

A CONSERVATION FOCUSED INVENTORY OF SUBTERRANEAN INVERTEBRATES OF THE SOUTHWESTERN ILLINOIS KARST

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*In 1998-1999 The Nature Conservancy conducted a bioinventory of caves in Monroe and St. Clair counties in southwestern Illinois. This karst area comprises a small section of the Ozark Plateau isolated from the Missouri Ozarks by the Mississippi River. In the 71 sites that were sampled, 41 species thought to be globally rare were found and were assigned state (S) and global (G) ranks of rarity for conservation use. The list includes 10 species considered to be new to science and 12 species previously unreported from Illinois. Twenty four taxa were classified as obligate subterranean species, including four endemic species: the pseudoscorpion *Mundochthonius cavernicolus*, the amphipod *Gammarus acherondytes*, the milliped *Chaetaspis* sp. (undescribed), and the dipluran *Eumesocampa* sp. (undescribed). *Gammarus acherondytes*, recently listed as an endangered species, was found in six previously unsampled caves. All sites were rank-ordered according to the number of global and state rare species. The greatest single site diversity was found in Fogelpole Cave with 18 global and 20 state rare species. The highest subterranean drainage system diversity was found in the Danes/Pautler Cave System with 20 globally rare species. Fogelpole Cave also had the highest number of troglobites with 14 species. The Danes/Pautler Cave System again had the highest number of troglobites found in a groundwater system with 16 species.*

In 1978 S.B. Peck and J.J. Lewis presented the first comprehensive list of subterranean invertebrates in Illinois. This list was the result of fieldwork done by Peck from 1966-1968, and Lewis from 1972-1976. In 1976 Lewis' work for the Illinois Natural Areas Inventory recommended several caves from the western Illinois "sinkhole plain karst" (SHPK) for conservation. This eventually became a reality with the creation of Fogelpole Cave and Stemler Cave nature preserves, the Armin Krueger Speleological Preserve, and Illinois Caverns State Natural Area. Despite these efforts, progressive urbanization of the SHPK due to the proximity of St. Louis, Missouri, was having an increasing impact on the caves and subterranean fauna of the area. With the growth in human population, groundwater contamination had become a growing reality, leading to several projects to define the kinds, sources and spatial relationships of groundwater contamination in the western Illinois karst (Panno *et al.* 1996, 1997, 1998, 1999; Taylor *et al.* 2000). Extensive dye tracing was also conducted to delineate the recharge areas of springs in the area (Aley & Aley 1998; Aley *et al.* 1999).

Much attention was drawn to the SHPK by the listing of the Illinois cave amphipod, *Gammarus acherondytes*, as an endangered species. Webb's (1995) report on the status of this unique amphipod, the only troglobitic species of *Gammarus* currently described in North America, became the foundation for its listing in 1998. We suspected that some other troglobitic species

were present, but yet undetected in the area, and that others known to be present were more widespread than had been demonstrated, possibly including *Gammarus acherondytes*. In 1998 The Nature Conservancy initiated a bioinventory project to gather more data on the status of cave invertebrates in Monroe and St. Clair counties (Lewis *et al.* 1999). The goal of this paper is to present the results of this bioinventory to support cave and karst conservation efforts in Illinois.

PROJECT AREA

The SHPK (Fig. 1) consists of an area of the Salem Plateau section of the Ozark Plateau physiographic province isolated through dissection by the Mississippi River, which left this island of karst east of the river (Willman *et al.* 1975). In St. Clair and Monroe counties, just southeast of St. Louis, a well developed karst is present with three somewhat distinct sub-units. These are the: (1) Columbia, (2) Waterloo, and (3) Renault karst areas.

The Columbia karst is the most isolated, with the separation visible on topographic maps as a swath of land devoid of sinkholes. This area coincides with the Waterloo-Dupo Anticline. Stemler Cave as well as dozens of smaller caves occur in this area just to the northeast of Columbia.

The Waterloo karst area includes the Pautler Cave System (includes the recently connected Pautler and Danes caves, with 8.3 kilometers of mapped passage) that resurges via Icebox

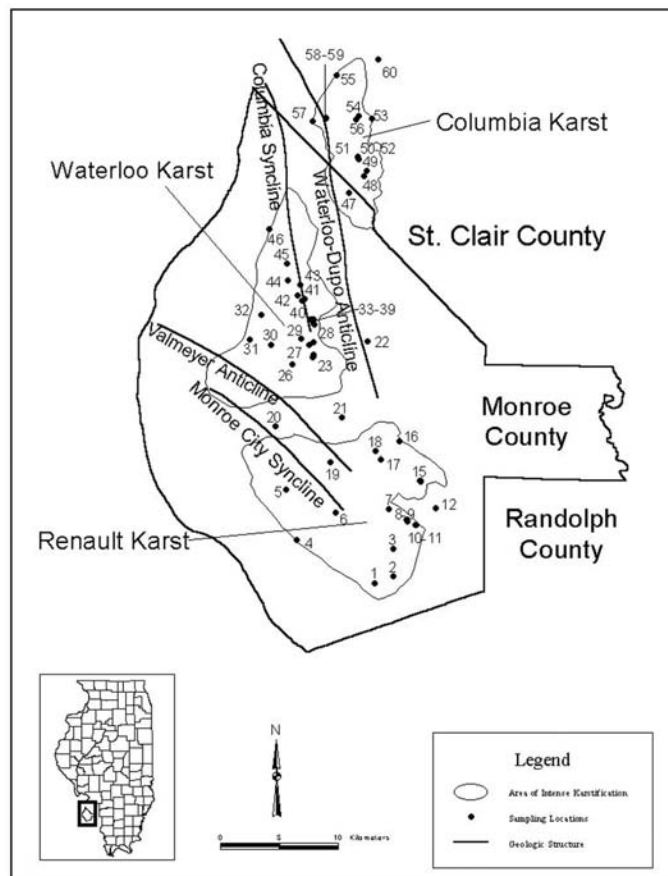


Figure 1. Key to Sampling Locations in the Sinkhole Plain:

1 Couchs Cave; 2 Jacobs Cave; 3 Wannabe Karst Window Cave; 4 Saltpeter Cave; 5 Wandas Waterfall Cave; 6 Juelfs Cave; 7 Fogelpole Cave; **8** Myrons Misery Cave and Bat Sump Cave; **11** Collier Spring and Karst Window; 12 Frees Well; 13 Walsh Seep; 14 Walsh Spring; 15 Walsh Cave; 16 Kelly Spring Cave (Dual Pit); 17 Illinois Caverns; 18 Spider Cave; 19 Metter Cave; 20 Madonnville Cave; 21 Voelker Well; 22 Belle Fontaine; **23** Danes Cave, Danes Annex Cave, and Dirks Cave; 26 Cedar Ridge Cave; 27 Rose Hole; 28 Pautler Cave; 29 Wednesday Cave; 30 Frog Cave; 31 Trout Hollow Spring; 32 Bicklein Cave; **33-38** Camp Vandeventer karst window, Camp Vandeventer Cave = Ice Box Cave, Camp Vandeventer Spring, Connecting Crevice Cave, Hidden Hand Cave, Little Cave, and Fountain Creek pump-well; 40 Antler Cave; **41** Two Row Cave and Antler Cave; 42 Bat Love Cave; 43 Andy's Run Cave; 44 Maya Spring; 45 Schipps Well; 46 Terry Spring; 47 Haney Spring; 48 Browns Cave II; 49 Dashed Hopes Pit; **50-52** Stemler well, Stemler Cave, Stemler Cave (Harres Pit); 53 Spring Valley Spring; 54 WH Spring and Karst Window; 55 Falling Springs; 56 Sparrow Spring; 57 Imbs Station Road Spring; 58 Pipe Spring; 59 Cement Hollow Spring; 60 drain tile.

Note: a **bold** number corresponds to multiple sampling locations on the figure

Cave at the Camp Vandeventer boy scout camp. The Renault karst area encompasses Fogelpole Cave (the longest cave known in Illinois with 24 kilometers of passages mapped), Krueger-Dry Run/Spider/Kelly Spring Cave System (8 kilometers), and Illinois Caverns (8.6 kilometers). Several of these sites were discussed by Bretz and Harris (1961).

FIELD WORK: METHODS

The following list presents collection records from a total of 71 sites, including 39 caves, 20 springs, 5 wells, 4 karst windows and 3 drain tiles (approximate locations are provided in Figure 1). The sampling was conducted between 20 June 1998 and 7 July 1999. The sites were sampled as appropriate using hand collecting, limburger cheese-baited pitfall traps, Berlese extraction of leaf litter, plankton netting of aquatic habitats, and placement of shrimp-baited jar traps in deep water habitats. The collected material was deposited in the institutional collections of the taxonomists identifying the specimens.

ANNOTATED LIST OF FAUNA

For each species the following list provides scientific name and author, ecological classification, common name for species of conservation interest (obligate subterranean species or species of high global rarity), localities and a suggested state and global rank of rarity. Taxa not identified to the species level or felt to be accidentals were eliminated from the list due to their limited conservation value. Our sources and definitions are as follows.

Common names are now required by many agencies and were obtained from published sources if available (e.g., Turgeon *et al.* 1998), suggestions from taxonomists, or coined if otherwise unavailable.

As discussed by Camacho (1992), the literature is replete with nomenclature for the ecological classification of subterranean organisms. Prominent among these are classification schemes using a variety of terms including troglobite (Schiner 1854, Racovitza 1907), stygobite (Thienemann 1925, Motas 1962, Viets 1959), troglomorph (Christiansen 1962), stygobiont (Husmann 1971) and stygicole (Chapman 1986). We have chosen to avoid this nomenclatural chaos by following (Table 1) the simple classification used by Peck and Lewis (1978) until a clearer consensus of classification emerges.

Localities listed are comprehensive, with known records cited, then new records given in alphabetical order by county.

One contribution of this paper intended to facilitate conservation use is the presentation of a suggested state and global rank of rarity (S and G-ranks, respectively). The basis for these ranks is the number of sites from which the species is known (Table 2). The definition of element (species) occurrence must be determined for each animal since barriers to dispersal differ from species to species. Thus, for *Ergodesmus remingtoni*, three sites that are physically separated to human entry (e.g., Danes, Pautler & Icebox caves) are easily connect-

Table 1. The ecological classification of cavernicoles as defined by Barr (1963, 1968) and Peck and Lewis (1978):

Classification	Abbreviation	Brief definition
troglobite	TB	obligate cavernicoles, live/reproduce only in caves
troglophile	TP	facultative cavernicoles, may live/reproduce in caves
trogloxene	TX	cave "visitors", must leave the cave at some point in life cycle
accidental	AC	enter caves only by accident
edaphobite	ED	soil inhabitant that may occur in caves
phreatobite	PB	groundwater animal that may occur in caves
parasite/commensal	PS	an organism that lives obligately in/on another

Table 2. Element occurrence criteria for assigning state and global rarity rankings

Rank	Criteria	Description
S1 – G1	<5 localities in Illinois / globally	critically imperiled
S2 – G2	6-20 localities in Illinois / globally	imperiled
S3 – G3	21-100 localities in Illinois / globally	vulnerable
S4 – G4	>100 localities in Illinois / globally	apparently secure
S5 – G5	widespread and common from many localities	secure
SE	exotic (introduced) species	

ed by the millipeds and thus considered a single element occurrence. After occurrences are determined the rank can be modified accordingly if the biotic potential (frequency of reproduction, number of offspring, life span) of the species is particularly high or low. Another common reason for modification of a ranking occurs with analysis of threats, such as loss of known populations due to environmental degradation (e.g., *Gammarus acherondytes*). Animals like the Illinois cave amphipod, with a very restricted range, are more sensitive to localized threats and are afforded a lower ranking. For a few species endemic to the southwestern Illinois karst all of the known sites are listed and the S/G ranks are apparent. For the other more widespread taxa listed, the rank was suggested based on the opinion of the taxonomists identifying the material (including their knowledge of unpublished records) and published sources. In the final analysis ranking remains somewhat subjective and conservation oriented agencies typically develop criteria for ranking based on criteria beyond the scope of this paper. A detailed discussion of ranking criteria is presented by Stein *et al.* (2000).

After the S/G rank a brief narrative is given to present range or occurrence information for each species and citations as deemed appropriate. G5 species are so widespread as to require no further information. Important sources by which S/G ranks could be evaluated were the Illinois cave bioinventories of Peck and Lewis (1978) and Webb *et al.* (1994). Also used were the checklists for cave faunas of Kentucky (Barr 1967), Indiana (Lewis 1983, 1998), Missouri (Gardner 1986), and the Driftless area (Peck & Christiansen 1990). In the interest of conservation of space a telegraphic style has been used in many cases to convey habitat and range information. Much of the information on species of lesser conservation interest has been placed in Table

3.

PHYLUM PLATYHELMINTHES

CLASS TURBELLARIA

ORDER TRICLADIDA

FAMILY KENKIIDAE

Sphalloplana hubrichti (Hyman) TB Hubricht's cave flatworm

Monroe Co.: Fogelpole, Juelfs, Spider caves, Illinois Caverns (Peck & Lewis 1978); Danes, Frog, Icebox, Jacobs, Kelly Spring, Madonnville, Walsh Spring, Wandas Waterfall, Wannabe Karst Window and Wednesday caves, Rose Hole, Camp Vandeventer Karst Window; **St. Clair Co.:** Stemler Cave (Peck & Lewis 1978); Dashed Hopes Pit.

S/G-rank: S3/G3; Caves and springs, western Illinois and southeastern Missouri (Kenk 1977, Peck & Lewis 1978).

PHYLUM MOLLUSCA

CLASS GASTROPODA

ORDER NEOTAENIOGLOSSA

FAMILY HYDROBIIDAE

Fontigens antroecetes (Hubricht) TB Eastern Ozark cave snail**St. Clair Co.:** Stemler Cave (Peck & Lewis 1978).

S/G-rank: S1/G1; Hershler *et al.* (1990) from Stemler Cave (type-locality), Cliff Cave, St. Louis Co. and 7 caves in Perry Co., Missouri. Of the Perry Co. sites, only three cave systems are actually involved and two of the sites (Mertz and Schindler caves) are synonyms. The continued presence of the snail in Cliff Cave, in suburban St. Louis is unknown. The population in the type-locality remains extant, but is threatened by pollution from septic systems in subdivisions surrounding Stemler Cave.

ORDER MESOGASTROPODA

FAMILY POMATIOPSIDAE

Pomatiopsis lapidaria (Say) TX**St. Clair Co.:** Stemler Cave.

S/G-rank: S5/G5; Calciphilic, semi-aquatic, eastern U.S (Hubricht 1985).

ORDER BASOMMATOPHORA

FAMILY CARYCHIIDAE

Carychium mexicanum Pilsbry TX Southern thorn snail**Monroe Co.:** Pautler Cave; **St. Clair Co.:** Dashed Hopes Pit.

S/G-rank: S1/G4; Moist litter of entrance pits, the first Illinois record and a significant range extension; otherwise occurs in the gulf coast states and eastern Mexico (Hubricht 1985).

		St. Clair County	
W. H. Spring			
W. H. Karst Window			
swale 1 mile south of Falling Sp			
Stemler Well			
Stemler Cave			
Spring Valley Spring Cave			
spring near Falling Spring			
Sparrow Spring			
Pipe (Cement Hollow) Spring			
Inbs Station Road Spring			
Falling Spring			
Falling Spring Cave			
Dupo Quarry Spring			
drain tile 1.2 km E Stolle			
Dashed Hopes Pit Cave			
Cement Hollow Spring			
Browns II Cave			
Amphipod Hall Cave			
Wildes Cave			
Wednesday Cave			
Wannabe Karst Window Cave			
Wannabe Karst Window			
Wandas Waterfall Cave			
Walsh Spring Cave			
Walsh Spring			
Walsh Seep			
Walsh Cave			
Veolker Well			
unnamed cave 2 miles north Fol			
unnamed near Wartburg Cave			
Two Row Cave			
Trout Hollow Spring			
Terry Spring Cave			
Talus Cave			
spring 2 miles north Fountain G			
Spider Cave			
seep near Valmeyer			
Saltpeter Cave			
Rose Hole			
Pautler Cave			
Myrons Misery Cave			
Metter Cave			
Maya Spring			
Madonnaville Cave			
Little Cave			
Krueger-Dry Run Cave			
Kelly Spring Cave			
Juelts Cave			
Jacobs Cave			
Illinois Caverns			
Icebox Cave			
Horseshoe Cave			
Hidden Hand Cave			
Haney Spring			
Frutis Spider Cave			
Frog Cave			
Fontabelle Cave			

**Table 3 (cont.)
Localities for
species of lesser
conservation
interest.**

Order	Family	Taxon	Ecological Classification	Rank	Monroe County										
					Andys Run Cave	Antler Cave	Bal Lower Cave	Bal Sump Cave	Belle Fontaine Spring	Bicklein Cave	Camp Vandeventer Karst Wind	Camp Vandeventer Spring	Cedar Ridge Cave	Collier Spring	Couchs Cave
PHYLUM PLATYHELMINTHES															
CLASS TURBELLARIA															
	TRICLADIDA	PLANARIIDAE	<i>Phagocata gracilis</i> (Haldeman)	TX/TP	S4/G5								L		
PHYLUM MOLLUSCA															
CLASS GASTROPODA															
	PULMONATA	PHYSIDAE	<i>Physella</i> sp. (near <i>halei</i> ?)	TP/TB	?								L		L
	MESOGASTROPODA	POMATIOPSIDAE	<i>Pomatiopsis lapidaria</i> (Say)	TX	S5/G5										
	BASOMMATOPHORA	CARYCHIIDAE	<i>Carychium exile</i> Lea	TX	S5/G5										L
	STYLOMMATOPHORA	PUPILLIDAE	<i>Pupoides albilabris</i> (Adams)	TX	S5/G5										
			<i>Gastrocopta armifera</i> (Say)	TX	S5/G5										
			<i>Gastrocopta contracta</i> (Say)	TX	S5/G5										
			<i>Gastrocopta pentodon</i> (Say)	TX	S5/G5										
		HELICODISCIDAE	<i>Helicodiscus singleyamus</i> (Pilsbry)	TX	S4/G4										L
		LIMACIDAE	<i>Deroceras laeve</i> (Muller)	TX	S5/G5									L	L
		ZONITIDAE	<i>Hawaia minuscula</i> (Binney)	TX	S5/G5										
			<i>Zonitoides arboreus</i> (Say)	TX	S5/G5								L		
		POLYGYRIDAE	<i>Inflectarius inflectus</i> (Say)	TP	S5/G5	L		L						L	
			<i>Mesodon clausus</i> (Say)	TX	S5/G5										
			<i>Xolotrema fosteri</i> (Baker)	TX	S5/G5								L		L
PHYLUM ARTHROPODA															
CLASS CRUSTACEA															
EUCOPEPODA															
SUBORDER CYCLOPOIDA															
		CYCLOPIDAE	<i>Acanthocyclops brevispinosus</i> (Herrick)	TX	S5/G5								L		
			<i>Acanthocyclops robustus</i> (Sars)	TX	S5/G5			L							
			<i>Acanthocyclops vernalis</i> (Fischer)	TX	S5/G5			L							
			<i>Acanthocyclops littoralis</i> Petkovski	TX	S5/G5			L							
			<i>Eucyclops agilis</i> (Koch)	TX	S5/G5										
			<i>Macrocyclops albidus</i> (Jurine)	TX	S5/G5			L							
			<i>Mesocyclops edax</i> (Forbes)	TX	S5/G5								L		
			<i>Microcyclops rubellus</i> (Lilljeborg)	TX	S5/G5										
			<i>Orthocyclops modestus</i> (Herrick)	TX	S5/G5			L							
			<i>Tropocyclops prasinus mexicanus</i> Kiefer	TX	S5/G5								L		
SUBORDER HARPACTICOIDA															
		CANTHOCAMPTIDAE	<i>Attheyella nordenskioldi</i> (Lilljeborg)	TX	S5/G5										
ISOPODA															
SUBORDER ONISCOIDEA															
		ARMADILLIIDIDAE	<i>Armadillidium nasatum</i> Budde-Lund	TX	SE/G5										L
		CYLISTICIDAE	<i>Cylisticus convexus</i> (DeGeer)	TX/TP	SE/G5										
		TRICHONISCIDAE	<i>Haplothalmus danicus</i> Budde-Lunde	TX/TP	SE/G5										
SUBORDER ASELLOTA															
		ASELLIDAE	<i>Caecidotea brevicauda</i> (Forbes)	TP/TP	S4/G5	L	L	L	L	L	L	L	L	L	F
	AMPHIPODA	CRANGONYCTIDAE	<i>Crangonyx forbesi</i> Hubricht & Mackin	TP	S4/G5	L	L	L	L	L	L	L	L	L	F
		GAMMARIDAE	<i>Gammarus pseudolimnaeus</i> Bousfield	TX	S5/G5									L	
			<i>Gammarus troglophilus</i> Hubricht & Mackin	TP	S4/G4	L		L	L	L	L	L	L	L	F
ARACHNIDA															
	PSEUDOSCORPIONES	NEOBISIIDAE	<i>Microbisium parvulum</i> (Banks)	TX	S5/G5										L
	ACARINA	IXODIDAE	<i>Dermacentor variabilis</i> (Say)	PS	S5/G5										L
	ARANEAE	AGELENIDAE	<i>Tegenaria domestica</i> (Clerck)	TX	S5/G5										
		LINYPHIIDAE	<i>Bathyphantes pallida</i> (Banks)	TX/TP	S4/G5			L							
			<i>Centromerus latidens</i> (Emerton)	TX/TP	S5/G5										
			<i>Centromerus cornupalpis</i> (O.P.-Cambridge)	TX	S5/G5			L							
			<i>Eperigone maculata</i> (Banks)	TX/TP	S5/G5										L
			<i>Eperigone tridentata</i> (Emerton)	TX	S5/G5										
			<i>Linyphia (Niriene) radiata</i> (Walckenaer)	TX	S5/G5										
		LYCOSIDAE	<i>Pirata sedentarius</i> Montgomery	TX	S5/G5	L	L							L	L
			<i>Schizocosa ocreata</i> (Hentz)	TX	S4/G4										V
		NESTICIDAE	<i>Eidmanella pallida</i> Emerton	TP	S5/G5								L		
		PHOLCIDAE	<i>Pholcus phalangioides</i> Fuesslin	TX	SE/G5										
		PISAUROIDAE	<i>Dolomedes scriptus</i> Hentz	TX	S4/G5										
		TETRAGNATHIDAE	<i>Meta ovalis</i> (Gertsch)	TP/TP	S5/G5								L		L
			<i>Tetragnatha shoshone</i> Levi	TX	S4/G4										
		THERIDIIDAE	<i>Achaearanea tepidariorum</i> (Koch)	TX	S5/G5										

St. Clair County												
W. H. Spring												
W. H. Karst Window												
swale 1 mile south of Falling Sp												
Stemler Well												
Stemler Cave												
Spring Valley Spring Cave												
spring near Falling Spring												
Sparrow Spring												
Pipe (Cement Hollow) Spring												
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Falling Spring												
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drain tile 1.2 km E Stolle												
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Cement Hollow Spring												
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Wildes Cave												
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Walsh Spring												
Walsh Seep												
Walsh Cave												
Vecker Well												
unnamed cave 2 miles north Fol												
unnamed near Warburg Cave												
Two Row Cave												
Trout Hollow Spring												
Terry Spring Cave												
Talus Cave												
spring 2 miles north Fountain G												
Spider Cave												
seep near Valmeyer												
Saltpeter Cave												
Rose Hole												
Pautler Cave												
Myrons Misery Cave												
Metter Cave												
Maya Spring												
Madonnaville Cave												
Little Cave												
Krueger-Dry Run Cave												
Kelly Spring Cave												
Juettis Cave												
Jacobs Cave												
Illinois Caverns												
Icebox Cave												
Horsethief Cave												
Hidden Hand Cave												
Haney Spring												
Fruitts Spider Cave												
Frog Cave												
Escondido Cave												

Carychium nannodes Clapp TX File thorn snail

Monroe Co.: Metter Cave.

S/G-rank: S1/G4; Only Illinois record; otherwise of Appalachian distribution (Hubricht 1985).

Carychium riparium Hubricht TX Floodplain thorn snail

Monroe Co.: Danes Annex, Dirks, Fogelpole, Frog, Metter and Pautler caves; **St. Clair Co.:** Dashed Hopes Pit.

S/G-rank: S2/G3; Only Illinois records. Moist leaf litter of sinkhole floors, pits, and the twilight zone of these caves.

ORDER STYLOMMATOPHORA

FAMILY PUPILLIDAE

Gastrocopta abbreviata (Sterki) TX Plains snaggletooth snail

Monroe Co.: Fogelpole Cave; **St. Clair Co.:** Stemler Cave.

S/G-rank: S2/G3; Calciphile from over a dozen states in the central U.S. from the gulf coastal area to Wisconsin and North Dakota, including three sites in Illinois (Hubricht 1985).

Gastrocopta similis (Sterki) TX

Monroe Co.: Rose Hole; **St. Clair Co.:** Stemler Cave.

S/G-rank: S3/G4; Calciphile, from New York to the Dakotas (Hubricht 1985).

FAMILY STROBILOPSIDAE

Strobilops affinis Pilsbry TX Eightfold pinecone snail

St. Clair Co.: Stemler Cave.

S/G-rank: S2/G3; Leaf litter, Massachusetts west to Illinois and eastern Missouri, but known from relatively few localities (Hubricht 1985).

FAMILY PHILOMYCIDAE

Philomyces togatus (Gould) TX Toga mantleslug

Monroe Co.: Cedar Ridge Cave.

S/G-rank: S1/G4; Only known Illinois population and a large range extension of this Appalachian species, unknown from the intervening area of Indiana and western Ohio (Hubricht 1985).

FAMILY HELICODISCIDAE

Helicodiscus notius notius Hubricht TX Tight coil snail

Monroe Co.: Fogelpole Cave.

S/G-rank: S2/G4; Leaf litter on hillsides and ravines, common troglone, many sites in the southeastern U.S., including southwestern Illinois (Hubricht 1985); reported by Gardner (1986) from six Missouri caves.

Helicodiscus undescribed species TP/TX Undescribed terrestrial snail

Monroe Co.: Bat Love and Pautler cave, Rose Hole; **St. Clair Co.:** Stemler Cave.

S/G-rank: S1/G1; Resembles a hypertrophied *Helicodiscus parallelus* (Say), related to *H. eidenmanni*, a facultative cavernicole in Texas (Hubricht 1985, Grimm in litt. 1999).

FAMILY ZONITIDAE

Glyphalinia latebricola Hubricht TX Stone glyph snail

St. Clair Co.: Stemler Cave.

S/G-rank: S1/G2; Only Illinois record, the only published record is from northeastern Alabama (Hubricht 1985); Lewis (1998) found the snail in a cave in Orange County, Indiana.

Glyphalinia luticola Hubricht TX Furrowed glyph snail

Monroe Co.: Metter, Pautler and Wednesday caves; **St. Clair Co.:** Dashed Hopes Pit, Stemler Cave.

S/G-rank: S1/G4; Only Illinois records, typically found in moist floodplain forests in the southeastern U.S. (Hubricht 1985).

Paravitrea undescribed species TX Undescribed terrestrial snail

St. Clair Co.: Stemler Cave.

S/G-rank: S1/G1; Only known locality for this undescribed species.

Paravitrea undescribed species TX Undescribed terrestrial snail

Monroe Co.: Wednesday Cave.

S/G-rank: S1/G1; Only known locality for this undescribed species, which is distinct from the above species from Stemler Cave.

Ventridens intertextus (Binney) TX Pyramid dome snail

Monroe Co.: Danes Annex Cave.

S/G-rank: S1/G4; Only known Illinois record, a significant range extension to the west, mostly occurs in a band paralleling the Appalachians and extending south to Louisiana, frequently found in acidic habitats (Hubricht 1985).

Zonitoides nitidus (Muller) TX

Monroe Co.: Dirks, Pautler and Wednesday caves.

S/G-rank: S2/G5; Holarctic, reported from the northern tier of counties in Illinois (Hubricht 1985).

FAMILY POLYGYRIDAE

Xolotrema denotata (Ferussac) TX Velvet wedge snail

Monroe Co.: Danes Cave.

S/G-rank: S1/G4; Appalachians, west to three reported sites in southeastern Illinois (counties along the Wabash River), west to eastern Arkansas; previously unknown from other parts of Illinois (Hubricht 1985).

PHYLUM ARTHROPODA

CLASS CRUSTACEA

ORDER ISOPODA

FAMILY ASELLIDAE

Caecidotea packardii Mackin & Hubricht TB Packard's cave isopod

Monroe Co.: Fogelpole, Fruths Spider, Juelfs, Horsethief, Pautler, Terry Spring caves, Illinois Caverns (Peck & Lewis 1978), Antler, Danes, Frog, Icebox, Jacobs, Icebox, Kelly Spring, Krueger-Dry Run, Madonnaville, Spider, Walsh Spring, Wandas Waterfall and Wannabe Karst Window caves, Rose Hole, Haney Spring; **St. Clair Co.:** Falling Spring and Stemler caves (Peck & Lewis 1978), Dashed Hopes Pit Cave.

S/G-rank: S3/G3; Reported from 10 caves, springs and a pumpwell in Illinois, one record from a cave in Lincoln Co., Missouri (Lewis & Bowman 1981); found to be rare or absent despite seemingly suitable habitat in some caves in Monroe County.

Caecidotea spatulata Mackin & Hubricht PB Flat-tailed groundwater isopod

St. Clair Co.: swale 1 mile south of Falling Spring (type-locality).

S/G-rank: S1/G2; Reported by Mackin and Hubricht (1940) from temporary pools in St. Clair Co., Illinois, St. Louis and Boone counties in eastern Missouri; Lewis and Bowman (1981) regarded as a groundwater inhabitant. The type-locality has been heavily modified with quarry spoil and we were unable to find this species despite an exhaustive search (Lewis 2000a).

ORDER AMPHIPODA

FAMILY CRANGONYCTIDAE

Baetrurus brachycaudus Hubricht & Mackin TB Eastern Ozark cave amphipod

Monroe Co.: Fogelpole, Icebox, Juelfs, Pautler, Terry Spring and unnamed near Wartburg caves, Illinois Caverns (Peck & Lewis 1978), Andys Run, Antler, Danes, Frog and Jacobs caves, Rose Hole, seep near Valmeyer, Walsh Seep; **St. Clair Co.:** Stemler Cave and spring near Falling Spring (Peck & Lewis 1978), Dashed Hopes Pit Cave, Cement Hollow, Imbs Station Road and pipe spring (Cement Hollow) springs, Schipps Well.

S/G-rank: S3/G3-4; Cave streams or seep springs; east central Missouri into southwestern Illinois. Reported from 19 Illinois caves, springs and seeps, 4 sites in Missouri (Peck & Lewis 1978). Gardner (1986) from caves in 13 Missouri counties.

Stygobromus subtilis (Hubricht) TB/PB Western Illinois groundwater amphipod

Monroe Co.: Saltpeter Cave (Peck & Lewis 1978).

S/G-rank: S2/G2; Found in drip pools in Saltpeter Cave, otherwise reported from eight caves and seeps in Illinois, one cave in Missouri (Peck & Lewis 1978).

FAMILY GAMMARIDAE

Gammarus acherondytes Hubricht & Mackin TB Illinois cave amphipod

Monroe Co.: Fogelpole, Krueger-Dry Run and Pautler caves, Illinois Caverns (Peck and Lewis 1978), Madonnaville (Oliver & Graham 1988), Cedar Ridge, Danes, Frog, Spider and Wednesday caves, Rose Hole. **St. Clair Co.:** Stemler Cave (Peck & Lewis 1978).

S/G-rank: S1/G1; Endemic to the karst of Monroe and St. Clair counties, previously known populations were summarized by Webb et al. (1998), now known extant in six drainage conduits: (1) Fogelpole, (2) Illinois Caverns, (3) Krueger-Dry Run (including Spider Cave), (4) Pautler/Danes/Rose Hole, (5) Frog Cave, (6) Annbriar (Wednesday Cave and possibly Cedar Ridge Cave). In addition to the 10 cave populations in these six drainages, a single specimen was taken in Madonnaville Cave (in 1986), but a collection from the cave in 1995 failed to demonstrate its presence (Webb 1995). A collection in Stemler Cave likewise failed to demonstrate its presence (Webb 1995). The amphipod was not found in Stemler Cave during sampling for this project nor in community censusing in the main stream passage.

Gammarus minus Say TX

Monroe Co.: Andys Run, Juelfs and Madonnaville caves (Webb 1995);

Collier, Haney and Trout Hollow springs. **St. Clair Co.:** Falling Spring (Peck & Lewis 1978), Stemler Cave (Webb *et al.* 1994).

S/G-rank: S5/G5; Springs and cave streams, eastern U.S. (Holsinger 1972).

CLASS ARACHNIDA

ORDER PSEUDOSCORPIONES

FAMILY CHTHONIIDAE

Chthonius virginicus vs. *tetrachelatus* TX

Monroe Co.: Hidden Hand, Icebox caves.

S/G-rank: S1/G3; If this is *Chthonius virginicus*, these are the only known Illinois records (elsewhere from two caves and two epigeal sites in Ohio, also Virginia, Maryland, North Carolina and the District of Columbia (Muchmore 1994), plus three Indiana caves (Lewis 1998). This group needs revision and it is impossible to separate *virginicus* from *tetrachelatus* at present (Muchmore in litt. 2001).

Mundochthonius cavernicolus Muchmore TB Illinois cave pseudoscorpion

Monroe Co.: Saltpeter Cave (Peck & Lewis 1978), Fogelpole Cave (Gardner 1986).

S/G-rank: S1/G1; Described from a single specimen taken in Saltpeter Cave (Muchmore 1968), endemic to the Renault karst area of Monroe Co., Illinois. A visit to the cave by JLL for the Illinois Natural Area Inventory in 1976 failed to find the pseudoscorpion. Two additional trips to the cave made during this survey including placing 10 pitfalls also failed to demonstrate its presence. Gardner (1986) reported *M. cavernicolus* from Fogelpole Cave, as well as a cave in Lincoln County, Missouri. Muchmore (in litt. 2001) now believes that the Missouri specimens represent an undescribed species.

ORDER PHALANGIDA

FAMILY ISCHYROPALIDAE

Sabacon cavicolens (Packard) TP Cavernicolous harvestman

Monroe Co.: Fogelpole Cave.

S/G-rank: S1/G3; Southeastern U.S.; reported as *Sabacon* sp. from a cave in Johnson Co., Illinois (Peck & Lewis 1978) and one surface population in Illinois (Shear 1975). Lewis (1998) in two Indiana caves.

ORDER ARANEAE

FAMILY AGELENIDAE

Cicurina arcuata Keyserling TX

Monroe Co.: Illinois Caverns (Webb *et al.* 1994).

Webb *et al.* 1994 reported *Cicurina arcuata* (sic) from Illinois Caverns. This species was reported by Chamberlin and Ivie (1940) only from the type-locality in Arcata, California, suggesting a transcription error by Webb *et al.* (1994) of *Cicurina arcuata*, an occasional troglone widespread in the eastern U.S. and Canada.

Cicurina brevis (Emerton) TX

Monroe Co.: Cedar Ridge Cave.

S/G-rank: S3/G4; Chamberlin and Ivie (1940) from about 20 localities across the eastern U.S. and Canada, where it is presumed common in suitable habitats. Gardner (1986) from one Missouri cave.

Cicurina cavealis Crosby and Bishop TP Cavernicolous funnel web spider

Monroe Co.: Saltpeter Cave (Peck & Lewis 1978).

S/G-rank: S1/G3; Chamberlin and Ivie (1940) from two caves in Missouri and one in Arkansas. Gardner (1986) from several other Missouri caves.

FAMILY LINYPHIIDAE

Eperigone indicabilis Crosby and Bishop TX Minuscule sheet web spider

Monroe Co.: Illinois Caverns (Webb *et al.* 1994).

S/G-rank: S1/G1; Smallest of the linyphiid spiders (about one millimeter long), the S/G-ranks are probably inflated since the range is wide. Reported by Lewis (1994) from litter in William Cleveland Cave, Indiana; only other known collection is from the type-locality in New York (Millidge 1987).

Phanetta subterranea (Emerton) TB

Monroe Co.: Horsethief, Icebox, Juelfs and Terry Spring caves, Illinois Caverns (Peck & Lewis 1978), Antler, Bat Love, Bat Sump, Bicklein, Danes, Dirks, Fogelpole, Frog, Hidden Hand, Jacobs, Madonnville, Pautler, Spider, Wandas Waterfall, Wannabe Karst Window and Wednesday caves, Rose Hole; **St. Clair County:** Browns II, Dashed Hopes Pit and Stemler caves.

S/G-rank: S3/G4; Eastern U.S., reported from over a dozen states, but only from caves (Millidge 1984).

Porrhomma cavernicola (Keys) TB Cavernicolous sheet web spider

Monroe Co.: Krueger-Dry Run Cave (Peck & Lewis 1978).

S/G-rank: S1/G3; *Porrhomma* sp. (Peck & Lewis 1978) presumably refers to *P. cavernicola*, the only cavernicolous species of the genus that occurs in the eastern U.S., where it is widespread, but sporadic in its occurrence.

FAMILY MYSMENIDAE

Maymena ambita (Barrows) TP Minute cave spider

Monroe Co.: Saltpeter Cave (Peck & Lewis 1978).

S/G-rank: S1/G2; Reported by Gertsch (1960) from 11 sites, including caves in Kentucky, Tennessee and Alabama. Sutton (1993) found it in 2 caves in Missouri.

CLASS DIPLOPODA

ORDER POLYDESMIDA

FAMILY NEARCTODESMIDAE

Ergodesmus remingtoni (Hoffman) TB Illinois cave milliped

Monroe Co.: Pautler Cave (Peck & Lewis 1978), Danes Cave, Rose Hole.

S/G-rank: S2/G2; The only U.S. nearctodesmid outside the Pacific Northwest, restricted to western Illinois counties of Adams, Jersey, Pike and Monroe (Hoffman 1962, Peck & Lewis 1978) and disjunctly in Cave Spring Cave, Hardin County (Shelley 1994). Known from eight caves, although Pautler and Danes caves as well as Rose Hole are parts of the same system.

FAMILY MACROSTERNODESMIDAE

Chaetaspis sp. TB Undescribed cave milliped

Monroe County: Pautler Cave (Peck & Lewis 1978), Danes, Icebox Cave.

S/G-rank: S1/G1; Peck and Lewis (1978) reported juveniles of an undescribed species of *Antridesmus*, a synonym of *Chaetaspis* (Hoffman 1999), from Pautler Cave. Additional females were taken in the above caves during this project. The original collection was identified by Dr. N. Causey from females, but the cave lies within the range of *Chaetaspis albus* (Hoffman 1999) and a male specimen will be necessary to determine the identity of the species. *Chaetaspis* contains three troglotic (or perhaps edaphic) species from Tennessee and Kentucky, with a fourth being described from Tumbling Creek Cave, Missouri (Lewis in progress 2002a).

ORDER CHORDEUMATIDA

FAMILY CONOTYLIDAE

Austrotyla specus (Loomis) TP Eastern Ozark cave milliped

Monroe Co.: Horsethief, Icebox and Krueger-Dry Run caves, Illinois Caverns (Peck & Lewis 1978), Bat Love, Bat Sump, Bicklein, Danes, Danes Annex, Dirks, Fogelpole, Frog, Hidden Hand, Jacobs, Juelfs, Kelly Spring, Madonnville, Metter, Pautler, Spider, Two Row, Wandas Waterfall, Wannabe Karst Window and Wednesday caves, Rose Hole; **St. Clair Co.:** Stemler Cave (Peck & Lewis 1978), Brown II Cave.

S/G-rank: S3/G3-4; Illinois, eastern Missouri, southern Wisconsin, eastern Iowa and southern Minnesota (Shear 1971). Surface populations were reported in the northern part of the range, in the southern part of its range limited almost, or entirely, to caves. At Metter and Danes Annex caves the millipeds were taken from sinkhole floors (i.e., sheltered epigeal habitat).

CLASS INSECTA

ORDER COLLEMBOLA

FAMILY ENTOMOBRYIDAE

Pseudosinella undescribed species near *argentea* TB Undescribed cave springtail

Monroe Co.: Saltpeter (Peck & Lewis 1978), Fogelpole, Spider and Wandas Waterfall caves.

S/G-rank: S2/G2; Peck and Lewis (1978) from 3 caves in Illinois and one in Missouri (Lewis 1974), to which Gardner (1986) added 6 more caves. *Pseudosinella* unidentifiable to species were also taken from Bat Love and Cedar Ridge caves.

FAMILY HYPOGASTRURIDAE

Sensillanura illina Christiansen & Bellinger TX Illinois springtail

Monroe Co.: Bat Sump Cave.

S/G-rank: S1/G1; Known only from Karber's Ridge, Illinois; a site in Johnson Co., Illinois, and the above record (Christiansen & Bellinger 1998a).

FAMILY ONCOPODURIDAE

Oncopodura iowae Christiansen TB Iowa cave springtail

Monroe Co.: Fogelpole Cave, Illinois Caverns.

S/G-rank: S1/G2; Christiansen *et al.* (1961), Christiansen and Bellinger (1998c) from caves in Iowa and Missouri, and a reference therein to an Illinois locality is based on an unpublished 1959 collection in Illinois Caverns (Christiansen, in litt. 2000). Christiansen and Bellinger (1996) reported that all

Oncopodura are either troglotic or edaphic, are very uncommon, fragile, and usually represented in collections by very few specimens.

FAMILY ONYCHIURIDAE

Onychiurus relictus Christiansen TP Glistening springtail

Monroe Co.: Bat Sump, Fogelpole, Hidden Hand and Saltpeter caves;
St. Clair Co.: Stemler Cave.

S/G-rank: S3/G3; Widespread in caves, few reports of surface populations (Christiansen 1982), reported from about two dozen caves in Missouri (Gardner 1986) and several in Indiana (Lewis 1998).

Onychiurus undescribed species TB Undescribed cave springtail

Monroe Co.: Bat Love, Fogelpole, Frog and Icebox caves.

S/G-rank: S1/G1; Known only from these caves. This genus contains numerous undescribed species (Christiansen, in litt. 2000).

FAMILY SMINTHURIDAE

Arrhopalites carolynae Christiansen & Bellinger TB Carolyn's cave springtail

Monroe Co.: Hidden Hand and Saltpeter caves.

S/G-rank: S1/G2; Only Illinois records, known from seven caves in Virginia (Christiansen & Bellinger 1996b, 1998d) and one in Indiana (Lewis 2002b in progress).

Arrhopalites undescribed species TB Undescribed cave springtail

Monroe Co.: Frog, Hidden Hand, Jacobs, Madonnaville and Pautler caves, Rose Hole.

S/G-rank: S2/G2; Riparian habitats, known only from the above caves.

Arrhopalites ater Christiansen & Bellinger TB Black Medusa cave springtail

Monroe Co.: Bicklein, Danes and Fogelpole caves.

S/G-rank: S1/G2; Known from 5 caves in southern Indiana (Lewis 1998, Christiansen & Bellinger 1998d). The morphology of the specimens from Illinois is slightly different, tentatively regarded as geographic variation (Christiansen, pers. comm. 2000).

Arrhopalites hirtus Christiansen TB/ED Hairy cave springtail

Monroe Co.: Fogelpole and Little caves.

S/G-rank: S1/G2; Christiansen (1966) from a drain tile in Union Co., Illinois, as well as caves in Iowa, Wisconsin and Ohio.

Arrhopalites lewisi Christiansen & Bellinger TB Lewis' cave springtail

Monroe Co.: Icebox Cave.

S/G-rank: S1/G2; Only Illinois record, known from caves in southern Indiana (Lewis 1998, Christiansen & Bellinger 1998d).

Arrhopalites whitesidei Jacot TP Whiteside's springtail

Monroe Co.: Saltpeter Cave (Peck & Lewis 1978).

S/G-rank: S1/G2; Caves in the eastern U.S., including 5 Missouri counties (Gardner 1986, Christiansen 1966).

FAMILY TOMOCERIDAE

Tomocerus (Lethemurus) missus Mills TB Relict cave springtail

Monroe Co.: Illinois Caverns (Peck & Lewis 1978), Bat Love and Pautler caves, Rose Hole; **St. Clair Co.:** Stemler Cave.

S/G-rank: S2/G2; Christiansen (1964) speculated that this species may be the last remnant of a group that was otherwise known only from Japan. Previously known from Illinois Caverns and Brainard Cave (type-locality) in Illinois, three caves in Indiana (Lewis 1998, single caves in Virginia and Tennessee, plus caves in Colorado. Even in areas collected rather thoroughly, like Missouri (Gardner 1986) or Indiana (Lewis 1998, 2002b) the species occurs sporadically. Christiansen (in litt. 1999) believes it is quite likely that two or more species are involved.

ORDER DIPLURA

FAMILY CAMPODEIDAE

Eumesocampa sp. TB Undescribed cave dipluran

Monroe Co.: Horsethief, Icebox Madonnaville caves (Peck & Lewis 1978), Bat Sump, Bicklein, Danes, Fogelpole, Frog, Jacobs and Pautler caves, Rose Hole; **St. Clair County:** Browns II and Stemler caves.

S/G-rank: S2/G3; Known only from the above localities and six populations in caves of Jefferson, St. Genevieve and Perry counties in Missouri.

Eumesocampa sp. TB Undescribed cave dipluran

Monroe Co.: Bat Love Cave.

S/G-rank: S1/G1; This species appears related to, but morphologically distinct, from the *Eumesocampa* listed above (Ferguson, in litt. 1999).

Haplocampa sp. TB Undescribed cave dipluran

Monroe Co.: Illinois Caverns (Peck & Lewis 1978), Bicklein, Fogelpole, Jacobs, Pautler and Spider caves, **St. Clair Co.:** Stemler Cave.

S/G-rank: S2/G2; Reported previously in Illinois only from Illinois Caverns (Peck & Lewis 1978), is conspecific with populations in Crawford and Washington counties, Missouri (Ferguson, in litt 1999).

ORDER ORTHOPTERA

FAMILY GRYLLACRIDIDAE

Ceuthophilus elegans Hubbell TX

Monroe Co.: Fogelpole Cave, Illinois Caverns (Peck & Lewis 1978), Bicklein, Cedar Ridge, Couchs, Danes, Jacobs, Juelfs, Kelly Spring, Madonnaville, Pautler, Spider, Two Row, Wandas Waterfall and Wednesday caves, Rose Hole; **St. Clair Co.:** Stemler Cave.

S/G-rank: S3/G4; Common in the caves of this area and of the *Ceuthophilus* found in Monroe/St. Clair county caves, this is the species that occurs the deepest in the caves; a prairie species reported by Hubbell (1936) from about 20 sites, six in Illinois.

Ceuthophilus seclusus Scudder TX Secluded camel cricket

Monroe Co.: Krueger-Dry Run Cave (Peck & Lewis 1978).

S/G-rank: S1/G3; Reported from about 25 sites by Hubbell (1936), first reported from Illinois by Peck and Lewis (1978). Not found in additional caves, but occurred on oat meal trails at Camp Vandeventer adjacent to Hidden Hand and Little caves. Gardner (1986) reported it from 36 Missouri caves.

Ceuthophilus williamsoni Hubbell TX Williamson's camel cricket

Monroe Co.: Little Cave.

S/G-rank: S2/G3; Hubbell (1936) from 11 sites, two in Illinois, with the rest in Missouri and Iowa. Six of Hubbell's sites were caves. Several of these crickets were also present in a collection made on an oatmeal trail at Camp Vandeventer along the creek bank adjacent to Little Cave. Gardner (1986) reported it from 35 Missouri caves.

ORDER COLEOPTERA

FAMILY CARABIDAE

Rhadine larvalis LeConte TP Masked ground beetle

St. Clair Co.: Falling Spring Cave (Peck & Lewis 1978).

S/G-rank: S1/G2; One of two eastern *Rhadine*, also known from caves in Alabama and Florida (Barr, in litt 2000).

FAMILY LEIODIDAE

Ptomophagus cavernicola Schwarz TP

Monroe Co.: Bat Love, Cedar Ridge, Fogelpole, Icebox, Jacobs, Little, Pautler, Two Row and Wandas Waterfall caves; **St. Clair County:** Stemler Cave.

S/G-rank: S2/G4; Only Illinois records of this widespread troglitic species, previously unknown from the state. Known almost entirely from caves, two surface collections exist; known from Mexico north to the Ozarks, then east to Florida (Peck 1973). Gardner (1986) reported from over 50 Missouri caves.

FAMILY STAPHYLINIDAE

Tychobythinus bythinoides (Brendel) TP Cave-loving ant beetle

Monroe Co.: Pautler Cave.

S/G-rank: S1/G3-G4; Illinois to New England, but sporadic; three of the five known species of *Tychobythinus* are troglitic (Chandler 1997).

Thesiastes fossulatus (Brendel) TX Grooved ant beetle

St. Clair Co.: Dashed Hopes Pit.

S/G-rank: S3/G3; Leaf litter on the pit floor.

Aleochara lucifuga (Casey) TP Cavernicolous rove beetle

Monroe Co.: Frog Cave; **St. Clair Co.:** Stemler Cave.

S/G-rank: S1/G3-G4; Previously known in Illinois from Burton Cave, Adams Co. (Peck & Lewis 1978). Recorded only from caves and animals burrows; largely Appalachian from southern Pennsylvania to northern Alabama (Klimaszewski & Peck 1986). Lewis (1998) found it in several southern Indiana caves.

ORDER DIPTERA

FAMILY SPHAEROCERIDAE

Spelobia tenebrarum (Aldrich) TB

Monroe Co.: Antler, Bat Love, Bat Sump, Bicklein, Cedar Ridge, Couchs, Danes, Danes Annex, Dirks, Fogelpole, Frog, Hidden Hand, Jacobs, Juelfs, Icebox, Kelly Spring, Little, Madonnaville, Myrons Misery, Pautler, Saltpeter, Spider, Two Row, Wandas Waterfall, Wannabe Karst Window and Wednesday caves, Illinois Caverns, Rose Hole. **St. Clair County:** Browns II, Dashed Hopes Pit and Stemler caves.

S/G-rank: S4/G5; One cave in Illinois by Peck and Lewis (1978), but the unidentified *Leptocera* sp. reported from 20+ caves therein was probably this

species. Marshall and Peck (1985) found that of over a hundred populations in the eastern U.S., all were from caves. They also described troglomorphisms that, when combined with its apparent restriction to cave habitats, indicated that this species was troglobitic. This species and *Megaselia cavernicola* probably occur in most Illinois caves.

DISCUSSION

RESULTS

Forty one species of global rarity are reported from the SHPK, of which 12 were G1, 14 G2 and 15 G3. Of these, 20 were reported by Peck and Lewis (1978), and Webb *et al.* (1998) added *Eperigone indicabilis*. Of the 71 sites visited, 39 produced at least one species of significance. For conservation purposes, all sites were rank-ordered by the number of global and state rare species present, as well as the number of troglobites. This produced a prioritized list for conservation purposes, e.g., acquirement of property (Table 4). Fogelpole and Stemler caves had the highest number of globally rare species with 18 and 16, respectively. The Pautler Cave System (combined Danes, Pautler, Camp Vandeventer caves and Rose Hole) had 20 globally and state rare species.

Twenty-four taxa thought to be obligate subterranean species were found. The highest number of troglobites found in a single cave was 14 at Fogelpole, although the Pautler Cave System was found to be inhabited by 16 troglobites. The zoogeographic and evolutionary scenario proposed by Peck and Lewis (1978) remains unchanged by the data presented here. With the discovery of *Caecidotea packardi* in southeastern Missouri (Lewis & Bowman 1981), all aquatic troglobites known from the SHPK except *Gammarus acherondytes* are known from southeastern Missouri. The isolation of the karst subunits of the SHPK is illustrated by the endemism of *Mundocthonius cavernicolus* to the Renault karst, and by *Chaetaspis* undescribed species and *Eumesocampa* undescribed species to the Waterloo karst. Although found outside of the SHPK, within the project area *Fontigens antroecetes* is known only from the Columbia karst, *Ergodesmus remingtoni* and *Arrhopalites lewisi* from the Waterloo karst, and *Stygobromus subtilis* and *Oncopodura iowae* from the Renault karst.

PROBLEMATIC SPECIES

The presence of a milliped of the genus *Scoterpes* in Illinois was reported by Shear (1969) from an unspecified site in western Illinois, speculated by Peck and Lewis (1978) to be Illinois Caverns. Neither Peck and Lewis (1978), Webb *et al.* (1994), nor this survey demonstrated the presence of *Scoterpes* in Illinois. Shear (in litt. 1999) was unable to provide further information on a locality and has seen no specimens of *Scoterpes* from Illinois. We have not included *Scoterpes* in the species list as we have been unable to verify its presence.

The troglobitic leiodid *Ptomophagus nicholasi* was described from Fogelpole Cave (Barr 1963), however Peck (1984) found this species to be identical to *P. hirtus* from the Mammoth Cave area of central Kentucky. The collector had

Table 4. Sites in the SHPK rank-ordered by the number of globally rare species and number of troglobites present

Site	Globally Rare Species	Troglobites
Fogelpole Cave	17	14
Stemler Cave	14	10
Pautler Cave	12	10
Rose Hole	10	10
Frog Cave	10	8
Illinois Caverns	9	9
Danes Cave	8	9
Jacobs Cave	7	8
Salt peter Cave	7	5
Spider Cave	6	7
Madonnville Cave	6	7
Camp Vandeventer Cave	6	6
Bat Love Cave	5	5
Hidden Hand Cave	5	4
Bicklein Cave	4	5
Wednesday Cave	4	4
Bat Sump Cave	3	5
Juelfs Cave	3	4
Wandas Waterfall Cave	3	4

been collecting in Mammoth Cave prior to visiting Fogelpole cave and the possibility of a mislabeled specimen from Kentucky was suggested (Peck & Lewis 1978). Due to the inability to rediscover *Ptomophagus nicholasi* in any Illinois cave, the unlikely dispersal event needed to explain the presence of a *P. hirtus*-like population in Illinois, and the possibility of labeling error, Peck (1984) suggested that the species in fact never existed and *P. nicholasi* was synonymized with *P. hirtus*.

STATUS OF *GAMMARUS ACHERONDYTES*

This species was previously recorded from six caves, to which we add six new sites (see species account), including those in the Annbriar and Frog Spring groundwater systems where the amphipod was not formerly known to occur. At present, the largest known population of *G. acherondytes* is known from Frog Cave (Lewis 2002c in progress). Pautler Cave had been reported as physically closed and the status of the amphipod was unknown (Webb 1995). In 1999 we found the cave to be open and *G. acherondytes* present. Preliminary findings (Lewis 2002c in progress) indicate that the second largest known population of *G. acherondytes* occurs in Pautler Cave. Identical to the finding of Webb (1995), we were unable to demonstrate the presence of *Gammarus acherondytes* in Stemler Cave, where the species was previously known to occur (Peck & Lewis 1978). We were furthermore unable to find *G. acherondytes* in any other site in the Columbia karst subunit. In Illinois Caverns *G. acherondytes* is present in the main entrance passage but disappears downstream (Lewis 2000b). The disappearance of the amphipod correlates with a decrease in the diversity of the invertebrate community and the appearance of filamentous biofilms on rocks in the stream (Lewis 2000b).

Gammarus acherondytes was found to have a wider habitat preference than found by Webb *et al.* (1998), that is, gravel riffle habitat of large streams such as in Illinois Caverns and Fogelpole Cave. We found the amphipod in similar habitat in

Spider and Frog caves, as well as in narrow headwater streamlets (less than 30 cm across) in Rose Hole and Wednesday Cave. In the latter, *G. acherondytes* was taken from a scoured rimstone pool with a bare limestone substrate containing only a couple of cobbles. The amphipod also accepts pool habitats (Lewis 2000b, 2002c in progress).

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ADDENDUM

As this paper was being sent to press new collections of *Gammarus acherondytes* were made in the following Monroe County localities: Snow White Cave (Dual Spring groundwater basin), Rick's Pit (Luhr Spring groundwater basin), Reverse Stream, Jason's Surprise and Triple Delight caves (Annabriar Spring groundwater basin). The first two sites represent the presence of the amphipod in previously unknown drainage basins.

The milliped *Ergodesmus remingtoni* was also found in Jason's Surprise Cave.

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