

BAT ECOLOGY AND MANAGEMENT



Bats are one of the most diverse, specialized, and fascinating groups of mammals. They also play many significant roles in forested ecosystems such as nutrient cycling, insect population control, transmission of diseases, and accumulation of pesticides. North American bats are small (4-30 g), fly over large distances, and are only active at night, making them very difficult to study. Until recently, there has been very little research on the ecology of forest bats or the effects of forest management on their populations. Therefore,

we do not have sufficient knowledge of the habitats and habitat structures that are required to maintain bat populations. This information is critical because bat populations are declining worldwide. In the southeastern US, four species of bats are listed as endangered, and four are considered to be species of special concern. Thus, almost ½ of the bat species that commonly inhabit the South are vulnerable to extinction. Fortunately, new technologies such as tiny radio-transmitters and portable bat detectors have recently been developed that allow us to learn about the biology, ecology, and behavior of these important animals.

Our research on bats focuses on 3 areas:

- Ecology and conservation of endangered and sensitive species, particularly Indiana bats (*Myotis sodalis*) and Rafinesque's big-eared bats (*Corynorhinus rafinesquii*);
- Effects of forest management on bat habitat use and populations;
- Development and testing of methods to inventory and monitor forest bats.

Our research shows:

- Pine snags that receive a lot of solar radiation are important maternity roost sites for Indiana bats in the Southern Appalachians. Oaks are used as alternate roost sites.
- Stable hydrogen isotope analysis may be an important tool for studying the migratory behavior of Indiana bats and other species.
- Rafinesque's big-eared bats in Coastal Plain forests select large old trees, primarily tupelo (*Nyssa* spp.) usually with basal hollows. In areas where tupelos are less common, the bats use a greater variety of trees including many species of oaks.
- Vegetation density is the best predictor of bat habitat use in the Upper Piedmont and Mountains of South Carolina. Early successional habitats and forest gaps or openings appear to provide the best areas for bat commuting and foraging activity. However, mature forest is important for species such as the northern long-eared bat.

- Species richness of bats in 10 National Parks in Georgia, South Carolina, and North Carolina is not affected by urbanization. In contrast, species diversity is negatively impacted by urbanization, primarily due to the dominance of big brown bats (*Eptesicus fuscus*) in urban areas.
- Bat activity in the Piedmont of South Carolina is higher in stands that have been thinned than in stands that have not been thinned.

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