

CAVE MANAGEMENT IN THE OZARK NATIONAL SCENIC RIVERWAYS: A PUBLIC AND PRIVATE PARTNERSHIP

*Scott House
Cave Research Foundation and
Ozark National Scenic Riverways
1606 Luce Street
Cape Girardeau Missouri 63701
Scott_House@semo.net
573-651-3782*

Abstract

The Ozark National Scenic Riverways, a unit of the National Park Service, contains more than 340 caves. Managing these resources is difficult given the limitations of budgets and personnel. Through a series of agreements with Cave Research Foundation (CRF) and the efforts of caver volunteers, cave management at the Ozark Riverways is accomplished for relatively minimal funding. CRF works through the Resource Management office to coordinate the work of paid and unpaid help in performing a wide range of management activities on lands within the park. Special emphasis will be given to the mechanisms and personnel management through which this is accomplished.

Key words: cave management, Ozark National Scenic Riverways, National Park Service, Cave Research Foundation, Missouri

Introduction

The Ozark National Scenic Riverways (OZAR) of the National Park Service (NPS) was created by PL. 88-492 in 1964 in order to protect and preserve 215 km (134 mi.) of the free-flowing Jacks Fork and Current Rivers. The enabling legislation of the

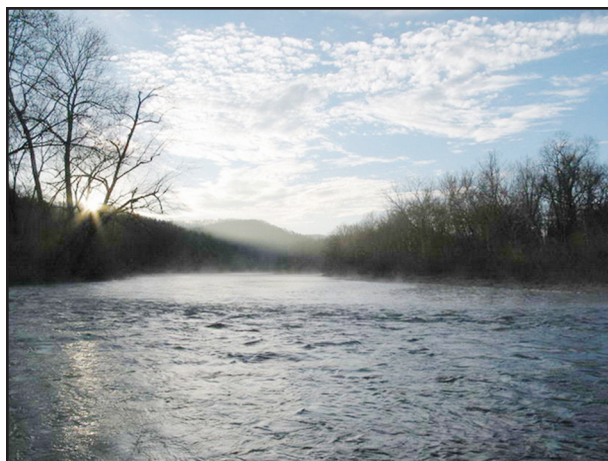


Figure 1 Dawn on the Current River.

park specifically mentioned the karst resources, "For the purpose of conserving and interpreting unique scenic and other natural values and objects of historic interest, including preservation of portions of the Current River and the Jacks Fork River in Missouri as free-flowing streams, preservation of springs and caves, management of wildlife, and provisions for use and enjoyment of the outdoor recreation resources thereof by the people of the United States."

The karst component was well-known to the proponents of the Riverways. Beyond that, it is obvious that the values greatly admired in the region owe much to karst processes. The Current River is largely spring-fed by a number of springs, great and small. This results in a river that is of nearly constant flow and temperature with a smooth and gentle gradient. It is an easy river on which to use a boat, and in the summer the cool waters create a microclimate suitable for enjoyment. In the winter, the warm waters do the same. The Jacks Fork River is also spring-fed, although to a lesser degree for the

greatest portion of its length. Below Alley Spring, however, the Jacks Fork is very similar to the Current.



Figure 2 *Big Spring is the nation's second largest. Photo by William R. Elliott.*

The Karst Resource

Caves. In 2007 there were over 360 inventoried caves within the authorized boundaries of Ozark Riverways. Of these, more than 300 were on NPS land *per se*; the rest are on state and private lands. Some of the privately-owned caves within the boundaries are on scenic-easement lands, in which the NPS owns an interest. The Code of Federal Regulations extends some powers or consideration of the NPS to all lands within the authorized boundaries for certain purposes. Thus, all of the caves within the boundaries are of interest to OZAR.



Figure 3 *The Park's show cave, Round Spring Cavern.*

Springs. The springs of the Ozark Riverways comprise the finest collection of karst springs within the National Park system. Four springs are of first magnitude size (average flow $>2.8 \text{ m}^3/\text{sec}$ ($100 \text{ ft}^3/\text{sec}$)). Six more springs within the Park boundaries are second magnitude ($0.28\text{-}2.8 \text{ m}^3/\text{sec}$ or $10\text{-}100 \text{ ft}^3/\text{sec}$), while hundreds of additional springs of lesser magnitude dot the landscape. In addition there are large springs along the Current and Jacks Fork Rivers that lie outside of the park boundaries. The springs contribute the majority of the flow of the rivers.

Karst Features. Other karst features within the park include sinkholes, small natural bridges or tunnels (larger ones are classified as caves), sinking or losing streams, seeps and surface travertine deposits.

Cultural Resources. Many of the caves and springs have prehistoric archaeological sites associated with them. Additionally, many of the springs have historic mills or remnants associated with them. There is a variety of historic structures both within and without the caves. There is also a plethora of oral traditions and local history associated with the caves, including historic signatures in several of the caves dating back to Civil War times.



Figure 4 *Bluff Cave is now a permit cave.*

Geologic Resources. Most of the caves and springs are developed in dolomites of Cambrian and Ordovician age. A small number of caves are in or on the boundary with Precambrian rhyolites. The solutional caves display a wide variety of speleothem types: beyond the considerable displays of normal speleothems such as stalactites, stalagmites, columns, and flowstones are more unusual forms such as spathites and aragonite clusters.

Biological Resources. OZAR caves are home to many cave species. The park is important to the endangered Gray and Indiana bats (*Myotis grisescens*, *M. sodalis*), as well as the blind Grotto salamander (*Eurycea spelaea*), southern cavefish (*Typhlycthis subterraneus*), Salem cave crayfish (*Cambarus hubrichti*), and a new, rare species of trechine beetle (*Pseudanophthalmus n.sp.*).



Figure 5 An adult Grotto salamander underwater. Photo by William R.

Paleontological Resources. Vertebrate paleontological resources are numerous in the caves. Within the park boundaries are remains of at least two species of bear, dire wolf, peccary, elk-moose and a variety of other Pleistocene mammals. The full extent of these resources is not known.

Cave Exploration

For years relatively few of the caves had been explored, documented or mapped. A few notable exceptions included the Devils Well, Round Spring Cavern, Cave Spring, and very few others. By the late 1970s only 78 caves had been located within the boundaries. In 1980, a volunteer effort of the Missouri Speleological Survey (MSS) was initiated. Within a few years the Cave Research Foundation (CRF) joined the effort. Within a decade, the number of known caves had tripled. This effort is ongoing at this time with the result that over 270 caves within the park have been mapped.

Cave Management Problems

As the Riverways became more popular, the resulting visitation resulted in increased cave management concerns. Bat hibernacula and maternal colonies were disrupted, caves suffered vandalism of various sorts, illegal pot-hunting and treasure

seeking destroyed cave floors and safety concerns manifested themselves. Around 1980 OZAR contracted with Ozark Underground Laboratory (OUL) to conduct two overview surveys of certain high-use and high-profile caves. This led to OZAR's involvement with a cooperative cave survey in the early 1980s, focusing on biology and public use, contracted through the Missouri Department of Conservation and partially effected through the use of MSS volunteers. Last, studies of river and cave recreation were performed by the University of Missouri, Columbia (UMC). Some management steps were taken, including the construction of several cave gates, not all of which were appropriate, and the placement of unusually large signs at certain cave entrances, warning of dangers within.

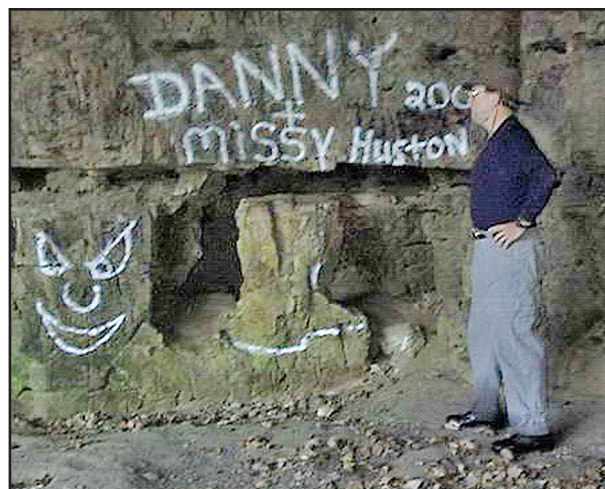


Figure 6 Cave vandalism is a recurring problem.

Cave Management Plan

As all studies pointed toward continued cave management problems, the NPS initiated work on a cave management plan. As part of this process, outside experts from CRF/MSS, UMC and OUL were involved. What came from this process was the Cave Management Plan (CMP) of 1988. Rather than focus on specifics, the plan was a blueprint for a process that would evolve over time. This is the strength of the plan. Three components of the plan were critical:

- A cave management team was to be established. The team would meet with a goal to developing consistent cave management. People outside of the NPS would be part of the team.
- Cave management was to be done by individ-

ual prescription rather than by pigeon-holing caves into pre-set categories.

- More specific objectives (general) and goals (specific) were set.

Objectives of the Cave Management Plan

- Protect natural and cultural cave resources.
- Provide for acceptable types and levels of visitor use
- Promote appreciation of cave resources through interpretation and furthering of education and scientific knowledge about caves.

These objectives are the normal content found in management plans everywhere. They are clearly not measurable. However the goals of the Cave Management Plan were much more specific.

Goals of the Cave Management Plan

- Complete an inventory, evaluation and classification of Riverways caves and develop a resource database integrated with information from cooperating agencies and organizations.
- Establish guidelines for restrictions, access and use of popular caves for recreational, interpretive and scientific purposes that will assure resource preservation.
- Assure the preservation of identified rare and endangered cave species and their habitat.
- Provide opportunities for recreational cave use and integrate park interpretive programs and materials with resources protection, visitor safety and resource management concerns.
- Evaluate existing problems of vandalism, overuse, impact on cave biota, safety hazards and information needs identified in current surveys and implement corrective actions.
- Establish a long-term monitoring system for cave resources and visitor use which will document impact and indicate need for management response.
- Cooperate with other agencies, educational institutions and organizations to increase public awareness and appreciation of cave resources.
- Encourage investigations and scientific research which will improve existing knowledge of Ozark Riverways' cave resource and further the park's management objectives for preservation, use and interpretation.

Implementing the Cave Management Plan took several years but finally during the 1990s the Cave Management Team began to meet and some changes were effected. It was not, however, until several CRF/NPS projects got under way that real progress was made. These included:

- A data synthesis project in which all available information was collected, filed in hard copy form, and entered into a database. The database of park cave information is a subset of the MSS cave database.
- A biological study of aquatics of certain caves along the lower stretches of the Current River.
- Photographic documentation of Round Spring Cavern and other caves.
- A biological survey of Round Spring Cavern.
- Development of a monitoring program, the field work of which would be done by law enforcement rangers.

Additionally, a series of extensive archaeological surveys performed by NPS and the University of Missouri identified additional caves as archaeological sites. In essence, this identification further delineated the extent of the management problems.

A New Approach

Despite these additional initiatives, cave problems continued and the specific goals of the CMP were not being met. Because of the elongated nature of the park and its heavy recreational use, a large portion of park resources is dedicated to facilities, infrastructure, and maintenance. Funding does not permit additional resource management staff in the form of a cave management specialist or karst hydrologist. Finally in 2001, NPS decided to put dedicated manpower to work. Initially this manpower was in the form of a CRF member working seasonally, but owing to the year-round nature of the work and other considerations, this was shifted to a contract with CRF.

This contracted work includes a large number of field and office responsibilities, performed by one lead worker (the author) and such other help as CRF can supply. Included within the scope of work are:

- Database management of caves and cave species



Figure 7 CRF worker installing a cave sign.

- Coordinating the monitoring program, relying on contracted and volunteer labor in addition to the ranger work.
- Development and implementation of a cave signage program.
- Maintenance of cave gates and locks.
- Development of cave permit program.
- Cooperation with other groups and agencies.
- Providing environmental review for cave issues.

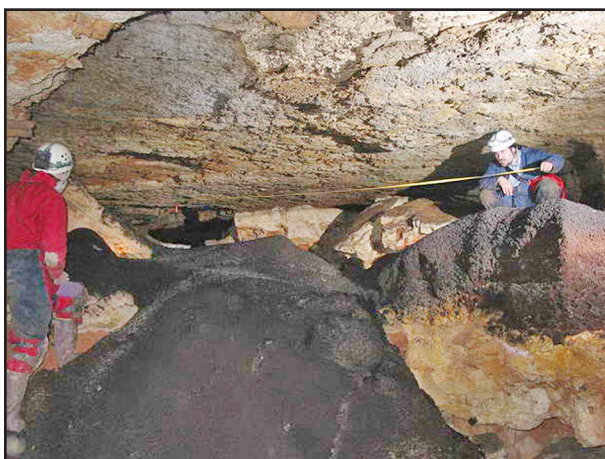


Figure 8 CRF crew measuring guano.

- Numerous other tasks, providing immediate resolution of necessary management actions.

Concurrently with the cave management contract, NPS and CRF embarked on a series of cooperative projects funded by a variety of NPS initiatives plus volunteered labor and time. These include:

- A winter census of all park bat caves, counting individuals or measuring guano.
- A cave gating project which resulted in ten new cave gates on known bat caves or restorative sites. Additional funding was provided by the state of Missouri.
- A detailed biologic survey and analysis of seven caves used by the public.
- A cave restoration project focusing on a number of heavily-used caves.



Figure 9 A cave gate under construction on a hibernation cave.

Most of the above funded projects use considerable volunteer labor. In addition to CRF the volunteers come from a number of partners. These include grottos, state groups, and university groups. The university groups are typically biology or natural resource classes that receive hands-on cave management and biology experience by working with CRF personnel on projects. The partners include:

- Meramec Valley Grotto
- Springfield Plateau Grotto
- Mid-Mississippi Valley Grotto
- Kansas City Area Grotto
- Southeast Missouri State University

- Missouri Speleological Survey
- Missouri Caves and Karst Conservancy
- Washington University of St. Louis
- Missouri State University
- Missouri Western State University

Strictly volunteer projects include:

- Continued identification and survey of park caves. Several active cave surveys are ongoing at this time.
- Monitoring caves. This is a high priority for the park. Each year, volunteers monitor more than 50 caves within the park.

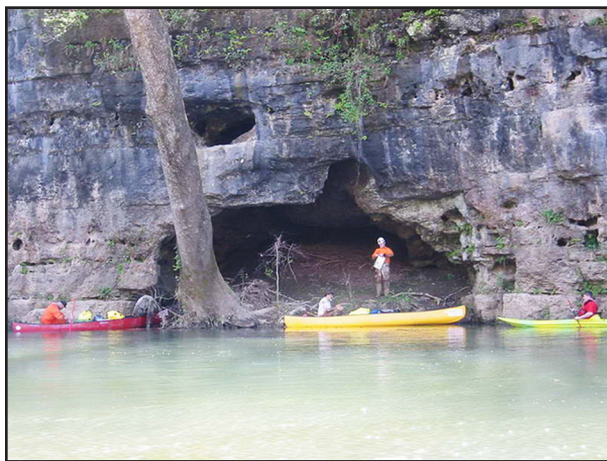


Figure 10 *Volunteers monitor a cave on the Jacks Fork River.*

Volunteer time on projects in the park amounts to more than 1,200 hours a year for the past three years. These volunteers are provided camping at no cost. Most, however, stay at the Powder Mill Research Center, which was designated in 2004. The Center provides living quarters with bunks for eight people plus kitchen and other amenities such as equipment storage and office space. The Center is used heavily by volunteers, CRF workers, researchers, and cooperating agencies. The actual preparation of the Center was done primarily by CRF volunteers who also do minor maintenance at the facility.

The result of the management contract, additional cooperative projects, and volunteer projects is that the goals of the Cave Management Plan are now being met. All are not resolved completely, but every issue is being actively addressed. A cave-management, action-hit-list is maintained by CRF

and action on problems usually takes only weeks, rather than years.

Summary

- Resources are actively protected and managed by those who know the resource and care about it.
- New information is being gained, including maps, biotic censuses, locations, and photographs.
- GPRA (Government Performance Results Act) goals for caves and volunteers are met.
- Volunteers feel enabled – they can actually assist in rectifying a cave problem.
- Money is saved. The CRF contract is currently for \$17,000 a year which includes over 2,000 hours of skilled labor both paid and volunteered.

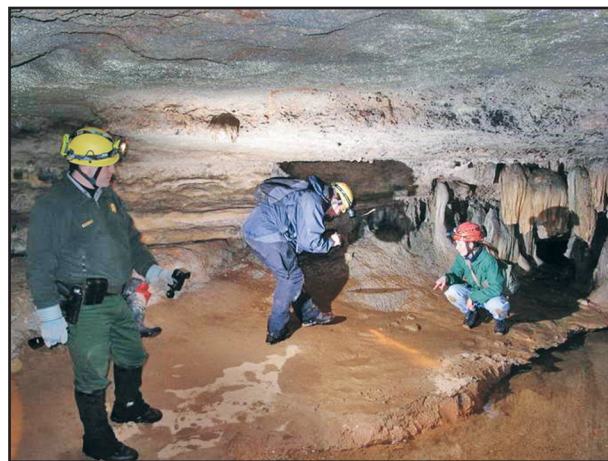


Figure 11 *Law enforcement ranger and volunteers monitor a cave.*

CRF and OZAR feel that this is an exemplary cave management program, one that protects and manages the cave resources with a fairly minimal amount of funding. People interested in further details of this work and/or the agreements are encouraged to contact the author.

Acknowledgments

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