

Sphinx Cave – Bat Gating Project

Coronado National Forest, Arizona

Sphinx Cave is a limestone cave located in the Chiricahua Mountains of Southeastern Arizona. This cave, unlike others in Arizona, is near a road and is fairly accessible by car and foot. Knowledge of the existence of this cave was historically limited, but in recent years locals have “discovered” the cave resulting in a large increase of traffic. Unfortunately this has led to the cave being vandalized on several occasions. This cave is the seasonal home to a summer maternity roost for bats, which can be very sensitive to disturbance. With growing awareness of the importance of bats to the local ecology, and increasing concerns regarding cave resource conservation by local groups, steps were taken with the USFS Coronado Forest to install a bat-friendly gate inside the cave. Gating of this cave allows for seasonal closure for the protection of the bats, and also allows for the facilitation of recreational and research visits to the cave when permissible.



Roosting Bats

Before the bat gate design was initiated, the site was assessed by Jerry Trout, Cave Specialist, U.S. Forest Service, along with Jim Werker and Val Hildreth-Werker Conservation Co-chairs of the National Speleological Society. The local Forestry biologist was also consulted to help plan the optimum management plan for this unique site. It was crucial that the gate's design allow for usage by both bats and other small mammals. Several other species of animals use the cave for many reasons, including shelter and water. This cave has a standing body of water not far from the bat roosting site, which provides local wildlife with a year-round drinking source. This feature is very important to the local biota since the cave is located at low elevation in a desert environment where there is precious little water resources during much of the year.



Moving Huge Boulder for New Trail

The project first began with a day trip to the cave for trail building and site preparation. The old trail to the cave originally went straight up a hill and had severe erosion problems. For this project we decided to reroute the trail with a gentler slope so that we would be able to later carry the heavy gate, generator, and welding equipment up to the cave. One section of trail edged around a large rock outcropping so we had to manually build up that section with stacks rock and fill dirt. We also moved some rocks and dirt in the area where the gate would be built inside the cave. This was done to improve the bat flyway path adjacent to the gate.

The gate fabrication in our shop took about two days of work. We then spent an additional day packing up all the tools and equipment needed to install the gate. On the appointed day, our group all met at the bottom of the hill below the cave, ready to haul hundreds of pound of tools and materials up a steep hill.



US Forestry Geologists Carrying the Bat Gate

A safety briefing was held, both at the staging site near the vehicles and again outside the cave, prior to work beginning at either location. The focus of the brief was the safety of the workers and to minimize the impact to the cave. Work was initiated at the site by moving unstable rock from the vicinity, making the area safe to work for the teams. Moving breakdown rocks that would later be used to reinforce the footer of the gate also required several people. Crews then set to dressing up a few of the attachment points for the gate to the rock. After clearing the site and moving the welding equipment, powered by a generator outside the cave, to the site, work was begun on the setting of the anchors and footers. Two welding teams worked the site at different points, while another team moved rocks and mixed concrete for the final installation. All teams wore appropriate safety equipment, including helmets, safety glasses, gloves, and respirators where appropriate.



Safety Meeting Before Beginning any Work

This bat gate, as with most, was to be installed nearly perpendicular to the flight path of the bats that use the cave. This configuration allows the bats to pass most comfortably through the gate, thereby eliminating the risk for them to be intimidated by the gate and not returning. The gate location pictured below proved a convenient spot for installation. It is small, requiring fewer materials, and still close enough to the entrance to be accessible to our installation equipment such as welders and concrete.



Gate Inside of Cave and Ready for Placement

The gate is made of heavy mild steel, 2"x2" tubing, reinforced with re-bar and concrete inside the tubing. The welding has continuous seams all the way around each bar sealing and strengthening the gate bars. This gate design makes it very resistant to decay and possible vandal attacks. The dimensions of the gate are approximately 36 inches wide and 24 inches tall. It took 2 people almost an hour to carry the gate nearly one quarter of a mile from the staging site to the cave entrance. Due to its weight, water was pumped from a US Forestry Fire truck parked at the staging site to large plastic trashcans located just inside the cave entrance. This water was used for the concrete mixing. Re-bar reinforcements, steel mounting anchors and many yards of concrete make this gate very resistant to vandalism and damage from the elements. We also inset rocks and buried the concrete to make the area around the gate look as natural as possible.



Small Passage Window Closure

A few nearby holes between rocks near the installation site were also sealed off to prevent and discourage digging around or possibly breaching the gate. These were reinforced with re-bar and concrete, drilled deeply into the surrounding rock and set in place with concrete footers. The steel bars were left far enough apart that bats could still fly through these windows, but they are small enough to keep out human visitors. These windows are not along the normal bat flight path, but we try to keep them open for the occasional bat and to leave airflow in its natural state.



Small Passage Window Closure

Several types of bats use the cave seasonally throughout the year. This particular region gets heavy visitation from bats as they migrate to and from lower latitudes. Large colonies of Townsend's Big-eared bats often use the cave for roosting during the summer. Unfortunately, the accumulation of expended shotgun shells and other debris inside the gate area, indicate recent increased visitation and disturbance of these bats. People need to understand the great value bats have in our local environments. Many species of bats will eat half of their body weight in insects every night. This is a huge advantage in keeping down the populations of pest insects. Other bats in this region prey on scorpions and centipedes, which also helps to reduce the number of these pests. And some species found around this cave play an important role in pollinating our beloved Saguaros and other desert cacti. We feel that it is very important to support and protect these often misunderstood mammals, and by protecting the caves they live in, we are making our world a better place.



Bat Roosting with Pup

This is a photo of the completed gate. Notice the bat flying through the gate bars. Several large groups of bats have been recorded residing in the cave a year after the gate's installation.

Partial funding for this project was provided by The Department of Agriculture, U.S. Forest Service and the Southern Arizona Grotto. Fabrication and installation work was performed by MineGates, Inc., with the help of volunteer cavers of the National Speleological Society, Southern Arizona Grotto and the USFS Coronado Forest. This project is an example of multiple group cooperation, including Federal agencies, private organizations and volunteer groups coming together to accomplish a common goal. Thank you to all those who helped out on this project.



Finished Gate with a Single Bat Flying Through the Bars