

# The Effect of Timber Harvesting on Forest-dwelling Bats

by Jeff Stringer and Phillip Arant

A number of bat species in North America are under attack from a fungal disease called “white nose syndrome.” This fungus spreads in caves during winter hibernation and debilitates bats, many times ultimately resulting in mortality. Several species of cave hibernating bats spend the summer, giving birth and living in hardwood forests throughout Kentucky. In the forest, they rest during the day under the bark of shaggy barked trees or in cavities and fly at night to feed on insects. Females stick together, giving birth to one pup and staying together as they rear the young. After the young can fly, females and young scatter and for the rest of the summer feed in the forest until they migrate back to the caves in the fall.

The Indiana bat and the northern long-eared bat are two notable summer forest dwelling species in Kentucky that have been federally listed as threatened or endangered. As such they are protected from harm and harassment through the Endangered Species Act. Because these two species spend time in the forest in the summer, as do many others, they pose a particular concern for woodland owners and forest industry. The concern can be legal—over violation of the Endangered Species Act—and/or a concern for perpetuation of these species and the health of the forest ecosystem in which they play an important role.

Dr. Michael Lacki, wildlife faculty at the University of Kentucky Department of Forestry and Natural Resources, is a leading expert on North American bat species. Recently he and silviculture and forest operations faculty, Drs. John Lhotka, Marco Contreras and Jeff Stringer, have partnered to determine the impact of timber harvesting on forest-dwelling bats in Kentucky and to determine if specific harvesting designs can actually improve bat habitat. The research study was supported by the forest industry and the U.S. Fish and Wildlife Service. Three 300-acre forest areas in Eastern Kentucky were chosen for this study. One on private land in Breathitt County, one at the University of Kentucky’s Robinson Forest and one at Kentucky Ridge State Forest managed by the Kentucky Division of Forestry. Each 300-acre tract was divided into three sections. One section was left uncut. Half

of the timber was selectively harvested from the other two sections (Figure 1). In one section, the timber was removed

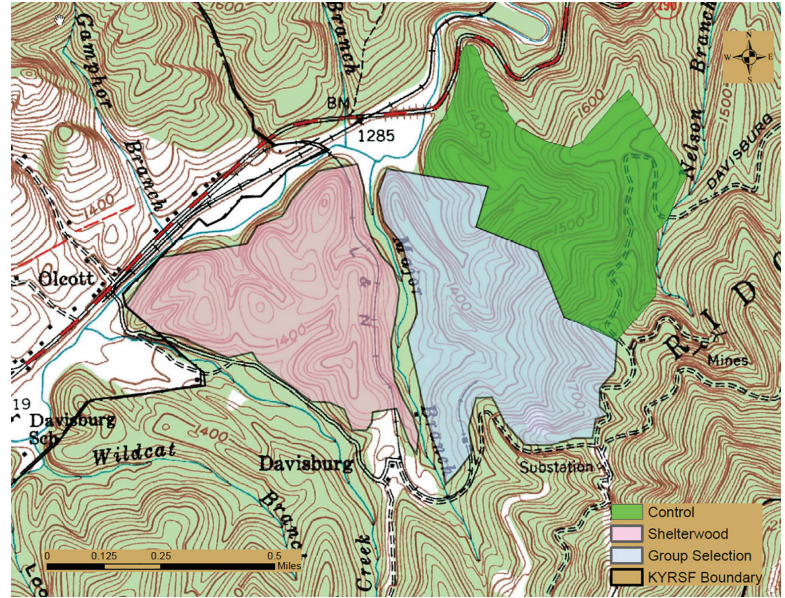


Figure 1. Topographic map of the Kentucky Ridge State Forest 300-acre study site showing the uncut, shelterwood, and group open sections.

using a shelterwood harvest, where 50 percent of the over-story trees were removed evenly across the entire 100 acres (Figure 2). In the third section, timber was removed in groups creating 1 to 1½ acre openings (Figure 3). The area around the openings was left undisturbed except for the construction of skid trails connecting the openings. Phillip Arant, University of Kentucky Forest and Natural Resources Sciences research assistant, used acoustic recorders (Figure 4) to determine what species were flying and feeding in the harvested and uncut areas and what specific areas within each section were being used. Bats also were caught and released to ensure that the species identified



Figure 2. 100-acre shelterwood harvest section at Robinson Forest.





**Figure 3. A.** An overhead view of the 100-acre group opening section at Robinson Forest. **B.** (below) A newly installed 1½ acre group opening at Robinson Forest.

Photos courtesy: Jeff Stringer



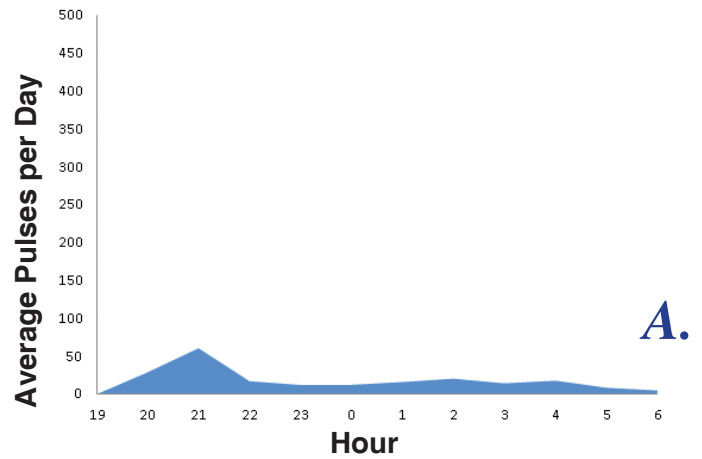
from the acoustical data were in-fact present and to determine their condition (Figure 5).

The study is still ongoing and initial data indicate that bats use the open areas within harvests to move about and feed. This includes skid trails and haul roads that allow them to fly efficiently through the forest and harvest openings that provide

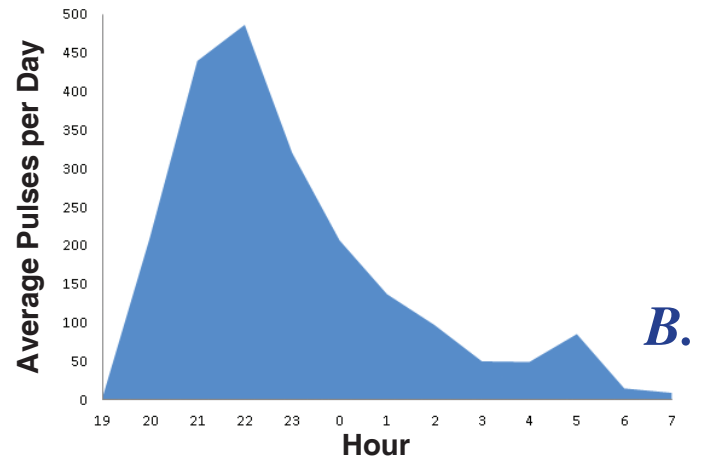
them room to successfully hunt. Figure 6 shows the increase in the average acoustically recorded pulses from all species of bats during a 24-hour period between the uncut section and a group opening at one of the study sites. The research also has shown that species behave differently and use different areas within the harvests. Some fly around and feed in the middle of the harvested openings, some spend time on the edge of the openings, and some use the streamside management zones. It

is important to note that these behaviors and use of different habitats within the harvests

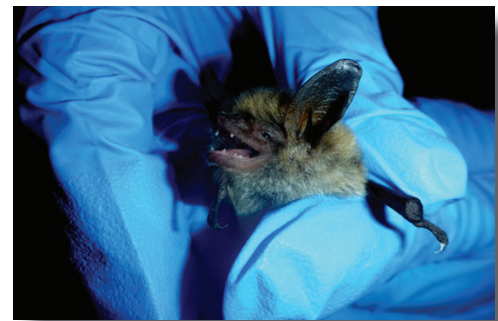
may change over time, particularly as regeneration of the openings and the understory in the shelterwood starts to develop. Based on the distribution of use by different species, the data



**Figure 6. Figure A** shows the number of pulses recorded over an average 24-hour period in the uncut section compared to **B** showing the number of pulses associated with one of the group openings.



indicates that leaving areas within a harvest or adjacent to it relatively undisturbed is important for some species. In all cases the harvests, which were selective using a shelterwood or group openings and which had intact forests around the tracts, did not result in the loss of bat species. Initial data also indicates that harvesting provided habitat attributes that were used by a number of bat species, including those federally listed. Continuation of the study will allow the research team to finalize data on the initial response to harvesting and watch to see how use of the harvested areas changes as natural regeneration develops. This study will ultimately yield information that can help guide forest management, use, and harvesting while maintaining the habitat attributes important for our bats.



**Figure 5. Long-eared bat captured using a mist net at Robinson Forest.**

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