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Helping Nature provide hollow trees for forest bats
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Searching for bats in hollow trees of bottomland hardwood forests can be a nerve-racking experience. Most tree cavities are so narrow that you lie on your back on the often-soggy ground and squeeze your head and one hand holding a flashlight into a ragged little opening. You never really know what lurks in the dark interior of that tree. If youâ€™re very unlucky, a venomous copperhead or water moccasin snake might be stretched amidst the twigs and wood dust. Usually, though, the hollow is alive with mosquitoes or camel crickets that drop bits of debris on your face as they skitter about. A panicky wood rat may scamper across your chest as it flees.

Thereâ€™s no room to jerk back in fright, so you hold your ground and maneuver the flashlight until you can scan the walls and ceiling of the chamber. Those reflective eyes you immediately notice high above are not those of bats but of large wolf spiders. If itâ€™s a good day and you keep looking, however, you might just spot a Rafinesqueâ€™s big-eared bat (Corynorhinus rafinesquii) clinging to the cavity wall 15 feet (4.5 meters) overhead.

The work is less disconcerting when old trees offer hollows big enough to crawl into and stand upright during the search. But such trees are, unfortunately, becoming increasingly rare in American forests.

As a wildlife biologist with the U.S. Fish and Wildlife Service, Iâ€™m exploring the native habitat of Rafinesqueâ€™s big-eared bats, studying the natural hollows within bottomland hardwood trees. I am working with graduate student Candy Stevenson and Professor Jeanne Jones of Mississippi State Universityâ€™s College of Forest Resources, with support from Bat Conservation International, the U.S. Fish and Wildlife Service, U.S. Geological Survey and Mississippi State University. We are documenting the relative abundance of tree cavities and their use by big-eared bats within mature bottomland forests. Our goal is to develop forest-management recommendations to conserve these bats. The availability of appropriate hollow trees is critical.

One unanticipated result of our fieldwork is a promising â€“ and virtually free â€“ strategy for increasing the number of natural hollow-tree roosts for Rafinesqueâ€™s big-eared bats. In trying to simplify our monitoring efforts, we discovered a way to give bats access to previously closed tree cavities: We simply add an entrance.

Big-eared batsâ€™ extensive use of human-made structures, such as bridges and dilapidated barns and abandoned houses, is well documented, but few researchers have examined big-eared batsâ€™ natural roosts â€“ which have been disappearing at an alarming rate. Most of the research attention has been aimed at cavities in water tupelo and bald cypress trees of southern swamps and brakes. The hardwood bottomland forests present a very different ecosystem.

For several years, we have been repeatedly inspecting a sample of approximately 650 randomly located hollow trees across the bottomland hardwood forest at the 48,000-acre (19,400-hectare) Noxubee National Wildlife Refuge in east-central Mississippi. Each cavity

has been inspected at least eight times over two years. An estimate of cavity density, relative age of the tree, its use by bats and other characteristics are being collected to help us understand the types of cavity trees these bats are selecting and how they utilize the trees across the seasons.

On the best of days, we might encounter several trees with bats, mostly single bats â€“ presumably males, which tend to roost alone or in small groups. Other trees may hold a colony of southeastern myotis (Myotis austroriparius), which is also dependent on hollow trees for natural roosts. The chittering of these smaller bats can be readily heard within the trees, where they consistently cling to the ceiling. We often find both species using the same tree at the same time, and even, on rare occasions, roosting together in a single cluster. Sometimes an eastern pipistrelle (Perimyotis subflavus) will be perched near the entrance while the big-eared bats roost farther up inside the hollow.

Of those 650 cavity trees in our study, only 80 have been observed with bats. We undoubtedly failed to detect some bats, but additional visits to the same trees ultimately will give us a better estimate of use. The roost requirements of Rafinesqueâ€™s big-eared bats are still being determined. Very old, very large hollow trees are clearly the most important for these bats, but we have documented a few big-eared bats using cavities in trees as small as 16 inches (41 centimeters) in diameter with hollows just seven feet (2.1 meters) high.

We search for potential maternity colony sites by following radiotagged female bats. We have tracked such bats to a few relict cypress trees. These ancient giants of the forested bottoms â€“ some measuring more than 60 inches (1.5 meters) in diameter â€“ have grown for centuries, slowly expanding in girth while the heartwood decays, leaving a hollow vessel behind.

The audible beep of a transmitter clearly indicates the presence of a bat within a tree, but often the only opening, created when the top of the tree broke off, is 60 feet (18 meters) or more above the ground. Our challenge was to find a way to easily and regularly examine a cavity without having to climb the tree. Our solution was to cut a small opening, typically about 12 by 18 inches (30 x 45 centimeters), into the base of the tree. We plunged the bar of a chain saw through the four- to six-inch (10- to 15-centimeter) thick trunk wall to create a â€œremovable windowâ€ that could be reinstalled to maintain the internal environment.

These portals give us a unique view of big-eared bat maternity colonies from the batsâ€™ perspective. Leaning through the small window at one tree, I could see perhaps 75 adult bats clinging to the interior wall of the high cavity. A few bats took wing, apparently disturbed by my intrusion, but they settled again with little hesitation. Our radiotagged informant, with colored bands on its forearm and a radio glued to its back, stood out from the others.

Beginning in early June, this and several other cypress trees along a two-mile (3.2-kilometer) stretch of creek periodically hold mothers and pups. Throughout the pup-rearing period and into fall, the females move among these trees, changing roosts every few days for no apparent reason. This movement may be linked to where they foraged the previous evening. Or perhaps a raccoon, a rat snake or another predator ventured into the tree. It is clear that the minimal intrusion of our observations during the day is not causing the bats to leave these trees.

When temperatures begin falling around November, the bats (which do not hibernate)

abandon the tree cavities theyâ€™ve used as summer roosts. Our searches have revealed only a few large, old cypress trees that fit Rafinesqueâ€™s big-eared batsâ€™ apparent winter-roosting needs. These rare trees have very small entrances, and the temperature and humidity inside the cavities are very stable. The number of bats that use these few trees as winter roosts is relatively small, probably about 200 or less, but this may constitute the entire big-eared bat population in hundreds or even thousands of acres of continuous bottomland. These winter-roost trees serve much the same purpose as caves, but with the arrival of spring, bats are rarely seen within them.

We stumbled upon our potential solution for helping Nature boost the number of natural-cavity roosts while searching for hollow trees that might hold maternity colonies. Loggers for many decades determined whether a hardwood was sound or hollow at the base by interpreting the sound generated by thumping the tree with an ax. In the days of the two-man crosscut saw, hollow trees were left standing. When we identified hollow trees suspected of having unseen upper entrances, we used chain saws to open portals to let us peer into the cavities, then used the cut-out chunk of wood to close the window after examining the interior.

We discovered that some of these trees had no opening at all â€“ no way for bats to reach what otherwise seemed an attractive roost. When we encountered such trees, we simply left the portal open. Within weeks, we observed a southeastern myotis colony in a cottonwood tree and Rafinesqueâ€™s big-eared bats in cypress and hickory trees with the cutouts.

This inadvertent discovery could represent a major opportunity to easily increase naturally occurring roost trees in forests where appropriate trees are rare or when entrances are too small for big-eared bats. When possible, this could prove more cost-effective than building artificial roosts made of wood or concrete.

The concept needs further research, but our initial observation that big-eared bats are finding these artificial openings and moving into the cavities is extremely promising. The prospect that simply creating access to existing tree hollows can provide long-term day roosts and perhaps even maternity sites is exciting.

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