

Bats Roosting in Deciduous Leaf Litter

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Despite the recent surge of information concerning characteristics of roost sites used by tree-roosting bats during summer (e.g., Crampton and Barclay, 1998; Menzel et al., 1998), little is known about roost sites used by bats during winter. During summer, some tree-roosting bats roost within the canopy of hardwood trees (Menzel et al., 1998). However, once leaves fall, deciduous trees may no longer be adequate as roost sites. Herein, we report observations that further support claims concerning use of litter on the forest floor by bats in winter.

We made 10 observations of bats in winter flying from deciduous leaf litter of three upland hardwood stands in the South Carolina Piedmont. The three stands were located on the Clemson University Experimental Forest ca. 4 miles N of Clemson, South Carolina. All observations were made in stands comprised predominately of mixed oaks (*Quercus*) with lesser amounts of yellow poplar (*Liriodendron tulipifera*), hickory (*Carya*), and red maple (*Acer rubrum*). The understory was sparsely vegetated with isolated mountain laurel (*Kalmia latifolia*), red buckeye (*Aesculus sylvatica*), and American holly (*Ilex americana*). Depth of the litter layer in the three stands was ca. 7 cm.

A single bat was flushed from leaf litter on 5 January 1999, as several researchers walked near its location. Nine other observations were made while conducting low-intensity strip-head fires in six 1-ha plots within the three stands. All burns were conducted on clear days. Bats roused during prescribed burns flew as the strip fires approached, and one bat was flushed while raking fire lines. Two or more of the authors viewed each bat. Once bats were roused, they flew over the roost site for several seconds and disappeared into the canopy or smoke created by the fire. Because bats flew out of sight, some observations could have been of the same individual.

On 16 February, we conducted a prescribed fire at two plots bisected by a small perennial stream. The aspects and slope gradients of the two plots were 105° SSW and 280° WNW and 40% and 15%, respectively. At the time of the burn ambient temperature was 18°C, and minimum temperature the previous night was -2°C. Two bats flew from the forest floor of the SSW-facing slope, and three bats flushed from the WNW-facing slope. One of the bats on the WNW-facing plot flew from a location within 5 m of where the first bat was flushed on 5 January, suggesting the individual may have returned after researchers left the area. On 25 February, we conducted a second prescribed fire at two plots bisected by a different perennial stream. The aspects and slope gradients of the two plots were 45° NE and 216° SSW and 32% and 23%, respectively. Ambient temperature during the prescribed burn was 14°C, and minimum temperature the previous night was 0°C. Two bats were roused from the SSW-facing plot, but no bats were observed while burning the second plot. On 23 March, a third prescribed burn was conducted at two plots bisected by a third small stream. Aspects and slopes of the two plots were 20° NNE and 210° SSW and 30% and 26%, respectively. While burning, ambient temperature was 22°C, and minimum temperature during the previous 24 hours was 4°C. One bat was flushed when fire lines were raked on the SSW-facing slope, and a second bat flew from the forest floor on the NNE-facing slope as the fires approached.

Although we were unable to make definitive identifications, we suggest the bats were eastern red bats (*Lasiurus borealis*). All were relatively large (i.e., larger than *Myotis*), and those seen up close were reddish in color. Saugey et al. (1989) also reported seeing bats "smoked" from their hibernation sites during a prescribed

winter burn in Arkansas, and they believed the bats were eastern red bats resting in leaf litter on the forest floor. In 1993 and 1994, a female and male eastern red bat were radiotracked to a single site in hardwood-pine leaf litter on the forest floor (Saughey et al., 1998). Past reports were from the central United States, but our data indicate possible use of leaf litter by eastern red bats is more widespread geographically and may occur throughout the species' range.

Oak leaves dominated the litter layer of plots prior to burns. No bats were flushed from up-slope portions of the stands, which typically contained fewer hardwoods and more pines (*Pinus*). Because of its color, insulatory properties, and resistance to decay, sites with well-developed hardwood litter, especially oak litter, may provide important wintering sites for eastern red bats. However, prescribed fires typically eliminate much forest-floor debris, including leaf litter and small woody debris. Therefore, fire likely renders the burned area temporarily inadequate for ground-roosting bats. Although prescribed fire traditionally has been used for pine management, recent research (Brose and Van Lear, 1998; Brose et al., 1999) indicates that fire is an essential ecological process in management of upland oaks during the regeneration phase. In light of our observations, further investigation of bat use of forest-floor debris is warranted, especially in areas where prescribed burning or other silvicultural manipulations are common.

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Discriminating *Myotis sodalis* from *Myotis lucifugus* with Anabat—a Critique

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It is obvious from a series of papers (e.g., O'Farrell, 1999; O'Farrell and Gannon, 1999; O'Farrell et al., 1999) that Mike O'Farrell is arguably the most experienced and probably the most accurate researcher using the Anabat II system for qualitative identification of bats in North America. In a recent paper, O'Farrell (1999) conducted a "blind test" of his ability to distinguish between little brown bats (*Myotis lucifugus*) and the federally endangered Indiana bat (*Myotis sodalis*). Having been involved in the "blind test", we have no doubt that O'Farrell learned to identify and distinguish *M. sodalis* and *M. lucifugus* under the described conditions.