Introduction

Jewel Cave is in the Black Hills of southwestern South Dakota. The Jewel Cave National Monument Visitor Center and Headquarters is located about thirteen miles west of Custer, South Dakota, and about twenty-five miles east of Newcastle, Wyoming, on US Highway 16. The monument encompasses 1,275 acres of rugged, rocky land, deeply dissected by two steep-sided canyons: Hell Canyon, generally extending to the southeast, and Lithograph Canyon, trending southwest into Hell Canyon.[1] Jewel Cave itself is located in a sedimentary rock layer of limestone. Its natural passageways follow a geometric pattern of eroded underground fissures in the limestone, which intersect at various angles. In 2005, around 130 miles of underground passages had been explored and mapped. The potential for finding additional tunnels is extraordinary; less than 3 percent of the cave has been discovered, it is believed. Perhaps 5,000 miles awaits future exploration and mapping. Jewel Cave remains cool (in the 50s F) year round.

Much of Jewel Cave National Monument supports a forest of tall Ponderosa (western yellow) pine (*Pinus ponderosa*), whose dark needles and bark appear black at a distance, thus giving the Black Hills its name. Mountain mahogany (Meliaceae family) and other shrubs also thrive on the dry canyon hillsides. In addition to the open pine park that clothe the hillsides of the park, a tangle of boxelder, birch, quaking aspen, willow, snowberry, and other berries are scattered in the lower canyons and lower moister valleys. Nearby low-sloping valleys are clocked with various grasses and perennial wildflowers that bloom from spring into autumn—pasqueflower (crocus), shooting star, phlox, evening primrose, kinniknick,

[1] Information in this and several subsequent paragraphs has been synthesized from several sources, including: James B. Thompson, *The Geology of Jewel Cave* (Hot Springs, SD: Wind Cave National Park and Jewel Cave National Monument Natural History Association,1900); William A. Braddock, *Geology of the Jewel Cave SW Quadrangle Custer County, South Dakota, Geological Survey Bulletin 1063-G* (Washington, DC: Government Printing Office, 1963); Arthur N. Palmer, *Jewel Cave: A Gift from the Past* (Hot Springs, SD: Black Hills Parks and Forests Association, 1999); "Jewel Cave National Monument" brochure, December 1974, Vertical File, Special Collections, Devereau Library, South Dakota School of Mines and Technology, Rapid City; Sven G. Froiland, *Natural History of the Black Hills and Badlands* (Sioux Falls, SD: Center for Western Studies, Augustana College, 1999); E. P. Rothrock, *A Geology of South Dakota, Part I: The Surface, Bulletin No. 13* (Vermillion, SD: State Geological Survey, 1943).

western wallflower, and anemone, followed in season by segolily, scarlet globemallow, white penstemon, bluebell, coneflower, daisy, and golden rod. Historically, the vegetated landscape above Jewel Cave and in the southern Black Hills generally supported large herds of elk, white-tail and mule deer, some Rocky Mountain goats, buffalo, and a few grizzly bears, as well as coyotes, bobcats, mountain lions, badgers, and smaller mammals. Many of the mammals (mule deer, white-tailed deer, coyotes, bobcats, weasels, porcupine, marmots, ground and tree squirrels, chipmunks, and cottontail rabbits) remain in the forests above Jewel Cave today.

Fire has played a historic key role in shaping the plant and animal communities and associated ecosystem processes at Jewel Cave and throughout the Black Hills. Prior to Euro-American settlement in the southern Black Hills that began in the mid-1870s, natural fires occurred relatively often in the Ponderosa pine forests above Jewel Cave (on average about every twenty to twenty-three years). The diminishing frequency of fires due to fire suppression forest management practices since the early 1900s have caused numerous changes in the Ponderosa pine forests in the Jewel Cave area: fewer fires have created crowded clusters of tree saplings and young pole trees; slower tree growth and higher death rates among older trees; retarded the production of soil nutrients; increased forest vulnerability to damaging insects and tree diseases; diminished the water in streams; and reduced wildlife that depends on herbaceous vegetation. All of these changes brought about by less frequent fires above Jewel Cave have contributed to a loss of diversity of wildlife habit and the species it supports.[2]

The underground world of Jewel Cave owes its existence to the geologic history that created the Black Hills many millions of years ago. Rising some 4,000 feet above the encircling northern Great Plains, the Black Hills are a great oval island of uplifted layers of the earth's crust, stretching 125 miles to the north and south and 75 miles to the east and west at the oval's widest section. (Although most of the uplift forming the Black Hills is in South Dakota, a small portion of the uplifted formation stretches northwest into Wyoming, where it is known as the "Bear Lodge Mountains.") The hard igneous rock of granite and schist that comprise the central dome, climaxing in 7,242-foot Harney Peak (about twenty miles

[2] Peter M. Brown and Carolyn Hull Sieg, "Fire History in Interior Ponderosa Pine Communities of the Black Hills, South Dakota, USA, *International Journal of Wildland* 6: 3 (1996): 97-105.

northeast of Jewel Cave), has been eroded to expose deposited layers of softer material, which have been sculpted by wind and rain over hundreds of thousands of years.[3]

The wild jumble of pinnacles, cliffs, and chasms that form the central dome of the Black Hills is surrounded by an oval outward-sloping limestone plateau on the western flank of the Hills, known as the Pahasapa limestone, or "Minnekahata" limestone. Roughly 300 million years ago, this outer ring of limestone, sandstone, and shale was deposited at the bottom of an ancient inland sea. Over time, this mile-wide encircling ring of softer less-resistant sedimentary material eroded resulting in deeply incised narrow canyons that occasionally widened into broader valleys.

For modern European and Euro-American explorers the outer high limestone cliffs presented an escarpment that discouraged access to the interior central dome of the Black Hills. The few streams that flowed outward from the heart of the Hills moved to the east through the narrow canyons of Beaver Creek, French Creek, Battle Creek, Spring Creek, Rapid Creek, and Boxelder Creek into the branches of the Cheyenne River. Although the gradually sloping southern Hills made human entrance to the mountains easier, the scarcity of water and the sparse vegetation on the southern slopes presented its own distinctive challenges to early Euro-American access. The slightly higher steep ramparts of the dryer more isolated broad western limestone plateau, the host rock of Jewel Cave, experienced extremely severe winters caused by exposure to storms approaching from the west.

Jewel Cave and most other Black Hills caves are located in the Pahasapa limestone rock layer of the Black Hills. The cave formed over a period of millions of years as water dissolved and later deposited calcium carbonate in the limestone. Early in the geologic history of Jewel Cave formation, groundwater joined with rainwater that had seeped through

[3] For more detailed scientific information on Jewel Cave geology see: Dwight Deal, "Geology of Jewel Cave National Monument, Custer County, South Dakota (M.S. thesis, University of Wyoming, 1962); Delmer L. Brown, "A Study of the Geology and Description of a Portion of Jewel Cave" (B. S. thesis, South Dakota School of Mines and Technology, 1959); John Edward Roth, "Porosity Evolution of the Pahasapa (Madison) Limestone at Jewel Cave National Monument" (M.S. thesis, South Dakota School of Mines and Technology, 1977); Michael Wiles, "Infiltration at Wind and Jewel Cave, Black Hills, South Dakota (M.S. thesis, South Dakota School of Mines and Technology, 1992).

overlaying sandstone filled fractures in the limestone (created by movement of the earth's crust). This water slowly dissolved limestone as it moved along joint planes. Over several million years, the limestone that was dissolved and carried away in solution, enlarged small fractures into larger passageways that formed a three-dimensional grid-like network.

Sometime after the initial formation of passageways, new water that flooded cave passages and deposited calcium carbonate in the form of calcite crystals, mostly in bluntly pointed hexagonal crystals (called "nailhead spar"). In places, the layering of calcite crystals that lined the passageways reached a thickness of eighteen inches. Finally, the water receded, leaving all known passages above the water table. The only known natural entrance, through which blowing wind attracted the attention of visitors to the area, is found in the east cliff above Hell Canyon.[4]

The subterranean Jewel Cave became a national monument in 1908, principally for the scientific interest in its geologic history and its curious and attractive rock formations. Although initially considered for designation as a game preserve that would have highlighted terrestrial wildlife, it was Jewel Cave's underground features that served as the principal rationale for creating a federal public park. The long history of the land now contained in the national monument has much more to do with human use of the land above the cave and with the historic and present cultural features on the landscape that convey some of the evolving efforts to develop and promote Jewel Cave's underground attractions.

This Historic Resource Study presents an overview of the history now contained in Jewel Cave National Monument. Emphasis in this study is on the time period before the National Park Service (NPS) began administering Jewel Cave in 1933-1934. This study endeavors to not only narrate the history of local events and people that have been associated with Jewel Cave history, but also aims to provide an understanding of this local history by placing it in the broader context of regional and national historical trends and movements. The Michaud family, beginning with the arrival of Felix Michaud in the late 1870s and ending with Mamie Michaud's sale of Jewel Cave in the late 1920s, has been a central player in a fifty-year slice of Jewel Cave history. The Michaud family serves in this study as a thread that connects larger historical themes (such as settlement, ranching,

[4] Different hypotheses about the formation of Jewel Cave are presented briefly in Palmer, *Jewel Cave*, 46-47.

mining, and tourism) in the tapestry of Black Hills history with the sequence of local activities at and near Jewel Cave.

Chapter 7 goes beyond the pre-NPS period of administration. It tells the history of Civilian Conservation Corps activities at Jewel Cave in the 1930s and of the period of NPS Mission 66 building construction in the 1960s and early 1970s. The physical imprint of these activities is very much in evidence in the early twenty-first century, along with cultural landscape features (such as the faint remains of paths, roads, building foundations, grazing, and human-caused fires) that predate-NPS administration and date back to the late 1800s.