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## Vertebrate Fauna of Abandoned Mines at Gold Mine Springs, Independence County, Arkansas

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In their second in a series of papers on cave fauna of Arkansas, McDaniel and Gardner (1977) provided records of mammalian fauna (primarily bats) that utilize mines in the Ouachita and Ozark Mountains. Saugey et al. (1985) reported on the use of abandoned mines by the Caddo Mountain salamander, *Plethodon caddoensis* in the Ouachitas. In a more exhaustive study of vertebrates in abandoned mines of the Ouachitas by Heath et al. (1986), a great deal of information was added to the growing knowledge of mine use by vertebrate fauna. Herein, we report ecological data on vertebrate fauna in a series of mines in the eastern Ozarks.

Between December 1991 and March 1995, we made eight visits to a series of three abandoned mines (designated numbers 1, 2, and 3) located 12.1 km NW of Possum Grape at Gold Mine Springs, Independence County (T11N-R4W-S32). This site is within the eastern limit of the Ozark Mountains (most eastern extent of Boston Mountains) near the Gulf Coastal Plain boundary. Habitat consisted of vegetation typical of upland hardwood forest in sandstone-limestone soils.

The entrance of mine shaft no. 1 faced to the northeast and measured (width x height) 2.6 m x 1.0 m. A straight shaft averaging 1.6 m x 1.8 m led to a room 2.4 m x 2.9 m. During the study period, this mine was the wettest, had the highest humidity, and the coolest air temperatures of the three. The opening of mine shaft no. 2 was 37 m from no. 1 and faced the east and measured 2.7 m x 1.3 m. The shaft was short and led to a room 5.0 m x 3.3 m. Mine shaft no. 3 was located 6.7 m from no. 2 and faced the southeast and its entrance measured 2.2 m x 1.3 m. A small shaft led to a room 1.3 m x 2.0 m. The shaft abruptly ended some 23 m into the mine. This mine was the driest, warmest, and shortest of the three.

On each visit, vertebrates were collected by hand, aquatic dipnet, or with Pilstrom tongs (Pilstrom, Fort Smith, AR). When possible, amphibian and reptile voucher specimens were collected, sexed, and measured for snout-vent length (SVL) and retained for deposition in the Arkansas State University Museum of Zoology (ASUMZ). Specimens of mammalian taxa were prepared as alcoholic vouchers and deposited in the Collection of

Recent Mammals of Arkansas State University (ASU).

The probable ecological adaptation of each species in the mines was noted following terminology developed for facultative (accidental, troglonexes, trogliphiles) and obligate (trogllobites) cave fauna by Barr (1963) and followed by McDaniel and Gardner (1977). Comments regarding status, life history, and distributional information within Arkansas are included.

Sixteen vertebrate taxa, including two salamanders, six frogs and toads, two lizards, one snake, one bird, and four mammals were found to utilize these mines. The majority of vertebrates were collected from mine shaft no. 1. No fish or trogllobitic vertebrates were found in any of the three mines surveyed. An annotated listing of vertebrate fauna follows:

### Annotated List of Vertebrate Fauna in Abandoned Mines at Gold Mine Springs

#### Class Amphibia

##### Order Caudata

##### Family Plethodontidae

*Eurycea multiplicata griseogaster* Moore and Hughes, 1941. Troglophile. Two adult graybelly salamanders (SVL = 42, 44 mm) were found in mine no. 1 on our first visit (23 December 1991) and two additional salamanders (SVL = 44, 47 mm) were collected on the last visit (13 March 1995). Heath et al. (1986) previously reported larval and adult many-ribbed salamanders, *E. multiplicata multiplicata* (Cope, 1869) from Ouachita mines. In addition, McAllister and Fitzpatrick (1985) reported neotenic *E. m. griseogaster* from Savoy Cave, Washington County. However, to our knowledge, this documents the first time the graybelly salamander has been reported from mine habitat. Specimens deposited as ASUMZ 18113-18114, 20143-20144.

*Plethodon albagula* Grobman, 1944. Troglophile. Numerous western slimy salamanders, including juveniles and adults, utilized all three mines as habitat. Breeding activity and brooding behavior was not observed. Heath et al. (1986) observed reproductive activity by *P. albagula*

et al. (1986) observed reproductive activity by *P. albagula* in abandoned mines in the Ouachita Mountains. This salamander is commonly found in caves of the Ozarks (McDaniel and Gardner, 1977), and was the most common salamander of these mines. Specimens deposited as ASUMZ 18018, 19827-19828.

#### Order Anura

##### Family Bufonidae

*Bufo americanus charlesmithi* Bragg, 1954. Accidental. Two adult dwarf American toads (38, 42 mm SVL) were collected on a single visit on 18 August 1993 within the entrance zone of mine no. 2. The toads may have used the mine as a water source during the summer. Bufonids have not been reported previously from Arkansas mine or cave habitat. Specimens deposited as ASUMZ 19218-19219.

##### Family Hylidae

*Hyla cinerea* (Schneider, 1792). Accidental. Three adult green treefrogs (SVL range 30-32 mm) were collected within the entrance zone of mine no. 2 on 2 October 1994. Primarily an epigeal species, *H. cinerea* is reported from mine habitat for the first time. Specimens deposited as ASUMZ 19854-19856.

*Pseudacris crucifer crucifer* (Wied-Neuwied, 1838). Accidental. A single adult male northern spring peeper (SVL = 38 mm) was collected several meters within mine no. 1 (transition zone) on 18 August 1993. McDaniel and Gardner (1977) previously reported several *P. c. crucifer* from an Ozark cave in Stone County. Typically an epigeal species, this represents the first report of *P. c. crucifer* from mine habitat. Specimen deposited as ASUMZ 19228.

*Pseudacris triseriata* (Wied-Neuwied, 1838). Accidental. A single adult male western chorus frog (SVL = 27 mm) was collected on 18 August 1993 within the entrance zone of mine no. 1. Another epigeal hylid, this frog is reported from mine habitat for the first time. Specimen deposited as ASUMZ 19221.

##### Family Ranidae

*Rana clamitans melanota* (Rafinesque, 1840). Accidental or Troglaxene. Nine green frogs were collected on three separate occasions (23 December 1991, 18 August 1993, 17 September 1993) during the study period from all three mines. Specimens included four juvenile males (SVL range 35-46 mm), two adult males (SVL = 69, 71 mm), and three adult females (SVL range 66-73 mm). Two of these latter females collected on 18 August 1993 were gravid. Green frogs were collected from the transition to dark zones of the mines with *R. palustris*. Black (1973) reported *R. c. melanota* from the twilight

zone of an Oklahoma cave, and Trauth and McAllister (1983) found a green frog in the entrance of Savoy Cave, Washington County, Arkansas. In addition, Grove (1974), in an unpublished thesis, reported *R. c. melanota* from Blanchard Springs Caverns in Stone County, Arkansas. Herein, we document a new record for *R. c. melanota* from mine habitat. Specimens deposited as ASUMZ 19185, 19222-19224.

*Rana palustris* Le Conte, 1825. Troglaxene or troglophile. The pickerel frog was the most common amphibian found to utilize the mines. Numerous *R. palustris*, including juveniles, adult males, and adult females (most of which were gravid) were observed from the transition to dark zones within all three abandoned mine shafts. Heath et al. (1986) also noted that *R. palustris* was the most common frog found in Ouachita mines. Further, McDaniel and Gardner (1977) provided records of *R. palustris* from Arkansas caves, including four sites in Independence County. In addition to the present study, *R. palustris* from the mines were utilized for parasitological analyses (see McAllister et al., 1995). Specimens deposited as ASUMZ 19193-19194, 19201-19217.

#### Class Reptilia

##### Order Squamata

##### Suborder Sauria

##### Family Phrynosomatidae

*Sceloporus undulatus hyacinthinus* (Green, 1818). Accidental. An adult male northern fence lizard was observed at the entrance of mine no. 2 on 2 October 1994. Several other specimens were seen in surrounding woodland habitat but not within the mine entrance. These lizards were probably attracted to the entrance in search of arthropods. McDaniel and Gardner (1977) suggested fence lizards seek shelter among rocks within the entrance of caves. Voucher specimen not retained.

##### Family Scincidae

*Eumeces laticeps* (Schneider, 1801). Accidental. A juvenile male broadhead skink (SVL = 70 mm) was collected on 18 August 1993 at the entrance of mine no. 1. McDaniel and Gardner (1977) reported five-lined skinks, *E. fasciatus* (Linnaeus, 1758) from entrances of Ozark caves. McAllister et al. (1994) reported the same lizard reported herein as a new host for a coccidian parasite. Specimen deposited as ASUMZ 19148.

##### Suborder Serpentes

*Akistrodon contortrix contortrix* (Linnaeus, 1766). Troglaxene. A southern copperhead was found within the transition zone of mine no. 1 on 2 October 1994. Southern copperheads have been reported previously from Ouachita mines (Heath et al., 1986) and Ozark caves

(McDaniel and Gardner, 1977; Dunivan et al., 1982). This is probably the most common snake found in mine and cave habitat. Specimen deposited as ASUMZ 19814.

#### Class Aves

##### Order Passeriformes

##### Family Troglodytidae

*Troglodytes aedon* Vieillot, 1808. Accidental. A house wren was collected within the twilight zone of mine no. 3 on 17 September 1993. A nesting site was not found although other bird species have been reported to either roost or nest in Arkansas caves (McDaniel and Gardner, 1977). This is the first report of a house wren from mine habitat. Voucher specimen not retained.

#### Class Mammalia

##### Order Chiroptera

##### Family Vespertilionidae

*Myotis austroriparius* (Rhoads, 1897). Troglaxene. A southeastern myotis was collected on 3 September 1994 in mine chamber no. 1 along with several *M. septentrionalis*. Individuals of *M. austroriparius* have been reported previously from Ouachita mines (Davis et al., 1955; Sealander and Young, 1955; Heath et al., 1986; Saugey et al., 1993) and Ozark caves (McDaniel and Gardner, 1977). Our collection site is at the extreme western edge of the species range in the Interior Highlands of the Ozarks. The species has been reported previously from Independence County (Sealander and Heidt, 1990) as well as Bradley, Calhoun, Cleveland, Columbia, Drew, Garland, Grant, Howard, Lafayette, Little River, Miller, Mississippi, Montgomery, Nevada, Ouachita, Pike, Sevier and Woodruff counties (Saugey et al., 1993). Specimen deposited as ASU 27181.

*Myotis septentrionalis* (Trouessart, 1897). Troglaxene. Four northern myotis were collected on 3 September 1994 within a chamber of mine no. 1. Additional specimens were observed on several other occasions but not collected. The species has been reported commonly from Ouachita mines (Davis et al., 1955; Sealander and Young, 1955; Heath et al., 1986) but less frequently in Ozark caves (McDaniel and Gardner, 1977; Harvey and McDaniel, 1983). Northern myotis have been reported previously from Independence County (Sealander, 1979; Sealander and Heidt, 1990). Voucher specimens deposited as ASU 27182-27185.

*Plecotus rafinesquii* Lesson, 1827. Troglaxene. A solitary eastern big-eared bat was observed on three visits (17 September 1993, 3 September 1994, 2 October 1994). Unlike other bats in these mines, it was always active and invariably flew further into the mines or out the entrances into other mines to allude capture when

approached. On our last visit (13 March 1995), however, we collected a scrotal male *P. rafinesquii* from mine no. 1. Although reported previously from caves (McDaniel and Gardner, 1977; Saugey et al., 1993), this is the first time *P. rafinesquii* has been reported from mine habitat. Gardner and McDaniel (1978) reported *P. rafinesquii* from a locale approximately 30 km to the NE in nearby Jackson County. Therefore, Independence County is a new county record for *P. rafinesquii* and represents an extension of its range into the eastern Ozarks (Sealander and Heidt, 1990). This bat has also been reported from Arkansas, Bradley, Calhoun, Clark, Cleveland, Columbia, Craighead, Crawford, Cross, Dallas, Drew, Faulkner, Grant, Greene, Jackson, Lafayette, Lawrence, Little River, Nevada, Ouachita, Pope, Pulaski, Sevier and Union counties. Voucher specimen deposited as ASU 27250.

##### Order Rodentia

##### Family Muridae

*Peromyscus leucopus* (Rafinesque, 1818). Troglaxene. A *Peromyscus* sp. was seen nesting in the twilight zone of mine no. 3 on 3 September 1994. On subsequent visits prior to 13 March 1995, the nest was still intact but the mouse was not present. On our last visit, we collected a scrotal male *P. leucopus* from deep within mine no. 1. Although Heath et al., (1986) reported Texas mice, *P. attwateri* from two Ouachita mines and McDaniel and Gardner (1977) reported a nursing *P. attwateri* deep within an Ozark cave in Sharp County, there are no previous reports of *P. leucopus* utilizing mine habitat. Voucher specimen deposited as ASU 27251.

At least 16 vertebrate taxa utilized the three abandoned mines at Gold Mine Springs. Of these taxa, 44% were reported previously from Ouachita Mountain mines by Heath et al. (1986), whereas 63% were reported by McDaniel and Gardner (1977) from Ozark Mountain caves. Heath et al. (1986) reported a total of 27 vertebrate taxa from 27 abandoned mines in the Ouachita Mountains. Interestingly, we report 16 taxa from three mines in the Ozark Mountains. Although not collected during the study period, larger mammals (coyote, opossum, raccoon, skunk) occasionally used the mines as foraging sites as evidenced by tracks observed within entrances. These mines were utilized by vertebrates seeking temporary or permanent habitat as well as those using them as breeding sites and summer or winter retreats.

In conclusion, new records are established for 11 vertebrate taxa using mine habitat and a new county record is documented for *P. rafinesquii*. Unfortunately, current landowner use suggests the future loss of this mine habitat for local fauna at Gold Mine Springs.

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