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Counting Bats the Hard Way
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We peered down into the gigantic sinkhole, tied our rope to a tree, and rappelled 25 feet (7.6 meters) to a rocky landing. Then we secured another rope to two metal bolts at the edge of a 97-foot (29.5-meter) pit, crept over the ledge, and descended into the cold darkness. Then the going got tough.

Surveying the bats of Fern Cave, by far the most important remaining hibernation site for the endangered gray myotis (Myotis grisescens), is not for the faint of heart or for inexperienced cavers. That's why, despite its importance, this Alabama cave – a huge complex of exceedingly rugged passages – hadn't been visited by a bat biologist since Bat Conservation International Founder Merlin Tuttle last conducted research there more than 25 years ago.

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During his initial research in the 1970s, Tuttle estimated that more than half of the remaining population of gray myotis relied on Fern Cave for hibernation. As a result of his findings, he convinced the U.S. Fish and Wildlife Service to acquire and protect the cave as a national wildlife refuge in 1981.

Counting the bats currently hibernating in the cave would be critical in -confirming what appears to be one of the most important bat-conservation achieve-ments ever – restoring a species that experts had once predicted was doomed to extinction [*BATS*, Summer/Fall 2002]. To determine the number of bats currently hibernating in Fern Cave and the health of the species in general, Tuttle planned the grueling but necessary task of conducting an inventory.

On January 20, 2003, Tuttle, along with BCI cave specialist Jim Kennedy, began the rough drive down a long, winding road to the cave. Accompanying the BCI crew were me and my husband, Steve Pitts, photographer Chris An-derson, and biologist Bob Madej.

Pitts, a member of the National Speleological Society and volunteer for the U.S. Fish and Wildlife Service, is access coordinator for the cave and knows it better than almost anyone. He served as the guide through the maze of passages. I helped guide the group and carried critical equipment. Anderson would photographically document the cave's importance for bats. Madej would gain experience needed for future monitoring.

A group approach was required, given the weight of hundreds of feet of rope and other equipment that had to be carried a mile and a half (2.5 kilometers) up a rugged mountain before we even began the main challenge: Fern Cave's deep pits and intricate passages.

Fern Cave is vast beyond description. Over 16 miles (25 kilometers) of interlocking canyons, sprawling rooms, and deep, vertical pits run as much as 541 feet (165 meters) below the surface. Visiting this cave requires specialized skills in rappelling and rope climbing – not to mention expertise in negotiating tight crawls, ledges over 100 feet (30 meters) above the floor, and many other obstacles. Al-though parts of the cave are popular destinations for cavers, the hibernation areas are strictly protected from August 15 to April 15.

After rappelling to the bottom of the pit, we moved as quickly and cautiously as possible down a narrow canyon appropriately called the Refrigerator Passage. Chimney-effect winds of 41 to 45 degrees F (5 to 7.2 degrees C) made us wish we could move faster.

Suddenly, we rounded a corner and were greeted by huge clusters of gray myotis. They blanketed the limestone walls for as far as we could see. I really didn't expect to see bats this close to the entrance, since I assumed it would be too cold for them. Turns out the gray myotis really like temperatures in the low 40s (F), which makes Fern Cave an ideal hibernation roost.

There are around 4,000 caves in Alabama, but this is the only one that combines the multilevel entrances and huge volume required to trap enough cold air for gray myotis hibernation. The bats come here from hundreds of miles around.
As soon as we passed through the Refrigerator Passage, hundreds of thousands of bats began waking up, a typical reaction for this species. Soon we were engulfed in a massive bat flight.

The sound of thousands of bat wings created a dull roar like a distant waterfall. In fact, there were times when we simply couldn't move for fear of hurting them. We crouched low while literally tens of thousands of bats passed within inches of us, often using a shoulder as a temporary landing site. Such a close encounter with so many bats was an awe-inspiring experience!

Tuttle and Kennedy estimated that just the first small section of cave, about 100 feet (30 meters) stretching from the entrance to the next large room, held some 200,000 bats.

Counting that many small animals seems almost as much art as science. You just can't count that many individuals. So they first estimate the number of bats in a manageable area – one square foot (929 square centimeters), for instance. Anywhere from 50 to 275 gray myotis can be packed into a square foot of roosting space. Then they estimate the total area where bats are roosting. You get a total by multiplying the number of square feet by the estimated number of bats per square foot. To better understand error rates, Tuttle and Kennedy didn't com-pare their counts until several days later. Then they averaged their numbers to reach final conclusions.

I was concerned that we were disturbing too many bats, and Tuttle explained that this is exactly why gray myotis cannot survive in caves where human disturbance is more than a rare event. Kennedy said hibernating bats normally have spare fat supplies, but these can be quickly exhausted if the bats are repeatedly disturbed. On average, bats lose approximately 30 to 60 days of stored fat reserve per arousal from hibernation.

It is normal to wake up and sometimes change roosting locations within a cave several

times in the winter; but each time a bat arouses, it runs an increased risk of starving before spring. We did our best to minimize the disturbance, but it quickly became obvious why such sites must be protected.

After the first count was completed, we rappelled down one more pit, then proceeded to navigate a series of tight crawls and narrow canyon passages, interspersed by large rooms. This area features mazes of interlocking canyons, and peering into any of them usually revealed bats hanging in dense clusters. The large rooms also contained many gray myotis.

Bats hibernate throughout an area that extends for miles, far more than we could check in a single day. In fact, the difficulty of our task was well illustrated when Tuttle, relying on his sketches and descriptions from the past, failed (even with the help of our entire team) to find one roost that he insisted was probably within 50 feet (15 meters) of us.

After visiting several rooms in this section, we headed back to the entrance and began climbing the rope back up to the surface. Although we spent 11 hours inside the cave, Tuttle doubts we encountered more than a small proportion of the cave's bats, which partly explains why this is such a bastion of survival for them.

You may wonder how these counts could make much difference in conservation planning, given the number of bats we certainly missed. But Tuttle was delighted. Finding so many bats occupying ideal temperature zones near the main entrance indicated humans had not been disturbing them. Tuttle's counts at other significant gray myotis caves with appropriate temperatures have sharply in-creased since the caves gained protection. That appears to be the case at Fern Cave.

Tuttle and Kennedy counted only about 840,000 gray myotis. But based on the size of the sections we examined and the many promising passages we weren't able to visit, Tuttle estimates the total population is at least 1.5 million – and perhaps far more. That's great news for a species that, in 1969, was not expected to survive.

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