

# Carlsbad Caverns National Park

## 2020 Conservation Outlook Assessment

### SITE INFORMATION

**Country:** United States of America (USA)

**Inscribed in:** 1995

**Criteria:** (vii) (viii)



This karst landscape in the state of New Mexico comprises over 80 recognized caves. They are outstanding not only for their size but also for the profusion, diversity and beauty of their mineral formations. Lechuguilla Cave stands out from the others, providing an underground laboratory where geological and biological processes can be studied in a pristine setting. © UNESCO

### SUMMARY

#### 2020 Conservation Outlook

Finalised on 02 Dec 2020

#### GOOD WITH SOME CONCERNS

The cave resources of the site which form the basis of its Outstanding Universal Value are generally protected. However, concern remains about continued small but permanent damage from tourists. The site will be able to maintain current biodiversity only with heightened diligence, funding and direction, particularly to address the threat to air and water quality from adjacent development outside the park. More baseline studies of surface ecosystems are needed as a measure of probable impacts from climate change. There are no current threats to the geological values of the site for which it was inscribed. But increased oil and gas development reduces the quality of views from the park due to air pollution and light pollution at night, and poses a small risk of air pollution in some caves from natural gas leaks.

## FULL ASSESSMENT

### Description of values

#### Values

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##### Other important biodiversity values

► **Biodiversity**

The park contains a large number of species of birds, mammals and reptiles (Bailey, 1928). Over 15 species of bats have been recorded in the park, including a large colony of Brazilian free-tailed bats which sometimes exceeds 1,000,000 in number (Geluso & Geluso, 2004; West, 1995). Approximately 900 species of plants are found in the park, with many examples of species at the margins of their range. Recent studies have discovered several moth species new to science and others new to the United States and some new to New Mexico (Metzler et al., 2013; Metzler & Knudson, 2011). Numerous single-celled organisms live in the caves, especially Lechuguilla Cave (Cunningham et al., 1995), and exhibit adaptations to cave existence, feeding on inorganic materials. Studies show the potential for cancer inhibiting properties in some of them. A ten-year study is expected to show a high degree of biodiversity with several thousands of species present.

### Assessment information

#### Threats

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##### Current Threats

Low Threat

There are no threats to the geological values of the site. However, exotic plants and animals threaten the biological stability of native ecosystems.

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

Low Threat

*(Exotic plants and animals)*

Inside site, scattered(5-15%)

**Other invasive species names**

Outside site

**barbary sheep (*Ammotragus lervia*), maltese-star thistle (*Centaurea melitensis*)**

Exotic plants and animals threaten the biological stability of native ecosystems. Barbary sheep are the primary invasive animal. The park is also threatened by about a dozen plant species, especially a non-native thistle, that occur mostly along park roads and trails, brought in and distributed on the feet and vehicles of visitors.

► **Other Ecosystem Modifications**

High Threat

*(Habitat shifting)*

Inside site, throughout(>50%)

Change in plant composition due to grazing, climate change and habitat fragmentation on the boundaries of the park. Additionally, the US Air Force is proposing training flights over the vicinity of the park which may affect the park's bat populations. Studies and negotiations are currently in progress on this question.

► **Livestock Farming / Grazing**

Very Low Threat

*(Trespassing livestock)*

Inside site, localised(<5%)

There have been no breaches of the boundary fence in the past five years.

##### Potential Threats

Low Threat

Increased oil and gas development could result in groundwater contamination and lower water levels in the Capitan Aquifer, which is the primary water supply for the City of Carlsbad, but it will not impact the water supply, water resources, or caves in the park because they are above the water table (except for one small pool). A leak from a natural gas well could threaten the air quality of some caves in the park, and their associated ecosystems, but the caves formed primarily vertically. The horizontal extent of their passages and associated conduits and fractures have a low probability of extending far enough from the park to be affected significantly by leaks from natural gas wells off-site. Currently, the most significant impact by the region's oil and gas development on the park is on the views from the park. Flaring has increased haze, limiting views of daytime vistas, and increased ambient light to impact views of the night sky.

► **Oil & Gas exploration/development**

*(Oil and gas development)*

**Low Threat**

Outside site

Increased oil and gas development can result in contamination of water resources for the area but not for the park or its caves. A release of natural gas has a low potential to pollute some cave atmospheres.

► **Unknown Threats**

*(White-Nose Syndrome)*

**Low Threat**

Outside site

Carlsbad Caverns is home to 17 species of bat. While evidence of White-Nose Syndrome has not necessarily been reported in the area, it is a serious threat to bat populations around North America and its reach is expected to spread (IUCN Consultation, 2020).

## Protection and management

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### Assessing Protection and Management



**Highly Effective**

The General Management Plan dates from 1996 and is, potentially out-of-date, except that multiple specific management documents have been updated or developed and implemented: Emergency Medical Services Plan (2004), Tourism Strategic Plan (2005), Cave and Karst Management Plan (2006), Carlsbad Cavern Protection Plan (2006), Flash Flood Plan (2011), Fire Management Plan (2011), Foundation Document (2016), and Wilderness Stewardship Report (NPS, 2018). Planning for a 5-year natural resource stewardship strategy has just begun, as well as strategic planning for Rattlesnake Spring, the drinking water supply for the park.



**Highly Effective**

The management system in place appears adequate and is being fully implemented (State Party of the United States of America, 2013).



**Mostly Effective**

Boundaries of the site are adequate to protect the site's Outstanding Universal Value; however, they could be improved (State Party of the United States of America, 2013). The site has no formal buffer zone, but most of the surrounding land is controlled by other federal agencies and those agencies coordinate their activities with the park to minimize adverse impacts. Additionally, negotiations are currently in progress to acquire an in-holding of private land and add it to the park.



**Mostly Effective**

Interagency planning and coordination occurs between the park and adjacent federal lands, principally the US Forest Service and the Bureau of Land Management (BLM). The BLM has agreed to prohibit oil and gas operations within a designated exclusion zone north of the park to prevent impacts to Lechuguilla Cave, and more recently to restrict such operations to east of Highway 62/180 (an average 6-10 km from the park boundary).



**Mostly Effective**

Overall, the relationship with local people is good, although while local communities provide some input, they do not have a direct role in the management of the site (State Party of the United States of America, 2013). Park staff are active in the community in multiple ways, including the cooperative development of the Guadalupe Ridge Trail that extends through the park, adjoining federal lands, and to other properties to the City of Carlsbad.

- ▶ **Mostly Effective**  
Carlsbad Caverns was designated as a national park in 1930. Two-thirds of the area is also gazetted as wilderness. The Federal Government has full jurisdiction over all lands within the park boundary through the US Department of the Interior and National Park Service. A Land Protection Plan approved in 1984 is in place covering the private tract. The most recent Periodic Report notes some deficiencies in the implementation of the legal framework (State Party of the United States of America, 2013).
- ▶ **Mostly Effective**  
NPS has cooperative enforcement agreements in place with adjacent jurisdictions that supplement park ranger staff.
- ▶ **Highly Effective**  
No decisions issued requiring implementation.
- ▶ **Mostly Effective**  
Small but cumulative permanent damage occurs from tourists in Carlsbad Cavern. The park is aware of it and continues to seek ways to minimize and prevent it.
- ▶ **Mostly Effective**  
The available budget is sufficient; however, further funding could help enhance the management of the site to international best practice standards (Levine & Pyne, 2010; State Party of the United States of America, 2013).
- ▶ **Mostly Effective**  
Current staffing is sufficient for natural resources, interpretive, and law enforcement personnel. Addition staff is needed for maintenance and facilities, which might be gained through a recently-announced increase in maintenance funding for US national parks.
- ▶ **Mostly Effective**  
Education and interpretation programs are in place and improved following increases in staffing, expansion of the Visitor Center and its exhibits, increased local outreach, and the upgrade in interpretive signage throughout the park that should be complete by the end of 2020. The notable deficiency in education and interpretation is the self-guided nature of most tours, which greatly limit contact and educational experience with the park's interpretive personnel.
- ▶ **Some Concern**  
Tourism is generally well-managed. However, monitoring of damage in Carlsbad Cavern finds continued damage from tourists on self-guided tours. While the amount of damage over a given period is generally small, most is permanent and irreparable and cumulatively increases in significance. Park resource staff are evaluating options to reduce and prevent further damage. On the positive side, the parks plans to replace the trails in the cave within a couple of years with materials that are less harmful to the cave environment.
- ▶ **Mostly Effective**  
There is considerable monitoring of management needs: vegetation and soils, oil and gas methane emissions and development impacts on exotic species, monitoring of cave temperature, noise, carbon dioxide, lighting/lampenflora, damage from tourists to develop appropriate visitor use numbers and

management methods.



Mostly Effective

There is considerable research ongoing, both scientific and management related. A survey of archaeological resources along the newly-established Guadalupe Ridge Trail has begun. See the list of projects for more research information.

## Overall assessment of protection and management

### ▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Mostly Effective

Oil and gas extraction in the area is a low threat to the park. Exotic species remain a concern. Livestock have not been found on the park in five years, although some boundary fences need repair and funds are sought, which might be available through a just-announced increased in funding for US national parks maintenance.

### ▶ Good practice examples

The park actively supports research funded through its own budget and outside sources, such as universities, to better understand its resources, impacts to those resources, and how to better manage them.

## State and trend of values

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### Summary of the Values

#### ▶ Assessment of the current state and trend of World Heritage values

Trend: Deteriorating

#### ▶ Assessment of the current state and trend of other important biodiversity values

Low Concern  
Trend: Improving

Biodiversity values of the park, and what needs to be done to maintain them, are studied through research on certain species and niches as park funding and scientists with independent funding become available. A comprehensive survey of the surface ecosystem is needed as a baseline to compare to probable upcoming impacts from climate change. A comprehensive survey on the park's cave fauna has not been published since 1928. Exotic species continue to degrade the park environment, primarily along trails and roads, and are addressed by remediation methods such as pulling out of exotic plants.

## Additional information

### Benefits

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#### Summary of benefits

Having a World Heritage Site in the community of southeastern New Mexico helps to raise the status of the area and calls attention to the unique resources and values of the park, while promoting visitation to the park, especially by international visitors. However, World Heritage designation is primarily appreciated by non-US visitors. In general, US citizens are unaware of World Heritage and some communities, including those near Carlsbad Caverns National Park, do little to celebrate or recognize it. Continued effort by the park may help improve this situation.

## Projects

### Compilation of active conservation projects

| №  | Organization   | Brief description of Active Projects   | Website   |
|----|--|--|---|
| 1  | /  | Searching for close relatives of <i>Pseudogymnoascus destructans</i> and clues to natural defenses in bats at Carlsbad Caverns National Park, New Mexico |   |
| 2  | /  | Population dynamics and ecology of <i>Ocotillo</i> .   |   |
| 3  | University of New Mexico                                 | Late Pleistocene and Holocene paleoclimatology of the southwestern United States.  |   |
| 4  | /  | CHDN uplands vegetation and soils monitoring.  |   |
| 5  | University of Texas at El Paso                           | Critical loads of nitrogen deposition in grasslands at Carlsbad Caverns National Park  |   |
| 6  | Texas Tech University                                    | Biological invasions, fire, and changes in landscape flammability in the arid west   |   |
| 7  | Penn State University                                    | Quantification of methane emissions from natural gas extraction in the Permian Basin   |   |
| 8  | MSC Project- University of Tennessee, Knoxville          | Improving recreation and conservation in environments shared by humans and bats  | <a href="http://fwf.ag.utk.edu/mgray/wfs512/SeminarFA18/ShapiroFlyer.pdf">http://fwf.ag.utk.edu/mgray/wfs512/SeminarFA18/ShapiroFlyer.pdf</a> |
| 9  | /  | Is the causative agent of White-nose Syndrome, <i>Pseudogymnoascus destructans</i> , present in Carlsbad Caverns?  |   |
| 10 | University of Texas at Austin, Austin, TX, United States | Late Guadalupian evolution of the Delaware Basin: insights from stable isotope and trace element Geochemistry  |   |
| 11 | /  | Assessing quaternary tectonics in the Guadalupe Mountains of New Mexico using cave shelfstones as tilt meters  |   |

| <b>Nº</b> | <b>Organization</b>                             | <b>Brief description ofActive Projects</b>                                      | <b>Website</b>                                   |
|-----------|---|---|--|
| 12        | Senckenberg am Meer, Marine Research Department | Subaqueous celestite crystals forming in Lechuguilla Cave.                      |  |
| 13        | /   | The geomorphic extent of Rockslide Cave determined through survey and inventory |  |
| 14        | National Cave and Karst Research Institute      | Cave lighting and algae study, Carlsbad Caverns National Park, New Mexico       | <a href="http://www.nckri.org">www.nckri.org</a> |

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