



National Park Service
US Department of the Interior

Mammoth Cave National Park
Kentucky

FINDING OF NO SIGNIFICANT IMPACT
Cave and Karst Management Plan

Recommended:

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FINDING OF NO SIGNIFICANT IMPACT CAVE AND KARST MANAGEMENT PLAN

ENVIRONMENTAL ASSESSMENT MAMMOTH CAVE NATIONAL PARK

SEPTEMBER 2019

INTRODUCTION

In June 2019, the National Park Service (NPS) issued an environmental assessment (EA) describing the effects associated with the Mammoth Cave National Park Cave and Karst Management Plan. The environmental assessment outlines actions associated with cave management zones; visitor opportunities and safety; resource management; and management indicators, thresholds, and visitor capacity.

The purpose of the federal action is to provide a consistent framework for managing the world-class cave and karst resources in the park and to work cooperatively with partners in the broader Mammoth Cave Area International Biosphere Reserve. The plan provides direction to protect and conserve the more than 450 caves in the park and the karst groundwater system through the use of science to promote stewardship and understanding. The plan also addresses resource-protection issues and supports sustainable public enjoyment, education, and research efforts through redefining management zoning and identifying visitor capacities for existing cave tour routes.

The Finding of No Significant Impact (FONSI) has been prepared in accordance with the requirements of the National Environmental Policy Act of 1969, as amended (NEPA); its implementing regulations (40 Code of Federal Regulations [CFR] 1500-1508); the Department of Interior NEPA regulations (43 CFR 46); NPS Director's Order 12 (*Conservation Planning, Environmental Impact Analysis, and Decision-Making*); and the NPS NEPA Handbook.

The statements and conclusions reached in this Finding of No Significant Impact are based on documentation and analysis provided in the environmental assessment and the associated decision file. To the extent necessary, relevant sections of the environmental assessment, which is available at <https://parkplanning.nps.gov/maca>, are incorporated by reference below.

SELECTED ALTERNATIVE AND RATIONALE FOR THE DECISION

The National Park Service has selected the action alternative (the preferred alternative identified in the environmental assessment; hereinafter referred to as the "selected action"). A summary of the selected action is below (see chapter 2 of the environmental assessment for a full description). Desired conditions—statements of aspiration that describe resource conditions, visitor experiences and opportunities, and facilities and services that help guide

management decisions—were outlined as part of the plan and are included in FONSI attachment A.

Visitor Opportunities

Under the selected action, the park will provide a range of visitor opportunities that highlight various resources and cave areas. Management actions include the following:

- Evaluate expanding the types of tour options available by making infrastructure improvements to certain tour routes.
- As possible, provide a variety of guided cave opportunities that range from no previous experience to advanced caving opportunities using current and previous routes.
- Present cave tour options in a manner that will make trip planning less confusing for visitors and help ensure they choose a tour that is aligned with their desired experiences and skill level.
- Provide permitted opportunities for scientific study, exploration, and special uses.
- Increase available tour routes at various times of the year (e.g., off-peak visitation periods during spring and fall shoulder seasons) and non-peak times of day.
- Consider offering tours that explore different caves or portions of the cave system on current or previously used routes.
- Optimize appropriate use levels (e.g., visitor capacity) for tour routes and cave areas that provide visitor opportunities and protect resources.
- Enhance regional partnerships to improve how visitors gain information on additional cave tour opportunities in the park and in the area if their desired experience is not available at Mammoth Cave National Park.
- Revise cave zoning (from that of the 1983 general management plan) to best protect cave resources while sustaining public enjoyment and educating visitors.

The following seven cave tours are proposed to be reopened along previously toured routes:

- Wondering Woods
- Crystal Cave
- Colossal
- Colossal to Bedquilt
- Marion Avenue
- All day
 - Option A: Historic Tour Route to Violet City to Carmichael to Frozen Niagara
 - Option B: Historic Tour Route to Bridge (inflatable rafts) over River to Frozen Niagara
- Cathedral Domes

Cave Management Zones

Revising cave zoning will assure that park activities occur in the areas where they are most suited. The 1983 general management plan includes a cave zoning system that is designated by the letters “A” through “F” in descending order of intensity of use and development (see EA appendix A, figure 4). In the selected action, zones will be condensed into four zones, including an overlay to better capture areas with similar management approaches.

Management zoning revisions are summarized in Table 1. Proposed Zone A includes current Zones A and B (from the 1983 general management plan). Proposed Zone B will be largely the same as current Zone C. Proposed Zone C covers approximately the same area as current Zone D. The Restriction Overlay Zone D in the proposed zoning is fundamentally similar to combining current Zones E and F. Newly discovered caves and passages will be classified as Zone C, unless resources in the area indicate that a “Restriction Overlay” designation is warranted. To provide specific guidance for cave zone updates in the selected action for this plan, desired conditions for visitor use and experience are further articulated by zone in FONSI attachment A.

Table 1. Revised Cave Management Zones

Current Cave Zoning from General Management Plan (1983)	Updated Cave Zoning from Cave and Karst Management Plan (2019)
Zone A: This zone includes developed areas and facilities that can accommodate concentrated uses, events, and interpretive opportunities for a large number of visitors. Areas are designed to provide important visitor services and amenities.	Zone A: This zone includes public tour areas of the cave that have major development for walking (or accessible) tours and electric lights and could include a telephone communication system. It supports concentrated use designed for visitor comfort and convenience. This zone contains infrastructure that can accommodate events and interpretive opportunities for a large number of visitors.
Zone B: This zone includes electrically lighted and fully developed passages. Developments include trails, bridges, steps, stairways, and handrails. Guides accompany all parties, which have a maximum of 120 visitors.	Zone A: See above for a brief description.
Zone C: This zone includes partially developed passages and passages that were once developed and are now abandoned. Overall development is limited to infrastructure essential for visitor safety; there is no electric lighting.	Zone B: This zone provides for a more primitive cave experience and requires handheld lanterns, flashlights, and/or headlamps. Moderate development (including formalized trails) may also occur in this zone to improve resource conditions; however, visitors may need to prepare for potentially challenging conditions.
Zone D: Passages in Zone D are defined as “natural.” Only those visitors with requisite caving experience and equipment are permitted to explore this zone. Caves are not improved with the exception of known hazardous areas. Small party sizes are required.	Zone C: This zone provides for a more intensively primitive cave experience, which is reflective of the conditions experienced by earlier cave explorers. These caves/passages are undeveloped and entered less frequently. This zone encompasses most of the Mammoth Cave system in the park as well as most of the other caves in the park. Minimal development will occur in this zone, mostly limited to narrow trails for traversing areas or minimal modifications for safe exploration, mapping, research, or management.

Current Cave Zoning from General Management Plan (1983)	Updated Cave Zoning from Cave and Karst Management Plan (2019)
	Newly discovered caves and passages will be classified as Zone C, unless resources in the area indicate that a "Restriction Overlay" designation is warranted.
Zone E: Zone E includes portions of the cave systems reserved for scientific study and exclusively approved for exploration. Temporary access to Zone E may be obtained in specific passages by scientists conducting approved projects.	Restriction Overlay Zone D: This overlay is necessary to designate exceptional areas that require seasonal and/or special conditions for entry. This overlay will be managed to restrict resource impacts and is designed to protect pristine caves/passages with highly sensitive resources or specific resources that require additional safeguards and will be tailored to specific areas.
Zone F: Cave areas containing highly sensitive, fragile, rare natural and/or cultural features are in Zone F. They may also be located in Zones B through E.	Restriction Overlay Zone D: See above for a brief description.

To fulfill the requirements of the 1978 National Parks and Recreation Act (54 United States Code 100502), visitor capacity identifications are legally required for all destinations and areas that this planning effort addresses (Interagency Visitor Use Management Council and Framework Guidance 2016). To identify appropriate visitor capacities for portions of the cave, key areas were selected as destinations where high levels of use cause—or are projected to cause—impacts to natural resources, cultural resources, or visitor experiences and are related directly to desired conditions. These key areas are based on the cave management zones that are updated as a part of this planning project. The park opens tours for visitors only in Zones A and B and manages those in accordance with desired conditions included in the plan. Future monitoring of use levels and indicators will inform the National Park Service if use levels are at or near visitor capacities. If so, management strategies, as outlined in appendix B of the plan, will be implemented.

Resource Management

High-priority resource management strategies address critical needs to more comprehensively manage visitor access, improve research, protect water quality, sustain natural airflow, protect cultural resources, and maintain cave biotic communities in the cave environment. Strategies will be implemented to protect natural and cultural resources, as outlined in the management indicators, thresholds, and visitor capacity included in appendix B of the plan.

Actions in the selected action encourage improved hydrologic practices above ground to protect subsurface resources through means such as maintaining and improving stormwater management, upgrading sanitary sewer, and limiting the use of hazardous chemicals in situations where they could get into the groundwater. Where appropriate, artificial entrances may be modified to limit inappropriate water flow. The park will continue dye-tracing and research programs to further understand hydrology in the karst environment.

A comprehensive algae management program will be implemented and will include a systematic monitoring plan to incorporate indicators and thresholds, and a mitigation plan for remediated and ongoing algae control.

Sustaining natural airflow to caves is an overarching resource management necessity the plan addresses by acknowledging the need for future airflow restoration actions such as airlock installations or reopening older areas that provided historical airflow at specific cave entrances. The park will monitor cave airflow and climate to help determine what appropriate airflow restoration projects may be needed.

Illegal cave entry/trespass will be reduced by placing gates at the cave passages most vulnerable to trespass. Gate installations will follow the park's rigorous gating standards and guidelines that include "bat-friendly" gate designs and materials and will be considered within the context of broader resource protection tools (permits, law enforcement patrols, special use permits, etc.)

Similarly, vandalism and other visitor-caused impacts that negatively impact natural and cultural resources will be limited by implementing visitor capacities on park-guided cave tours and controlling access with park-approved permits. Improving trail boundaries and continuing to harden certain sections of walking surfaces will reduce off-trail activities and inadvertent damage to resources.

Other management strategies—several that have shown success in their initiation—include installing lint curbs to trap lint and improving orientation of best cave management practices for park staff, contractors, and research permittees.

Rationale for the Decision

The selected action was chosen because it best meets the plan purpose and need for action by providing a comprehensive approach to managing visitor use, establishing tour capacities, providing desired future conditions for the cave system, and addressing resource protection issues.

The selected action provides a consistent and comprehensive framework for managing the park's cave resources, with considerations for natural resources, cultural resources, and visitor safety and experience. The selected action also restructures zoning created in the 1983 general management plan. In addition, the selected action uses mitigation measures to further protect natural resources, cultural resources, and visitor safety during implementation.

MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

The National Park Service places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources, protect visitors, and promote natural cave environments, the mitigation measures and best management practices included in "Attachment B: Mitigation Measures and Best Management Practices" will be implemented as part of the selected action.

PUBLIC INVOLVEMENT

Public scoping for cave management occurred in March 2018, including public outreach meetings at Cave City Convention Center, Cave City, Kentucky (March 20, 2018) and Edmonson County Library, Brownsville, Kentucky (March 21, 2018).

The Mammoth Cave National Park Cave and Karst Management Plan/Environmental Assessment was made available for public review and comment through the project NPS Planning, Environment, and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/MACA> during a 30-day period from July 1 through July 31, 2019. Two public meetings were held during the comment period at Cave City, Kentucky (July 16, 2019) and Brownsville, Kentucky (July 18, 2019).

Five correspondences were received and documented in the project NPS PEPC website from individuals, organizations, and agencies. Attachment C provides a summary of public comments received and the NPS response to those comments. The park did not receive any substantive comments and, as a result, no editorial changes or additions to the document were necessary.

FINDING OF NO SIGNIFICANT IMPACT

No potential for significant adverse impacts to park resources as a result of implementation of the cave and karst management plan have been identified. The conclusion of no significant impact was determined based on analysis compiled from a combination of scientific data and professional judgement from NPS staff and documented in the environmental assessment. As defined by 40 CFR 1508.27, significance, as used in NEPA, requires consideration of context and intensity. The following considerations, included in 40 CFR 1508.27, are relevant to this finding of no significant impact.

Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that, on balance, the effect will be beneficial.

No significant impacts to resources were identified that would require analysis in an environmental impact statement. Mitigation measures and best management practices described in attachment A will be implemented to minimize any potential nonsignificant adverse impacts. Additional details on impacts to resources can be found in chapter 4 of the environmental assessment.

The degree to which the proposed action affects public health and safety.

Cave resources contain features and conditions such as confusing passages, low ceilings, loose rocks, unstable floor material, ledges, pits, tight constrictions, conditions conducive to hypothermia, and areas with water. These are part of the natural environment that the park preserves. The park mitigates these hazards to the greatest extent possible for visitors, researchers, and staff. For visitors on walking tours, there is a high degree of mitigation including hardened walking surfaces, electric lights, and safety barriers, while Wild Cave Tours,

off-trail educational trips, and researchers are more exposed to these conditions. The park strives to ensure these activities occur in the safest way possible.

The selected action includes potential trail and tour improvements, enhanced ticketing and information about cave tours, and revised visitor capacities for cave tour routes. Trail and tour-route improvements also provide enhanced safety for visitors and decreases the chance for vandalism. Increasing the number of guides on large tours can help answer visitor questions, provide safety instructions, and monitor for behavior potentially impactful to the resources. In the selected action, the proposal for improved trail infrastructure, such as the installation of handrails and permanent anchoring systems to aid in patient evacuations, provides safety-related beneficial impacts to visitor use and experience. These effects, when considered with other past, present, and reasonably foreseeable future projects, will have long-term, beneficial cumulative impacts to visitor experience and safety.

Unique characteristics of the area such as proximity to historic and cultural resources, ecological critical areas, wetlands, floodplains, etc.

Mammoth Cave National Park is home to 13 federally endangered species and 2 federally threatened species, and unoccupied critical habitat of an additional federally endangered species. The cave is one of the cave biodiversity hotspots in the world, with more than 160 regularly occurring species of troglobites (e.g., cavefish, flatworms), troglaphiles (e.g., spiders, salamanders), and troglloxenes (e.g., cave crickets). The environmental assessment includes analysis of potential impacts to biological resources; rare, threatened, or endangered species and species of interest; cave climate; and water resources (see EA chapter 4). The selected action will likely result in temporary, small to negligible, localized, direct adverse impacts on biological resources and special status species from human activity and construction associated with proposed cave-enhancement activities. Overall, activities included in the selected action will have long-term beneficial impacts to the cave environment and cave species by restoring historic air flow, minimizing off-trail activities, and better defining appropriate areas for visitor use and research through zoning.

The degree to which the action may adversely affect historic properties in or eligible for listing on the National Register of Historic Places, or other significant scientific, archeological, or cultural resources.

Within the boundaries of Mammoth Cave National Park, 284 archeological sites have been recorded with the Kentucky Office of State Archaeology, representing past human activity dating from at least 9,500 BC to the establishment of the park in 1941. Numerous other sites have been recorded in the Archeological Sites Management Information System (ASMIS) database maintained by the National Park Service.

Sections of Mammoth Cave were designated a historic district on the National Register of Historic Places in 1991. An area with approximately 12 miles of underground passages—including those portions of the cave used for early mining, medical, exploratory, and commercial purposes—are included in the historic district. The district includes five contributing sites (the Historic Entrance, the Carmichael Entrance, the Violet City Entrance, the Frozen Niagara Entrance, and Gothic Avenue where historic signatures, monuments, and rock

walls are found); eleven contributing structures (the Mushroom Beds, Rock Stairs and Walls near Olive's Bower, Saltpeter mining works, Rock Wall at the Bridal Altar, Rock Wall at Jenny Lind's Armchair, Rock Wall at the end of Gothic Avenue, two stone Tuberculin Huts, Albert's Stairway, and the Landing at Crystal Lake); and one contributing object (the cable at Aerobridge Canyon).

Cultural landscapes in Mammoth Cave are currently under formal evaluation. The Mammoth Cave Historic District Cultural Landscape Report is anticipated to be completed in 2020. The forthcoming Cultural Landscape Report may recommend expanding the period of significance from 1816-1941 to 1798-1969 to include Mission 66 resources and additional areas of significance. The Cultural Landscape Report will likely suggest expanding the historic district boundaries to include all passages that have been the focus of tourism between the Historic Entrance and Frozen Niagara, which include evidence of historic industry, medical experimentation, science, and exploration. This suggests a total area of approximately 35 miles of passages.

The selected action has potential adverse effects on cultural resources. New additions to trail infrastructure may potentially diminish the integrity of materials, design, setting, and workmanship of the historic district. Any adverse effects related to actions included in the selected action will likely be localized and permanent and will be limited by the mitigation measures outlined in this plan or included in future NEPA or section 106 documentation prepared during the design and construction of individual trail or improvement projects.

At this time, there are not enough details associated with the design, location, and implementation of these individual actions to complete assessment of effects associated with section 106. In this decision, Mammoth Cave National Park commits to complete additional section 106 review for federal undertakings that have the potential to affect historic properties that stem from the cave and karst management plan/environmental assessment in accordance with the 2008 programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation (ACHP), and the National Conference of State Historic Preservation Officers for compliance with section 106 of the National Historic Preservation Act and the ACHP's regulations (36 CFR Part 800). Cultural resources found in the cave and along tour routes will continue to be considered during the implementation of actions included in this plan and when completing compliance for future projects.

The degree to which the action may adversely affect an endangered or threatened species or habitat.

Mammoth Cave National Park is home to 13 federally endangered species and 2 federally threatened species. In addition, the park is home to unoccupied critical habitat of an additional federally endangered species. All of these species are also state listed. These species are identified in table 1 of the environmental assessment and described in "Chapter 3: Affected Environment." The park also houses an additional 86 species with state listings from the Office of Kentucky Natures Preserves (EA appendix C).

The selected action will likely result in temporary, small to negligible, and localized, direct adverse impacts on special status species from proposed cave-enhancement activities. There is

potential for rare, threatened, or endangered species and species of interest to occur in areas where cave-enhancement activities will occur under the selected action. Gray bats, Indiana bats, and northern long-eared bats are known to have used the Historic Entrance and historic section of Mammoth Cave in the past and still occasionally occur in the area at least transiently. At this time, however, no Indiana or gray bats are known to hibernate in the historic section of Mammoth Cave. Indiana and gray bats hibernate in six other cave locations in the park, including one hibernaculum in the Mammoth Cave system (Colossal Cave). No northern long-eared bat hibernacula have been identified in the park, however, bats occasionally use various park caves in both summer and winter. If Colossal Cave is opened for visitation, which is possible under this action, it will be closed and not be toured or maintained during the months of hibernation. In addition, all infrastructure work will occur during times when it is not being used as a hibernaculum. All infrastructure work will be executed in a way to not reduce current airflow or modify cave microclimate. Since both Indiana and northern long-eared bats use trees for maternity colonies, surface activities may also impact them. The possibility that these bats could be present during proposed management activities is very low, thus this selected action is not likely to adversely affect Indiana, gray, or northern long-eared bats. Although the management plan and its protections for caves and cave resources will not adversely impact any listed species, several possible projects authorized in the selected action have the potential to impact listed bats. The park will initiate consultation during the planning process for all of those projects.

Noise and human presence during this plan's proposed cave-enhancement activities will cause temporary displacement and disturbance of special status species, including bats (if present), woodrats, cave crickets, and cave beetles. Although individual cave-enhancement activities will occur over relatively short periods of time, work activities and disturbance of rare and listed species in any one section of the cave will be substantially shorter. Species are expected to return to project sites after construction is completed. Impacts will be localized and limited to the immediate area of the particular cave-enhancement activity.

Infrastructure projects to improve protections of water quality (such as sewer enhancements, stormwater runoff controls, and water system upgrades) will benefit aquatic cave animals, including the Kentucky cave shrimp. However, construction activities do pose some risk from siltation and contamination. Consultation during planning of those projects will ensure adequate protection of these species. Visitor use of trails and roads and construction to improve visitor use may also impact water quality and has the potential to adversely affect Kentucky cave shrimp. Continued consultation will ensure these activities will not adversely affect this species (or other associated aquatic species). Reopening tours over River Styx and Echo River (all-day tour route) will have the potential to adversely affect Kentucky cave shrimp (and several state species of concern). Further consultation will be needed to determine the potential impacts of this tour and of any infrastructure required before this project can move forward.

Several different types of activities associated with this plan have the potential to impact aquatic cave organisms, notably the Kentucky cave shrimp. Projects associated with protection of groundwater quality and limiting unauthorized entry into park caves will increase protection of aquatic cave organisms; therefore, these impacts will be positive. The possible project with the most potential for negative impact is reopening the all-day tour route over the river. A section of

the project trail proposed for possible reopening for all-day tour route occurs in the lowest section of the cave where cavefish, crayfish, and the Kentucky cave shrimp may occur. If the park proceeds with planning to reopen tours in the lowest levels of the cave, the park will initiate consultation to ensure adequate protection of the Kentucky cave shrimp and other species inhabiting the streams in those levels. The other manner in which aquatic cave organisms may be impacted is by siltation or contamination of groundwater during use of park roads and trails or construction associated with cave infrastructure and surface projects like sewer upgrades. Seasonally appropriate construction (during the dry season in wet areas, for example) and best management practices for prevention and containment of erosion and contaminants will limit the potential for these projects to impact Kentucky cave shrimp and other aquatic cave organisms. Additional consultation will occur with projects that may impact these species to eliminate or minimize potential impacts.

The nine endangered and one threatened freshwater mussel species and the endangered diamond darter's critical habitat will not be adversely affected by any of the actions in this plan. The measures to protect and improve water quality in the karst system may also improve water in the Green River (their habitat). However, all impacts to these species will be indirect. Nevertheless, the park will consult concerning any potential impacts of component infrastructure projects. Park staff consulted with the US Fish and Wildlife Service during development of the plan to identify actions that have the potential to impact federally listed species and mitigation that could lessen any potential effects. The park will continue to consult with the US Fish and Wildlife Service on this plan and as projects associated with the comprehensive cave and karst management plan are initiated.

CONCLUSION

The selected action does not constitute an action meeting the criteria that normally requires preparation of an environmental impact statement. The selected action will not have a significant effect on the human environment in accordance with Section 102 (2) (c) of the National Environmental Policy Act. Attachment D contains the non-impairment determination for the selected action.

Based on the foregoing, it has been determined that an environmental impact statement is not required for this project and, thus, will not be prepared. The Mammoth Cave National Park Cave and Karst Management Plan will be implemented as soon as practical when funding becomes available.

REFERENCES

Interagency Visitor Use Management Council

- 2016a Visitor Use Management Framework, A Guide to Providing Sustainable Outdoor Recreation. First ed. Denver, CO.
<http://visitorusemanagement.nps.gov/VUM/Framework>.

National Park Service (NPS)

- 2006 *Management Policies 2006*. https://www.nps.gov/policy/MP_2006.pdf.

ATTACHMENT A: DESIRED CONDITIONS

Desired conditions are defined as statements of aspiration that describe resource conditions, visitor experiences and opportunities, and facilities and services that an agency strives to achieve and maintain in a particular area. Within the Visitor Use Management framework described in the Mammoth Cave National Park Cave and Karst Management Plan/Environmental Assessment, desired conditions are a crucial element that help guide management decisions. In the plan, desired conditions described in previous plans (e.g., the general management plan) were considered and provide high-level guidance. To provide guidance for specific actions contained in the plan, desired conditions for visitor use and experience are outlined here and further articulated in chapter 2 of the cave and karst management plan/environmental assessment.

- Natural
 - The natural function, diversity, complexity, and resiliency of park caves are protected.
 - Impacts on fragile natural and cultural resources are minimized by locating facilities in areas that are able to support such use without sustaining unacceptable environmental damage.
 - Cave use-related impacts are minimized or mitigated by management strategies.
 - Infiltrating water is protected to ensure good water quality to support cave functions and organisms.
 - Cave habitats and communities, especially cave-obligate endangered species, are maintained and protected.
- Cultural
 - Archeological resources are preserved and protected from, adverse effects and/or disturbance associated with cave use.
 - Cultural resources—including archeological sites, historic structures, cultural landscapes, and ethnographic resources—are identified, documented, and protected, through avoidance, minimization of effects or mitigation, as deemed appropriate.
- Visitor Experience
 - A variety of cave tours are readily available to provide visitors with a high-quality experience, and an opportunity to learn about and enjoy Mammoth Cave's iconic cultural and natural resources.
 - Visitor congestion and conflict are managed to provide visitors with a high-quality experience.

To provide specific guidance for cave zone updates for the selected action, desired conditions for visitor use and experience are further articulated by zone (A through D), below.

CAVE ZONE A

- Provide visitors with opportunities for a variety of experience levels and physical abilities while also being immersed in the sights and sounds of the cave where social recreation experiences are appropriate.
- Provide opportunities for special events and interpretive tours for large groups of people.

Example Cave Areas

- Cleaveland Avenue, Snowball Room, Kentucky Avenue, Grand Central Station, Frozen Niagara, Boone Avenue, Rafinesque Hall, Houchin's Narrows, Broadway, Main Cave, Blacksnake Avenue, Fat Man Misery, Great Relief, Sparks Avenue, Mammoth Dome, Little Bat Avenue, and Audubon Avenue.

CAVE ZONE B

- Provide visitors with a cave experience where the sights and sounds of the cave will dominate the experience.
- Provide opportunities for research, in appropriate areas.

Example Cave Areas

- Main Cave from Star Chamber to Violet City, Great Onyx Cave, Clark Avenue, Cathedral Domes, Becky's Alley, Nickerson Avenue, Big Break, Ganter and Jessup near Wooden Bowl, El Ghor-Silliman Avenue, Woodbury Pass, Colossal Entrance to Bedquilt Route, Historic Crystal Cave Trails, Historic Proctor, Long Cave, Upper Salts Cave, Olive's Bower, Briggs Avenue, Black Chambers, Blue Spring Branch, Echo River (end of Styx Catwalk to Minnehaha), Pensacola Avenue, Sylvan Avenue, Emily's Avenue, Wondering Woods Cave, Dixon Cave, Pohl Avenue, Turner Avenue, New Discovery (main passage to end of trail development with potential extension to Big Paradise), Owl Cave, Fort's Way, and Roaring River.

CAVE ZONE C

- Preserve a minimally traversed cave environment—one that is reflective of the conditions experienced by earlier cave explorers and where the cave system has been minimally impacted by human activity.

Example Cave Areas

- Examples from within the Mammoth Cave system include East Bransford Avenue, Carlos Way, River Acheron, Miller Avenue, Proctor Cave (from Proctor Crawl), Logsdon River, Bridge Avenue, Colossal River, Candlelight River, Lower Salts, Ball Trail, The Overlook, Waterfall Trail, and Gravel Avenue.

- Other notable caves include Lee Cave, Wilson Cave (other than historic section), Running Branch Cave, Little Beauty Cave, Dennison Cave, Smith Valley Cave, Sand Cave, Bat Cave (other than A-survey), Luna Cave, Fort's Funnel, and Silent Grove Springhouse Cave.

OVERLAY ZONE D

- This zone overlays the appropriate zone assigned to a passage. It is intended to protect specific resource conditions and may require special conditions for entry. Such restrictions or conditions in Overlay Zone D can be seasonal or occur throughout the year and may vary depending on the level of protection needed to protect a specific resource. The following is a list of some justifications for closures and a few examples of passages with special conditions. Neither the reasons for closure nor the examples represent an exhaustive list. The park maintains a list of passages with restrictions and discusses those restrictions with those seeking to enter those areas under appropriate permits.

Reasons for Closure and Examples

- Seasonal Bat Closure (hibernation or maternity use) – Colossal Cave (Grand Avenue and Colossal Entrance), Bat Cave, Cathedral Cave, and Blight Cave.
- Bat Restrictions All Year (summer negotiable) – Long Cave and Dixon Cave.
- Archeological Resources – Watson Trace and Salts Trunk.
- Historic Resources – TB Huts, Saltpeter Vats, and New Discovery (CCC trail).
- Delicate Formations or Minerals – Little Paradise.
- Safety Concerns – Sand Cave.

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ATTACHMENT B: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

The National Park Service places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources, protect visitors, and promote natural cave environments, the following mitigation measures and best management practices will be implemented as part of the selected action.

GENERAL

- Resource management staff will provide all contractor employees with an orientation/briefing that will inform them of relevant natural and cultural resource issues and the importance of minimizing impacts. The resource management division will be notified and consulted when wildlife, cave features, or artifacts must be disturbed or handled.
- To the extent possible, any construction, development, or other enhancement activities will be scheduled to minimize construction-related impacts on visitation and wildlife behavior.
- All staging and stockpiling areas will use existing laydown areas to the extent possible and be rehabilitated to natural conditions following any construction or enhancement activities.
- All tools, equipment, surplus materials, and trash will be removed upon project completion. Any construction debris will be sanitized to prevent potential spread of disease from the cave and hauled from the park to an appropriate disposal location.
- To the extent possible, construction and maintenance activities (such as those involving structural upgrades to mitigate impacts due to water infiltration or gate maintenance and construction) in areas with sensitive wildlife will be timed to avoid sensitive wildlife periods, such as breeding seasons and bat hibernation periods.
- Lint and dust mitigation measures, such as periodically removing lint and other foreign materials from some of the heavily traveled tour routes, will continue to be implemented and these areas will be monitored for accumulation. Where applicable, lint curbs and railing will be maintained or installed to control the migration of potentially harmful dust, lint, and other small debris distributed by visitors.
- Dust abatement measures will be implemented to minimize the spread of dust during cave-enhancement activities. Where applicable, continue to install hardened surfaces to help control dust. Where appropriate, older dust can be removed to limit on-going damage to cave resources and aesthetic values.
- Where applicable, old lighting in algae-prone sections of the cave will continue to be replaced with advanced lighting intended to limit the growth of lamp flora. Lamp flora will continue to be routinely removed, where necessary.
- Park staff will coordinate with the regional sewer system operator to implement mitigation measures and reduce threats to water quality.

- To minimize the possibility that construction equipment (limited to propane or electric powered equipment) could leak fluids, introduce noise pollution, or emit pollutants, equipment will be checked frequently to identify and repair any leaks, mufflers will be checked for proper operation, and only equipment that is within proper operating specifications will be used. All excess debris and foreign material resulting from construction, maintenance, and research activities will be removed from the cave for legal and proper disposal.
- Cave personnel and equipment will be subject to stringent decontamination protocols as needed to prevent the introduction and spread exotic species into the cave.
- All visitors and staff using non-electric lanterns will be trained in their operations and follow an approved job hazard analysis. Those using liquid fuels will be required to take extreme care not to spill any fuel in the cave system. All fueling will take place outside the cave. All users will take appropriate steps to mitigate safety and environmental hazards associated with their use and report any fuel spills in the cave to the park's Chief of Science and Resources Management according to the park's Spill Prevention, Control, and Countermeasure Plan (National Park Service Management Policies 2006).
- The park's Spill Prevention, Control, and Countermeasure Plan will be updated to prevent the discharge of hazardous substances near cave resources. The plan's countermeasures for managing a discharge will be updated as well.
- Infrastructure needed for cave-enhancement projects—such as curbs, railings, signs, and stairs—will be designed and located to minimize adverse impacts on the character and features of the cultural landscape. Similarly, new facilities will be compatible with the historic character and material of the landscape and will be designed and located to minimize adverse impacts on cave biotic communities.
- Materials needed for cave-enhancement or maintenance projects—such as curbs, railings, signs, stairs, and lighting fixtures—will be chosen to minimize adverse impacts to the cave (through outgassing, decomposition, or leaching of toxic substances).
- Chemicals used in the cave or near cave entrances for cleaning, maintenance, or construction will be selected and used to minimize impact to the cave. Appropriate precautions will be taken to avoid spills. All chemicals will be disposed of properly and safely to protect cave organisms. All spills will be promptly cleaned up and reported to Resource Management for further evaluation and potential remediation.
- Check dams, stormwater filters, or water control structures will be installed to reduce potential for impacts on water quality in areas prone to spills, sewer breaks, or other water quality issues, as appropriate.

NATURAL RESOURCES

- Access to the park's caves will be provided to the following user groups:
 - visitors with tour tickets (approved for on-trail visitation in the area and time indicated by the tickets)
 - approved educational tours and activities
 - researchers working under approved permits, cooperative agreements, contracts, or park administrative actions

- people under approved special use permits
 - contractors working in the cave (access allowed for areas needed for specific contracted project)
 - park staff and approved cooperators working under park administrative actions
- Exploration, mapping, and research activities will be pursued in a manner that minimizes impacts to the cave and cave resources. Activities will minimize unnecessary disturbance of cave floors and walls. Modifications needed for research or exploration (such as placing permanent mounts for equipment, bolting, or digging) will be considered on a case-by-case basis. Permanent station markers and cave brass caps should be placed to avoid impacting cultural resources. Other than small amounts of exploration needed for reconnaissance, newly discovered cave areas will be surveyed as they are explored.
 - Newly found caves will be reported to Science and Resource Management for evaluation.
 - Per NPS standards, NPS managers will coordinate and supervise any construction and maintenance activities. Specifically, park staff will monitor or direct proposed maintenance and mitigation activities in particularly sensitive portions of the cave; proposed enhancement activities such as stairway and handrail maintenance; where to obtain fill and other materials for enhancements; and how to apply fill materials such as soil, gravel, and rocks. Park staff will be responsible for ensuring that crews perform the necessary work in accordance with NPS instructions and standards.
 - Surface trail enhancements will avoid excessively steep slopes to minimize erosion. To provide for soil stability and prevent movement of soils, erosion control features such as rock walls and rolling dips will be used where appropriate.
 - On the surface, where runoff might impact the cave, soil erosion will be minimized by limiting the time soil is left exposed and by applying erosion control measures such as erosion matting, silt fencing, and catchment basins in construction areas to reduce erosion, surface scouring, and discharge to drainages.
 - Within the cave, only clean fill (dense grade, sand, etc.) will be used as fill. Fill derived from deposits in the cave will only be used with project-specific approval detailing amount of fill to be used, specific areas approved for use, and specific areas approved as the source of fill.
 - Pest and pathogen monitoring and treatment will be conducted prior to and following any construction or enhancement efforts.
 - Native materials will be salvaged and reused during project implementation.
 - All equipment entering the park will be cleaned and pressure washed if necessary to remove foreign soil or outside debris.
 - When construction or other activities requiring ground disturbance occur in cave entrances, plant and wildlife surveys will be conducted by qualified biologists prior to ground disturbance to ensure activities do not destroy or alter special or rare vegetation, plant communities, sensitive wildlife, or important habitat. If special status or rare plants are discovered, they will be clearly flagged and avoided when possible. If avoidance is impossible, park managers will consult with experts and measures will be considered to avoid or minimize impacts (e.g., transplantation).

- For work within the cave, wildlife surveys will be conducted by qualified biologists prior to ground disturbance to ensure reroutes and new trail routes do not destroy sensitive wildlife or important habitat. If special status or rare animals are located, they will be avoided when possible. If avoidance is impossible, park managers will consult with experts and measures will be considered to avoid or minimize impacts (e.g., relocation).
- Care will be taken to avoid or minimize disturbance of sensitive wildlife species such as bats known to inhabit tour routes. Resource management personnel will be notified or consulted when wildlife must be disturbed or handled.
- Where possible, natural features with obvious high value to wildlife will be preserved (e.g., small pools, cricket guano patches, bat roosting areas).
- Trash and food waste will be removed daily from worksites to avoid attracting wildlife.
- When necessary, park managers will use temporary or seasonal visitor use restrictions or area closures to protect sensitive wildlife habitat, sensitive wildlife behavior, life stages, cultural resources, or cave minerals. That is, park managers will add areas to the "Restricted Overlay" zone as necessary to protect natural and cultural resources,

CULTURAL RESOURCES

- Areas without previous cultural resource identification or containing potentially significant archeological or paleontological resources will be monitored by a qualified archeologist or paleontologist during trail construction activities to prevent disturbance of highly significant deposits and to recover samples of scientifically important materials. For off-trail survey and research activities, those same areas will minimally require a briefing by a qualified archeologist regarding the identification and avoidance of significant archeological resources. Significant archeological resource deposits would include dense concentrations of torch remains (beyond the normal background of torch charcoal that is scattered throughout the cave) or archeological materials of rare occurrence in the cave (e.g., cordage, textile fragments, paleofeces, bone deposits, climbing poles, ladders, lanterns, cans, bottles, other artifacts associated with intensive periods of prehistoric or historic activity in the cave).
- Recommendations for areas identified to have high potential for archeological or paleontological resources include a broad range of possible actions, all of which are designed to minimize the effect of proposed trail rehabilitation construction on intact archeological or paleontological deposits. At a minimum, monitoring by a qualified archeologist or paleontologist will be conducted in high-potential areas. Priority will be given to avoid or minimize effects on cultural and paleontological resources. However, should adverse effects be unavoidable, mitigation measures will be designed to document, interpret, and/or recover significant resources and/or information. Mitigation measures may include the following:
 - data recovery through expanded archeological or paleontological excavations
 - interpretive media either in the cave, in the visitor center, in library materials, or online, for the benefit of understanding resource significance
 - developing a resource benefit action that will match the evaluated value benefit of an adversely affected resource with a preservation need

- implementing an education program through lecture or media that can teach the public about a resource, its significance, and the benefits of preservation
- Should an activity encounter previously undiscovered cultural resources, any construction activity in the vicinity of the discovery will cease and park managers will consult with the state historic preservation officer and the Advisory Council on Historic Preservation, as necessary, according to 36 CFR 800.13. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during any construction activities, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 will be followed.
- Infrastructure needed for future cave enhancement, such as curbs, railings, signs, and stairs, will be designed and located to minimize adverse effects on the character and features of the cultural landscape. Every effort will be taken to ensure new construction and components related to infrastructure and visitor safety will be compatible in their materials, color, and texture with historic materials to the extent possible.
- All work that may affect cultural landscapes will be evaluated by a historical landscape architect and other professionals, as appropriate.
- NPS staff will continue to inform visitors and others of the importance of protecting and not disturbing archeological and historic resources. Visitors will be informed (through NPS educational and interpretive programs and/or interpretive media products, and ranger contacts) of the penalties for causing resource damage.

VISITORS

- NPS staff will implement measures to reduce adverse effects of construction on visitor safety and experiences. Measures may include, but are not limited to, noise abatement, visual screening, and directional signs that aid visitors in avoiding construction activities.
- Appropriate barriers and barricades will be used to clearly delineate work areas and provide for safe visitor travel near construction areas.
- Barriers and signs will be used to deter visitor travel on trails being rerouted to allow restoration of these areas.

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ATTACHMENT C: PUBLIC COMMENT SUMMARY

Mammoth Cave National Park released the cave and karst management plan/environmental assessment to the public on July 1, 2019 and announced its release through press releases, posts to the park's website, and an announcement on the National Park Service (NPS) Planning, Environment, and Public Comment (PEPC) website. To ensure that a variety of stakeholders and visitors could participate in this public scoping, the park elected to accept public comments from July 1 to July 31, 2019.

The cave and karst management plan/environmental assessment was posted to the PEPC website and made available in hard copy at the public open house meetings. Posters and flyers about the public meetings were sent to the surrounding community with the dates/locations and information on how to comment on the plan.

Public meetings were held on July 16, 2019 in Cave City, Kentucky and July 18, 2019 in Brownsville, Kentucky. The meetings were open house style, allowing participants to drop in from 4 p.m. to 6 p.m. and ask questions or bring up concerns about the plan. Seven people attended the Cave City, Kentucky meeting. People who attended the meeting were from the local area. There was representation from the county tourism board and Mammoth Cave National Park Association. Eleven people attended the Brownsville, Kentucky meeting. All of the attendees were from the local area. There was representation from the county tourism board, concessionaires who work out of Mammoth Cave National Park, and Edmonson News.

Five correspondences were received and documented in the project NPS PEPC website from individuals, organizations, and agencies. Several comments supported the preferred alternative for its focus on resource protection and improved visitor experience. Commenters agreed that a formal management plan would ensure the cave resources are protected by consistent methods and supported expansion of tour options, including historic routes, to allow for more visitors to enjoy the cave environment.

Other comments were generally supportive of the preferred alternative for the improved visitor experience but believed more could be done to provide for visitors and local educators interested in bringing student groups to Mammoth Cave. One commenter stated that educators are having trouble scheduling tours for their students and would like to see a better reservation system in place. Another respondent worried that the increase in park visitation during the summer season results in an increase in people being turned away for tours. Visitor capacities described in appendix B of the environmental assessment were calculated to ensure that resources are protected and visitors have the opportunity for a range of high-quality experiences. Under the selected action, the current capacity levels for most existing cave tours would stay the same or increase slightly, which would allow the park to achieve or maintain the desired resource and visitor experience conditions and manage crowding and congestion on tours.

Commenters mentioned working with neighboring communities about water quality concerns; and another comment was concerned about the park's past participation in the Conservation Reserve Enhancement Program (CREP), a US Department of Agriculture-sponsored watershed

protection program that helps provide buffers to waterways near agricultural land uses. The purpose of the cave and karst management plan is to provide a consistent framework for managing the world-class cave and karst resources in the park and to work cooperatively with partners in the broader Mammoth Cave Area International Biosphere Reserve. The cave and karst management plan includes opportunities for the park to enhance partnerships with resource stewardship partners for the protection of the larger cave system and watershed, and with regional tourism partners to ensure visitors know about the tour opportunities at Mammoth Cave and can successfully have their desired experience either at the park or other area attractions.

One commenter supported reopening of the Snow Ball Dining Room experience; the decision to cease food service in the Snow Ball Dining Room was made by the National Park Service prior to this planning effort and was not revisited as a potential action in this plan/environmental assessment.

ATTACHMENT D: NON-IMPAIRMENT DETERMINATION

By enacting the National Park Service (NPS) Organic Act of 1916 (Organic Act), Congress directed the US Department of the Interior and the National Park Service to manage units “to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (16 United States Code [USC] 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the National Park Service must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a-1). NPS Management Policies (NPS 2006), Section 1.4.4, explains the prohibition on impairment of park resources and values.

While Congress has given the National Park Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service and ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities to enjoy them.

The National Park Service has discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park (NPS 2006: Section 1.4.3). However, the National Park Service cannot allow an adverse impact that would constitute impairment of the affected resources and values (NPS 2006: Section 1.4.3). An action constitutes an impairment when its impacts “harm the integrity of Park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006: Section 1.4.5). To determine impairment, the National Park Service must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006: Section 1.4.5).

This determination on impairment has been prepared for the selected action described in this Finding of No Significant Impact for the Mammoth Cave National Park Cave and Karst Management Plan. An impairment determination is made for all resource impact topics (biological resources; rare, threatened, and endangered species; cave climate; physical cave features; water resources; paleontological resources; and cultural resources) analyzed in detail in the environmental assessment for the selected action.

BIOLOGICAL RESOURCES

Actions included in the selected alternative to sustain natural airflow by modifying artificial entrances, improve stormwater management by installing catchment basins, implement improved cave-access protocols, and reduce harmful off-trail impacts by continuing to improve trail boundaries will have small to moderate, wide-ranging benefits for biological resources.

Temporary, local, and direct adverse impacts on biological resources from proposed management activities will be expected under the selected action; however, these impacts will be largely mitigated by the long-term beneficial effects of implementing the selected actions. Because impacts associated with modifying cave entrances and installing stormwater catchment basins will be temporary and mitigated, there will be no impairment of the park's resources or values with respect to biological resources.

Rare, Threatened, and Endangered Species

Many rare, threatened, or endangered species and species of interest are expected to occur in areas impacted by this plan. The planned activities to maintain or improve water quality, better protect cave microclimate, and protect caves from unauthorized entry will provide medium and long-term improvements in protection of cave organisms. Some construction associated with these activities (installing sewer components or gates) may cause temporary, small to negligible, localized, direct adverse impacts on special status species. Some rare, threatened, or endangered species and species of interest occur in areas where proposed cave-enhancement activities or new tours will take place. Two of the proposed tour reopenings (Colossal Cave and the all-day route over the river) occur in habitat in which listed species regularly occur. In the case of Colossal Cave, tours will be seasonal and will avoid the cave from early fall to late spring to avoid hibernation and shoulder seasons when bats use the cave. In addition, infrastructure upgrades will be completed outside the bat-use season and will maintain or improve cave microclimates and access for bats. However, impacts will continue to occur where there are currently regular disturbances from visitors and tour groups.

In the case of potential impacts on aquatic species of special concern (including Kentucky cave shrimp) from construction and running the all-day tour over the river, consultation will be needed to determine and minimize potential impacts when detailed plans are available (including how people will get over the water, what lighting sources will be needed, how frequent tours will occur, and what infrastructure will be needed). If reopening this tour could not be done without adversely impacting Kentucky cave shrimp or take low enough to avoid causing impairment (after consultation and mitigation), we will not develop and open this tour option. Trail work will not be conducted during times of trail flooding to avoid impacting aquatic special status species and to minimize impacts on terrestrial special status species. The selected action will likely result in temporary, small to negligible, localized, direct adverse impacts on special status species from proposed cave-enhancement and new tour activities; therefore, there will be no impairment to species of special concern.

CAVE CLIMATE

Actions in the cave and karst management plan—including future airlock installations at strategic, human-made cave entrances and reopening cave areas that provided historic airflow—will have beneficial impacts to the cave climate. There will be no impairment to the resource from actions in the selected action.

PHYSICAL CAVE FEATURES

Cave-enhancement construction activities have the potential to damage physical cave features from the use of material-moving equipment, an increased number of workers in the cave, and surface disturbance on or adjacent to cave-tour trails. Best management practices will be employed to ensure that speleothems are avoided and protected from damage and that cave walls and floors are not impacted inadvertently. However, some areas of cave walls and floors will be adversely impacted because of cave enhancements, such as drilling into rock to install new lint curbs, handrails, stairs, and other similar infrastructure. Employing mitigation measures included in the environmental assessment for areas that have medium and high potential to produce scientifically significant paleontological materials will avoid or greatly reduce adverse impacts to physical cave features. Implementation of cave protection, impact monitoring (graffiti and algae), and visitation limits will maintain or improve protection of physical cave resources. The selected action will likely result in small to negligible, localized, direct adverse impacts on physical cave features in areas where development or construction occurs; best management practices and mitigation measures will be employed to limit the scope of any potential impact. Therefore, there will be no impairment to physical cave features.

WATER RESOURCES

The implementation of overall water quality protection actions in this plan will result in overall improvement of the water quality in the park and in the caves. Cave-enhancement activities under the selected action will largely avoid wet areas, such as running streams and pools fed by dripping water, during construction activities. Underground rivers rise periodically and flood certain trail sections. Work on such trails will be conducted during dry periods. Any necessary contact with cave-water resources will implement best management practices to control erosion, sediment release, and runoff during all construction activities. As most passages are dry and work will not be conducted during wet periods, runoff will not likely occur. Because of the nature and location of cave-enhancement activities included in the selected action and best practices and mitigation measures related to cave development, there is very little probability for direct impacts on water resources in most of the cave system. Therefore, there will be no impairment to water resources.

PALEONTOLOGICAL RESOURCES

Under the selected action, a host of cave-enhancement activities resulting in surface disturbance has the potential to adversely impact numerous paleontological resources. However, employing mitigation measures included in the environmental assessment for areas that have medium and high potential to produce scientifically significant paleontological materials will avoid or greatly reduce adverse impacts to paleontological resources. Additionally, locations containing significant sensitive resources will be excluded from cave-enhancement activities to ensure that no impacts will occur. Because adverse impacts on paleontological resources from proposed cave-enhancement activities will be small to negligible and localized, there will be no impairment to paleontological resources from the selected action.

CULTURAL RESOURCES

The selected action has potential for beneficial and adverse effects on cultural resources. Implementation of cave protection, impact monitoring (graffiti and algae), and visitation limits will maintain or improve protection of cultural resources in park caves. The replacement of historic infrastructure or the addition of modern infrastructure on historic trail routes could adversely affect the integrity of the Mammoth Cave Historic District and other national register-eligible resources through the removal or replacement of contributing features. New additions and the removal of historic features could result in the diminished integrity of materials, design, setting, and workmanship.

Any adverse effects related to actions proposed under the selected action will be localized and permanent. In the event of an adverse effect, the mitigation measures outlined in the cave and karst management plan, or a similar action, will be implemented. Additional section 106 consultation will be completed during the design and construction of individual trail development or other improvement projects included as part of the overall cave and karst management plan to ensure there is no impairment to these resources. Because of active mitigation and ongoing consultation under section 106 for cave-enhancement activities included in the selected action, there will be no impairment to cultural resources.

SUMMARY

In conclusion, as guided by the expected outcomes notes above, implementing the selected action does not constitute impairment of any resource or park value whose conservation is (1) necessary to fulfill specific purposes identified in establishing legislation or proclamation of the park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as the goal in the park's general management plan or other relevant NPS planning documents as being of significance.