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## New Records and Life History Observations of the American Badger (*Taxidea taxus*) in Arkansas

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Running Title: Observations of American badgers (*Taxidea taxus*) in Arkansas

The first American badger (*Taxidea taxus*) reported from Arkansas was collected in 1964 from Washington County in northwestern Arkansas (Sealander and Forsyth 1966). A sight record in Franklin County (Sealander and Heidt 1990) was later supported by a specimen trapped near the Arkansas River (Cartwright and Heidt 1994). A roadkill specimen provided a disjunct record in Stone County, well eastward of the known distribution (Cartwright and Heidt 1994). Since 2003, several new observations revealed a reproductive population in northeastern Arkansas (Tumilson et al. 2012). Additional observations of Arkansas badgers have accumulated, permitting further documentation of new records and observations of their life history in the state. Two new specimens were catalogued into the collection of mammals at Henderson State University (HSU).

### ***New Records of Distribution***

*Craighead County* – Several records dating from 2003 were reported for Craighead County by Tumilson et al. (2012). Since then, Derek Vinson reported to us his extended observation of a badger in Valley View, SW of Jonesboro. A dog chased the badger from his yard and it escaped via a ditch and into a cow pasture. This observation was in 1985, the earliest date presently known for NE Arkansas, and about 18 years before the other documented cases were made.

*Crawford County* – We have an anecdotal account of a roadkill badger along AR St. Hwy 59 in western Crawford County during 2010. It had been brought to Cockrum's Taxidermy, Rudy, AR and retired Arkansas Game and Fish Commission (AGFC) wildlife officer David Wilson saw the specimen.

This anecdotal record is supported by photos and a specimen of a badger shot in a yard in Van Buren (approximate GPS 35.458°N, -94.364°W) on 15 June

2011. The head was mounted by Cockrum's Taxidermy. The location was 1.9 km (1.2 mi.) NE of the Arkansas River and 0.6 km (0.4 mi) S of U.S. I-40.

*Crittenden County* – Several recent observations of badgers have occurred between the town of Marion and Wapanocca National Wildlife Refuge (NWR). On 24 May 2013, county workers photographed 3 live juvenile badgers on Roseboro Island Road, reportedly about 3.2 km (2 mi.) N of its junction with U.S. Hwy 64 (Figure 1). Badgers also were observed near this location in 2007 (Tumilson et al. 2012). Presence of juveniles allow us to infer the second observation of reproduction in Arkansas, the first being from near Proctor, 18.7 km (11.6 mi) to the SE (Tumilson et al. 2012).

On 11 June 2014, a roadkill lactating female (though to be dead only a couple of hours) was found adjacent to a bean field along Roseboro Island Road, about 5.5 km (3.4 mi.) WNW of Marion (GPS 35.22627°N, -90.25420°W). The specimen was collected and prepared as skin and skeleton and catalogued as HSU 831. Standard measurements were: total length 700 mm, tail length 150 mm, hind foot length 90 mm, ear length 60 mm, weight 7.7 kg (17 lbs). Epiphyses of all bones were completely fused, and considerable tooth wear indicated she was an older adult.

Photographs taken at these sites were matched with images available via Google Earth Streetview at the GPS coordinates, which revealed this location to be exactly the same as the 2013 observation of juveniles on the same road. The roadkill specimen was collected by K. Harris, who returned to the location the following day and obtained images and a video of another badger (which appeared to be an adult, perhaps the male) that moved from the road into the bean field. A search of the area revealed a den beneath an oak tree located about 10 m (33 ft.) from the kill site.

From the image taken of the 3 juveniles, we

counted the number of broken center line marks between the badgers and the den on Roseboro Road, and by application of the Google Earth ruler function, were able to estimate that the 3 juveniles photographed on 24 May 2013 at this site were 90 m (295 ft.) from the den at the time of observation. We used the standard width of highway striping (4 in., or about 100 mm) as a reference to estimate the length of a juvenile badger that was broadside in the image, resulting in an estimated body length of 16 in. (ca. 400 mm). The adult male and female specimens collected during this study had body lengths of 615mm (24.2 in.) and 550 mm (21.6 in.), respectively. From this, we estimate that the juvenile badgers were 65% - 73% grown on 24 May.

On 15 October 2013, Bill Petersen photographed a roadkill badger at the edge of a cotton field along AR St. Hwy 77, about 1.1 km (0.7 mi.) N of Clarkdale (GPS 35.31905°N, -90.23970°W). Almost a year later, on 18 August 2014, he photo-documented another roadkill badger at the edge of a corn field about 1.6 km (1 mi.) W of this site, along U.S. I-55 (GPS 35.322564°N, -90.259220°W). These new records extend observations about 10.5 km (6.5 mi.) N of earlier records in the county (Tumilson et al. 2012).

*Mississippi County* – On 21 August 2014, a male badger was collected by C. Vlautin on the S shoulder of AR St. Hwy 18 near Manila, about 1.6 km (1 mi.) W of Big Lake NWR, (GPS 35.872112°N, -90.156273°W). The specimen was prepared as skin and skeleton, and catalogued as HSU 832. Standard measurements were: total length 750 mm, tail length 135 mm, hind foot length 105 mm, ear length 64 mm, weight 9.5 kg (21 lbs). Epiphyses of all bones were thoroughly fused, but tooth wear was light, indicating a young adult individual. The carcass appeared to be fresh with little external damage, although necropsy revealed broken bones and ruptured viscera, supporting the likelihood of road mortality as the cause of death. The specimen was nearly hairless over a dorsal oval extending from the neck to the tail, which appeared to have existed well before its death. We conjecture that such damage may have been caused by repeated abrasion during entrance and exit of a den. These abrasions were inconsistent with patterns normally associated with mite infestations or other possible etiologies. This specimen is a new county record for Arkansas.

A roadkill on AR St. Hwy 119 E of Marie, Sec. 6, T11N, R10E was reported 19 January 2014 by R. Miller. This record is about 30 km (18.7 mi.) SSE of

the specimen record from near Manila and 35.5 km (22 mi.) NE of the nearest record in Crittenden County. No confirming evidence (e.g., an image) was available.

*Sebastian County* – A live badger was photographed under a parked car at 100 S 10<sup>th</sup> Street, Fort Smith on 1 May 2014, about 1.1 km (0.7 mi.) SE of the Arkansas River. The animal was captured by Fort Smith Police Dept. personnel and released at 300 Parker Ave, near the Arkansas River. This is a photo-vouchered new county record and apparently the first documented Arkansas observation S of the Arkansas River since the 1983 capture of a male badger 2.5 km (1.6 mi.) S of the Ozark Dam on the Arkansas River, Franklin County (Cartwright and Heidt 1994). This occurrence is not surprising as badgers have been documented in neighboring LeFlore and McCurtain counties of Oklahoma (Tumilson and Bastarache 2007). The LeFlore County record was taken just S of the Kerr Lock and Dam on the Arkansas River, about 35 km (22 mi.) from this new Arkansas observation

The 2011 Crawford County record noted previously was located only 11.1 km (6.3 mi.) NE of the new Sebastian County Record, but on the N side of the Arkansas River. It is likely that the Arkansas River serves as a corridor for badgers dispersing into Arkansas from the west.

### Dens

In 2009, trail camera images revealed a presumed coyote den to actually be the den of a family of badgers near Proctor, Crittenden County (Tumilson et al. 2012). This den faced a road and had excavated dirt deposited in front of the opening, creating a small mound.

The entrance to the den located on Roseboro Island Road in Crittenden County was positioned at the top of the incline from the road ditch, facing the road, and was somewhat protected by surrounding dead branches. Excavated dirt was deposited downslope of the entrance.

We have no observations of dens beyond the appearance of the entrances. Both of these were natal dens, each producing offspring. Deposition of excavated dirt at the entrance is typical of the species, and natal dens tend to be more complex than resting dens due to the amount of dirt excavated (Lindzey 2003). Badgers are known to move young among dens, and to use several different dens – some only for resting (Messick and Hornocker 1981). The nature of dens in northeastern Arkansas may be different than

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those reported for western populations, as agricultural practices in Arkansas may create a different landscape than western rangelands. For example, the female from Roseboro Island Road appears to have used the same natal den during consecutive years (based on 2013 and 2014 observations at the same site). Currently, these are the only observations and descriptions of badger dens in Arkansas.

In lowland areas subject to flooding, elevated den entrances should be advantageous. Higher elevations for dens also were selected by badgers in cropland of Illinois and Ohio (Duquette et al. 2014). In the Midwest, badgers were found to avoid roads (Duquette et al. 2014) yet our observations of dens (as well as distribution) were along roads. Data from Arkansas so far have been limited to chance observations along roads, therefore a detailed study is needed to understand space use of badgers in Arkansas croplands.

**Litter size**

Very little is known about biology of badgers in Arkansas, and reproduction in particular. Two observations in Crittenden County allow inferences of likely litter size. The observation of a den near Proctor on 29 May 2009 revealed 5 badgers, all of which were similar-sized (Tumlison et al. 2012). Because badgers do not den together except as family groups (Lindzey 2003), and these individuals were about mature, it is likely that they represent a successful litter of three or four (assuming one was the mother, leaving a litter of 3 if the paternal male was also present, or 4 if he was not).

The 24 May 2013 observations photodocumented a litter size of at least 3, as all individuals were clustered at the time of the photograph and away from the den.

**Subspecies**

Long (1972) treated the only badger specimen known at the time from Arkansas as *Taxidea taxus berlandieri*, although he also stated that specimens from eastern Kansas, southern Oklahoma, and northern Arkansas were intergrades of *T. t. berlandieri* and the more northern *T. t. taxus*. His treatment of the single Arkansas specimen was due to its small reported size, although only a skin was available (Sealander and Forsyth 1966) and it was not examined. Specimens from E Kansas also were considered to be intergrades, but were included as *T. t. taxus* in the distributional map of subspecies. Further, specimens from northern

and western Missouri were not examined, but Long (1972) attributed them to *T. t. taxus* based on location. Tumlison et al. (2012) believed that the population in northeastern Arkansas represented expansion of Missouri populations, therefore these could be considered *T. t. taxus*, but intergradation clouds the issue. We examined available materials to determine if subspecific identification could reasonably be assigned.

Long (1972) described the southern badger, *T. taxus berlandieri* as having a long mid-dorsal stripe, typically extending at least mid-dorsum, but usually to the rump. This form is small, has reddish pelage, and the sagittal ridges often do not merge dorsally. Photovouchers allowed us to examine the mid-dorsal stripe of 15 individuals from Arkansas. In all cases, the stripe ended no further caudally than the mid-scapular region, thus affiliating best with *T. taxus taxus*. However, coloration of the specimen (HSU 831) matched the description of *T. taxus berlandieri*, as did about half of the photographed individuals. Long (1972) considered the badgers in adjacent Oklahoma and Missouri to represent intergrades, and those are the source populations for the Arkansas dispersers.

The sagittal ridges of HSU 831 and 832 were merged dorsally, not supporting identification as *T. taxus berlandieri*, although the idea of intergradation cannot be dismissed. Specimens from NE Arkansas average looking more like *T. taxus taxus*. In any case, it is apparent that the Arkansas population represents expansion from 2 different sources, along the Arkansas River in W Arkansas and from SE Missouri in NE Arkansas.

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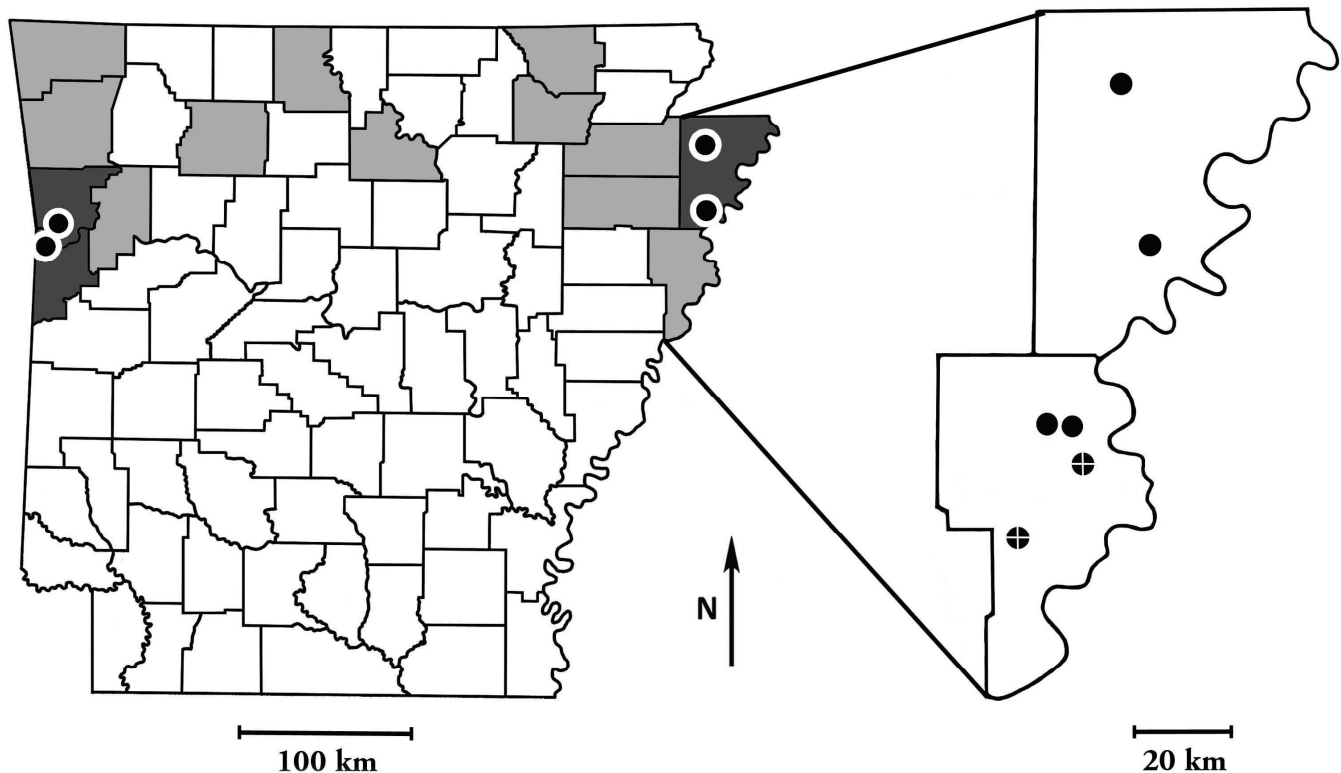


Figure 1. Currently known distribution of American badgers (*Taxidea taxus*) in Arkansas. Lighter shading shows counties with previously reported records. Darker shading indicates new county records, and dots within them show approximate location of records. Enlargement is of Mississippi County (top) and Crittenden County (bottom), with black dots indicating approximate locations of new records. Crossed dots show historic and new records of breeding.