

Management Plan

Ennis Cave

(Arkansas Underground Laboratory)

Effective July 1985

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Introduction and Management Objectives

Ennis Cave is located 13 miles east of Mountain View, Arkansas off the Younger access road to the White River in Stone County, Arkansas. The cave entrance has been closed from February 1975 until June 1985, by debris caused from the settling of a man made shaft dug in 1905.

The cave has over 19,500 feet of surveyed passage with much more cave to be explored. The cave has three distinct levels with the possibility of a fourth level. The cave has several large rooms including the Break-down and Cairn Rooms. There are several other notable rooms including the Waterfall Room which has an 80 foot waterfall that normally sprays just a light shower but after heavy rains enlarges rapidly into a torrent of pounding water. The Gypsum Room also is of particular interest due to the Gypsum flowers that have developed. The final Formation Room contains many formations including stalagmites up to eight feet tall. The cave has seven main passages including the Entrance Passage, Campsite Passage, Main Downstream Passage, Main Upstream Passage, the "Maze" Passage, Waterfall Passage, and Avenue "E". The Waterfall Passage, Avenue "E", the "Maze" Passage and the Main Upstream Passage all connect into the Breakdown Room. The cave has several different types of cave passages including rib-vaulted phreatic passages, canyon passages, stream passages, break-down passages, low wet crawlways, and several very complex passages. The mineral types found in the cave include calcite, aragonite of the anthodite form, gypsum, limonite, manganese, galena and pyrite. Located also in widely separated areas are some outstanding cephalopod fossils that are almost free of their bedrock ceiling. Speleothem features of the cave include gypsum flowers, flowstone, draperies, columns, stalactites, stalagmites, and aragonite. Speleogens include, natural bridges, balconies, and dome pits of various sizes. The fauna within the cave is not known. There has been a report of blind cave fish in some remote section of the cave.

The management objectives for Ennis Cave are as follows.

1. To conserve, protect, and perpetuate the natural cave system.
2. Provide opportunity for safe, educational, and recreational use of the cave by visitors in such a manner that will leave the cave unimpaired for future generations to enjoy.
3. Provide opportunity for scientific study of the cave's resources and systems.
4. Provide opportunity for the expansion of the known cave system.

5. Rehabilitate or restore cave resources that have been impacted by past visitor activities, where possible.

The basic program elements needed to accomplish these management goals are as follows.

1. An effective visitor information and safety program.
2. A structured inventory and survey.
3. A comprehensive research program.
4. An efficient and effective resource protection and monitoring program.
5. A feasible rehabilitation and restoration plan.

SAFETY

The safety of the visitors to Ennis Cave is of the utmost importance. Ennis Cave is a large and complex cave which presents numerous challenges and hazards. Ennis Cave is managed to provide a wild cave experience, therefore, safety must remain the responsibility of each individual. As with any other physical activity, visitors to Ennis Cave should be familiar and prepared for any hazard and or risks of the areas they are entering and should not exceed their individual limits.

The owner of Ennis Cave recognizes his responsibility to advise visitors of safety issues and will inform the cave users of known potential hazards found in Ennis Cave. The following steps will be implemented in an effort to educate visitors to Ennis Cave's potential hazards and should be observed in the strictest manner.

1. A minimum group number of four is required to obtain a recreational caving permit and enter the cave. A minimum group number of two is required for administrative or research trips.
2. A small scale cave map will be provided upon request.
3. A safety message will be developed and provided along with each permit issued to enter Ennis Cave. The message will:
 - a. Provide a brief description of the cave and known potential points of difficulty.
 - b. List basic equipment recommended of any caving party.
 - c. List recommended equipment for technical portions of the cave.
 - d. A brief safety message reminding cavers that Ennis Cave is a wild cave with potential hazards and that injuries are more likely to result from overexertion, fatigue, and carelessness than from any other cause and that safety is the responsibility of each individual caver.

- e. Provide information on the procedures to be followed to notify the owner in the event of an emergency.

SURVEY

A cave map has been completed for the main passages of Ennis Cave. In the future, side passages and new discoveries will have to be added to the existing map. The map will assist in the following ways.

1. To assist in a cave rescue.
2. To show surface and cave relationships.
3. To help understand cave features and hydrology.

The owner of Ennis Cave will accept the assistance of volunteer cavers in mapping the cave. The owner will coordinate the survey and mapping effort. Permanent benchmarks will be installed at critical locations to which surveys of secondary passage can be tied into the main survey. These markers will be installed in nonobtrusive locations and will not be installed on any speleothem nor will they be constructed of or contain any type of reflective material. Intermediate survey markers will be limited to carbide dots or mylar tags. The map produced will be of a scale of 1 inch = 20 feet and contain symbols that are approved by the Missouri Speleological Survey.

RESOURCE INVENTORY

Inventory procedures will consist of identifying the cave's hazards and geological and biological resources, and recording the condition of these resources in such a manner as to provide a baseline for future monitoring of the effects of current levels of use and management.

Resource inventories will be categorized and segmented into small projects, as much as is practical, in order to obtain specific quality analysis of the cave system.

Qualified personnel will be allowed to conduct research within Ennis Cave only after receiving the approval of the owner. Since uniformity of interpretation can best be accomplished by utilizing individuals experienced in mapping and inventorying caves using standard criteria, every effort will be made to use groups and individuals experienced in cave mapping and research to carry out these functions.

Vistas in the cave will be monitored using a system of fixed photopoints established at selected sites within the cave. This photographic documentation will not produce quantitative data but will provide comparative qualitative data for any resources visible within the photograph.

RESEARCH AND IMPACT MONITORING

Cave aquatic systems are vulnerable to alteration by visitor use. These systems usually possess indices of change that are relatively easy to measure. Phosphates, nitrates, chlorine, turbidity, bacteria, and other parameters that are likely to be altered by man's activity both inside and outside the cave, will be monitored periodically to quantitatively measure any change in cave water quality.

Cave microclimates need to be monitored to assess interrelationships with seasonal changes, speleothem formation, flora and fauna abundance and distribution, and human impacts. Parameters to be measured include: relative humidity, air and surface temperatures, air movement, and air content of carbon dioxide and other gases. Population and distribution studies on cave fauna and flora will also be used to monitor the impacts of human visitation and disturbance on the cave system. Research of the mineralogical, geological, and paleontological significance of the cave are also needed.

Due to the nonrenewable nature of cave resources, it is important that the impact of various types and intensities of use be carefully and systematically documented so that acceptable levels and types of use can be anticipated and reasonable carrying capacities are established from the correlation of two important types of information, the level of cave use and the measured condition of the resource associated with that level of use. The resource criteria used to evaluate impact must be accurately measurable with a consistent technique, and its condition must be correlated with numbers of cave visitors. The permit system will provide such data for the quantification of cave use. Many of the cave areas where use may need to be regulated may not be feasible to gate. Therefore, the accuracy of use data generated from approved permits is dependent largely on voluntary compliance with entry procedures.

Quantitative and qualitative measurements of impacts on cave resources are generally more difficult to make than measurements of visitation. The monitoring of cave vistas, water quality, and population densities of cave organisms are principal indices of cave use impacts. A minimal level of monitoring for impacts of cave users will be conducted by the owner. These monitoring trips will be conducted a minimum of one time per six months and will use the occurrence of litter, carbide dumps, excreta and vandalism as indices. Other parameters such as water quality, flora occurrence, temperature and humidity will also be monitored during these trips, if possible. A timely determination of the effects of use on the cave is an absolute requirement to minimal protection of the resource.

The following are research and service functions that are needed within the cave.

1. Monitoring of water quality.
2. Monitoring of cave microclimates.
3. Setting up and photographing cave photopoints or vistas.

4. Surveying/mapping.
5. Inventory of cave flora and fauna (species list) - fungi, invertebrates, vertebrates, etc.
6. Ecological baseline studies, i.e., population and distribution studies of selected species, development of energy budgets, etc.
7. Hydrology (dye tracing), to determine all water inputs and outputs and eventually define the entire surface recharge zone.
8. Geological studies of cave and speleothem formation processes.
9. Cave cleanup and resource restoration.
10. Trail marking.

With the exception of cave cleanup and trail marking in projects listed above are bona fide research or scientific studies, and persons selected to perform these activities must have prior experience and expertise in the field of study or activity for which they apply.

RESOURCE PROTECTION

The owners recognize that cave gates are often an obstruction on the aesthetic integrity of a cave entrance and may, if constructed improperly, be deleterious to the ecology of a natural cave by hindering air flow and the movement of bats and other organisms into and out of a cave and that the use of gates to prohibit unauthorized entry is often unsuccessful against vandals. However, to provide a maximum level of protection for the cave resource, a gate will be installed on the cave entrance. The gate will be of a design that will allow relatively unimpaired entry for bats and other animals and minimal reduction in air flow.

Trails will be established through sensitive areas of the cave. The trails will help reduce unintentional vandalism and muddying of speleothems or speleogens. Marking of trails will be limited only to fragile or sensitive areas in order to preserve the overall wilderness character of the cave. All markings that are not historically significant or necessary for visitor safety will be removed. All painted markings will be removed and paint will not be allowed in the cave.

Carbide dumps are a considerable problem within caves. Cavers using carbide lights must let the owner know. The owner has the sole right to request a light other than a carbide light. Anyone using carbide must carry in and out all carbide whether spent or not and if carbide dumps become a problem, carbide will be banned completely from the cave. It is suggested that carbide lights be used as a secondary source instead of the primary source of light or as a dot marker on survey trips.

Human excreta is a tremendous esthetic and ecological problem. Burying these wastes is an unsuitable alternative in a cave environment. Therefore, all cave users will be required to carry out any and all excreta. Eventually a sanitary system will be installed in the Breakdown Room that cavers can use. This sanitary system will be taken out of the cave at least once a month and will be of a system that will not harm the cave environment at all. Tobacco, sterno, or camp fuel will be prohibited in the cave.

SURFACE MANAGEMENT

Surface areas around and above the cave contained in the owner's property lines will not be developed or altered in any manner that will have a direct or indirect significant adverse impact on the cave system. The streams within the cave will not be dammed or have their flows impeded. Any system installed for the disposal of human waste will be of a design that will not impact the cave. No cesspools, septic tank leach fields, or any other such system will be constructed within a recharge zone on the owner's property. Cave users will be prohibited from introducing pollutants, such as dishwashing soap and other compounds, into the stream. An esthetically and ecologically compatible restroom will be installed. No roads, parking lots, or future development should change natural groundwater drainage patterns near the cave. Once the recharge area of the cave's stream is defined, monitoring of any clear-cutting or other surface alteration in the hydrologic drainage area of the cave should be conducted and its potential impact on the cave's hydrology determined. Camping in the general vicinity of the cave will be restricted to certain areas. No facilities other than a restroom and a common fireplace will be provided at these sites.

REGULATION AND RESTRICTION OF VISITOR'S USE

Ennis Cave is a regionally well-known and popular cave. The primary objective of this permit system is to gather use information for the cave and to begin to get spelunkers accustomed to securing a permit before entering the cave. As soon as a gate is installed, a restricted permit system allowing for the use of the cave by both researchers and recreational cavers will be implemented. The permit system is based on a first-come first-served basis. Conditions of a recreational permit require cavers to be in groups of no less than 4 and no more than 8. A "group" is defined as individuals who enter, traverse the cave and exit as a unit and which remain in such close proximity to one another that the group may be fully reassembled at one spot within a reasonably short period of time. Until a need for a change in carrying capacities is established through research and monitoring, recreational permits will be issued to no more than two groups per week up to a maximum number of 4 permit days per month. In addition one extra research/service permit for 2 to 5 people may be issued per week. These research/service permits will be issued under the criteria mentioned in the research section of this plan and are not included in the 8 permit days per month limit. The owner will be required to write a cave trip report following any cave trip taken for administrative purposes. No group leader for a recreational permit will be allowed to hold more than one current and valid recreational use permit at a time. In other words, a holder of a valid permit must either wait until that permit is cancelled or expires to apply for another permit. Standard safety requirements, cave sanitation principles, and cave conservation practices will be conditions of the permit. These requirements will be enforced in the field by the owner when possible. Completion of a cave trip report will be a requirement of the permit. Failure to return cave trip reports or any violation of other permit conditions could bar the group members from consideration for future permits.

An additional means to assure conservation of the cave's resources, especially those that are extremely delicate, would be to have groups accompanied by the owner or by persons designated by the owner. Such a person could be a volunteer or other person whom the owner has oriented to its cave management objectives. Any novice groups entering the cave will be under this restriction.

Implementation of this program may also be brought about if other measures recommended in this plan fail to sufficiently protect the cave resource. Any trips conducted by owner will be under the same permit conditions as apply to other cavers.

Permits can be obtained only from the owner. Permits may be applied for via telephone, mail or in person; however, no recreational use permits will be issued more than 30 days prior to the date for which it is to be used, and mail or telephone requests should be made sufficiently in advance of the trip date to allow mail delivery of the permit. No permit application will be accepted without complete permit information. Information such as group member names or vehicle descriptions may be changed after permits are issued by contacting owner.

When research data has been gathered in sufficient quantity to determine that a change in a carrying capacity is appropriate, the level of use will be adjusted up or down accordingly and additional research initiated to monitor the effects of this new level of use on the cave system. The future of the cave depends on diligent attention to detail by the owner and concerned cavers, and only careful monitoring of the cave resource can determine the impacts of continued use of Ennis Cave by caving visitors.

EDUCATION

Education is a very important part of the Ennis Cave Management Plan. There is an interpretive education program planned for the cave in the future. At this time, the owner will conduct educational trips into the cave for students of geology, biology, hydrology and other specialized areas. There will also be surface tours to identify the surface-subsurface relationships and other Karst features. People interested in the education program of Ennis Cave should contact the owner for further details.