

Gray Bat (*Myotis grisescens*) Use of Trees as Day Roosts in North Carolina and Tennessee

Stephen T. Samoray^{1,*}, Shelby N. Patterson¹, Joey Weber², and Joy O'Keefe²

Abstract - We documented female *Myotis grisescens* (Gray Bat) from different colonies using 2 separate live trees and 1 snag as diurnal roosts during fall and spring migration periods. The live trees were both *Platanus occidentalis* (American Sycamore) located along the bank of the French Broad River in Madison County, NC, and the snag was a *Fraxinus pennsylvanica* (Green Ash) located in a swamp on the western edge of the city of Cookeville in Putnam County, TN. The Gray Bat is considered a year-round cave obligate and, to our knowledge, these observations represent the first documented use of tree roosts by this species.

Introduction. *Myotis grisescens* Howell (Gray Bat) spends both summer and winter in caves or cave-like structures, using colder roosts during the winter hibernation period and warmer roosts in summer (Gore 1992, Tuttle 1976). Though little is known about their behavior in fall and spring, it is generally accepted that Gray Bats use transition caves for short periods while migrating between hibernacula and summer cave sites (Tuttle 1976).

Observations. We captured and radio-tagged 2 non-reproductive adult female Gray Bats independently at a bridge roost near Marshall in Madison County, NC. The first bat, captured on 28 September 2018, was radio-tracked on 30 September 2018 (high temperature = 27 °C, low temperature = 18 °C, intermittent mist; NOAA weather station ID KGCY) to a live *Platanus occidentalis* L. (American Sycamore) tree, measuring 89-cm diameter at breast height (DBH), on the north bank of the French Broad River. The tree had 1 dead branch and was 0.7 km northwest of the bridge roost site. We detected the bat leaving the tree via radio-telemetry but were unable to confirm the roost location. The second bat was captured on 18 September 2019 and radio-tracked to a different live American Sycamore on 28 September 2019 (Fig. 1; high temperature = 27 °C, low temperature = 18 °C, sky mostly clear; NOAA weather station ID KGCY). The 81-cm-DBH tree was located on the south bank of the French Broad River 2.9 km southeast of the bridge and had no obvious damage. Again, we could not confirm the roost location within the tree. These 2 roost trees were ~30.4 km from the closest known Gray Bat cave in Tennessee C. Holliday, The Nature Conservancy of Tennessee, Gainesville, TN pers. comm.).

On the night of 10 April 2019 (high temperature = 27 °C, low temperature = 16 °C, sky clear; NOAA weather station ID KRNC), we used aerial telemetry to track a female Gray Bat as she moved 70.0 km north from a cave hibernaculum near McMinnville in Warren County, TN, to a 31.5-cm-DBH *Fraxinus pennsylvanica* Marsh (Green Ash) snag in a swamp on the western edge of the city of Cookeville in Putnam County, TN (Fig. 2). Only 10% of the snag's trunk was covered in bark, 75% of which was loose enough to provide access for roosting bats. On 11 April 2019 (high temperature = 27 °C, low temperature = 13 °C, sky clear; NOAA weather station ID KGCY), an exit count revealed that the bat was roosting alone under a piece of exfoliating bark ~4 m above the ground; she used this tree for only 1 day. On 12 April, she was found in a culvert ~50 m north, and the following day she was in a known Gray Bat maternity cave 4.6 km southeast of the culvert.

¹Copperhead Environmental Consulting, Inc., 471 Main Street, Paint Lick, KY 40461. ²Center for Bat Research, Outreach, and Conservation. 600 Chestnut Street, Terre Haute, IN 47809. *Corresponding author - ssamoray@copperheadconsulting.com.

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Discussion. Although other bat species that commonly use caves may also roost in bottomland hardwood trees—e.g., *Corynorhinus rafinesquii* Lesson (Rafinesque's Big-eared Bat) and *Myotis austroriparius* Rhoads (Southeastern Myotis) (Harvey et al. 1999, Lance et al. 2001)—there are few published accounts of Gray Bats roosting outside of caves. Hays and Bingman (1964) reported the presence of a Gray Bat maternity colony in a storm sewer in Pittsburg, KS, and Gunier and Elder (1971) documented a maternity colony in an abandoned barn in Missouri. In 1988, a maternity colony was found in a storm drain in Newark, AR (Timmerman and McDaniel 1992). Maternity and bachelor colonies also have been

Figure 1: Roost tree used by a female Gray Bat Howell (*Myotis grisescens*) on 28 September 2019 near Marshall in Madison County, NC.



found inside the gate rooms of a dam on Wood's Reservoir, TN, and a maternity colony was found inside a bridge 5.0 km south of this dam (Lamb 2000). Gray Bats also have roosted in crevices between concrete barriers on the sides of bridges in Arkansas, primarily during the spring and fall migrations (Sasse 2019). Given that our tree roosts were used during these transition periods and that each tree was used for only 1 day, we believe that the use of tree roosts by Gray Bats may be a season-specific behavior, possibly related to migration.

These tree roosts could be opportunistic resting sites during migration. However, in the case of the North Carolina bats, the tree roosts were <5 km from the bridges where the bats were captured. The Tennessee tree roost also was <5 km from a known maternity cave, and we found the bat in that cave 2 nights after roosting in the tree. Given estimated speeds of 38 km/hour and large foraging home ranges (2700–39,000 ha) for Gray Bats during summer (Moore et al. 2017), it seems unlikely that these bats chose these tree roosts because they were too far from preferred roost sites. Alternatively, Gray Bats may use trees and other structures opportunistically in spring and fall because they do not require the same strict temperature and humidity profiles needed during hibernation or the maternity season (Tuttle

Figure 2: Roost tree used by a female Gray Bat Howell (*Myotis grisescens*) on 10 April 2019 near the city of Cookeville in Putnam County, TN.



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1976). We note that outside temperatures were higher than 30-year historical averages for all 3 days on which we tracked Gray Bats to trees. Similar to the concrete-barrier roosts on the sides of bridges reported by Sasse (2019), potential tree roosts are ubiquitous on the landscape compared to caves. If there are suitable tree roosts close to optimal foraging habitat, Gray Bats may choose to roost in trees to maximize feeding opportunities during migration. Finally, the bats we observed may have been young and possibly lost, using tree roosts temporarily until they could become better oriented or follow experienced individuals to traditional roost sites. Nonetheless, these observations suggest Gray Bats use tree roosts more than previously thought, especially during migration and indicates that continued protection of riparian corridors, both for foraging habitat and potential roosting habitat, is prudent for the conservation of this species.

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