Appendix 6—Cave Management Plan: Caves of McKittrick Hill

Cave Management Plan: Caves of McKittrick Hill

Sample Cave Management Plan: Caves of McKittrick Hill
Bureau of Land Management, Carlsbad Resource Area

This plan is consistent with the Carlsbad Resource Management Plan of 1988 and other Bureau of Land Management (BLM) national, state, and district plans and policies. It shall become effective when signed and may be updated or amended when necessary.

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Management Summary
Eight caves are located within the McKittrick Hill Special Recreation Management Area (SRMA). The management goals for the SRMA are to provide opportunities for quality recreation, scientific research and education, continued exploration, and ensure visitor safety. These caves are managed under the guidelines of the Federal Cave Resources Protection Act of 1988 (FCRPA), the Bureau of Land Management (BLM) National, State, and District cave management policies, and the Carlsbad RMP. This plan presents the cave management practices and policies established for the caves on McKittrick Hill to accomplish those goals. Management practices and activities are designed to resolve or avoid resource use conflicts.

Damaged areas of the caves will be restored as much as possible while delicate formations or historical sites will be flagged to decrease the threat of accidental destruction. The cave resources will be monitored in several ways including patrolling, photo monitoring, bat counts, visitor feed back, and register information.

McKittrick Hill Caves Management Plan

I. Introduction
The McKittrick Hill Caves Complex was designated in the Carlsbad Resource Management Plan (RMP) of 1988 as a Special Management Area (SMA). See Map 1 for a location of the SRMA. It was designated to protect numerous caves and their resources in the McKittrick Hill area. There are eight known caves in the SRMA containing a variety of resource values. These caves have significant resources which include; geologic, mineralogic, biologic, archaeologic, paleontologic, scenic, scientific, educational, and recreational values. Some of the caves are quite extensive and complex with as much as two miles of surveyed passage, while others are relatively short. The purpose of this plan is to establish the overall management goals and objectives for the SRMA and the specific management practices for each cave.

Management practices will be consistent with the broad programmatic policies, goals, and objectives established in the FCRPA, the BLM Cave Resources Manual (8380), State Office Supplemental Hand Book (Cave Inventory and Classification), and the Pecos District Caves Program plan and Resource Management Plan. Through the use of available management options, conflicts between cave resources and cave use are either avoided, resolved, or mitigated.

A. Management Goal and Objectives: The management goal for The McKittrick Hill Caves Complex SMA is two-fold. The first goal is to protect and maintain sensitive and fragile cave resources, and their surface to subsurface relationship. The second management goal is to provide for quality recreational, educational, and scientific use of the cave resources in the McKittrick Hill Caves Complex. These two management goals can be accomplished through a variety of management actions which utilize both physical and regulatory prescriptions. Management prescriptions include the use of protective structures and restrictions, discretionary and nondiscretionary lands actions, and public education. Cave specific management plans may be developed in subsequent years based on need and management priorities. Decision factors considered for setting priorities will include; use conflicts with high-value cave resources, threats to biological, archeological, or
Appendix 6—Cave Management Plan: Caves of McKittrick Hill

B. Background: McKittrick Hill is located 12 air miles west of the city of Carlsbad, New Mexico. Legal public access to McKittrick Hill was acquired along the primary access route to the SMA in 1982 with the purchase of approximately 1½ miles of access easement.

The caves of McKittrick Hill were evaluated for designation as a National Natural Landmark in 1981 by Mr. Thomas Aley. His report was presented to the South Central Region of the Heritage Conservation and Recreation Service. The caves were determined to be eligible for designation as a National Natural Landmark and were proposed as such in the Draft Carlsbad RMP. This proposal was protested by the grazing allottee on the basis that it would increase the visitation to an undesirable level. The protest was resolved by not formally pursuing Landmark designation.

The area has been the site of cave exploration and use since the earliest known human occupation as evidenced by cultural remains. The earliest recorded visits by white settlers begin in 1889 and have continued to increase steadily. Some of the first extensive exploration to occur on McKittrick Hill began in the mid 1920s. Bob Nymeyer, a Carlsbad photographer, began exploring and photographing many of the caves as early as 1926. An interesting history of his exploration of the caves can be found in his 1978 book Carlsbad, Caves, and a Camera. Since the time of the earliest exploration most of the caves have been heavily vandalized and some of their speleothems removed for souvenirs or for sale as curios at Carlsbad Caverns. Because of the early photos that Mr. Nymeyer had taken, there is at least some record of the original beauty of the caves. A more complete history of the exploration of the caves of McKittrick Hill can be found in the History section of Appendix A (The Caves of McKittrick Hill).

C. Visitor Use: Currently, Endless, Sand, and McKittrick Caves account for 75% of the cave entry permits issued annually in the Carlsbad Resource Area. An average of 150 permits are issued to these three caves each year and represent an average of 870 visitor use days. Figures 1, 2, & 3 show the number of permits issued to Endless, Sand, and McKittrick caves from 1981 to 1993.

As a result of this heavy use and in order to maintain acceptable levels of visitor-use-impacts, restoration trips are a regular occurrence in the caves. The restoration work generally involves washing speleothems, graffiti removal, establishing trails, and repairing broken formations. All of the restoration work is conducted by volunteer groups. These groups include high school classes, colleges, explorer posts, caving organizations, and environmental education groups. At least two restoration trips are undertaken each year. These trips are normally supervised by a BLM employee to ensure maximum protection of the cave.

Due to the density and the complexity of the caves on McKittrick Hill, proposals for scientific research are received on a regular basis. Research work has been conducted for individual papers, for masters thesis, and for PhD dissertations. Research topics include speleogenesis, geology, mineralogy, radio isotope studies, biological diversity and inventory, bat population stability, archeology, and paleontology. For a more complete description of the paleontological resources, and public health and safety issues.
resources of the caves refer to the paleontological section of Appendix A (The Caves of McKittrick Hill).

D. Geology: Structurally the area has been uplifted to the northeast as a result of the Carlsbad fault. Azoten Mesa, where McKittrick Hill is located, has also been highly folded and fractured in a northwest to northeast curving arch called the Waterhole Anticlinorium and by a set of folds generally running in a northwest to southeast direction (Kelley 1971, page 51,52). A complete description of the geology can be found in the geology section of Appendix A (The Caves of McKittrick Hill).

Several mineralogical studies have been conducted in the caves of McKittrick Hill. Collectively the caves contain a high diversity of rare and common types of speleothems. Some of the rare types of speleothems and speleogens include: subaqueous helictites, biogenic honeycombs, cave pearls, helictites, gypsum vents, and others. The minerals have been described in Cave Minerals of the World; The Mineralogy, Petrography, and Diagenesis of Carbonate Speleothems from Caves in the Guadalupe Mountains, New Mexico; Caves of the Guadalupe Mountains; and in several periodicals and journals.

E. Biology: The biological resources of the caves of McKittrick Hill are generally common to most of the other limestone caves in the Carlsbad area. As recently as 1993 a contract for an intensive biological inventory was issued. Over the years cave biologists have collected numerous specimens. A compilation of this data up to 1977 can be found in Appendix A (The Caves of McKittrick Hill). Further data following 1977 is being compiled by several researchers.

II. General Management Practices
Management practices of the caves on McKittrick Hill are guided by the following laws, policies, and management plans:
• The Federal Cave Resources Protection Act of 1988,
• Washington Office Policies (W.O. Instruction Memorandum 84 541/ Cave Management Policy),
• New Mexico State Office Manual Supplement (Cave Inventory and Classification),
• Pecos District Caves Program Plan and Resource Management Plan,
• The Carlsbad Resource Management Plan.

A. Carlsbad RMP: The RMP prescribed the following management actions for the SRMA as protective measures:
1. No Surface Occupancy stipulations to future Oil and Gas leases (4,920 acres)
2. Withdraw from mining claim location and entry (1,210 acres)
3. Closed to solid mineral leasing (755 acres)
4. Closed to mineral material disposal (4,920 acres)
5. Restricted surface disturbance to conform with VRM Class II guidelines (4,920 acres)
6. Limited ORV use (4,920 acres)
7. Right-of-Way avoidance area (3,440 acres)
The withdrawal from surface entry and mining of 1,210 acres within the SRMA was completed and published in the Federal Register on September 1, 1992. All of the other RMP management prescriptions are discretionary actions and are in place.

B. Research: The goal of scientific research is to increase our knowledge and understanding of the caves. Responsible research is encouraged in
BLM caves by any competent researcher with a legitimate project. BLM employees should be provided time and support to conduct studies or assist other researchers in their studies. Guidelines for cave research within the SMA can be found in Appendix B.

C. Restoration: The goal of restoration is to reduce the amount of impact on heavy traffic areas and lower the cumulative impacts on the cave. Restoration trips will be conducted as per the guidelines in the Roswell District Cave Plan. All restoration trips will be accompanied by at least one BLM employee unless other arrangements are made for a BLM approved leader. Trips will concentrate on areas that show the most need or are threatened by nearby traffic. All restoration participants will be signed up as volunteers.

If observations and monitoring indicate that remedial actions are necessary to counteract visitor use impacts, appropriate restoration trips will be scheduled. Types of restoration activities that can take place are; graffiti removal, formation washing, trail building and flagging, speleothem repair, and trash removal.

D. Monitoring: The goal of monitoring is to keep management informed of resource changes and needs that may affect the overall health of the cave ecosystem. A number of monitoring activities will take place at each of the caves. These monitoring activities will be ongoing and performed as a regular function. Continued monitoring work is dependent on available budget, BLM personnel, and volunteers.

1. Visitor Monitoring - Monitoring by visitors is the most frequent and immediate method of monitoring conducted on The Hill. Much of the feedback is received from the post trip comments written on the back of the returned cave permits. Information regarding the status of locks, bat populations, restoration needs, and acts of vandalism are reported. Conscientious cave visitors provide the backbone for cave monitoring on McKittrick Hill especially in times of low budget and Bureau staffing.

2. Photo Monitoring - Photomonitoring points have been established in Endless, Sand, and McKittrick Caves. Points are being installed in Dry Cave as of April 1994. Photo points will be established at each of the caves as budget and staffing allows. Points will be tied into the cave surveys for exact locations. Photos will be taken annually or semiannually depending on volunteer availability. The photos or slides will be stored in the CRA. Photos should be reviewed annually or biannually to monitor for cumulative impacts in the caves. Photo points should be located in areas receiving heavy traffic or containing delicate speleothems or other sensitive resources.

3. Law Enforcement Patrol - Patrolling by law enforcement rangers and BLM personnel is periodic. More frequent patrols occur during incidences of vandalism or break-ins.

4. Bat Monitoring - Bat monitoring occurs annually during the spring and summer months. Bat counts are conducted at Endless and McKittrick Caves beginning thirty minutes before sundown and continuing for the duration of the flight or until it gets too dark to see. The standard method of counting is to use tally counters. It is recommended that at least two persons count and preferably three. The numbers are averaged. If there is one number that is "wild" it is thrown out. It is not recommended to have more than four persons at the entrance counting as human presence definitely affects the bat flight. Counts should be conducted weekly or bimonthly between
April 1 and September 15. Volunteers generally conduct the bat counts.

5. Visitor Use Monitoring - Using data from returned permits and signatures on registers provides a good profile of the actual visitor use. Registers should be placed at each of the caves and maintained on a regular basis. Information from the registers is used to determine the amount of traffic in relation to the amount of visitor use impacts. Using this information, visitor use limitations can be adjusted to better meet management goals and objectives.

E. Continued Exploration: The goal of continued exploration is to learn and understand more about the extent of the resources we are managing. Therefore, the continued exploration and mapping of the caves of McKittrick Hill is strongly encouraged. Since 1986 several thousand feet of new passage has been discovered. This has greatly added to the understanding of the cave systems and to the discovery of many new cave resources. Much of the new exploration and discoveries have been aided by geologic studies and the perseverance of cavers in their quest for the unknown.

The most significant new discoveries have been made as a result of digging activities. See Appendix C for the Guidelines for Cave Digging Operations.

III. Ongoing Management Activities
There are several actions that occur on a regular basis as part of the overall cave management program. These actions are in conformance with the Roswell District Cave Management Plan. The following list of ongoing management activities at McKittrick Hill are conducted as time, staffing, and budget allows:

- Issue recreational use permits,
- Review and make recommendations on research and digging proposals,
- Change the lock combinations at regular intervals,
- Maintain cave gates, locks, and signs,
- Maintain and direct monitoring programs,
- Maintain positive caver contacts and relationships,
- Maintain a viable volunteer constituency and,
- Maintain a progressive public outreach and environmental education initiative using the caves at McKittrick Hill.

IV. Cave Specific Management Practices
The following are descriptions and current management practices for each of the individual caves in the McKittrick Hill Cave Complex. The class of each cave is determined by using the inventory and classification system found in the New Mexico State supplemental handbook for cave management. The inventoried contents (i.e., biological, geological) of the caves are noted with letters (A,B,C, etc.); hazards are noted with Roman numerals (I,II,III, etc.); and management classes are designated with numbers (1,2,3, etc.).

A. Endless Cave: Class C,III,3. Endless cave is probably the most popular of the caves on McKittrick Hill. General descriptions of the cave with maps are in Appendix A & D (Special Stipulations and Hazards and map).

1. West Maze Passage of Endless Cave: Class D,II,2. There is a nursery colony of bats that roost in the west maze near the entrance of the cave. In order to protect the bats from human disturbance this area of the cave is "off limits" for use during April 15 to September
30. The two passages that lead to the West Maze are signed and flagged to notify visitors and prevent access. Bat counts are conducted each season as time and staffing allows.
   - The general and specific hazards and stipulations for Endless Cave are listed in Appendix D.
   - Because of popular demand and the impacts of heavy use, entry permits to Endless Cave are limited to one permit per week. The permit week runs from Monday through Sunday.
   - Registers have been placed in the Gypsum Room and in the War Club Room.
   - Photo monitoring points have been established by the Lubbock Area Grotto. Photo points are monitored annually. The photo monitoring points are identified on a map of the cave. The photos are maintained in a binder with the map in the CRA cave management program files.
* Management Needs: No specific management needs.

B. Sand Cave: Class C,III,3. General descriptions and maps of Sand Cave can be found in Appendix A & E.
   - Specific hazards and stipulations are defined in Appendix E.
   - Permits are limited to one group in the cave at a time which generally means one permit per day. Visitor use impacts have not increased to the point where permit limitations are necessary.
   - Photo monitoring points have been established by the Lubbock Area Grotto. Photo points are monitored once each year.
   - A register is placed in the Sandy Floored Room.
* Management Needs: No specific management needs.

C. McKittrick Cave: Class C,III,3. General descriptions and maps of McKittrick Cave can be found in Appendix A & F.
   - Specific hazards and stipulations are defined in Appendix F.
   - Permits are limited to one group in the cave at a time which generally means one permit per day. Visitor use impacts have not increased to the point where additional permit limitations are necessary.
   - Photo monitoring points for McKittrick Cave have been established by the Lubbock Area Grotto. Photo points are monitored once each year. The photo monitoring points are pinpointed on a map of the cave. The photos are maintained in a binder with the map and are stored in the CRA cave management program files.
   - A register is placed in the Lower Maze near the Main (Sink) Entrance.
   - There is usually a summer bat roost near the pit entrance. This area is flagged off and signed to prevent visitor traffic from disturbing the bats. Additionally, the combination to the pit entrance is not given out during the roosting months.
* Management Needs: No specific management needs.

D. Little Sand: Class B,II,4. General descriptions and maps of Little Sand can be found in Appendix A & G.
   - Specific hazards and stipulations are defined in Appendix G.
   - Permits are no longer required for Little Sand due to the lower resource values there. The lock has been taken off the gate and visitors are allowed unrestricted access.
* Management Needs: Photo monitoring points, place register.

E. Dry Cave: Class E,IV,5. General descriptions and maps of Dry Cave
can be found in Appendix A.
- Dry Cave has been designated as a 420 acre Research Natural Area (RNA) in the RMP. The cave was designated as an RNA for its paleontological resources which are up to fifty thousand years old.
- The cave is generally closed to recreational use and is primarily used for research and environmental education.
- Occasional restoration trips are taken into the cave for graffiti removal from past years.
- Survey and exploration trips are still being conducted in the cave by the Cave Research Foundation (CRF) as a volunteer project under the national Memorandum of Understanding between the CRF and the BLM.
* Management Needs: No specific management needs.

F. Phalangid Cave: Class II-B-4.
- A description of the cave with maps is in the CRA Cave Program case file.
- The cave is ungated at this time and does not require a permit.
- A register is placed at the entrance to track visitation. The cave receives approximately 8 visitors per year.
* Management Needs: Photo monitoring points.

G. Spider and Little Spider Caves: Class I-B-4.
- Both of these caves are ungated and do not require permits.
- These caves are generally less than 100 feet in length but have not been surveyed or fully inventoried.
- Locational information can be found in the case file.
* Management Needs: Photo monitoring points, place registers.

V. List of Appendices
A. The Caves of McKittrick Hill
B. Guidelines for Cave Research
C. Guidelines for Cave Digging Projects
D. Endless Cave Special Stipulations and Hazards, Map
E. Sand Cave Special Stipulations and Hazards, Map
F. McKittrick Cave Special Stipulations and Hazards, Map
G. Little Sand Cave Special Stipulations and Hazards

Appendix A for The Caves of McKittrick Hill  (Excluded here)

Appendix B for The Caves of McKittrick Hill
Guidelines for Cave Research

1. A written proposal for each research project must be submitted to the Carlsbad office.

2. Approval must be obtained from the Carlsbad office before research can proceed, if any of the following are anticipated:
   a. Collecting of any kind (see additional guidelines for collecting),
   b. Disruption of the natural state of the cave,
   c. Entry to restricted areas or during restricted times. In this case the proposal must state explicitly how the impact of the research on the site will be minimized.

3. A biannual summary of research projects must be submitted to the Carlsbad office. Any findings or publications from research results will be made available to BLM and provided in a document.
4. No research will be permitted that endangers visitors, biota, or environmental quality, or which does not relate to speleology.

5. Researchers with permission to enter restricted areas, or during restricted times, may only be accompanied by minimum assisting personnel, as determined by BLM.

6. Guidelines for collecting:
   a. Approval for collecting will be granted only to qualified persons with demonstrable credentials (including prior publication of related research), or by persons under the direct supervision of such authority (i.e., college students, college faculty).
   b. Sampling should not impair the natural aspect of the cave.
   c. No more than 5% of any population (e.g., biota) or material (e.g., sediment) should be removed. Exceptions include materials that are not indigenous to the site, and which are in danger of being damaged if left in place, or which must be entirely removed to be studied (e.g., bones).
   d. No endangered species may be collected, except under extraordinary circumstances. Any doubt as to the status of a species should be clarified in coordination with BLM.
   e. No in situ speleothems or macroscopic fossils in bedrock may be collected, except under extraordinary circumstances.
   f. Bedrock samples should consist of loose fragments whenever possible. No visible scarring of cave walls is permitted.
   g. No collecting will be permitted simply for display purposes.
   h. Samples must be located explicitly, both vertically and horizontally, with the aid of surveys or maps, to ensure that collecting is systematic and not haphazard.
   i. Any remaining samples after the project is complete must be returned to the BLM. Any samples retained by the researcher must be made available for use by other researchers.

Appendix C for The Caves of McKittrick Hill
Guidelines for Cave Digging Projects

1. All digging must be approved by the BLM prior to the activity beginning.

2. A written proposal for digging must be submitted to the BLM and approved by the Area Manager.

3. Proposals should include the following points:
   a. Location of dig on surface and subsurface maps,
   b. Reasons for conducting the dig (geologic and physical evidence that suggests the dig and location will be productive),
   c. An operation plan (how the dig will be conducted, anticipated personnel, anticipated scheduling, disposal of spoils, mitigations),
   d. Safety concerns and practices in accordance with appropriate requirements to be followed by digging participants.

4. All digging proposals will be screened for possible conflicts with other resources, i.e., paleontology, archeology, biology, resource degrada-
5. A report will be submitted to BLM within five days after each digging event describing the progress and safety concerns or efforts. Any new discoveries will be reported within 24 hours. All injuries will be reported to the BLM immediately.

6. NO blasting or explosive devices will be used in digging operations.

7. All new discoveries will be surveyed as they are explored. Copies of all survey notes and sketches will be made available to BLM within 14 days.

8. Management needs and recommendations will be discussed with BLM for inclusion in a management plan.