Successful Cave Management Strategies at Carlsbad Caverns National Park

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Abstract

Carlsbad Caverns National Park contains 87 known caves of which Lechuguilla Cave and Carlsbad Cavern are the two largest. In the last ten years, there have been a number of successful management strategies implemented to protect cave resources while allowing a range of access availability. Carlsbad Cavern has been impacted from its early days of discovery in the late 1800s to the present and is the focus of a number of projects to restore impacted areas, remove lint from visitor trail areas and to survey and inventory cave features. A commitment from management for personnel and funding allows the park to manage over 200 volunteers throughout the year to work on cave projects. The development of survey standards and guidelines for those entering caves of the park have been successful in reaching our goals of protecting cave features while allowing access.

Management strategies have not been limited to inside the park, but also working with outside agencies and neighbors to protect cave resources. Oil and gas drilling operations adjacent to the park on our northern boundary has been a prime example of cooperation between agencies to protect cave resources.

For continued protection of cave resources for the future, strategies include removal or mitigation of manmade structures located over Carlsbad Cavern, developing better trail cleaning methods and other maintenance related activities in Carlsbad Cavern, and the replacement of the culvert and locking mechanism for Lechuguilla Cave.

Carlsbad Caverns National Park contains some of the most spectacular yet fragile caves in the world. There are numerous recent examples of successful cave management strategies that have provided education for visitors and better protection for cave resources. Without the approval and support of the upper management of the park, few, if any, of the examples listed would have been possible. In addition, without the support of hundreds of volunteers, our programs would have been smaller in scope and less successful.

Limited And Varied Access

Carlsbad Caverns National Park has a range of options for visitors to experience caves of the park. These options help protect park caves and their features while allowing access to the visiting public. Most visitors come to experience spectacular Carlsbad Cavern with its paved trails and electric lights. For the more adventuresome, guided tours into three off-trail areas in Carlsbad Cavern and two other park caves, Spider Cave and Slaughter Canyon Cave, are offered. For those with experience and proper gear, there are eight other caves available to visit on your own. These caves range in difficulty from an easy walk-in cave to a cave with a vertical entrance pitch of 300 feet. One last cave is available for the experienced vertical caver as a guided trip. This cave has a 180-foot entrance drop. The rest of the caves of the park are not available for recreational caving, but are open to approved scientific research.

Supporting Conservation, Restoration, and Lint Removal

Caves of the park are extremely fragile. Every day we learn more about how fragile these places really are. Any time anyone enters a cave of the park, there will be some impact. How

that person travels through the cave will determine the extent of that impact. Resources found in caves of the park are essentially nonrenewable. This means that once lost, these resources will never come back. With this in mind, we know that settlers discovered Carlsbad Cavern as early as the 1880s. The oldest known signature in the cave is dated 1898. This means that Carlsbad Cavern has seen more than 100 years of people marveling at its wonders. Unfortunately, for most of that time the extreme fragility of the cave was not understood. This has resulted in a tremendous amount of impact to the cave, much of which can never be recovered or restored. Causing impacts have not been limited to the visitor, but the building of the trails, the placement of the lights and electrical system, and the many trips off the paved trails to maintain the infrastructure have all taken its toll. Over the years, even an unimagined substance such as lint has changed Carlsbad Cavern forever.

Despite the negative impacts that have occurred, Carlsbad Cavern is still one of the world's great wonders and awes the unsuspecting visitor. Management has taken an active role in trying to conserve the cave features that are left, restore the areas that can be restored, and literally clean the cave of the lint that has accumulated over the past 100 years.

Conservation: One of the more recent innovative ways to conserve cave features has been the placement of double-lined flagged trails throughout all major trade routes in all caves of the park. Though initially perceived as visually ugly, the protection of floor features these flagged trails provide are well worth it. By keeping all traffic to a confined trail, the vast majority of continuing impacts have been stopped almost immediately. Once everyone has gotten used to the visual aspects of the flagged trails, it becomes hard to imagination not using them. The park uses fluorescent orange surveyor's flagging tape to mark trails and a striped red and white tape to indicate more delicate or hazardous areas where caution may be needed to avoid impacting delicate features.

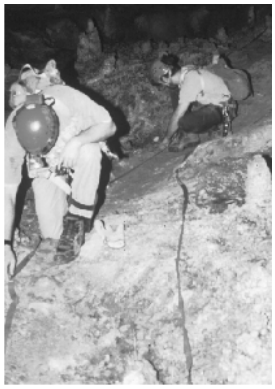

Figure 1 Delineating both sides of all major trails with surveyor's flagging tape provides those moving through the cave with easy-to-see trails that prevents them from walking in areas that are more delicate. (NPS Photo)

Other conservation projects have included replacing wooden bridges that cross deep pools or pits and replacing or removing rusting metal ladders that were used to provide easy access to areas throughout Carlsbad Cavern. It is thought that a number of these structures were placed in the cave in the 1940s or 1950s. Wooden bridges that had been used to span pools have become rotten over time and contaminated the pools. Most ladders that were placed in the cave were composed of galvanized steel, which over the past 40 years have severely corroded in places.

Restoration: Though many of the impacts can not be restored, many can be. Over the last ten years, hundreds of volunteers have spent literally thousands of hours cleaning flowstone, restoring floors, and removing elevator blast debris. Their efforts, though small considering what still needs to be done, have helped return the cave to a semblance of what it was like when the first explorers entered Carlsbad Cavern.

Some restoration efforts in the cave have involved the removal of structures such as metal ladders and metal walkways. Placed in a different time, all structures throughout the cave are being evaluated to determine their structural integrity as well as their purpose and need.

Lint: Over the years since the discovery of Carlsbad Cavern, the cave walls had slowly gotten darker and darker. Since it was a slow process, no one really noticed. No one noticed until some speleothems had turned black with dust and lint covering them. The lint even began forming its own stalactites, known affectionately now as lintcicles. Then onto the scene came Pat Jablonsky. She was ready to tackle this daunting task of cleaning the lint found along the three miles of paved

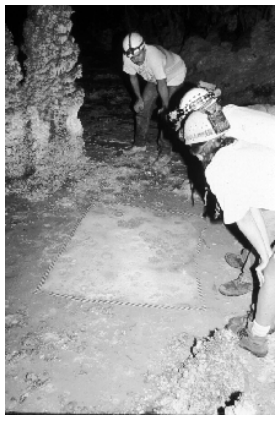

Figure 2. Volunteers observe a cleaned test spot along the visitor trail in an area of Lower Cave known as the Rookery. (Photo Richard Walk)

trails in Carlsbad Cavern. Her "Lint Camps" have cleaned literally pounds and pounds of lint from the cave. As an ongoing project, Pat and her "Lint Pickers" have returned some of the sparkle to areas long covered in dust and lint.

Development of Survey Standards

It is important to know where cave passages and rooms are in relation to each other as well as what is found in those places. Accurate, readable surveys of the caves can provide cave managers with a lot of this information. The modern survey of Carlsbad Cavern and other caves in the park began in mid-1960s and has continued to the present. Unfortunately over the years, the quality of notes, sketches, and survey data varied widely. In order to standardize the information being collected during survey trips, a set of survey standards were developed in 1992 that spells out what information is required from survey teams and the quality of those notes and sketches. Also implemented at this time was a guideline of only allowing designated sketchers to sketch the passage features and write down the notes as instrument readings are taken. The goal of the sketcher is to produce a quality sketch that accurately depicts the passage that has been surveyed and to record all necessary notes, numbers, and other information pertaining to the passage. The sketcher is also in charge of the survey team and needs to make sure all necessary information is collected and guidelines are followed. All notes and sketches are turned in to the park after each survey trip and a critique is prepared for each sketcher.

For the park, this has meant providing the personnel to oversee this activity, but the results have been a survey where the quality of notes and sketches are much better than in the past.

Development of Guidelines for Entering Caves

By the early 1990s, literally hundreds of volunteers, employees, and scientists were utilizing the caves of the park for various appropriate reasons. Though everyone knew that the caves of the park were fragile, there was very little guidance from the park as to how to minimize impacts while traveling and working in the caves. Written guidelines were developed for entering Lechuguilla Cave, Carlsbad Cavern, and the other caves of the park. These guidelines are part of the park's Cave and Karst Management Plan. Developed by park staff and numerous caver volunteers, these guidelines are designed to protect park caves. Our goal is to allow limited access to the caves or cave areas for various appropriate reasons while emphasizing the delicate nature of the caves and the need to minimize our impacts upon those caves. By stating exactly what is expected of those entering the caves, these written guidelines also help avoid confusion and miscommunications between the cave managers and those working in the caves. A primary result from the development of these guidelines has been a raising of conscientious among cave users concerning the fragility of the resources and better protection of the caves and their resources.

Working With a Number of Groups and Individuals

An important aspect of successful cave management strategies has been the use of volunteers to accomplish much of the physical exploration and survey of new passages and the conservation and restoration of known cave areas. It has been valuable to work with a number of different caving groups and individuals. This allows a larger pool of talented volunteers to be used and creates an atmosphere of fairness, which can be lacking when only one group is allowed to work in park caves. Maintaining a working relationship with a number of groups and individuals does require more staff time then if working with only one group, but can be very beneficial and rewarding.

Figure 3. Deemed to be a safely hazard and unnecessary, the metal ladder and a number of other metal structures leading into the New Mexico Room were removed by volunteers from the Pajarito Grotto. (Photo David Jagnow)

Basing Management Decisions on Good Science

The management of caves and other natural resources is not an easy task. Without correct, non-political answers to a complicated and intertwined set of factors, management decisions may have tremendous repercussions for natural resources, including fragile ecosystems. The critical need for good, scientific research is even more pronounced when those resources are non-renewable, such as are found in many caves. The following are two examples at Carlsbad Caverns National Park where scientific studies are helping to make reasonable management decisions which in turn will protect cave resources better for the future.

Development Concept Plan for Carlsbad Cavern Area: The area immediately adjacent to Carlsbad Cavern has been altered significantly since the early 1900s. Over the years a number of structures have been placed directly on top of the cave without any real knowledge of the effects these structures may have on the cave itself. In 1995, a study was initiated to investigate the (1) infiltration routes and pathways into the cave, (2) contaminant levels that already exist and potential sources for those contaminants and (3) a description of worst-case scenarios for major disasters and how they may affect the cave. This scientific study provides the backbone for a major effort to remove a number of non-essential structures and to mitigate impacts from others that must remain in place for now. This study will help ensure that Carlsbad Cavern remains a viable, protected resource for centuries to come.

Microbes and Lechuguilla Cave: From the time of the breakthrough in Lechuguilla Cave in May 1986 through the early 1990s, microbes were not even thought of in relationship to the cave much less considered in its management. That all changed when in 1993, Dr Larry Mallory from the University of Massachusetts applied for a research permit to culture and study native microbes from the cave. As these studies progressed, more research microbiologists became interested in the apparently unique organisms that Lechuguilla, and probably most other caves, may harbor. Various studies have shown that unique microbes are found in many locales throughout the cave including pools and other water sources, corrosion residues that are found on floors, walls, and ceilings in numerous areas, and the large deposits of native sulfur found in several places in the cave. The extent and the uniqueness of the microbes found in the cave has had a direct bearing on how Lechuguilla Cave has been managed in recent years. Scientific studies have shown us that the cave and its resources are even more fragile than ever considered. In response to these studies, we have changed our guidelines for entering the cave to help preserve these fragile ecosystems. Because of these studies and discoveries we can better protect a resource that until recently, we never even knew we had.

Working With Agencies and Neighbors

Maintaining good working relationships with agencies and neighbors make good sense. Occasionally issues may arise from outside the boundaries of the park that can directly or indirectly affect caves of the park. Oil and gas drilling operations adjacent to the northern boundary of the park have been the most threatening issue to arise in recent years. Working with the Bureau of Land Management, various caving organizations and individuals and, ultimately with the U.S. Congress, the National Park Service was able to stop the drilling activities and to create a cave protection zone north of the park.

Summary

Carlsbad Caverns National Park has made great strives in successfully implementing strategies to protect cave resources while providing education and interpretation to a visiting public. The conservation and protection of cave resources has become a priority for management officials and as a result the cave resources have greatly benefited from this support. The use of volunteers has been critical in the successful implementation of many of our management strategies. Everyone who has contributed to these efforts can be proud of the work they have done. We certainly are. The hope is that visitors to the park in the far future will still be able to enjoy the same spectacular cave resources that we see today.