Hubbards Cave Revisited: Adaptive Cave Resource Management on a Private Nature Preserve

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Abstract

Hubbards Cave Preserve, located in Warren County, Tennessee, was purchased by The Nature Conservancy in the mid 1980s to protect a significant endangered bat hibernaculum. Historic censuses indicate that over a quarter-million gray bats (*Myotis grisescens*) and several thousand Indiana bats (*Myotis sodalis*), both federally endangered, once utilized Hubbards Cave as a winter roost. Soon after purchasing the preserve, The Nature Conservancy, the American Cave Conservation Association, and other partners built an airflow cave gate over the main sink's south entrance to prevent human disturbance of the bat colonies. Since this initial gate project, however, declining bat populations, rampant vandalism by trespassers, and the discovery of irreplaceable cultural and archaeological resources inside Hubbards Cave have caused The Nature Conservancy to re-address its access management and biological monitoring of the entire property. In 1998 and 1999, airflow gates with newly adapted designs were constructed over the remaining two sinkhole entrances, and the south gate was retrofitted with a box opening to enhance the flight path of emerging bats. The Nature Conservancy and the National Speleological Society also joined forces to begin the development of an access and monitoring policy.

Introduction and Background

When the U.S. Fish and Wildlife Service and Bat Conservation International conducted a winter bat survey of Hubbards Cave Preserve in early 1998, it ended a three-year lull in population censusing at The Nature Conservancy's finest cave preserve in Tennessee. Although both the federally endangered gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*) thrived in this hibernaculum as recently as the late 1980s, a series of management situations at the preserve had caused concern about the bats' safety during hibernation. The 1998 survey team estimated just under 100,000 grays and no Indianas.

One hundred thousand bats seems like a lot, and it is—but in the 1960s and 1970s, Dr Merlin Tuttle from Bat Conservation International counted over a quarter-million grays and several thousand Indianas and heralded Hubbards Cave as one of the Southeast's most significant endangered bat hibernaculae. By the 1980s, that count had dipped to 150,000 grays; by 1991, less than 90,000 grays and a paltry ten Indianas made the record. And in 1998, the gray bats held steady at just under 100,000, and the Indiana bats were gone.

The purchase of Hubbards Cave and the surrounding 50 acres in the mid 1980s signaled the beginning of The Nature Conservancy's most challenging stewardship scenario in Tennessee. A multi-ton, steel airflow gate was erected over the cave's south entrance soon after the preserve's acquisition, but the gate did nothing to safeguard the two entrances across

the sinkhole or the mountain land around the cave mouth. By 1994, the sinkhole and cave walls were spattered with graffiti, black spray paint marred the Conservancy's endangered bat sign, and trespassing all-terrain vehicle users had beaten paths across the hilly terrain. Finally, in 1997, vandals burned a Civil War-era ladder inside the west passage, an especially atrocious offense that galvanized a massive effort to take back responsible control of the cave's access and resources.

Today, after 15 years of Conservancy ownership, Hubbards Cave Preserve boasts airflow gates over all three of its main sink entrances. Each gate embodies a separate design that was chosen to satisfy different management objectives.

Cave Gate Design Methodology and Results

The construction of Hubbards Cave's first gate in 1986 did not transpire without debate. Critics voiced concerns that the gate's full design would create a flight path obstacle for the bats. To research this possibility, the U.S. Fish and Wildlife Service observed the bat flight several times in the mid 1980s. Results indicated that the gate's full front (*i.e.*, vertical and horizontal bars reaching from ground level to the top of the mouth) was working properly and presented no problems for the bats using it. This older cave gate design is representative of the first models used for conservation, with vertical support beams spaced on four-foot centers.

In spite of the U.S. Fish and Wildlife Service's reassurance, the population of bats using the main sink's three entrances decreased from approximately 260,00 individuals to 88,000 between Dr Tuttle's original count and the late 1980s. Some bats also exhibited a behavioral change by choosing new roost sites not protected by the south gate, thereby creating concerns that the structure was somehow causing the population decline. Vandalism and raccoon predation were also increasing at the preserve so the relative importance of factors contributing to the bats' downward spiral was unclear.

One year after the Civil War ladder's destruction, Hubbards Cave's second gate was constructed over the west entrance. This small gate exemplified the new cupola design (Figure 1) that sought to protect the west passages' cultural and archeological artifacts while still accommodating the endangered bats that swarm in the west entrance before hibernation. However, the construction of the second gate also left one remaining entrance, the north passage,

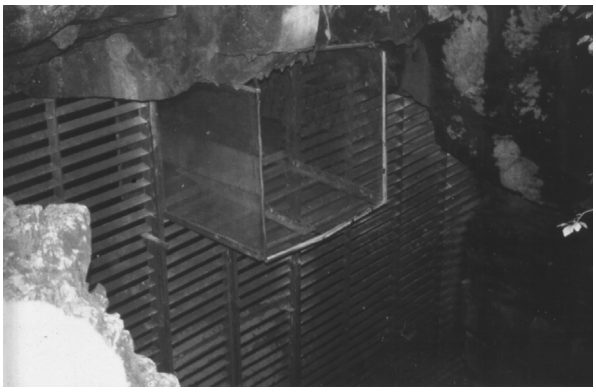

Figure 1

undefended against vandals and trespassers. Plans were immediately underway to build the third and final gate in 1999 in order to safeguard all of Hubbards Cave's winter bat roosts and human artifacts.

The north entrance gating project utilized yet another style of bat gate. This type has an open top to permit bats easier access to the north passage with less navigation between steel bars, but a shield extends off the front and back which makes it extremely difficult to violate (Figure 1).

The 1999 gate project also revisited the preserve's original south gate in an effort to stabilize the older structure while alleviating lingering concerns that the gate was inhibiting bat flight. The modifications of the south gate included reattachment of the column tops to the roof of the cave and the installation of a shielded, eight-foot by eight-foot window in the gate's top center (Figure 2).

Figure 2

In October of 1999, bats were observed with night vision equipment over several weeks of swarming activity prior to hibernation. Video was recorded at the south, west, and north entrances to gauge the animals' reactions to the three different cave gate designs. These observations revealed the following:

- At the south gate, the bats used the main part of the structure as often and as well as they used the modified, eight-foot by eight-foot opening.
- Bats using the north gate used the main part of the gate as well as the open space over the top.
- Bats easily used the west gate in spite of its size. Several bats were observed flying through both sides of the cupola as well as out the top cap.
- The south gate does not influence the temperature at the hibernation site.

Conclusion

Fifteen years and three gate styles later, it may finally be concluded that the original south gate did not cause the endangered bat population decline. Increases in human traffic, vandalism, and raccoon predation are the likely causes.

Hubbards Cave Preserve has become a success story that illustrates the power of partnerships in effecting conservation and adaptive land management. The preserve is now monitored by a local caver, a critical contact for educating neighbors about the endangered bats. Historians and archaeologists, all interested in preserving the cave's cultural resources, donate their time performing artifact surveys to document the extensive, prehistoric human use of Hubbards Cave. These same people are contributing to the preserve's new management plan in a cooperative effort to manage Hubbards Cave for a variety of resources, including recreation. Even simple actions like an annual trash clean-up bring dozens of volunteers to task, more so than at any other Conservancy preserve in Tennessee. With protected entrances and high levels of support and volunteerism, the Conservancy anticipates future bat counts in which Dr Tuttle's quarter-million tally for gray bats becomes a reality once again.

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