangered and considered a Species of Greatest Conservation Need in Georgia.

Comments: In summer, this federally endangered bat is known to roost in just three caves in Chattooga, Walker, and Catosa counties (Mar-
tin, 2007), although several additional occurrences exist. Unlike several Myotis species, *M. griseascens* does not appear to be nearly as susceptible to White-nose Syndrome.

**Myotis leibii** (Audubon and Bachman, 1842) (TX) Eastern Small-footed Bat

Localities: Dade Co.: Case Cavern (GDD1), Howards Waterfall Cave (GDD34); Union Co.: cave near Young Harris.

Conservation status: IUCN: Endangered; NatureServe: G4 (S1 in Georgia).

Comments: This small bat is rarely observed in Georgia caves.

**Myotis lucifugus** (LeConte, 1831) (TX) Little Brown Bat

Localities: Bartow Co.: Kingston Salt pette Cave (GDD11); Dade Co.: Byers Cave (GDD66), Case Cavern (GDD1), Howards Waterfall Cave (GDD34), Sittons Cave (GDD9); Polk Co.: Deatons Cave (GPO5), White River Cave (GP07); Walker Co.: Anderson Spring Cave (GKW46), Ellisons Cave (GKW51), Fricks Cave (GKW14).

Conservation status: IUCN: Endangered; NatureServe: G3 (S3 in Georgia); considered a Species of Greatest Conservation Need in Georgia.

Comments: This bat is encountered infrequently in Georgia caves during winter. Populations have sustained declines throughout its wide distribution in North America due to White-nose Syndrome. This species has not been observed during recent winter cave hibernacula surveys in Georgia (Morris and Ferrall, 2018).

**Myotis septentrionalis** (Trovesart, 1897) (TX) Northern Long-eared Bat

Localities: Bartow Co.: Davis Farm Cave (GBT222)*, Kingston Salt pette Cave (GDD11); Dade Co.: Byers Cave (GDD66), Case Cavern (GDD1), Howards Waterfall Cave (GDD34), Sittons Cave (GDD9); Polk Co.: Deatons Cave (GPO5), White River Cave (GP07), Rabun Co.: Black Diamond Tunnel Cave; Walker Co.: Anderson Spring Cave (GKW46), Kinda Pretty Cave (GKW258)*, Nash Waterfall Cave (GKW72)*.

Conservation status: IUCN: Near Threatened; NatureServe: G1G2 (S1S3 in Georgia); listed as Threatened under the U.S. Endangered Species Act; listed as Threatened and considered a Species of Greatest Conservation Need in Georgia.

Comments: This species can be found in low numbers in Georgia caves during winter. However, it is one of the bat species most impacted by White-nose Syndrome. It is now listed as Threatened under the U.S. Endangered Species Act as of 2015. This species has not been observed during recent winter cave hibernacula surveys in Georgia (Morris and Ferrall, 2018).

**Myotis sodalis** Miller and Allen, 1928 (TX) Indiana Bat

Localities: Chattooga Co.: Lowry Cave (GKH206); Dade Co.: Case Cavern (GDD1), Cave 4 mi W of Trenton, Sittons Cave (GDD9).

Conservation status: IUCN: Near Threatened; NatureServe: G2 (S1 in Georgia); listed as Endangered under the U.S. Endangered Species Act; listed as Endangered and considered a Species of Greatest Conservation Need in Georgia.

Comments: This bat is not commonly encountered in Georgia caves. Case Cavern and Sittons Cave are Priority 4 sites for this federally endangered species.

**Myotis sp.** (TX) A Bat

Localities: Chattooga Co.: Subligna Cave (GKH145)*.

Comments: This record is probably *M. griseascens* but identification could not be confirmed.

**Genus Perimyotis**

**Perimyotis subflavus** (Cuvier, 1832) (TX) Tri-Color Bat

Localities: Bartow Co.: Alford's Cave, Anthonys Cave (GBT175)*, Chert Oasm (GBT340)*, Jolley Cave (GBT187), Kingston Salt pette Cave (GDD11), Talls Lime Cave (GBT364 to GBT399); Bleckley Co.: Whitting- ton Cave/Taylor Cave (GBL460/GBL461); Catosa Co.: Chapmans Cave (GCZ25), Chickamauga Cave (GCZ106)*, Welcome Hill Cave (GKH163), Lowry Cave (GKH206), Parkers Cave (GKH119), Smiths Cave, Subligna Cave (GKH145), Trion Dam Cave (GKH158); Dade Co.: Trenton Bone Cave (GDD16), Alabama-Georgia Cave (GDD511), Boxcar Cave (GDD69)*, Byers Cave (GDD66), Caboose Cave (GDD475)*, Case Cavern (GDD1), Cave 4 mi W of Trenton, Cemetery Pit (GDD64)*, Chambliess Cave (GDD321), Dead Horse Cave (GDD111), Gypsy Cave (GDD32), Ha-ha Cave (GDD256), Howards Waterfall Cave (GDD34)*, Hurricane Cave (GDD62)*, Johnsons Crook Cave (GDD17)*, Lapp Hole, Longs Rock Wall Cave (GDD101)*, Lower Valley Cave (GDD136)*, Rising Fall Exit Cave (GDD397), Rusty's Cave (GDD70)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Upper Valley Cave (GDD135)*, Decatur Co.: "Bainbridge in Powell Hill Cave", Climax Cave (GDC36)*, Floyd Co.: Cave Spring Cave (GFL18), Osborn Cave (GFL220), Spout Springs Cave (GFL150); Gordon Co.: Rusty Cable Cave (GGO297)*, Grady Co.: Biscuits and Gray Cave (GGR602), Glory Hole (GGR56)*, Maloys Waterfall Cave (GGR27)*, Long Swamp Creek Cave; Polk Co.: Deatons Cave (GPO5), White River Cave (GP07)*, Randolph Co.: Griers Cave (GRA40); Union Co.: "Young Harris Bat Caves" (GUN28, GUN391 & GUN392); Walker Co.: Allen Springs Cave (GKW31), Anderson Spring Cave (GKW46), Dry Creek, Ellisons Cave (GKW51), Fricks Cave (GKW14), Goat Cave (GKW184)*, Harris Cave, Horseshoe Cave (GKW12)*, Pettijohns Cave (GKW29), Pigeon Cave (GKW75), Roger Branch Cave (GKW204)*, Shock Cave (GKW190), Spooky Cave (GKW404)*, Randolph Co.: J C Jones Cave (GRA207)*, Whitleff Co.: Ketchums Cave (GWT13).

Conservation status: IUCN: Vulnerable; NatureServe: G2G3 (S2 in Georgia); considered a Species of Greatest Conservation Need in Georgia.

Comments: This species is the most common bat observed in Georgia caves during winter where it can be found hibernating individually or in small clusters on cave walls and ceilings. Like several Myotis species, *P. subflavus* is susceptible to White-nose Syndrome and population declines have been noted for several Georgia caves based on recent winter cave hibernacula surveys (Morris and Ferrall, 2018).

**Order Didelphimorphia**

**Family Didelphidae**

**Didelphis virginiana** Kerr, 1792 (AC) Virginia Opossum

Localities: Walker Co.: Rocky Cave (GKW496)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S1 in Georgia).

Comments: Opossums have been reported from a few caves in the eastern United States (Dearolf, 1956; Cliburn and Middleton, 1983; Holer et al., in review).

**Order Rodentia**

**Family Castoridae**

**Genus Castor**

**Castor canadensis** Kuhl, 1820 (TX) American Beaver

Localities: Walker Co.: Mountain Cove Farm Cave #2 (GKW74)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: A collection of beaver-chewed branches was present in the cave. Beavers are known to build lodges inside the entrances of stream caves (e.g., Gore and Baker, 1989; Niemiller et al., 2016).

**Family Cricetidae**

**Genus Neotoma**

**Neotoma floridana** (Ord, 1818) (TX) Eastern Woodrat

Localities: Dade Co.: Afterbirth Cave (GDD153)*, Caboose Cave (GDD475)*, Case Cavern (GDD1), Jeff's Hole Cave (GDD400)*, Lime-stone Caverns (GDD140)*, Lower Valley Cave (GDD136)*, Sittons Cave (GDD9), SSS Cave (GDD229)*, Walker Co.: Anderson Spring Cave (GKW46), Bee Rock Cave (GKW123)*, Ellisons Cave (GKW51), Fingerhole Cave (GKW259)*, Fricks Cave (GKW14), Horseshoe Cave (GKW12)*, Kinda Pretty Cave (GKW258)*, Moudly Bat Pit (GKW257)*, Mountain Cove Farm Cave #2 (GKW74)*, Nash Waterfall Cave (GKW72), Pettijohns Cave (GKW29), Pigeon Cave (GKW57), Rocky Cave (GKW496)*, Spooky Cave (GKW494)*.

Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia).

Comments: Both *N. floridana* and *N. magister* (Allegheny Woodrat) occur in Georgia, although the contact zone in Georgia is unclear. Here we treat all records as *N. floridana*, but note that some occurrences may represent *N. magister*. Several records are based on indirect evidence of inhabitation, such as the presence of latrines, caches, and nests.
Class Reptilia
Order Squamata
Family Colubridae
Genus Carphophis
Carphophis amoenus (Say, 1825) (AC) Eastern Worm Snake
Localities: Walker Co.: Flowing Stone Cave (GWK524)*. Conservation status: IUCN: Least Concern; NatureServe: G5 (S5 in Georgia). Comments: This accidental has been reported from caves and mines in West Virginia (Pauley, 1993; Osbourn, 2005).

Genus Cemophora
Cemophora coccinea (Blumenbach, 1788) (AC) Scarlet Snake
Localities: Greene Co.: Parrott Cave*. Conservation status: IUCN: Least Concern; NatureServe: G5 (S4S5 in Georgia). Comments: This accidental is also has been reported from caves and mines in West Virginia (Pauley, 1993; Osbourn, 2005).

Genus Diadophis
Diadophis punctatus (Linnaeus, 1766) (AC) Ringneck Snake
Localities: Walker Co.: Screech Owl Cave (GWK205)*. Kinda Pretty Cave (GWK258).

Discussion

Summary of biological records

Our review of biodiversity in Georgia caves and other subterranean habitats identified 281 species, including 228 invertebrates and 53 vertebrates (Table S3) represented by more than 1200 occurrence records. There are ~350 additional records of taxa that have not been identified to species (Table S2). Of the taxa identified to species, five phyla (Annelida, Arthropoda, Chordata, Mollusca, and Platyhelminthes) are represented. The arthropods are the most diverse group documented with 195 species, including 50 arachnids, 34 crustaceans, and 78 insects. Fifty-one cave-obligate species (34 troglobites and 17 stygobites) have been reported from Georgia, and as many as a dozen additional troglobionts have been mentioned in the literature but are undescribed.

The biodiversity of a few caves has been studied using baits and repeated visits (e.g., Reeves and McCreadie, 2001; Campbell et al., 2011, 2012; Disney and Campbell, 2011). The application of such approaches in Howards Waterfall Cave (Dade County, with 88 total records), Horseshoe Cave (Walker County, 68 records), Pettijohns Cave (Walker County, 64 records), and Byers Cave (Dade County, 61 records) have provided the broadest picture of Georgia cave biodiversity.

Vertebrates

Fifty-three species of vertebrates have been reported from Georgia caves, including four fishes, 27 amphibians, five reptiles, two birds, and 15 mammals (Table 1). Mammal diversity was predominantly bats, with ten species. Most vertebrates reported from Georgia caves are accidental or occasional visitors, but several species of salamanders are common in caves, such as Eurycea lucifuga and Gyrinophilus porphyriticus, as are several cave-roosting bats and woodrats. Three vertebrate species are considered cave-obligates: the cavefish Typhlichthys subterraneus and the salamanders Eurycea wallacei and Gyrinophilus palleucus. All three species are known from few (~5) verified occurrences in the state, but also occur in adjacent states. The salamander Pl ethodon petraeus is endemic to Pigeon Mountain in Walker County. All the other vertebrates have been reported from caves in other states (Lewis, 2005; Godwin, 2008; Niemiller et al., 2016).

Bats

Ten species of bats have been reported from caves across Georgia, and the Tri-Colored Bat (Perimyotis subflavus) is known from more caves (67) in more counties (16) than any other animal in the state (Table 1). However, most bats are known from few caves, and cave-dwelling bats, in general, are of great conservation interest. Seven are “High Priority Species” in the current State Wildlife Action Plan (Georgia Department of Natural Resources; 2015) (Table 1). In addition, Rafinesque’s Big-eared Bat (Corynorhinus ra fishesquii) is designated “Rare” by Georgia, the Northern Long-eared Bat (Myotis septentrionalis) is listed as “Threatened” under the U.S. Endangered Species Act and by the state of Georgia, and the Gray Bat (Myotis grisescens) and the Indiana Bat (Myotis sodalis) are both listed as “Endangered” under the U.S. Endangered Species Act and by the state of Georgia. Critical population centers for bats in Georgia include Fricks Cave in Walker County, which hosts a bachelor colony of Gray Bats during the summer, and Climax Cave in Decatur County, a major site for Southeastern Myotis (Myotis austroriparius). Fricks Cave is owned by the Southeastern Cave Conservancy, Inc. and is generally closed to visitation (currently it is open just one day a year during the winter).
### Table 1. Ecological classification, conservation status, and number of Georgia caves and counties from which vertebrate species have been documented.

| Species                          | Ecological classification | IUCN Red List \(^a\) | NatureServe status |
|---------------------------------|---------------------------|-----------------------|--------------------|
| **Fishes**                      |                           |                       |                    |
| Ameiurus nebulosus              | SX/AC                     | LC                    | G5, S5             | 1                  | 1                  |
| Cottus bairdi                   | SP                        | LC                    | G5, S4             | 1                  | 1                  |
| Cottus carolinus                | SP                        | LC                    | G5, S4             | 4                  | 2                  |
| Typhlichthys subterraneus       | SB                        | VU                    | G4, S1             | SE, SGCN           | 5                  |
| **Amphibians (Frogs and Toads)**|                           |                       |                    |
| Anaxyrus fowleri                | AC                        | LC                    | G5, S5             | 1                  | 1                  |
| Anaxyrus terrestris             | AC                        | LC                    | G5, S5             | 1                  | 1                  |
| Hyla chrysoscelis               | TX/AC                     | LC                    | G5, S5             | 1                  | 1                  |
| Hyla gratiosa                   | AC                        | LC                    | G5, S5             | 1                  | 1                  |
| Rana catesbeiana                | TX                        | LC                    | G5, S5             | 5                  | 3                  |
| Rana clamitans                  | TX                        | LC                    | G5, S5             | 9                  | 5                  |
| Rana palustris                  | TX                        | LC                    | G5, S4             | 11                 | 2                  |
| Rana sphenochephalia            | TX/AC                     | LC                    | G5, S5             | 1                  | 1                  |
| Pseudacris crucifer             | AC                        | LC                    | G5, S5             | 3                  | 2                  |
| Pseudacris feriarum             | AC                        | LC                    | G5, S5             | 1                  | 1                  |
| **Amphibians (Salamanders)**    |                           |                       |                    |
| Ambystoma tigrinum              | AC                        | LC                    | G5, S3S4           | SGCN               | 1                  |
| Aneides aeneus                  | TX                        | NT                    | G3G4, S3           | SR, SGCN           | 8                  |
| Desmognathus conanti            | AC                        | LC                    | G5, S5             | 8                  | 3                  |
| Desmognathus ocoee              | AC                        | LC                    | G5, S5             | 1                  | 1                  |
| Eurycea cirrigma                | TX                        | LC                    | G5, S5             | 6                  | 4                  |
| Eurycea guttolineata            | TX                        | LC                    | G5, S4S5           | 2                  |
| Eurycea longicauda              | TP/TX                     | LC                    | G5, S4             | 11                 |
| Eurycea lucifuga                | TP                        | LC                    | G5, S4             | 52                 |
| Eurycea wallacei                | SB                        | VU                    | G2, S1             | ST, SGCN           | 3                  |
| Gyrinophilus palleucus          | SB                        | VU                    | G2G3, S1           | ST, SGCN           | 2                  |
| Gyrinophilus porphyriticus      | TP                        | LC                    | G5, S4             | 20                 |
| Notophthalmus viridescens       | AC                        | LC                    | G5, S5             | 1                  |
| Plethodon glutinosus            | TP                        | LC                    | G5, S5             | 44                 |
| Plethodon petraeus              | TP/TX                     | VU                    | G2, S2             | SR, SGCN           | 4                  |
| Plethodon serratus              | TX                        | LC                    | G5, S5             | 4                  |
| Plethodon ventralis             | TP/TX                     | LC                    | G4, S4             | 14                 |
| Pseudotriton ruber              | TP                        | LC                    | G5, S5             | 8                  |
| **Reptiles (Snakes)**           |                           |                       |                    |
| Carphophis amoenus              | AC                        | LC                    | G5, S5             | 1                  |
| Cemophora coccinea              | AC                        | LC                    | G5, S4S5           | 1                  |
| Diadophis punctatus             | AC                        | LC                    | G5, S5             | 2                  |
| Nerodia sipedon                 | AC                        | LC                    | G5, S5             | 1                  |
| **Reptiles (Turtles)**          |                           |                       |                    |
| Terrapene carolina              | AC                        | VU                    | G5, S5             | 1                  |
| **Birds**                       |                           |                       |                    |
| Cathartes aura                  | TX/AC                     | LC                    | G5, S5             | 1                  |
| Sayornis phoebe                 | TX                        | LC                    | G5, S5             | 4                  |
| **Mammals (Bats)**              |                           |                       |                    |
| Corynorhinus rafinesquii        | TX                        | LC                    | G3G4, S3           | SR, SGCN           | 1                  |
| Eptesicus fuscus                | TX                        | LC                    | G5, S5             | 4                  |

\(^a\) Endangered, \(^b\) Extinct.
Table 1. (Continued).

| Species                      | Ecological classification | IUCN Red List | NatureServe status | Government status | Caves/Wells | Counties | Georgia endemic? |
|------------------------------|---------------------------|---------------|--------------------|-------------------|-------------|----------|-----------------|
| Lasiurus borealis            | AC                        | LC            | G3G4, S5           |                   | 2           | 2        |                 |
| Myotis auroriparius          | TX                        | LC            | G4, S3             |                   | 4           | 4        |                 |
| Myotis grisescens            | TX                        | VU            | G4, S1             | FE, SE, SGCN      | 8           | 5        |                 |
| Myotis leibii                | TX                        | EN            | G4, S2             |                   | 3           | 2        |                 |
| Myotis lucifugus             | TX                        | EN            | G3, S1             |                   | 10          | 4        |                 |
| Myotis septentrionalis       | TX                        | NT            | G1G2, S2S1         | FT, ST, SGCN      | 13          | 6        |                 |
| Myotis sodalis               | TX                        | NT            | G2, S1             | FE, SE, SGCN      | 4           | 2        |                 |
| Perimyotis subflavus         | TX                        | VU            | G2G3, S2           |                   | 67          | 16       |                 |

Mammals (non-Bats)

- *Castor canadensis*  
  IUCN Red List: LC  
  NatureServe status: G5, S5  
  Government status: FE, FT, SGCN  
  Caves/Wells: 1  
  Counties: 1

- *Didelphis virginiana*  
  IUCN Red List: LC  
  NatureServe status: G5, S5  
  Government status: FE, FT, SGCN  
  Caves/Wells: 1  
  Counties: 1

- *Neotoma floridana*  
  IUCN Red List: LC  
  NatureServe status: G5, S5  
  Government status: FE, FT, SGCN  
  Caves/Wells: 22  
  Counties: 2

- *Procyon lotor*  
  IUCN Red List: LC  
  NatureServe status: G5, S5  
  Government status: FE, FT, SGCN  
  Caves/Wells: 13  
  Counties: 5

* IUCN Red List: LC = Least Concern, VU = Vulnerable, NT = Near Threatened, EN = Endangered  
* Government Status: FE = Federally Endangered, FT = Federally Threatened, SE = State Endangered, ST = State Threatened, SR = State Rare, SGCN = Species of Greatest Conservation Need  
* Ecological classifications include: TB = Troglobiont, SB = Stygobiont, TP = Troglophile, SP = Stygophile, TX = Trogloxene, SX = Stygoxene, and AC = Accidental. IUCN Red List categories include: LC = Least Concern, VU = Vulnerable, NT = Near Threatened, EN = Endangered. Government status categories include: FE = Federally Endangered, FT = Federally Threatened, SE = State Endangered, ST = State Threatened, SR = State Rare, SGCN = Species of Greatest Conservation Need (State Wildlife Action Plan High Priority Species)

Table 2. Ecological classification, conservation status, and number of Georgia caves and counties from which troglobionts have been documented. Abbreviations are the same as in Table 1, with the addition of SY = Symbiont.

| Species                        | Ecological classification | IUCN Red List | NatureServe status | Government status | Caves/Wells | Counties | Georgia endemic? |
|-------------------------------|---------------------------|---------------|--------------------|-------------------|-------------|----------|-----------------|
| Arachnids (pseudoscorpions)   | TB                        |               |                    |                   |             |          |                 |
| Apochthonius minor            | TB                        |               |                    |                   | G1, SNR     | 13       |                 |
| Hesperochernes mirabilis      | TB                        |               |                    |                   | G5, SNR     | 13       |                 |
| Kleptochthonius magnus        | TB                        |               |                    |                   | G1, SNR     | 13       |                 |
| Arachnids (spiders)           | TB                        |               |                    |                   |             |          |                 |
| Appaleptoneta fiskel          | TB                        |               |                    |                   | GNR, SNR    | 11       |                 |
| Liocranoides unicolor         | TB                        |               |                    |                   | G5, SNR     | 11       |                 |
| Nesticus georgia              | TB                        |               |                    |                   | G1G2, SNR   | 11       |                 |
| Ozarkia georgia               | TB                        |               |                    |                   | GNR, SNR    | 11       |                 |
| Phanetta subterranea          | TB                        |               |                    |                   | G5, SNR     | 11       |                 |
| Porrhomma cavernicola         | TB                        |               |                    |                   | G5, SNR     | 11       |                 |
| Crustaceans (amphipods)       | SB                        |               |                    |                   |             |          |                 |
| Crangonyx antennatus          | SB                        |               |                    |                   | G5, SNR     | 11       |                 |
| Stygobromus ackerlyi          | SB                        |               |                    |                   | G1G2, SNR   | 11       |                 |
| Stygobromus dicksoni          | SB                        |               |                    |                   | G5, SNR     | 11       |                 |
| Stygobromus doughertyensis    | SB                        |               |                    |                   | GNR, SNR    | 11       |                 |
| Stygobromus grandis           | SB                        |               |                    |                   | G1, SU      | 11       |                 |
| Stygobromus minutus           | SB                        |               |                    |                   | G2G3, SU    | 11       |                 |
| Crustaceans (copepods)        | SB                        |               |                    |                   | G3G4, SNR   | 11       |                 |
| Crustaceans (crayfish)        | SB                        |               |                    |                   | G2G3, S2    | ST, SGCN  | 11               |
| Crustaceans (isopods)         | SB                        |               |                    |                   | G1, SU      | 11       |                 |
| Amerigoniscus curvatus        | TB                        |               |                    |                   | G1, SU      | 11       |                 |
| Amerigoniscus georgiensis     | TB                        |               |                    |                   | G1, SU      | 11       |                 |
| Amerigoniscus proximus        | TB                        |               |                    |                   | G1G2, SNR   | 11       |                 |
| Caecidotea cyrtorhynchus      | SB                        |               |                    |                   | G1, SU      | 11       |                 |
| Caecidotea hobbsi             | SB                        |               |                    |                   | G2G3, SNR   | 11       |                 |
Table 2. (Continued).

| Species | Ecological classification | IUCN Red List | NatureServe status | Government status | Caves/Wells | Counties | Georgia endemic? |
|---------|--------------------------|---------------|--------------------|------------------|-------------|----------|-----------------|
| **Crustaceans (isopods)** | | | | | | | |
| Caecidotea nickajackensis | SB | | GH, SNR | 1 | 1 | | |
| Caecidotea putea | SB | | G1G2, SNR | 2 | 2 | | |
| Caecidotea richardsonae | SB | | G5, SNR | 16 | 5 | | |
| **Crustaceans (ostracods)** | | | | | | | |
| Uncinocythere warreni | SB/SY | | G1, SU | 1 | 1 | Yes | |
| **Diplurans** | | | | | | | |
| Litocampa cookei | TB | | G5, SNR | 1 | 1 | | |
| **Insects (beetles)** | | | | | | | |
| Batriasymmodes spelaeus | TB/TP | | G3G4, SNR | 4 | 3 | | |
| Pseudanophthalmus digitus | TB | | G1G2, SNR | 3 | 1 | | |
| Pseudanophthalmus fastigatus | TB | | G1, S1? | 1 | 1 | Yes | |
| Pseudanophthalmus fulleri | TB | | G2G3, SNR | 12 | 1 | | |
| Pseudanophthalmus georgiae | TB | | G1G2, S1? | 4 | 2 | Yes | |
| Ptomaphagus fiskei | TB | | G1G2, SNR | 10 | 1 | Yes | |
| Ptomaphagus whiteselli | TB | | G2G3, SNR | 8 | 1 | | |
| **Insects (flies)** | | | | | | | |
| Spelobia tenebrarum | TB | | G5, SNR | 12 | 3 | | |
| **Springtails** | | | | | | | |
| Pseudosinella christianseni | TB | | G5, SNR | 15 | 2 | | |
| Pseudosinella hirsuta | TB | | G5, SNR | 15 | 5 | | |
| Pseudosinella pecki | TB | | G2G3, SNR | 2 | 2 | | |
| Pseudosinella spinosa | TB | | G5, SNR | 1 | 1 | | |
| **Myriapods (millipedes)** | | | | | | | |
| Ameractis satis | TB/TP | | G2G4, SNR | 1 | 1 | | |
| Pseudotremia aeacus | TB | | G1G2, SNR | 2 | 1 | | |
| Pseudotremia eburnea | TB | | G2G4, SNR | 15 | 2 | | |
| Scoterpes australis | TB | | G3G4, SNR | 16 | 3 | | |
| Scoterpes nudus | TB | | SNR | 3 | 2 | Yes | |
| Scoterpes willreevesi | TB | | GNR, SNR | 2 | 1 | | |
| **Snails** | | | | | | | |
| Glyphyalinia specus | TB | | LC | G3, SNR | 6 | 3 | | |
| Helicodiscus barri | TB | | LC | G3, SNR | 2 | 2 | | |
| **Flatworms** | | | | | | | |
| Sphalloplana georgiana | SB | | G1, SNR | 1 | 1 | Yes | | |
| **Vertebrates (fish, salamanders)** | | | | | | | |
| Eurycea wallacei | SB | | VU | G2, S1 | ST, SGCN | 3 | 2 | |
| Gyrinophilus palleucus | SB | | VU | G2G3, S1 | ST, SGCN | 2 | 1 | |
| Typhlichthys subterraneus | SB | | VU | G4, S1 | ST, SGCN | 5 | 2 | |

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1 IUCN Red List: LC = Least Concern, VU = Vulnerable
2 Government Status: SE = State Endangered, ST = State Threatened, SGCN = Species of Greatest Conservation Need (= State Wildlife Action Plan High Priority Species)
3 A count of the number of occurrences. Caves/Wells and Counties refer to sites in Georgia only
4 After Gladstone et al. 2018

Many bat populations across eastern North America are in decline as a result of White-nose Syndrome (WNS), which is caused by the fungus *Pseudogymnoascus destructans* (Blehert et al., 2009). First confirmed in northwestern Georgia during the winter of 2012–2013, WNS is now known from many counties in north Georgia (https://www.whitennosesyndrome.org/spreadmap). Over the past decade, WNS has impacted some cave-dwelling bats more than others; Tri-Colored Bats, Northern Long-eared Bats, Indiana Bats, and Little Brown Bats (*Myotis lucifugus*) have suffered steep population declines, whereas Gray Bats and Big Brown Bats (*Eptesicus fuscus*) have not (Francl et al., 2012; Campbell, 2017; Morris and Ferrall, 2018). Declines in bat populations, especially over such rapid timescales, will undoubtedly af-
fect cave ecosystems because cave-dwelling bats are an important link between surface resources and cave habitats.

**Troglobionts**

Fifty-one species reported from caves in Georgia are considered troglobionts (34 terrestrial and 17 aquatic). Troglobitic diversity includes four phyla (Arthropoda, Mollusca, Platyhelminthes, and Chordata). Troglobitic species richness in Georgia is dominated by arthropods (45 species), distributed across the major arthropod subgroups of crustaceans (17 species), hexapods (13), arachnids (9), and myriapods (6). Two snails, one flatworm, and three vertebrates compose the remainder of the described troglobiotic fauna in the state (Table 2).

**Biogeography**

Nearly half of the Georgia’s troglobionts are found in one of three geographically and hydrogeologically distinct areas: (1) west of Lookout Mountain in Lookout Valley; (2) east of Lookout Mountain, and (3) in the Dougherty Plains (Fig. 1). The taxa composing each group have ranges that do not overlap with members of the other groups.

Lookout Valley, primarily in Dade County, Georgia, is located west of Lookout Mountain and east of Sand Mountain (Fig. 1). This area is the southernmost extension of the Cumberland Plateau. Lookout Valley extends beyond Dade County to the north into Hamilton County, Tennessee, and to the south into DeKalb County, Alabama. At least seven troglobionts appear to be limited to Lookout Valley – the millipedes *Scoterpes willreevesi* and *Pseudotremia aeacus*, the
beetles *Ptomaphagus whiteselli*, *Pseudanophthalmus digitus*, and *Pseudanophthalmus fulleri*, and the spiders *Nesticus georgia* and *Ozarkia georgia*. The single-cave endemic flatworm *Sphalloplana georgiana* is another species known only from Lookout Valley, but unidentified *Sphalloplana* have been reported from Walker County, which may indicate a wider range for the species.

A second biogeographic group is located east of Lookout Mountain in Walker and Chattooga counties (Fig. 1). This group includes the beetles *Ptomaphagus fiskei* and *Pseudanophthalmus georgia*, the isopod *Caecidotea cyrtorhynchus*, the amphipod *Stygobromus minutus*, and the spider *Appaleptoneta fiskei*. In addition, four single-cave endemic
Figure 3. Representative non-troglobiotic fauna from Georgia caves: A) female *Meta ovalis* with egg case from Four Kings Cave, Walker County; B) *Myotis lucifugus* from Fricks Cave, Walker County; C) *Oxidus gracilis* from White River Cave, Polk County; D) *Pseudotriton ruber* from Fricks Cave, Walker County; and E) *Procyon lotor* from Trenton Bone Cave, Dade County. Photographs by Alan Cressler.
species are found in this region: the beetle *Pseudanophthalmus fastigatus*, the amphipod *Stygobromus grandis*, and the isopods *Amerigoniscus curvatus* and *A. georgiensis*. The troglophilic springtail *Pseudosinella georgia* is also known only from this area. Within this group, there is a cluster of troglobionts limited to Pigeon Mountain – *C. cytorhynchus*, *S. minutus*, *A. fiskei*, and an undescribed *Nesticus* species. The cave-associated Pigeon Mountain Salamander (*Plethodon petraeus*) is also limited to Pigeon Mountain. Slightly further south, the millipede *Scolerpes nudus* and the amphipod *Stygobromus ackerlyi* are limited to caves in Bartow, Floyd, and Polk counties.

Lastly, several stygobitic taxa are limited to the Floridan aquifer system of the Dougherty Plains in southwestern Georgia near the Georgia-Alabama-Florida state junction (Fig. 1). The Dougherty Plains Cave Crayfish (*Cambarus cryptodytes*) is known from seven counties in Georgia (Fenolio et al., 2017), with a range that extends into Florida. The Georgia Blind Salamander (*Eurycea wallacei*) shares a similar range (Fenolio et al., 2013), as does the amphipod *Stygobromus doughertyensis* (Cannizaro et al., 2019). The single-cave endemic ostracod *Uncinocythere warreni* is known only from its host *C. cryptodytes*.

The remaining half of Georgia's troglobionts are found in one or more of the biogeographic clusters described above, and some have ranges that include much of the southern Appalachians and Interior Low Plateaus. Within these species, at least three patterns are present: (1) two stygobionts, the amphipod *Crangonyx antennatus* and the isopod *Caecidotea richardonae*, are common throughout the Appalachian Valley and Ridge, ranging from southern Virginia into Alabama; (2) two vertebrates, the Tennessee Cave Salamander (*Gyrinophilus palleucus*) and the Southern Cavefish (*Typhlichthys subterraneus*), are widespread west of the Cumberland Plateau (Niemiller et al., 2008; 2012) and appear to have spread east via the ancestral Tennessee River and associated drainage network into one or a few sites in northwestern Georgia (e.g., Niemiller et al., 2016); and, (3) a few of species are widespread in caves across the southern Appalachians and the Interior Low Plateaus, such as the spiders *Phanetta subterranea* and *Porromma cavernicola*, the fly *Spelobia tenebrarum*, the pseudoscorpion *Hesperochernes mirabilis*, and the springtail *Pseudosinella hirsuta* (Christman and Culver, 2001). Some of these taxa may represent cryptic species complexes of morphologically similar, yet genetically distinct, lineages. Cryptic diversity is a common discovery from phylogeographic studies of subterranean organisms (e.g., Bradford et al., 2010; Niemiller et al., 2012; Katz et al., 2018). The remaining troglobionts in Georgia do not fit into the patterns described above. Species from poorly known groups, like pseudoscorpions and springtails, compose many of the remaining taxa. For some species, a lack of records prevents any confident description of their distribution within Georgia and beyond.

**Endemism**

Trogblobionts typically exhibit high rates of endemism (Christman et al., 2005), and we noted this pattern in the Georgia fauna. Seventeen of the 51 (33 %) troglobionts known from Georgia are endemic to the state (Table 2). Thirteen of these species (26 %) are limited to a single county, and six species (12 %) are known from a single cave. These single-cave endemics are the beetle *Pseudanophthalmus fastigatus* (Horseshoe Cave, Walker County), the flatworm *Sphalloplana georgiana* (Howards Waterfall Cave, Dade County), the isopods *Amerigoniscus curvatus* (Horseshoe Cave, Walker County) and *A. georgiensis* (Pettijohns Cave, Walker County), the amphipod *Stygobromus grandis* (Parkers Cave, Chattooga County), and the ostracod *Uncinocythere warreni* (Climax Cave, Decatur County). Several other cave-associated non-troglobionts, such as the Pigeon Mountain Salamander, the springtail *Pseudosinella georgia*, the caddisfly *Dipleuroptera mariana*, and the spiders *Pholcus dade* and *Pholcus lanieri*, are also endemic to Georgia and have highly restricted ranges.

**Hotspots of troglobionts**

Troglobionts are not uniformly distributed across Georgia. Of the 670 caves known in the state, only 22 (3.2 %) are known to host five or more troglobionts, with 11 of those caves being in Dade County, nine in Walker County, and two in Chattooga County. Eight caves support ten or more troglobionts, these are: Pettijohns Cave (14 troglobionts), Byers Cave (13), Johnsons Crook Cave (12), Mountain Cove Farm Cave No. 1 (11), Howards Waterfall Cave (11), Cemetery Pit (11), Morrisons Cave (10), and Sittons Cave (10). Of these caves, six are in Dade County and two (Pettijohns Cave and Mountain Cove Farm Cave No. 1) are in Walker County. Maximum troglobiont diversity per cave is not as high in Georgia as in Tennessee, which has 24 troglobionts known from the Wonder/Crystal Cave system in Grundy County, or Alabama, where 24 troglobionts are known from Shelta Cave in Madison County. However, both Pettijohns Cave and Byers Cave would rank in the top ten caves in the state of Tennessee in terms of total troglobionts (Niemiller and Zigler, 2013).

**Conservation considerations**

The cave fauna of Georgia is diverse and includes numerous species of conservation concern, as well as many species with highly restricted ranges. This review provides background for conservation efforts related to cave biodiversity in Georgia.
Species of conservation concern and threats to subterranean ecosystems. Many of the species found in Georgia caves are at an elevated risk of extinction because of their extremely small ranges. Of the troglobionts, 17 (33 %) are ranked “G1—Critically Imperiled” under NatureServe criteria, and the four troglobionts not ranked by NatureServe would likely be considered “G1” as well (Table 2). All of these species are considered short-range cave endemics (e.g., Niemiller et al., 2017), known from just a few sites within a limited geographic area. In addition, the Southern Cavefish, the Tennessee Cave Salamander, and the Dougherty Plains Cave Crayfish are ranked “S1—Critically Imperiled” in Georgia (Table 2). Although all these species are more wide-ranging in adjacent states, they are intrinsically vulnerable to extinction, as are most troglobionts (Culver et al., 2006; Culver and Pipan, 2009; Niemiller et al., 2018).

Cave communities can be impacted by modification of the surface landscape around caves and cave entrances, by water pollution that enters or moves through caves, or by human disturbance of cave habitats and populations. In the longer term, climate change may impact caves due to changing temperature and precipitation patterns, and indirectly by any changes in forest cover that result. In addition, the emerging infectious disease WNS has been present in Georgia for less than a decade. It appears to be affecting bat populations, in particular those of the Tri-Colored Bat, the most commonly encountered cave bat in Georgia (Morris and Ferrall, 2018). It will be some time before we reach a new steady state for bat population densities and distributions.

Caves on protected lands. Our Annotated List shows that, after half a century of work, there is a good deal known about cave biodiversity in Georgia. There are biological records from 18 % (121 of 670) of Georgia caves, a higher frequency than reported for Tennessee, where 7 % of caves have records of troglobionts (Niemiller and Zigler, 2013). In addition, a remarkably large proportion of the caves in Georgia are on protected lands. According to the records of the Georgia Speleological Survey, 165 caves are on property owned by federal, state, or local government. Government landholdings with significant numbers of caves include Chickamauga and Chattanooga National Military Park, Crockford-Pigeon Mountain Wildlife Management Area, and Cloudland Canyon State Park. At least 60 other caves are located on property owned or managed by land trusts, the Southeastern Cave Conservancy, Inc., or the National Speleological Society. In combination, around one third of all caves in Georgia are located on protected lands. Notably, many caves of particular biological importance are protected. For instance, of the eight caves known to host the ten or more troglobionts, seven are on protected lands. Several of these caves are well known (e.g., Pettijohns Cave, Howards Waterfall Cave), and receive regular visitation, which may be detrimental to cave communities.

Cave biodiversity knowledge shortfalls. Although much is known about cave biodiversity in Georgia, significant knowledge gaps remain, similar to subterranean biodiversity globally (Niemiller et al., 2018; Ficetola et al., 2019; Mamola et al., 2019). Although state-level conservation assessments for vertebrates are almost universally complete, such assessments are almost completely lacking for invertebrates (Tables 1, 2, and S3). Of the 49 invertebrate troglobionts known in Georgia, only one, the Dougherty Plains Cave Crayfish, has a state (“S”) ranking under the NatureServe system, and only six have been ranked using IUCN Red List criteria (Table 2). As many of these invertebrates have highly restricted distributions, state-level conservation assessments are particularly valuable. Most of the species have global (“G”) rankings (Table 2), which should facilitate developing state rankings for the species. As models for how this could be done, recently published conservation assessments for Bactrurus cave amphipods (Niemiller and Taylor, 2016) and cave snails of the Interior Low Plateau and Appalachians karst regions (Gladstone et al., 2018) implemented both NatureServe and IUCN Red List assessment criteria, while Hutchins (2018) evaluated the conservation status of Texas groundwater invertebrates using the NatureServe methodology.

For most troglobionts in Georgia, we lack information about population sizes, population trends, and species distributions (i.e., the Prestonian and Wallacean shortfalls; Lomolino, 2004, Cardoso et al., 2011). Of the 17 troglobionts endemic to Georgia, only one is known from more than four sites (Table 2). In many cases, species are known from just one or a few collections, which limits our ability to assess population trends or persistence. As a specific example, the single-cave endemic beetle Pseudanophthalmus fastigatus was described from just two specimens collected in 1967 from Horseshoe Cave in Walker County. This species has not been collected since, and recent work in the cave (Reeves and McCreadie, 2001; this study) did not rediscover this population. Recent work on other Pseudanophthalmus species in Tennessee has shown that focused efforts often confirm the presence of long-lost populations and uncover new populations (Niemiller et al., 2017). Similar efforts are warranted for the many poorly-known troglobionts in Georgia.

More than two dozen undescribed species have been collected in caves in Georgia (Table 3). About half of these taxa are likely troglobionts, indicating a significant proportion of troglobiotic diversity in Georgia has not yet been described (i.e., the Linnaean shortfall; Brown and Lomolino, 1998). As discussed by Culver et al. (2013), not all of these taxa may turn out to be new species once they have been examined by taxonomic experts, but it is likely that many of them will be formally described. These taxa are dispersed across the major groups of arthropods and across the major karst regions of Georgia. As far as is currently known, many of these taxa could be single-cave endemics, which makes them conservation concerns. A full understanding of Georgia cave biodiversity will require the taxonomic evaluation of these taxa.
Table 3. Undescribed species reported from caves in Georgia.

| Taxon | Cave(s) | Comments | References |
|-------|---------|----------|------------|
| **Arachnids (harvestmen)** | | | |
| Phalangodidae: *Bishopella* | Dade County: Howards Waterfall Cave | Described as “potentially troglobitic.” | Reeves et al. (2000) |
| **Arachnids (mites)** | | | |
| Rhagidiidae: *hagidia* | Bartow County: Kingston Saltpeter Cave; Dade County: Byers Cave, Morrison Cave; Walker County: Bible Springs Cave, Pettijohns Cave | | Holsinger and Peck (1971) |
| **Arachnids (pseudoscorpions)** | | | |
| Chthoniidae: *Aphrastochthonius* | Dade County: Byers Cave, Longs Rock Wall | | Campbell et al. (2012); this study |
| Chthoniidae: *Apochthonius* | Chattooga County: Parker Cave | One large female from entrance zone. | this study |
| Chthoniidae: *Chthonius* | Walker County: Howards Waterfall Cave, Horseshoe Cave | Two undescribed species represented. | this study |
| Chthoniidae: *Kleptochthonius* | Walker County: Rumble Rock Canyon Cave | | this study |
| Chthoniidae: *Mundochthonius* | Chattooga County: Parker Cave | Many collected from entrance zone. | Muchmore unpublished; this study |
| Chthoniidae | Walker County: Mt. Cove Farm Cave | From gut of *Eurycea lucifuga* found in dark zone. Partial specimen of an adult male. “Potentially new” because he did not place it in a genus. | Muchmore unpublished |
| Neobisiidae: *Lissocreagris* | Walker County: Pettijohn Cave | Small, eyeless. | Holsinger and Peck (1971); Muchmore unpublished; this study |
| Neobisiidae: *Microcreagris* (sensu lato) | Dade County: Johnson Crook Cave | Potentially an error, not in Muchmore’s material. Most Nearctic *Microcreagris* were transferred to other genera by Ćurčić (1981, 1984, 1989). | Holsinger and Peck (1971); Muchmore unpublished; this study |
| Neobisiidae: *Microcreagris* (sensu lato) | Dade County: Hooker Cave | | this study |
| **Arachnids (spiders)** | | | |
| Linyphiidae: *Anibontes* | Chattooga County: Parkers Cave | | this study |
| Nesticidae: *Nesticus* n. sp. 1 | Walker County: Anderson Spring Cave, Matthew Sink, Pigeon Cave (also possibly Moudy Bat Pit and Fingerhole Cave) | All sites on Pigeon Mountain. Eyeless. | Buhmann (2001); Jensen and Ozier; this study |
| Nesticidae: *Nesticus* n. sp. 2 | Walker County: Lula Falls Cave | Eyed. | this study |
| Pholcidae: *Pholcus* | Bartow County: Ladds Lime Cave; Dade County: Hurricane Cave, Sittons Cave; Walker County: Fricks Cave, Spooky Cave | Described as “several undescribed species of *Pholcus*.” | Reeves et al. (2000) |
| **Crustaceans (amphipods)** | | | |
| Crangonyctidae: *Stygobromus* | Dade County: Boxcar Cave, Caboose Cave | | Jensen and Ozier |
Recommendations and Conclusions

Many opportunities to improve our understanding of cave biodiversity in Georgia exist, including addressing the knowledge shortfalls by (1) conducting state-level conservation assessments of cave invertebrates, (2) focusing efforts to increase our knowledge on the ecology and life history of poorly-known and highly endemic troglobionts, and (3) supporting further study of the many undescribed taxa that have been reported. In addition, conservation resources could be focused on caves of biological interest. It is an important observation that many of the most biodiverse caves in Georgia are already on protected lands. Managing these sites for cave biodiversity is particularly important. However, there also are a handful of caves on private lands with important biological diversity that are worthy of further study and protection. Climax Cave in Decatur County is one of the longest caves in the state, and it supports populations of the Georgia Blind Salamander and the Dougherty Plain Cave Crayfish, which are both High Priority Species under the State Wildlife Action Plan, one single-cave endemic species, and is a significant Southeastern Myotis site. Horseshoe Cave in Walker County has the second-most biological records for any cave in the state and supports eight troglobionts, including two single-cave endemics and two potentially undescribed species. The Chelsea Gulf/Blowing Spring Cave system in Chattooga County hosts eight troglobionts, more than any other cave in Chattooga County. Parkers

Table 3. (Continued).

| Taxon | Cave(s) | Comments | References |
|-------|---------|----------|------------|
| Crustaceans (isopods) | | | |
| Trichoniscidae: Miktoniscus | Bartow County: Anthonys Cave; Chattooga County: Blowing Springs Cave, Parker Cave; Dade County: Howards Waterfall Cave, Sittons Cave; Decatur County: Climax Cave; Randolph County: Griers Cave; Walker County: Horseshoe Cave, Spooky Cave | May represent *M. alabamensis* or undescribed species. | Holsinger and Peck (1971); Muchmore unpublished; Reeves et al. (2000) |
| Diplurans | | | |
| Campodeidae | Bartow, Chattooga, Dade, Floyd, Walker Counties: 26 total sites | These records likely represent multiple undescribed species. | Holsinger and Peck (1971), Reeves et al. (2000), Buhlmann (2001), this study |
| Insects (beetles) | | | |
| Staphylinidae: Speleochus | Walker County: Pigeon Cave | | Buhlmann (2001) |
| Staphylinidae: Subterrochus | Walker County: Mountain Cove Farm Cave | | Holsinger and Peck (1971) |
| Insects (flies) | | | |
| Sciaridae: Lycoriella | Bartow County: Anthonys Cave; Dade County: Deans Pit, Newsome Gap Cave; Walker County: Pettijohns Cave, Horseshoe Cave | Described as “cavernicolous” | Reeves et al. (2000) |
| Insects (silverfish) | | | |
| Nicoletiidae: Nicoletia | Walker County: Horseshoe Cave | | Holsinger and Peck (1971) |
| Myriapods (centipedes) | | | |
| Lithobiidae: Pampibius | Walker County: Cave Spring Cave | | Holsinger and Peck (1971) |
| Myriapods (millipedes) | | | |
| Cleidogonidae: Pseudotremia n. sp. 1 | Dade County: Howards Waterfall Cave | Identified by W. Shear | this study |
| Cleidogonidae: Pseudotremia n. sp. 2 | Dade County: Hooker Cave | Also collected in adjacent Hamilton Co., TN. Identified by W. Shear | this study |
Cave in Chattooga County supports six troglobionts including one single-cave endemic, as well as three potentially undescribed species. Morrions Cave in Dade County supports ten troglobionts. Crane Cave in Catoosa County supports the only known Appalachian Valley and Ridge population of the Southern Cavefish. Further protection of any of these sites would greatly support cave biodiversity in Georgia.

Although much attention is given to troglobionts and cave-roosting bats, caves and other subterranean ecosystems contain important habitats for many other non-troglobitic species for reproduction, hibernation, shelter, and other aspects of their life histories. For example, caves are important habitats for many plethodontid salamanders (Niemiller and Miller, 2009; Goricki et al., 2012), including several species in Georgia that use caves for shelter and reproduction (e.g., Buhlmann, 2001; Niemiller et al., 2006; Camp and Jensen, 2007). The importance of caves for other non-troglobitic taxa, particularly invertebrates, has not been well-studied and should be a priority of future research.

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