New distributional records for spotted bat (*Euderma maculatum*) in Wyoming

John Priday  
*Wyoming Game and Fish Department, Lander, Wyoming*

Bob Luce  
*Wyoming Game and Fish Department, Lander, Wyoming*

Follow this and additional works at: [https://scholarsarchive.byu.edu/gbn](https://scholarsarchive.byu.edu/gbn)

**Recommended Citation**

Available at: [https://scholarsarchive.byu.edu/gbn/vol59/iss1/9](https://scholarsarchive.byu.edu/gbn/vol59/iss1/9)

This Article is brought to you for free and open access by the Western North American Naturalist Publications at BYU ScholarsArchive. It has been accepted for inclusion in Great Basin Naturalist by an authorized editor of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
NEW DISTRIBUTIONAL RECORDS FOR SPOTTED BAT
(EUERDA MACULATUM) IN WYOMING

John Priday and Bob Luce

ABSTRACT.—Before 1990 the spotted bat (Euderma maculatum) was known in Wyoming from only 2 records. Between June 1994 and May 1997 we documented habitat use and observations incidental to conducting a bat inventory of caves and abandoned mines. By monitoring audible echolocation calls, we observed bats at mist-netting sites. Spotted bats were heard or captured on 13 nights at 10 locations, all of which were near canyons or high cliff faces. No foraging habitat preferences were noted. E. maculatum occurrence appears to be related to roost structure, roost availability, and proximity to a permanent water source.

Key words: Euderma maculatum, spotted bat, bat, echolocation, audible calls, Wyoming.

The spotted bat (Euderma maculatum) is a relatively large bat (forearm = 48–51 mm, weight = 16–20 g) with striking coloration. There are 3 large white spots, 2 in the shoulder region and 1 on the rump, against a black dorsal surface, and the ventral surface is light with dark underfur. The ears, larger than those of any other North American bat, and wing membranes have a pink cast. Average external measurements are total length, 126 mm; tail, 51 mm; hind foot, 12 mm; ear, 47 mm (Schmidley 1991).

The spotted bat has been reported occurring in a wide variety of habitats, from desert shrub to coniferous forest (Findley and Jones 1965). Early records seemed to indicate a preference for forested habitat (Vorhies 1935) or caves (Vorhies 1935, Hardy 1941, Parker 1952). However, recent data indicate roosting habitat is rocky cliffs (Watkins 1977, Leonard and Fenton 1983). Spotted bats were never observed more than 10 km from substantial cliff features in California research (Pierson and Rainey 1998). Pierson and Rainey (1998) found spotted bats in black oak, ponderosa pine, incense cedar, giant sequoia/red fir, lodgepole pine, and white fir habitats in California. However, spotted bats have been observed or captured most often in dry, desert terrain at low elevations, often in association with a variety of habitats in canyon bottoms (Storz 1995). Foraging has been observed in forest openings (Woodsworth et al. 1981), pinyon juniper woodlands and large riverine/riparian habitat (Navo et al. 1992), meadows (Storz 1995), and wetlands and old agricultural fields (Leonard and Fenton 1983, Wai-Ping and Fenton 1989, Worthington 1991, Pierson and Rainey 1998).

Prior to 1990, E. maculatum was documented in Wyoming by a single specimen found dead near Byron (Mickey 1961). This specimen, originally deposited in the University of Wyoming mammal teaching collection, has since been misplaced and apparently lost. A photograph taken of a living individual at the Bighorn National Recreation Area headquarters near Lovell (Clark and Stromberg 1987) represents the 2nd Wyoming record. Both specimens were from the Bighorn Basin of north central Wyoming. We report an additional 34 observations, 31 audible calls (an audible call represents 1 pass), and 3 captures from 10 locations in Wyoming (Fig. 1). One capture and 1 call, possibly representing 2 different bats, occurred inside a cave.

The exact locations of E. maculatum observations reported at or near hypogeal bat roost sites are not reported due to the potential for human disturbance (Sheffield et al. 1992). Locations are available from the authors upon written request.

METHODS

Captures, sightings, and habitat use by E. maculatum were documented incidental to...
conducting bat surveys near caves and abandoned mines and cannot be considered a survey for the spotted bat. *E. maculatum* were either captured by mist-nets or identified by audible calls. We defined an audible call as either the series of clicking sounds emitted by *E. maculatum* in-flight while searching for insects, or rapid feeding buzzes. Each pass of a single bat was defined as 1 audible call. *E. maculatum* has the lowest frequency echolocation call of any bat found in Wyoming and is the only Wyoming bat with an echolocation call audible to the human ear.

Species that occur in the United States and have audible echolocation calls include *Idionycteris phyllotis*, *Nyctinomops macrotis*, and *Euderma maculatum*. Fenton and Bell (1981) reported the range of *I. phyllotis* as 12–24 kHz. The call of *Nyctinomops (Tadarida) macrotis* ranges from 17 kHz to 25 kHz (Simmons and O’Farrell 1977), and *E. maculatum* ranges from 9 kHz to 15 kHz (Leonard and Fenton...
1984). *N. macrotis* has been reported from Wyoming on only 1 occasion and is considered a Neotropical species occurring from central Colorado into Mexico, while *I. phylloides* occurs from extreme southwestern Colorado into Mexico (Fitzgerald et al. 1994). *Anuroctous pallidus*, which uses audible vocalizations to communicate intraspecifically, has been captured by the authors a number of times in Wyoming; thus, calls of this species and *E. maculatum* were separated by experience and comparison to calls heard immediately prior to the capture of 3 individual *E. maculatum*. Audible monitoring consisted of sitting quietly at a predetermined location and listening for calls during the entire survey period.

Sites in which *E. maculatum* was captured or audible calls were detected are listed. Legal descriptions are given for sites 1, 3, and 7 since they are not adjacent to caves and thus are not susceptible to disturbance by humans. Habitats are included but foraging cannot be assumed since feeding buzzes were not detected at all sites.

**SITE 1.**—We conducted a bat mist-netting survey in extreme northern Wyoming, T57N, R94W, S2, SWNE, Little Mountain Plateau, 19.3 km NE of Lovell, Bighorn County, on the nights of 27 and 28 August 1990. The survey site is 5.6 km E of Bighorn Canyon, a deep canyon with high rock walls. Habitat includes juniper (*Juniperus scopulorum*) and open grassland. Two shallow ponds approximately 75 m and 115 m, respectively, from a small spring were covered with a mist-net configuration. On the 1st night the pond closest to the spring had one 9.1-m mist-net set diagonally across the pond. On the pond farthest from the spring, four 9.1-m mist-nets were set, 3 in a "Z" pattern across the pond, and 1 on the edge of the pond perpendicular to the Z. On the 2nd night, each pond had three 9.1-m mist-nets set in a Z pattern. Mist-nets were continuously monitored from 2030 h to 2330 h on both nights and left in place without monitoring until daylight (0530 h), at which time they were checked.

**SITE 2.**—A cave in Spring Creek Canyon, 21 km SE of Tensleep, Washakie County, was surveyed on 17 July 1994. It is located on the south side of the canyon 200 m upslope from the base of a sheer limestone cliff. The 4.8-km-long canyon has high, shear rock faces and contains a small perennial stream. Boxelder (Acer negundo) occurs near the stream banks, with mountain mahogany (*Cercocarpus montanus*), big sagebrush (*Artemisia tridentata*), and *J. scopulorum* between the stream and canyon rim. The cave entrance is 23.7 m wide × 7.6 m high. The passage (110 m) contains 3 rooms and varies in size, 7.6–23.7 m in width and 3–9.1 m in height. A 2.1 × 2.4-m mist-net was placed at the entrance to the 2nd room (passage size 6.1 × 3 m), approximately 15.2 m inside the cave, and monitored every 15 min during the period 2030 h to 2345 h.

**SITE 3.**—Canyon Creek, T47N, R87W, S27, 12.9 km E of Tensleep, Washakie County, was surveyed on 18 July 1994 between 2100 h and 2400 h. Elevation is 1524 m. Canyon Creek is a perennial stream in a canyon of rugged rock outcrops and steep canyon walls. Adjacent habitat is mixed *J. scopulorum* and *A. tridentata*.

**SITE 4.**—The survey site located 3.2 km NW of the town of Green River, Sweetwater County, was surveyed on 21 July 1994 from 2100 h to 0115 h on 22 July. Elevation is 1890 m. Steep, rugged canyons with bare rock walls contain cracks and fissures. The Green River is approximately 0.8 km S of the cave. Greasewood (*Sarcobatus vermiculatus*) occurs between the river and cliffs, with *A. tridentata* on the plateau.

**SITE 5.**—A canyon located 5.6 km SW of Cody, Park County, was surveyed on 5 August 1994 from 2030 h to 2400 h. Elevation is 1920 m. The terrain is characterized by steep canyons and shear rock faces. Adjacent habitat is Douglas-fir (*Pseudotsuga menziesii*) interpersed with limber pine (*Pinus flexilis*) and aspen (*Populus tremuloides*).

**SITE 6.**—An area of natural caves and high, bare rock walls in Wind River Canyon 8.0 km S of Thermopolis, Hot Springs County, was surveyed on 6 June 1995 from 2030 h to 2300 h. Elevation is 1345 m. Habitat is mixed *A. tridentata* and *J. scopulorum*, with sagebrush-grassland on the plateau.

**SITE 7.**—Sheep Canyon, T54N, R94W, S35, NE, along the Bighorn River 7.2 km NW of Greybull, Big Horn County, was surveyed on 20 June 1995 from 2000 h to 2300 h. Elevation is 1250 m. Sheer rock exists between the river and the rim. Mixed sagebrush-grassland occurs on the plateau.

**SITE 8.**—This karst area with high, bare rock walls along the Middle Fork of the Powder

<table>
<thead>
<tr>
<th>Site #</th>
<th>Date</th>
<th>Time interval of calls</th>
<th>Number of captures</th>
<th>Number of audible calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27–29 August 1990</td>
<td>2030–2330</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>17 July 1994</td>
<td>2150–2212</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>18 July 1994</td>
<td>2150–0018</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>21 July 1994</td>
<td>2145–2222</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1 August 1994</td>
<td>2135</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5 August 1994</td>
<td>2135</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6 June 1995</td>
<td>2142</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>7 August 1995</td>
<td>2301</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>20 June 1995</td>
<td>2350–0008</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>20 July 1995</td>
<td>2112–2122</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>28 August 1995</td>
<td>2111</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>16 October 1995</td>
<td>1900</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

River 10.5 km SW of Barnum, Johnson County, was surveyed on 20 July 1995 from 2030 h to 2300 h. Elevation is 1597 m. Narrowleaf cottonwood (Populus angustifolia) and A. negundo occur near the stream banks, with lodgepole pine (Pinus contorta), F. scopulorum, and A. tridentata between the river and canyon rim. The plateau is dominated by sagebrush-grassland with scattered P. contorta.

Site 9.—A karst area 12.9 km W of Mayoworth, Johnson County, was surveyed on 28 August 1995 from 2000 h to 2300 h. Elevation is 2550 m. The site is located in an area of mixed P. contorta and P. menziesii interspersed with open sagebrush-grassland parks. Rock outcrops and a canyon with bare rock walls occur within 1.6 km of the survey site. Three man-made stock ponds occur within 3.2 km.

Site 10.—The survey site 6.4 km SW of Shoshoni, Fremont County, was surveyed on 16 October 1995 from 2000 h to 2100 h. The site is on the eastern shoreline of Boysen Reservoir near several high rock bluffs in sagebrush-grassland. Elevation is 1460 m.

RESULTS

Spotted bats were captured on 3 occasions and audible calls were documented 31 times between 1990 and 1995 (Table 1).

At site 1 five calls of E. maculatum were heard on 27 August 1990 between 2030 h and 2330 h. One post-lactating adult female was captured in a mist-net set between 2330 h on 27 August and 0600 h on 28 August. Both specimens (BS/FC 14512 and BS/FC 14513, respectively) were retained and reported under Mike Bogan’s collection permit and are currently deposited in the Biological Surveys Collection, Museum of Southwestern Biology, University of New Mexico, Albuquerque.

At site 2 a lactating female E. maculatum was captured in the mist-net at 2200 h on 17 July. E. maculatum calls were heard at 2150 h, 2155 h, 2206 h, and 2212 h. Three calls were heard outside the cave, while the 4th occurred 9.1 m inside the cave near the mist-net location. It is not known whether the bats intended to night roost, were foraging inside the cave, or were merely investigating the site. Storz (1995) and Leonard and Fenton (1983) documented E. maculatum activity throughout the night. The timing of audible calls documented at 9 sample sites in Wyoming is shown in Table 1. Sampling did not occur after 0018 h; however, for the summer (June through August), audible calls were documented throughout the period 2030 h to 0018 h. The mean time at which the first call was documented was 2200 h, indicating that foraging begins in early evening.

DISCUSSION

Eighty-two survey nights resulted in E. maculatum being captured or identified by audible calls on 13 nights at 10 locations. Fenton et al. (1987) reported no obvious association between spotted bat occurrence and a particular habitat type. However, all recorded occurrences of E. maculatum in Wyoming were associated with canyons containing cracks and
fissures, high bare rock walls, and rock ridges close to a permanent water source. Our observations indicate *E. maculatum* to be more closely associated with structure and roost availability than specific vegetation types. Our observations support those of Easterla (1970), Wai-Ping and Fenton (1989), Navo et al. (1992), and Storz (1995), and indicate that *E. maculatum* is not restricted by foraging habitat or geographic location in Wyoming. As reported for Colorado and Utah (Storz 1995), populations of *E. maculatum* appear locally abundant in areas with available roosting habitat and are absent from areas without suitable roost structure even though habitat is otherwise suitable.

**ACKNOWLEDGMENTS**

We thank M. Bogan, T. Ryder, and M. Ternent for review of the manuscript. We appreciate the assistance of Mike Bogan, Cindy Ramotnik, Mike O’Farrell, Mike Herder, Mike Bryant, Adam Halvarson, and Phil Shepard in conducting surveys. Funding for this project was provided by the Wyoming Game and Fish Department, Bureau of Land Management, U.S. Forest Service—Shoshone National Forest, and U.S. Fish and Wildlife Service.

**LITERATURE CITED**


Received 29 May 1997
Accepted 23 April 1998