

IUCN Conservation Outlook Assessment 2017 **(archived)**

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Please note: this is an archived Conservation Outlook Assessment for Mammoth Cave National Park. To access the most up-to-date Conservation Outlook Assessment for this site, please visit <https://www.worldheritageoutlook.iucn.org>.

Mammoth Cave National Park

SITE INFORMATION

Country:

United States of America (USA)

Inscribed in: 1981

Criteria:

(vii) (viii) (x)

Site description:

Mammoth Cave National Park, located in the state of Kentucky, has the world's largest network of natural caves and underground passageways, which are characteristic examples of limestone formations. The park and its underground network of more than 560 surveyed km of passageways are home to a varied flora and fauna, including a number of endangered species. © UNESCO

SUMMARY

2017 Conservation Outlook

Good with some concerns

Overall, the conservation outlook for the property can be assessed as good, and the park has especially benefited by the removal of Lock and Dam 6 in 2016, which previously flooded portions of the cave system unnaturally. The current condition of the World Heritage values is generally stable, the threat levels are generally low, and the protection and management standards are very high and intervention measures are mostly effective. There are concerns that levels of air and water pollution are increasing and impacting detrimentally on the biota and on visitor enjoyment. Of particular concern is the significant reduction of bat populations from the deadly white-nose fungal disease recently introduced into the property, which may prove extremely difficult to overcome.

Current state and trend of VALUES

High Concern

Trend: Stable

Overall the current state of World Heritage values in the property is of low concern and the trend is stable. There is growing concern about air and water pollution impacts. Of greatest concern is the recent die-off of a majority of seven native bats species due to white-nose fungal disease which could even eliminate some species, including populations of the three species already listed as endangered.

Overall THREATS

High Threat

Threats to the property range from very low to high. Low level threats come from ecosystem modification, especially suppression of wildfires and flooding of natural underground water systems due to storm water drainage from surrounding residential and industrial areas. Far more serious threats come from

neighboring coal-fired power plants that cause air and groundwater pollution, and from the incidence of the deadly white-nose fungal disease affecting the bat population. The most significant potential threat is from increased air and water pollution due to ongoing development in surrounding areas outside the park.

Overall PROTECTION and MANAGEMENT

Mostly Effective

Generally the protection and management of the property is of high standard and very effective. There is strong legal protection at State and Federal level, the property is under public ownership and the stakeholder support is good. The park has suffered some reduction in terms of staff and finance, but management intervention is guided by a series of comprehensive and widely consulted management plans. Monitoring, research, interpretation and education are exemplary. Of greatest importance for managers is the need to remain vigilant over impacts from urban, industrial and resource development activities outside the property that have the potential to increase above current levels.

FULL ASSESSMENT

Description of values

Values

World Heritage values

► **Superlative examples of natural features in limestone karst terrain.**

Criterion:(vii)

The longest cave system in the world, with huge chambers, vertical shafts, stalagmites and stalactites, splendid forms of beautiful gypsum flowers, delicate gypsum needles, rare mirabilite flowers and other natural features that are all superlative examples of their type. No other known cave system in the world offers a greater variety of sulfate minerals. (USA, 1980; IUCN, 1981; Statement of significance, 2006).

► **The world's largest network of natural limestone caves and underground passages.**

Criterion:(viii)

The 100 million-year old karst landscape presents nearly every type of cave formation known. Its huge and complex network of cave passages provides a clear, complete and accessible record of the world's geomorphic and climatic changes. The land surface has all of the classic features of a karst drainage system - a vast recharge area, complex network of underground conduits, sink holes, cracks, fissures, and underground rivers and springs. (USA, 1980; IUCN, 1981; Statement of significance, 2006).

► **The richest known cave biota.**

Criterion:(ix)

The property has the greatest diversity of known cave biota numbering over

130 species, of which 14 species of troglobites (animals adapted to living entirely in caves) and troglaphiles (animals preferring to live in caves) are endemic. (USA, 1980; IUCN, 1981; Statement of significance, 2006).

Other important biodiversity values

► Diverse vegetation and abundant wildlife.

Terrestrial vertebrates include 43 species of mammals, 207 birds, 37 reptiles and 27 amphibians. The temperate deciduous oak-hickory forest community includes 84 tree varieties, 28 shrubs and vines, 29 types of ferns, 209 wildflowers, 67 species of algae, 27 species of fungi and 7 species of bryophyte. (USA, 1980; IUCN, 1981; Statement of significance, 2006).

Assessment information

Threats

Current Threats

High Threat

Threats range from low to high. Low levels of threat come from disturbance by visitors and ecosystem modification, especially suppression of wildfires and flooding of natural underground water systems due to storm water drainage from surrounding residential and industrial areas. The most serious threats are from neighboring coal-fired power plants that cause air and groundwater pollution, and from the incidence of the deadly white-nose fungal disease affecting the bat population.

► Fire/ Fire Suppression

Very Low Threat

Inside site

Outside site

Wildfires are imprinted on patterns of vegetation development. Most fires are from arson, careless smoking and campfires, but there are some lightning fires. The authorities include fire suppression among fire management measures. Prescribed fires are considered unlikely to affect nationally protected species or critical habitats in the property (NPS, 2001; NPS, 2009; Olsen et al., 2005). Storm water drainage wells in neighboring areas are causing sinkhole flooding and ground collapse (May et al, 2005).

► **Commercial/ Industrial Areas**

Low Threat

Outside site

New development in the groundwater recharge basin, outside park boundaries, threatens water quality and cave biota.

► **Invasive Non-Native/ Alien Species**

High Threat

Inside site, widespread(15-50%)

Outside site

Beginning in 2013, the White-nose fungal disease resulted in a major die-off of bats native to the park, including all seven species, three of which were already listed as endangered. A response plan includes access restrictions, decontamination requirements for all activities, surveillance and monitoring, and outreach and education. (Bell, 2013; NPS, 2010; NPS, 2011).

► **Oil/ Gas exploration/development**

High Threat

Inside site, widespread(15-50%)

Outside site

There is existing and potential future groundwater contamination from human and animal waste production, agricultural land runoff and urban storm water discharge, because the majority of groundwater recharge area for Mammoth Cave lies beyond park boundaries. In addition, three major transportation corridors traverse the cave's recharge basin, so that any spills

or other release of contaminants is quickly washed into the karst aquifer.

► **Air Pollution**

Low Threat

Inside site, widespread(15-50%)

Outside site

Although air quality has improved modestly in recent years, a significant potential threat to the property continues from mercury contamination caused by emissions from coal-fired power plants. Several coal-fired plants in the vicinity have been taken out of service in recent years, but the area already contained 40 operating power plants. Plants produce huge quantities of carbon dioxide, sulphur dioxide, nitrogen and mercury. Some bats have up to 10x the mercury level considered safe for people, ozone pollution is considerably above levels known to harm plant life, and particulate matter causing hazy skies reduces vision for scenic viewing.

► **Storms/Flooding**

High Threat

Inside site, widespread(15-50%)

Outside site

Severe storms result in flooding, causing damage to trails, campsites and roads, and requiring emergency funding (May et al, 2005; NPS, 2003; NPS, 2006). Increasingly severe storms result in flooding, both at the surface and subsurface levels.

Potential Threats

Low Threat

Pollution from neighboring industrial developments, and its possible impact on natural values in the property, is of major future concern.

► **Commercial/ Industrial Areas**

Low Threat

Inside site, scattered(5-15%)

Outside site

Pollution, especially of groundwater, from neighboring commercial, residential, and industrial developments, and their possible impact on natural

values in the property, are of major future concern.

Protection and management

Assessing Protection and Management

► Relationships with local people

Highly Effective

Excellent stakeholder and local community support. Park management is supported by an NGO, Friends of Mammoth Cave National Park (IUCN, 1981; NPS, 2009a; USA, 1980).

► Legal framework

Highly Effective

Property is Federal and publically owned land subject to Federal and State protection laws (USA, 1980; IUCN, 1981).

► Enforcement

Mostly Effective

Protection of park resources is largely provided by the park's ranger staff, but supplemented by reciprocal enforcement agreements with local agencies.

► Integration into regional and national planning systems

Mostly Effective

Park land use co-ordinated with other State land and resource uses (IUCN, 1981; USA, 1980).

► Management system

Highly Effective

An excellent new Foundation Document for the park, released in 2016, an older Master plan, strategic plan and management plan along with several subsidiary plans such as business plan, water resources plan, fire plan, trail management plan etc. (NPS, 2001; NPS, 2003; NPS, 2006; NPS, 2007; NPS,

2011; USA, 1980).

► **Management effectiveness**

Highly Effective

Well resourced staff guided by comprehensive set of management plans (NPS, 2001; NPS, 2003; NPS, 2006; NPS, 2007; NPS, 2011; USA, 1980).

► **Implementation of Committee decisions and recommendations**

Mostly Effective

No recent Committee decisions or recommendations.

► **Boundaries**

Some Concern

Most current and potential threats to park resource quality arise outside park boundaries, and largely beyond NPS control.

► **Sustainable finance**

Some Concern

2016 Foundation Document reports that historical levels of funding were reduced by 30% in recent years. While a vacant cave specialist position has been recently filled, the park geologist, anthropologist, hydrologist, and botanist positions remain vacant. Some needed research is supplemented with a master cooperative agreement with a nearby university.

► **Staff training and development**

Highly Effective

Highly professional well trained and capable staff resources (IUCN, 1981; USA, 1980).

► **Sustainable use**

Data Deficient

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► **Education and interpretation programs**

Highly Effective

Excellent visitor centre and learning centre (NPS, 2003; NPS, 2010).

► **Tourism and visitation management**

Highly Effective

Approximately 650,000 tourists visit the property annually, about two thirds of whom take guided cave tours. Interpretation resources are excellent (NPS, 2003; NPS, 2010).

► **Monitoring**

Highly Effective

Comprehensive monitoring program for ecological indicators, water and air quality, cave environment, fire and visitor use, among others (May et al., 2005; NPS, 2006; NPS, 2007; NPS, 2009; NPS, 2011; Watson, 2005).

► **Research**

Highly Effective

Strong research program involving park scientists and domestic and international researchers. Research results are applied to management intervention (MCNP, 2013).

Overall assessment of protection and management

Mostly Effective

Generally the protection and management of the property is of high standard and very effective. There is strong legal protection at State and Federal level, the property is under public ownership and the stakeholder support is good. The park has suffered some reduction in terms of staff and finance, but management intervention is guided by a series of comprehensive and widely consulted management plans. Monitoring, research, interpretation and education are exemplary. Of greatest importance for managers is the need to remain vigilant over impacts from urban, industrial and resource development activities outside the property that have the potential to increase above

current levels.

► **Assessment of the effectiveness of protection and management in addressing threats outside the site**

Some Concern

There is good communication and collaboration with outside agencies, especially through NPS participation in an advisory committee of the surrounding Barren River Development District, but development priorities often conflict with park objectives for protection (NPCA, 2013; NPS, 2003; NPS, 2009a; USA, 1980).

State and trend of values

Assessing the current state and trend of values

World Heritage values

► **Superlative examples of natural features in limestone karst terrain.**

Low Concern

Trend:Stable

The general state and trend in scenic and aesthetic values are good, but concerns surround human disturbance and vandalism to some karst landforms and the incidence of atmospheric haze from pollution affecting scenic viewing and visitor enjoyment (AP, 2006; May et al., 2005; MCNP, 2013; NPS, 2007; NPS, 2009; State Party report, 2002).

► **The world's largest network of natural limestone caves and underground passages.**

Low Concern

Trend:Stable

The state and trend of the karst geological values can be assessed as generally of low concern. While there are concerns about modification to natural water flows and deterioration in water quality, the park achieved a major goal in 2016 with the removal of Lock and Dam 6 on the Green River, re-establishing natural flow on 10 miles of river in the park and significantly

reducing cave flooding. (AP, 2006; May et al., 2005; MCNP, 2013; NPS, 2007; NPS, 2009; State Party report, 2002).

► **The richest known cave biota.**

High Concern

Trend: Deteriorating

Of major concern to management is the recent introduction of the deadly white-nose fungal disease, which has destroyed much the bat population in the property (Bell, 2013; NPS, 2010; NPS, 2011, NPS Foundation Document 2016).

Summary of the Values

► **Assessment of the current state and trend of World Heritage values**

High Concern

Trend: Stable

Overall the current state of World Heritage values in the property is of low concern and the trend is stable. There is growing concern about air and water pollution impacts. Of greatest concern is the recent die-off of a majority of seven native bats species due to white-nose fungal disease which could even eliminate some species, including populations of the three species already listed as endangered.

► **Assessment of the current state and trend of other important biodiversity values**

Low Concern

Trend: Stable

Biodiversity values are not seriously impacted but there are low level concerns about the impacts on plant life from air pollution, caused by neighboring coal-fired power stations, and deterioration in water quality from external pollution sources affecting aquatic biota.

Additional information

Benefits

Understanding Benefits

► Importance for research, Contribution to education

The property is of great research interest to the international scientific community and through hosting visitors makes a major contribution to geological interpretation and education.

► Outdoor recreation and tourism

The property is a major tourist destination, with benefits flowing to local and regional tourist operators and other related commercial enterprises.

► History and tradition

Significant archaeological resources and historical sites have been identified, recovered, recorded and/or curated in the property.

Summary of benefits

The Mammoth Cave National Park World Heritage property not only protects a karst landscape of outstanding universal value, it also makes a significant contribution to geological science through research and education, and to cultural protection and promotion, while providing economic benefits from tourism.

Projects

Compilation of active conservation projects

Nº	Organization/ individuals	Project duration	Brief description of Active Projects
1	.	.	.

Compilation of potential site needs

Nº	Site need title	Brief description of potential site needs	Support needed for following years
1	Removal of Lock & Dam # 5	The US Congress authorized removal of outdated Locks and Dams on the Green River, but sufficient funding is not yet available to the US Army Corps of Engineers to complete the task. In particular, Lock & Dam # 5 continues to back water levels up into the park, unnaturally flooding caves and adversely affecting cave and river biota.	From: 2018 To: 2020

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