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TRAINING OPPORTUNITIES FOR CAVE AND MINE GATERS

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I cringe when I hear some of my caver friends tell me they just gated a cave. I dislike the undeniable fact that gating is a trend gaining momentum simply because it is the most effective method currently available for protecting fragile and irreplaceable resources. But I also worry that although the reasons were noble and intentions good, most people just don't understand enough about gates and how they affect the cave and mine resources to design and build a good one.

I should know. I have helped build several many years ago that I am less than proud of today.

Many, if not most, gates built on caves and mines are done so in response to some crisis situation. This mine is about to be backfilled. That cave is being visited by hordes of untrained explorers. That other one has just been discovered by pot hunters who are destroying the unique resources therein. And so on. Often, at least with caves, these gates are being built by volunteers using scrounged or donated materials. The main purpose is to control access. Little regard is given to the effects on wildlife, microclimate, nutrient flow, and so on.

This does not have to be the case. There exists a cadre of experts whose backgrounds have helped them experiment, test, and refine gate designs over many years. Gates, particularly those intended to not negatively affect bat populations, have come a long way from their humble beginnings.

But it wasn't always so. In the beginning, it was thought that any hole a bat could fit through would be adequate. So some sites, particularly show caves, often had solid stone walls built into the entrance, with a solid door with tiny cutouts. Not only was this difficult for bats to use, especially large colonies, but it changed airflow and the thermodynamics of the roost, usually rendering it totally unsuitable for bats. Other designs used grids of a variety of materials, often ¾ or one-inch rebar. Still others took advantage of whatever materials were available, such as recycled jail bars, vertically oriented.

Knowledge about gates took a great leap forward in 1975 with the publication of the National Speleological Society (NSS) book *Cave Gating* by Hunt and Stitt. Concepts that were intuitive for some were finally formalized and made available to the masses. Thousands of copies were printed and sold. However, the gate designs were primarily to solve access control problems. Rarely was mention made of the biological effects of those designs, and some were downright fanciful and impractical. But it was a start, and the book was revised in 1981 and is still being sold today.

A variety of papers were produced in succeeding years, mostly in the Proceedings of the National Cave Management Symposia (NCMS, or more recently, the National Cave and Karst Management Symposia, NCKMS) or in local caving publications. These are classic gray literature, and therefore most of the papers remain obscure. One important early paper, however, deserves mention. In 1976 Merlin Tuttle of Bat Conservation International (BCI) presented a paper at the National Cave Management Symposium entitled "Gating as a Means of Protecting Cave-dwelling Bats." This was the first paper to take an analytical approach to gate design and placement, discussing both good

and bad features. In particular, he addressed some biological concerns, identifying key characteristics both suitable and unsuitable for bats. This paper has been reprinted several times, notably in the 1981 edition of *Cave Gating* and in BCI's own training materials.

Most publications since that time have focused on the accomplishment of building a gate or gates, and few have examined the consequences of gating. Notable exceptions are White and Seginak's experiments at Sauta Cave, Alabama, and Cave Mountain Cave, West Virginia, which looked at design preferences by bats. Their study showed that horizontal round or angle-iron bars were preferable to "funnels", but round bars were more easily breached by vandals. MacGregor, in 1993, published observations on population fluctuations before and after gating at 11 Kentucky caves, but under-emphasized uncorrected passage alterations (mostly entrance modifications) as a cause of continuing population declines. In 1993, Richter *et al.*, further showed how inadequate closures and entrance modifications negatively affected the microclimate of the hibernacula and caused significant population declines in their studies at Twin Domes and Wyandotte caves in Indiana. Ludlow and Gore made observations of entrance preferences of a large colony in Old Indian Cave, Florida, in 2000, concluding that although emergences increased at one entrance after a gate was removed there, other factors such as predator avoidance or passage congestion could account for that preference.

An underlying issue is that the gates may have been poorly designed or situated in the first place, causing altered bat behavior that returned to normal after the gate was removed. And also in 2000, Martin *et al.* discussed the effective placement of horizontal bar angle-iron gates within the twilight zone (3-17m from the entrance) of 22 caves in eastern Oklahoma, which seem to be well accepted by small to medium nursery colonies of gray bats. Finally, Roebuck *et al.* published an engineering analysis on the effect of cave gates on airflow. Many other contributions, to numerous to name, were made to our current state of knowledge on gating effectiveness, and the most important are listed in the bibliography at the end of this paper.

To help spread the word about the latest bat-friendly closures, including fences and the now-standard horizontal bar angle-iron gate, Bat Conservation International produced *Bats and Mines* in 1994. More than 5000 copies were distributed free of charge, funded by the USDI Bureau of Land Management (BLM), USDI Fish and Wildlife Service (USFWS), USDI Natural Resources Conservation Service (NRCS), USDA Forest Service (USFS), National Fish and Wildlife Foundation (NFWF), and others. Although focusing on abandoned underground mines, most of the material contained was equally applicable to caves. Detailed drawings were included showing all components of a gate for both horizontal and vertical openings. A revised edition in 1998, with updated gate plans, also had a printing of 5000, and is still being distributed free to anyone needing gate plans.

In an effort to educate more cavers, biologists, and resource managers on the various types and applications of cave protection methods, including their pitfalls, a series of cave gating workshops were initiated. The first two were organized by Jim Nieland of the USFS and the ACCA. Two gates were built in September 1997 at Boulder Cave in Yakima County, Washington, to protect a maternity and hibernating colony of *Corynorhinus townsendii*. Instructors were Jim Nieland, Bob Currie (USFWS and ACCA), and Jim Kennedy (BCI). The Wenatchee National Forest helped provide additional funding and assistance. Twenty-two students participated during the two six-day workshops.

The workshops featured evening lectures on gate design and location, bat acceptance, logistics, construction techniques, safety, site restoration, and other aspects of gating theory. During the day, the students received first-hand experience in moving materials, cutting and welding steel, and

the rest of the back-breaking labor that goes into building a gate. Each day instructors provided formal and informal discussions on gate placement, materials calculation, bat natural history, and other related topics. These activities were so well received that the sponsors (ACCA, USFWS, and BCI) decided to plan additional workshops as suitable sites and co-sponsors presented themselves. The group also laid the initial groundwork at that time for an updated cave gating handbook, which eventually became the Bat Gate Design Forum in Austin in 2002 and the proceedings you are reading today.

The third cave gating workshop was held in June of 1998 and cosponsored by the National Park Service. The five-day event took place at Gregorys Cave in Blount County, Tennessee, a heavily-visited cave in Cades Cove in Great Smoky Mountains National Park. It was previously gated to protect the bats and other cave resources, but the gate became non-functional due to its poor location at the steep entrance, where it trapped leaves and debris and blocked airflow into the cave. Roy Powers and Rosa Stiltner of the ACCA assisted the original three instructors in leading the group of 11 students in constructing a much-larger angle iron gate further inside the entrance and in the removal of the old rebar gate and accumulated debris.

Our fourth workshop was held during a cold and snowy October 1998 in Pendleton County, West Virginia. A large group of more than 15 students and the five instructors built new gates on both the horizontal and vertical entrances of Sinnett-Thorn Cave, a critical hibernacula for endangered *Corynorhinus townsendii virginianus*, the Virginia big-eared bat. Students had an opportunity to hike from entrance to entrance to learn what each team was doing during breaks in their own gate-building tasks. While the cupola-style gate at the upper (Thorn) entrance was larger and took more materials, working conditions were usually more pleasant than the cramped crawlways of the horizontal Sinnett entrance. The existing old, poorly-placed rebar gates were removed after the new gates were completed, eliminating an ongoing predation problem by feral housecats. West Virginia Department of Natural Resources (WVDNR) was a partner in this project.

Most recently, we partnered with Missouri Department of Conservation (MCD) and Lake of the Ozarks State Park to place a large gate in the entrance of McDowell Cave in Miller County, Missouri. This gray bat maternity colony had a wide entrance, but needed a “chute” designed into the gate to accommodate the bats while keeping out humans, including trespassers looting archeological artifacts in the cave mouth. Nieland, Currie, Kennedy, Powers, and Roy’s new assistant Kristen Bobo labored for five days in constant rain, heat, humidity, and mud with 14 students. Both of the last two workshops were greatly assisted by ACCA Executive Director David Foster, who handled registration, meals, and acted as an all-around gofer. More such workshops will be planned as we learn of willing partners and caves with demonstrated gating need near adequate facilities for lodging, meals, and lectures.

The gating handbook we planned in 1997 was in limbo due to the work commitments of all the instructors, and the money provided for that publication from the Fish and Wildlife Service was due to run out. How could we get out the latest information on gating without having to write it all up ourselves? Bob Currie supplied the answer: hold a symposium similar to the successful Bats and Mines forum cosponsored by BCI and the UDSI Office of Surface Mining (OSM) in November 2000. Currie contacted OSM, who readily agreed. A steering committee was formed to represent interested agencies and organizations, who met to develop the structure and topics of the symposium. Session chairs were selected, potential presenters contacted, date and location set, and the forum took place. We had more than 100 people attend a highly-specialized conference on one topic of cave management, and by association abandoned mine management. The proceedings which you hold in your hand, ably compiled by Kimery Vories of OSM, are far greater that the

gating manual first discussed by Currie, Nieland, and Kennedy in 1997. This publication represents the current state of the art in gate design and construction.

We have come a long, long ways since the early days of cave protection with little thought to the biotic and abiotic consequences. But this publication is still not the final word in cave gating. Gating is an evolving science, and just as the 1975 NSS booklet *Cave Gating* is now obsolete, we expect that much of the information presented in these proceedings will soon be obsolete as well. Stay informed, keep in touch with those on the cutting edge of gating and cave gate research, and do not rely solely on printed information. And if you learn of better techniques, don't be afraid to modify or replace an old, substandard gate. And please share your findings with the rest of us!

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