

Geologic Resources Division



U.S. Department of the Interior National Park Service Natural Resource Information Division



Fact Sheet

Speleology in the National Park Service

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In 1988, the U. S. Congress created a major impetus for the involvement of the United States in cave and karst¹ protection and management by passing the landmark Federal Cave Resources Protection Act of 1988 (Public Law 100-691; November 18, 1988). The act directs the secretaries of the Department of the Interior and the Department of Agriculture to inventory and list significant caves on federal lands and to provide management and dissemination of information about caves. A current, nationwide assessment of significant federally owned caves is cataloging the known caves on federal land and further increasing the impetus for cave management and research.

In 1990, the Congress also directed the Secretary of the Department of the Interior, acting through the National Park Service, to establish and administer a program on cave research and to examine the feasibility of a centralized national cave and karst research institute. The feasibility study was prepared in cooperation with other federal agencies that manage caves, organizations that are involved in cave-related topics, cave

experts, and interested individuals and was forwarded to the Congress. Based on the results of the study, a bill (S. 231) was introduced in the 105th Congress to establish the National Cave and Karst Research Institute in New Mexico.

Caves and karst features occur in about 60 units of the National Park System². The number of caves ranges from as few as 10 to 15 caves per unit--as in the Chesapeake & Ohio Canal National Historic Park-- to more than 400 caves per unit--as in the Grand Canyon National Park.

Importance of Cave and Karst Systems

Cave and karst systems are important for two major reasons. First, the overwhelming majority of the nation's freshwater resources is groundwater. About 25% of the groundwater is located in cave and karst regions. The protection and management of these vital water resources are critical to public health and to sustainable

economic development. As identified by the National Geographic Society, water resources are a critical concern as society enters the twenty-first century.

Second, caves are storehouses of information on natural resources and on human history and evolution. Therefore, many avenues of research can be pursued in caves. Recent studies indicated that caves contain valuable data that are relevant to global climate change, waste disposal, groundwater supply and contamination, petroleum recovery, and biomedical investigations. Caves also contain data that are pertinent to anthropologic, archaeologic, geologic, paleontologic, and mineralogic discoveries and resources.

Many researchers have turned to caves as natural laboratories where over eons paleoclimatic evidence has been naturally deposited and is awaiting discovery. For example, the recently discovered Lechuguilla Cave in New Mexico has excited scientists with the possibilities of gaining insight into global warming from analyses of materials found there.

Cave-dwelling organisms have specialized adaptations such as extreme longevity and enhanced sensory perceptions. The adaptations reveal

¹A karst is a region of irregular topography with sinks, underground streams, and caves that were formed by dissolution of limestone.

²National parks and other entities of the National Park Service such as national monuments, national rivers, wild and scenic riverways, national scenic trails, and others are called *units* and collectively constitute the *National Park System*.

much about the evolutionary responses to past environmental changes and may provide valuable clues to current climate change. Many caves act as natural traps for flora and fauna, and new species of extinct animals such as a mountain goat and a bush oxen related to the present day muskox (*Ovibus moschatus*) have been discovered from paleontological excavations in caves. These discoveries add to the knowledge of paleo-fauna and are an aid to understanding changes in the global climate.

Other examples of climate information include pack rat middens in Grand Canyon caves that yielded pollen as old as 4000 years. This find was important because pollen characteristics are like records of climatic cycles. For example, researchers produced a regional paleoclimate record from samples of travertine deposits in a submerged cave system in Death Valley National Park, California. Coring carefully selected speleothems in Carlsbad Caverns, New Mexico, also provided indications of paleomagnetism and paleoclimate conditions.

Caves have always been known as repositories of archeological material. Some of the oldest evidence about the activities of human ancestors came from caves. In the caves of Arizona's Grand Canyon and in lava caves of El Malpais National Monument in New Mexico, important archeological discoveries are made every year in the form of excavations of ancient pottery, figurines made from twigs, and evidence of the use of caves for habitation.

In the Slaughter Canyon Cave in Carlsbad Caverns National Park in New Mexico, recent studies lead to the discovery of one of only three deep cave art sites in the United States. In the Mammoth Cave area of Kentucky, anthropological studies revealed that the caves were used for thousands of years by people for shelter and for mining minerals useful as medicine.

Historic and prehistoric cultural remains in caves are extraordinarily diverse. They range from ancient torch smudges on cave ceilings to civil war age saltpeter vats used to make gun powder. In spite of this diversity, the cultural resources have common attributes: (1) they are subtle, elusive, or fragile or all three; and (2) they provide unique and valuable information about the past. Without proper documentation and research of these hidden cultural remains in deep or shallow caves, valuable and important segments of the human history would be lost for all time.

Adversities and Threats to Cave and Karst Systems

Use of caves by humans can have significant detrimental effects on caves. Biological resources that are threatened include but are not limited to several species of endangered bats, ferns, and lichens. Especially vulnerable are cave-adapted invertebrates. So little is known about many of these species that evaluation of population stability, adversities from current and past human activities, and probabilities for species survival cannot be assessed without further inventories and monitoring.



Because cave and karst systems are intimately tied to local and regional hydrological systems, pollution or disruption of these natural systems can harm water supplies and water quality. Direct threats to cave and karst groundwater aquifers can be inappropriately placed toxic waste repositories, landfills, oil and gas leaks from hydrocarbon development, and toxic and corrosive chemical spills. Remediation can cost millions of dollars.

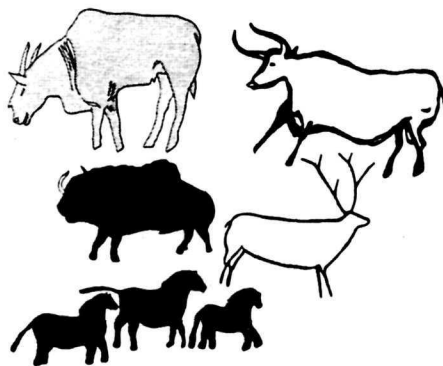
In addition, erosion from agricultural operations such as excessive tillage and overgrazing or from deforestation and fires can cause significant deterioration of water quality from sediment loading.

Management of Cave and Karst Systems

National Park System units may solicit the assistance of the Geologic Resources Division with the management and preservation of caves and karst. Recent management included the placement of gates on caves in Mammoth Cave National Park, Kentucky; assessments of cave resources at Petroglyphs National Monument, New Mexico; inventories of the culturally sensitive and important caves of Hawaii Volcanoes National Park; the generation of recommendations for the protection, development, and interpretation of Cathedral Caverns State Park, Alabama; and the development of cave management and protection in China, Mexico, and the Ukraine, including the Crimean peninsula.

A recent landmark decision was the passage of the Lechuguilla Cave Protection Act (P. L. 103-169, 2 Dec 1993) after the Lechuguilla Cave in Carlsbad Caverns National Park, New Mexico, was threatened by oil and gas exploration on adjacent lands, managed by the Bureau of Land Management. The act states that "Lechuguilla Cave...(has) internationally significant scientific, environmental, and other values and should be protected... against...adverse effects of mineral exploration and development." The act withdraws all federal lands inside the boundaries of a protected cave area from all forms of mineral and geothermal leasing. The protected area along the northern boundary of Carlsbad Caverns National Park was established by an expert panel of geologists and speleologists assembled by the National Park Service.

National Speleological Society and Bat Conservation International designed to secure assistance with inventories, surveys, monitoring, and exploration of caves and with the investigation and preservation of bat habitat. The staff of the Geologic Resources Division assist with cave management direction for the service, reviewed cave management documents such as the general management plans for cave areas, and conducted cave management seminars and workshops.



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