Capulin Volcano National Monument

Boundary Study
1994

National Park Service
Department of the Interior

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CAPULIN VOLCANO
NATIONAL MONUMENT
BOUNDARY STUDY

September 1994

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U.S. DEPARTMENT OF THE INTERIOR
CAPULIN VOLCANO
NATIONAL MONUMENT
BOUNDARY STUDY

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I. SUMMARY

The purpose of this study is to address resource protection at Capulin Volcano National Monument (hereafter referred to as "the park"), and to develop a range of alternatives for boundary expansion and future management of the park, including opportunities for partnerships with park neighbors. The criteria outlined in the December 1991 National Park Service Criteria for Boundary Adjustments (National Park Service, 1991) are used to evaluate potential boundary additions. Potential impacts to resources, local communities, visitors, and park operations are addressed in Section V.

Capulin Volcano National Monument was established in 1916 as a National Park System unit to protect an outstanding volcanic landform. The initial boundary failed to include the lower slope of the volcano and the geologically significant adjacent lava flows, tubes, and pressure ridges; and the National Park Service has therefore never been able to protect these aspects of the volcano. Although two subsequent minor boundary adjustments protected the area of emergence of lava flows and allowed for park facility development, they failed to address the problem of the unprotected lower slopes.

The land surrounding the existing park and included in the various boundary adjustment alternatives consists of privately owned properties and State of New Mexico trust lands. The affected State lands are all under grazing leases to private land owners. The major land use is cattle ranching, and ranchers lease their private land for hunting in season.

Capulin Volcano and the land around it are part of the Raton/Clayton Volcanic Field, and have regional significance as volcanic landforms that represent different types of eruptions over millions of years. Geologically, the story of Capulin Volcano cannot be told without reference to that broad history of volcanism.

Those volcanoes, lava flows, mesas, and smaller related features, as significant as they are to northeastern New Mexico's geologic story and as important a part of the view as they are from the top of Capulin, are not included within the park boundary. Some time ago, a large cinder pit was dug directly adjacent to, and now impinges upon, the eastern park boundary, creating erosion and a major disruption on the lower slope of Capulin Volcano. Another major cinder pit was developed directly to the south of the park.

Four additive alternatives, and one independent alternative, for boundary adjustment are discussed:

A: No Action (no boundary expansion);
B: Protection of the Capulin Volcano Cinder Cone and Boca;
C: Protection of the Volcanic Features and Contemporaneous Eruptive Sites in the Capulin Field;
D: The Holistic Volcanic Park;
E: Addition of the Folsom Site.

See appendix E for the number of acres included in each of the four alternatives.
Alternative E is the Folsom Site alternative, which includes the nationally significant Folsom Site within the boundary as a research site. This is a separate alternative, and can be approved independently of the other alternatives.

The Draft Boundary Study has been reviewed by local landowners, community members, agencies, and interested members of the public, and comments have been addressed in development of the final study. Any decision to change park boundaries would be made by Congress, not the National Park Service.
II. INTRODUCTION

A. PURPOSE OF THE STUDY

The purpose of this Boundary Study for Capulin Volcano National Monument is to address the issue of resource protection at Capulin and develop a range of alternatives for boundary adjustment and future management of the park. The three major questions addressed in the study are described below.

1) What expansion would be needed to adequately protect Capulin Volcano?

Not all of Capulin Volcano, and very few of its lava flow areas, were included in the park. On the north, east, and south sides of the park, the boundary lines chosen cut straight across the lower parts of the cone. On those sides, some of the lower slopes of the volcano were left outside the park. Of the extensive lava flows that issued from the western base of the cone, very little was included in the park. Additionally, straight boundary lines on a curved and sloping surface are difficult to sign, recognize, and patrol.

Two minor boundary adjustments (1962 and 1987) again utilized section and quarter-section lines. They added a small but important part of the flows to the park, and protected the park entrance from inappropriate developments, but again cut across slopes without regard to the wholeness of the volcanic or ecological features.

The unfortunate result of today’s boundary is that a considerable part of the cone’s lower slopes, and almost all of the lava flows that are essential parts of the volcano, lie outside the park and are vulnerable to commercial exploitation.

The National Parks & Conservation Association recommended a boundary expansion for the monument in Volume 5 of the 1988 National Park System Plan.

2) Capulin Volcano is one piece of a varied volcanic landscape (the Raton/Clayton Volcanic Field) containing over 100 volcanoes of varying forms and ages. What expansion is needed to include and protect other volcanic landforms representative of the Raton/Clayton Volcanic Field?

Capulin Volcano National Monument is an incomplete park in yet another way. The surrounding landscape is the result of millions of years of volcanic activity. The existing cinder cones, basaltic lava plateaus, pressure ridges, lava tubes, cinder fields, squeeze-ups, and lava flows are the products of the different periods of volcanic activities that occurred in northeastern New Mexico. Capulin Volcano is only one piece of that whole. Capulin Volcano may have
been singled out for preservation because of a human predilection for its height and symmetrical form, but this narrow view diminishes the importance of the landscape.

The establishment of Capulin Volcano as a national monument isolated it from its landscape context. A park that is limited to protecting Capulin Volcano and interpreting its story is doing only a part of the protection and interpretation that are suggested by its landscape setting. If visitors are to understand and appreciate the broad sweep of volcanic activity from the summit of Capulin Volcano, more than this one piece of the whole should be preserved and interpreted. Now, visitors are taken only to the threshold of that larger story.

3) What are the suitability and feasibility of adding the Folsom Site—a nearby archeological site—to the National Park System as a part of Capulin Volcano National Monument?

The Folsom Site, a national historic landmark located approximately 9 air miles northwest of the park, is the place where human association with now-extinct giant bison in the New World was first confirmed, thereby extending known human presence here from approximately 4,000 years Before Present (B.P.) to approximately 10,000 years B.P. The 10-acre Folsom Site is currently a State monument, but it is not completely protected, and the State has no plans for its development or visitor use. Although the Folsom Site is a nationally significant cultural site, it represents a different type of resource than the resources protected within Capulin Volcano National Monument.

B. BACKGROUND

1. Relationships of The Boundary Study to Park Planning

Congressional action is needed for boundary adjustments to Federal lands, except in the case of adjustments where authorized by existing law. If a National Park Service site boundary expansion is authorized by Congress, a Land Protection Plan for that site would be completed to determine land protection priorities and methods of acquisition.

A new General Management Plan would also be needed for a National Park System unit affected by a boundary adjustment. Before any land acquisition could proceed, the surface ownership and subsurface mineral rights would be determined, and private parcels would be appraised and surveyed for contaminants and abandoned-mine hazards.

2. Establishment of the Park

In 1891, much of New Mexico, still a territory, was Federal public domain. The U.S. Government had been trying for many decades—with considerable success—to convey the extensive public lands throughout the west to private ownership so that they could contribute to the Nation’s economic and social development.
At the same time, there was official recognition that the Capulin volcanic cone, located in the northeast corner of the territory, was unique—even in that area of outstanding geography and geology (figures 1 and 3). As a result, the public land, including the volcano and some of its surrounding volcanic features, was withdrawn from settlement or entry by the Secretary of the Interior (that is, it would not be conveyed to private owners) "until such time as Congress may see fit to take action ... or until otherwise ordered by competent authority ...." That "competent authority" was provided in 1906 when Congress passed the Antiquities Act. It was by then recognized that private interests were destroying and removing the historic and prehistoric resources of the public lands, and that natural and scientific features of great public value were being lost to commercial development. Among other provisions, the Antiquities Act authorized the President to issue proclamations that would protect such resources on Federal public lands by creating national parks.

President Wilson issued a proclamation on August 9, 1916, setting aside some 680 acres as Capulin Mountain National Monument. This was considerably less land than the 1,900 acres that had been withdrawn in 1891. Sixteen days later, the National Park Service was created by Congress, and the monument became a part of the new National Park System (figure 2). There have been two boundary extensions subsequent to the original proclamation, both by Acts of Congress (see appendix F).

3. Park Facilities

The nature and location of park development are determined by the shape of the cone and the limited amount of park land. The single park road begins at New Mexico Highway 325, then gently ascends the lava flow to a point at the base of the main slope, from which it climbs the cone in a spiral that ends at the low spot on the western side of the crater rim. There are three developments along the road: the visitor center and administrative complex; the picnic area; and the crater rim facilities. The visitor center and administrative complex includes visitor orientation facilities, a cooperating association bookstore, a maintenance shop, and administrative offices. Adjacent are three employee housing units, a sewage lagoon, and a maintenance material storage area. One-tenth mile above the Visitor Center Complex is the picnic area. The road ends at the low point on the rim, where there are a parking area and interpretive wayside exhibits. Two self-guided interpretive trails begin at the parking area—one into the crater, and the other along the rim of the crater.

4. Visitation

U.S. Highway 64/87, which passes 3 miles to the south of the park, is a major route linking Texas and Oklahoma to northeastern New Mexico and Colorado. The park is not a major destination park, but provides a brief stop for those driving through on U.S. Highway 64/87. A significant portion of visitors are therefore family groups and couples from Texas, Oklahoma, and Colorado. Local school groups, coming in the spring, comprise another type of visitors.

Visitation to the park has fluctuated over recent years. The peak was 63,000 visitors in 1991, with a low of 40,000 in 1984. In 1992, visitation declined to about 62,300, due to a 2-month Volcano Road closure. Most visitation occurs during the three summer months, although the shoulder seasons of April-May and September-October now receive increased visitation. There are peaks on winter weekends, when skiers travel to ski areas in the west. Saturday, Sunday, and holidays are usually the busiest days. In the next 5 years, visitation may dramatically increase as a result of the changing of U.S. Highway 64/87 from a two-lane to a four-lane
highway. The issue of potential negative impacts of increasing visitation on resource integrity and experience quality would be addressed in a General Management Plan.

Visitor use is channeled by the road leading from the entrance to the summit. Approaching the park from the Village of Capulin on New Mexico Highway 325, visitors become aware of the lava flow terrain. Most visitors stop at the visitor center, where they have access to restrooms, interpretive exhibits, an audiovisual presentation, and a short interpretive trail.

Ascending the spiral road to the top of Capulin Volcano, visitors can see a 360-degree panorama of the country below. Once they arrive at the Crater Rim parking lot, they can look down into the crater and west over volcanic cones, lava flows, and cinder fields. It is estimated that 90 percent of park visitors drive to the Crater Rim. Visitors stay at the monument an average of approximately 2 hours.
A. INTRODUCTION

Capulin Volcano is the centerpiece of an extensive volcanic landscape (figures 2 and 4). At the summit, a great variety of volcanic landforms can be seen, each determined by the physical characteristics of the lava that issued from the ground and by the form of eruption that occurred: lava plateaus, cinder cones, shallow flows, composite and shield volcanoes, levees, pressure ridges, squeeze-ups, and lava lakes.

The biology and ecology of the area, and the history of human occupation, are also important aspects of the landscape. Figure 2 shows the location of the major resources described below, and figures 3 through 10 illustrate various features.

B. GEOLOGY

1. Capulin and Capulin Flows

The landscape of which Capulin Volcano is a part is the result, first, of at least 2 million years of intermittent volcanic eruptions; and, second, of the constant weathering and erosion on the products of volcanism that produce the landforms we see today. The volcanism is quiet today--temporarily at least--but the work of nature continues.

Capulin Volcano is one of the most recent (fewer than 10,000 years old) products of an extended regional period of volcanic activity. Seen from any angle, Capulin Volcano rises abruptly and prominently to its summit almost 1,400 feet above the surrounding rolling plain. It is a remarkably symmetrical cone that was formed by vast quantities of ash and cinders (called ejecta) that erupted as a fire fountain from a vent or fissure. As it fell into place and piled up, this ejecta assumed a natural angle of repose, forming similarly angled slopes on all aspects. Natural erosion has been slight because of the volcano's relatively young age.

No lava flows issued from the summit—that is, flows that would have eroded ash and cinders from the slopes and altered the shape of the volcano. Lava flows issued instead from the base of the volcano on the west side, thereby preserving the cone's symmetry. From there, successive major lava flows ran north and south, interrupting the smooth silhouette of the cone and forming a more broken landscape at the western base. More of the ejected cinders were blown to the east side of the crater during the eruptions, probably due to prevailing westerly winds. The result has been that the high point of the rim is on the east, dipping 400 feet to a lower point on the west. This gives the cone its curious tipped appearance as seen from a distance.
2. Surrounding Volcanic Landscape

On the summit of Capulin Volcano, one can look out over landforms that represent approximately 7 million years of volcanic activity (Stormer, 1972; Nielsen and Dungan, 1985). Below the summit, extending westward, then northward and southward, are the basalt flows that issued from vents at the base of Capulin Volcano. They are among the most recent volcanic products in the region—from perhaps as recently as 5,000 years ago—and are not yet markedly eroded, and still show flow lines.

Farther to the west are high mesas—erosional remnants comprising hard basaltic lava flows. These capping layers originally flowed into broad valleys. As the softer sedimentary uplands eroded away, subsequent lava flowed in slightly lower valleys. This process has produced an inverted stratigraphy, in which the oldest flows are found on the highest exposures and the most recent basalts are found at the lower levels. Rising out of the mesas are two impressive cinder cones—Jose Butte and Robinson Peak—both as high as Capulin Volcano, with a sweeping lava field between them.

To the northeast of Capulin Volcano is Mud Hill, an older vent that was partially covered by the more recent Capulin flows. A short distance farther is Baby Capulin (figure 6), whose lava flowed many miles down the Dry Cimarron River; and also an elongated cinder cone named Twin Mountain, which has been largely removed by cinder mining (figure 10).

The volcanic landscape of which Capulin Volcano is a part can best be understood by reference to the sequence of events that produced it. Areas of present-day Colfax and Union Counties were active volcanically for a period of many millions of years. The entire period is divided into three stages: Raton, Clayton, and Capulin. See appendix G for an in-depth explanation of these successive stages of activity.

3. Significance of Capulin Volcano in Its Landscape Context

Capulin Volcano is significant as the youngest and most perfectly-formed cinder cone in the Raton/Clayton Volcanic Field of northeastern New Mexico. The park includes the cone, along with most of the boca—the area from which the lava flowed. A boca is not a common feature found in association with cinder cones, and its geology provides a great deal of insight into the history of the cone. The sequence of geological events in the boca are closely related to the eruptive history of the Capulin Volcano lavas. The existing park includes most of the boca, but not the flows produced by Capulin Volcano. Several features of interest—for example, lava tubes, kipukas (areas left untouched by lava flows), and pressure ridges—are included within the flow area.

The Raton/Clayton Volcanic Field is unique in North America because it is the easternmost on the continent—that is, it is the one lying farthest away from the active tectonism of the west coast. In addition, the field contains several different types of lava—a rather heterogeneous mixture for such a compact volcanic field, and "is arguably the most chemically and mineralogically diverse volcanic field in the U.S." (Stormer, 1987). Further study is needed to determine what caused the volcanoes to erupt this large pile of basalts, why this activity took place over such a long period of time (approximately 8 million years), and why some of the other lavas are very different in composition from the basalts.
3. Capulin Volcano. Capulin Volcano from the south showing mining pit in middle ground. 
Source: Capulin Volcano National Monument. 1993

4. Volcanic field. 
Source: Capulin Volcano National Monument. 1993
5. Capulin flow, lava tube.
Source: Capulin Volcano National Monument. 1993

Source: Capulin Volcano National Monument. 1993
7. Raton flow area. Looking west from Capulin Volcano.
Source: Capulin Volcano National Monument. 1993

8. Homestead south of Capulin Volcano.
Source: Capulin Volcano National Monument. 1993
9. Cinder pit on east boundary.
Source: Capulin Volcano National Monument. 1993

10. Twin Mountain cinder operation, with Capulin Volcano in the back round.
Source: Capulin Volcano National Monument. 1993
The Raton/Clayton Volcanic Field is also located at the eastern end of the Jemez Lineament, a linear alignment of volcanic centers extending as far west as the White Mountains of eastern Arizona. Bandelier National Monument and El Malpais National Monument also preserve volcanic rocks of part of the lineament.

The plateau area making up the west part of the study area (Johnson Mesa) is probably a recharge zone for the park's water supply; and Capulin Volcano and its flows are probably a recharge zone for the Village of Capulin (Trauger and Kelly, 1987). Although groundwater quality is not yet seriously degraded, the portion of Johnson Mesa within alternative D comprises a significant portion of the collection surface for groundwater in the Capulin area.

C. ECOLOGY

1. Introduction

With its present boundaries, Capulin Volcano National Monument represents a small, isolated biological island separated from the surrounding landscape by fences and different land use patterns.

The study area is biologically diverse, due to differences in: elevation; sun aspect; and a considerable variety of landforms and site types, including canyons, mesa tops, rock faces, crevices, mountain peaks, and natural spring habitats. Also, the lava and cinder surfaces range from those that support pioneer species to very old ones that have well-developed soils and support advanced successional stages of vegetation.

2. Vegetation

The study area contains examples of Lower Montane Coniferous Forest (ponderosa pine-piñon pine-Gambel oak series); Piñon-Juniper Woodland and Mixed Woodland (Colorado piñon pine, one-seed juniper, skunkbush, mountain mahogany, chokecherry, currants, thimbleberry, blue grama, and other associations); Montane Scrub (upper and middle [available moisture] zones: mountain mahogany, skunkbush [semiriparian], chokecherry [semiriparian], Ribes Spp., thimbleberry); Plains-Mesa Grassland (dominated by blue grama, with buffalograss, big and little bluestem, bottlebrush, squirreltail, sideoats grama, mountain and ring muhly, Western wheatgrass, and other grasses and forbs being important); and Juniper Savanna (as described in Dick-Peddie, 1993). The ecological habitats provided by vegetation communities include open grassland, moist thicket, dry scrub, open piñon-juniper forest, coniferous and mixed woodland scrub, savanna, and riparian associations. Ponderosa pine and aspens are found in sheltered canyons. The shortgrass prairie complex in the area has some species elements of mixed and tallgrass prairies such as big bluestem.

Rapid forestation of piñon-juniper has occurred on the slopes of Capulin Volcano during the last 75 years, but Robinson Peak and Jose Butte—much older volcanic cones—have remained grasslands. In the absence of disturbances such as a major fire, a climax piñon-juniper forest
will occur in about 300 years (Wright and Bailey, 1982). Capulin’s forests, therefore, are still quite young and have not reached climax, although some of Capulin’s piñon pines have been found to be over 400 years old. Other piñon-juniper woodlands in the area may be climax forests.

Although no Federally listed threatened and endangered plants have been documented within the monument, some State-listed, Federal candidate, and locally rare are present in the area.

3. Fire Ecology

The ecological role of wildfire in the region has yet to be determined. Gambel oak, the dominant shrub in the area, is known to be a highly fire-tolerant species. Fire stimulates suckering in this species, but if protected from fire, it tends to thin out and retreat over time (Wright and Bailey, 1982). However, at present, shrubby species appear to be crowding out most of the open grasslands on the upper slopes and on the lower fringes of the park. This might be the effect of the termination of cattle grazing in the park (migrating bison may have played a similar role in maintaining grasslands in the area) and from past wildfire suppression. Fire and wildlife grazing are important in preserving natural shortgrass prairies.

In piñon-juniper woodlands and montane scrub, cattle grazing may have reduced fine fuels—mostly grasses—that carry fire. Fuel reduction and suppression efforts have not allowed fire to perform its natural thinning function in these habitats (Barbour and Billings, 1988).

4. Wildlife

Because its land base is small, Capulin Volcano National Monument does not include a significant portion of the home ranges for much of its wildlife. This makes wildlife management and resource protection more difficult. Although they could be present any time of year, the park’s larger wildlife, such as mule deer, wild turkey, and black bear, are generally not year-round residents, but rather move in and out of the park according to season, food and water availability, shelter value, and other factors. Nevertheless, wildlife is plentiful, and can cause significant impacts to resources, such as heavy browsing.

Other wildlife in the area includes porcupine, cottontail rabbit, rock squirrel, coyote, bobcat, rattlesnake, and elk. Mountain lions are occasionally seen. There are over 122 species of birds present—resident, transient, and seasonal—54 percent of which can be considered neotropical. Recent studies have shown that populations of neotropical birds have been declining, and that protection of unfragmented habitat is critical for their survival. Potential nesting sites exist for hawks, peregrine and prairie falcons, and eagles.

The potential exists for Federal threatened and endangered (listed) species to be present in the monument area. There are nine category 2 candidate species that migrate through the region, or whose range includes the monument; and there are three threatened and endangered species that have been documented in and around the area. Two species of concern—due to declining populations—that are not listed or designated as candidate species are also present.
5. Water Resources

The Capulin aquifer and groundwater basin covers at least 105 square miles in parts of Colfax and Union Counties, including the west portion of the study area (Trauger and Kelly, 1987). This aquifer supplies water to surface discharge points and natural reservoirs. These access points are utilized by a variety of indigenous wildlife, as well as by domestic livestock and permanent human residents.

6. Air Quality

The air quality of the Capulin Volcano area is generally outstanding, although continental and global air pollution threatens to degrade this resource. Particulate matter and chemicals in the air may come from dust on unpaved roads, automobile exhaust, coal and cinder mining, power plants, smelters, and other sources. The result of deteriorating air quality may be a loss of scenic vistas.

The scenic vistas from the crater rim are the most important air quality values of the park. The viewshed often exceeds 90 miles, and encompasses parts of three states, much of the Raton/Clayton Volcanic Fields, and the distant snow-capped Sangre de Cristo Mountains. Capulin Volcano National Monument is designated as a class II area in accordance with the Clean Air Act of 1963 (amended in 1977 and 1990).

7. Significance

The biodiversity of the study area is high. Its ecology is characteristic of the region, and is not well represented in other National Park Service units. Also, it contains important habitat for the protection of threatened and endangered species. Future research may indicate the presence of critical habitat.

D. CULTURAL RESOURCES

1. Introduction

Centuries of modification of the natural environment by various cultural groups has resulted in the present-day cultural landscape that surrounds and includes Capulin Volcano.

Artifacts found within the park indicate that the cinder cone may have been used as a prehistoric surveillance point, as a safe haven, or as a hunting campsite possibly associated with the Folsom Culture. Capulin Volcano may have served as a landmark for European explorers as early as 1541, when Vasquez de Coronado traversed the area. Immigrants, traders, and military expeditions followed the nearby Santa Fe Trail (1820s to 1880); and Charles Goodnight recalled pasturing herds in Capulin Vega, near a branch of the Goodnight-Loving Cattle Trail (1866 to 1875). Cattle ranching began on land surrounding the park in the 1870s, and dry-land farming by homesteaders had a tentative beginning in the 1890s.
(figure 8). Farming was marginal, and had ended by the Dust Bowl of the 1930s. Although not formally associated with the park, the Folsom Site is a related archaeological site of national historic landmark importance. The area may still be valued by the Jicarilla Apache, Kiowa, and Comanche Indian Tribes.

2. Prehistory

Only four prehistoric sites have been recorded in the immediate area of the park, but many more are informally known. Three of these sites are actually within the existing boundary of the park. However, 74 sites have been documented in the upper Dry Cimarron Valley immediately northwest of the area and surrounding the Folsom Site. Because of the systematic nature of this inventory, it probably represents the true nature and density of prehistoric sites in the region. Similar archeological remains are expected to exist within the study area (Winter, 1988; Anderson, 1975; Lent and Winter, 1983).

Although details of the aboriginal occupation of the area are poorly known, with the exception of the Folsom Site, the general prehistory can be deduced from the few specific remains that have been recorded and from what is known about the surrounding region. However, because no sites have received detailed study or evaluation, there is insufficient information upon which to base a judgement of their National Register significance. It is believed that the sites in the study area do have the potential to yield significant information in future investigations, and so may qualify as National Register properties under criterion D, which applies to properties that have yielded, or are likely to yield, information important to prehistory or history.

The American Indian occupation of the southern high plains can be divided into four subdivisions: Paleo-Indian, Archaic, Ceramic, and Protohistoric/Historic.

a. Paleo-Indian Period. Peoples of this period, which dates approximately 12,000 to 7,500 B.P., were the first to inhabit the region. This stage, typified by the Folsom Site, is characterized by small groups exploiting regional resources in a migratory lifestyle. Utilization of large Pleistocene megafauna, such as mammoth and the giant bison discovered at the Folsom Site, was an important part of seasonal activities; undoubtedly, acquisition of plant resources was an equally important part of life. Paleo-Indian material culture reflects the mobile, big-game-hunting lifestyle, with tool kits generally suited for animal-killing and processing. Habitation structures are extremely rare; none have been reported from northeastern New Mexico.

Beyond the Folsom Site itself, regional evidence of this big-game-hunting tradition occurs as isolated projectile points. Many Clovis points, Folsom points, and later-dating Plainview-like points have been found in the Folsom and Capulin areas. In the early 1960s, mammoth remains were excavated from an old alluvial deposit at the northern edge of the proposed expansion area. Although no cultural materials were discovered during this work, the mammoth remains, along with the Folsom Site remains, demonstrate that alluvial deposits dating from the Paleo-Indian period still exist. During a recent study (Anderson, 1975), an evaluation of the alluvium in the region was conducted, which demonstrated further that older deposits still remain. These deposits have the potential for containing archeological materials that date to this early time period.

b. Archaic Period. As terminal Pleistocene environmental conditions were replaced by those more similar to today's environment, the big-game-hunting tradition evolved into a lifeway that focused on plant collection and processing and on hunting a great variety of
small fauna. This lifeway endured from approximately 7,500 to 1,700 B.P. in northeastern New Mexico.

c. Ceramic/Formative Period. The Ceramic, or Formative, stage is marked by the appearance around 1,700 B.P. of agriculture (probably scattered horticulture in low-lying areas of northeastern New Mexico), and the resultant establishment of a sedentary or semi-sedentary lifeway. By A.D. 1050-1100, the population density was rapidly increasing in southeastern Colorado and northeastern New Mexico.

d. Protohistoric Period. By approximately A.D. 1550-1750, the Athabascan groups generally known as the Dismal River Apache and Kiowa Apache gradually moved south and west through the area. The encampments of these Athabascan people sometimes take the form of tipi ring sites, one of which is known to be within the boundary of alternative D.

3. History

After about A.D. 1700, several new American Indian groups are documented in the immediate area of Johnson Mesa: the Ute, Jicarilla Apache, Southern Cheyenne, and Southern Comanche. These groups were highly mobile, following a basic Archaic-style lifeway, with hunting and gathering forming the major portion of their subsistence activities. The Comanche and Cheyenne, more traditionally associated with the Central Plains, occasionally forayed into the area, pushed by the westward movement of the American frontier. These late-dating groups survived until the middle 1870s, when travel over the Santa Fe Trail and its Cimarron cut-off signaled the end of the unsecured frontier. By 1875, all remaining local American Indian groups were confined to reservation life in New Mexico and Oklahoma.

A 1706 Spanish expedition camped just east of Capulin. The expedition, under Sergeant Major Juan de Ulibarri, succeeded in returning Picuris Puebloans to New Mexico. They had gone to live on the plains to escape the Spaniards, but had grown disenchanted after incessant Indian attacks on their adobe homes located in eastern Colorado along the Arkansas River.

The trans-Sangre de Cristo region was not a significant area to the Spaniards, nor to the Mexicans during their relatively short dominion over New Mexico. Substantial development began after the Santa Fe Trail came through the area in the 1820s. Even then, the Sangre de Cristo Mountains formed a barrier between the area and the Rio Grande Valley—the center of the New Mexican development. For some time, northeastern New Mexico’s ties were largely with Texas and Colorado.

In the 1860s and 1870s, Charles Goodnight led massive cattle drives through the area, blazing trails to advancing railheads and northern pastures. The Goodnight Trail passes directly between Capulin Volcano and the Raton Mesa on the way to Trinchera Pass. Some of the area’s current ranchers had relatives who remembered or participated in the great cattle drives.

Following sheep ranching, cattle ranching became the main economic activity—as it remains today. Many local ranches have been operated by successive generations of the same families for more than a century. Dry-land farming was undertaken by some homesteaders in the 1890s, but was only marginally successful, and it was essentially eliminated by the Dust Bowl of the 1930s.

Early attempts to settle and farm the area are seen in scattered examples of homesteads. Many of the homesteads are "discovery" sites with little historical integrity remaining;
however, some structures that seem to possess substantial integrity do remain. The frontier ambience appears to have endured longer in New Mexico than in other parts of the west, as represented by a number of homesteads here that date to the early 20th century. The outlines of dry-land farm sites may be seen from the Volcano Road.

The Granada-Fort Union road passed a mile or so east of Capulin. This road was used primarily by the U.S. Army to transport quartermaster stores originating at Fort Riley, Kansas, to Granada, Colorado, and thence to Fort Union, New Mexico. The road's period of significance was from 1873 to 1875, when Granada was an end-of-track town on the transcontinental railroad. The road, which may be nationally significant, is part of the Santa Fe Trail network.

A listing of historical themes represented in the study area is included in appendix H.

4. Current Use

Although there is no evidence of ongoing use by American Indian groups at the park, an ethnographic study is needed to determine the concerns of contemporary peoples who have traditional associations with resources in the study area. Cattle ranching continues in the area. Many people living in the nearby communities of Capulin, Folsom, Clayton, Des Moines, and Raton work in service or trade, and the establishment of the national monument has introduced structured tourism to the region.

5. Significance

Except for the Folsom Site, there are no known National Register sites within the study area. Further study is needed to determine the presence of additional eligible resources. However, National Register status is not necessary for cultural resources in the study area to be considered for inclusion in the boundary, because these resources do not have to be individually nationally significant to be considered—they just need to be directly related to the purpose of the park. Although the purpose to date has emphasized natural resources, Capulin Volcano itself has cultural significance as a natural feature; for instance, historically as a landmark, and as an outstanding visual feature. Throughout the study area, the natural environment and patterns of human use and settlement go together to make up a landscape that is at the same time natural and cultural. The numbers of cultural sites at such volcanic landscapes as Sunset Crater, Petroglyph, El Morro, and El Malpais demonstrate the importance of such landscapes to ethnographic groups and prehistoric lifeways.

6. The Folsom Site

a. Introduction. In 1926, a group of paleontologists working on a bison quarry in Colfax County discovered and recognized the significance of projectile points in direct association with the remains of long-extinct animals. This discovery revolutionized scientific thinking about human antiquity in the New World, and pushed back the accepted time of occupation by at least 6,000 years.

The Folsom Site is a bison (Bison antiquus taylori) killing and processing area that dates to approximately 10,250 B.P. This site is the type locality for the Folsom Culture (that is, the place where the culture was first identified and studied), a big-game-hunting group that occupied the high plains, from 10,000 to 8,000 B.P. Subsequent to the killing and butchering
activities, the bison bones, Folsom point fragments, and other tools were buried. For the next 10,000 years, a cycle of alluvial deposition and erosion alternately cut through the area and left thick deposits over the site. This series of events eventually established the modern topography.

During a 1908 flood, headward cutting of the arroyo at the site cut through the Folsom period alluvial deposits and exposed the bison bones. In 1926, local residents realized that the site might be of paleontological significance, and took some of the bones to the Colorado Museum of Natural History (now the Denver Museum of Natural History). The museum's director and paleontologist decided to excavate the site. Excavations began the summer of 1926, and bison bones were soon exposed. The bison was determined to be a new variety, and was called *B. taylori*. Overall, 23 bison were located, and 22 point fragments removed.

The Folsom Site was designated a New Mexico State Monument in 1951, and a national historic landmark in 1961. In 1972, as part of a larger study, a radiocarbon date of 10,260 years (plus or minus 110) was derived from bison bones recovered at the Folsom Site.

b. Significance. The Folsom Site is of national significance, representing the National Register theme "Indigenous American Populations: The Earliest Inhabitants." It is nationally significant in four ways:

1) The 1926-1928 discovery and subsequent acceptance of human artifacts in direct association with extinct fauna revolutionized previously accepted views of human antiquity in the New World. The resultant impact upon American archeology was tremendous; the accepted time of human occupation of the New World was expanded by 6,000 years, and the scientific stage was set for recognition of even earlier periods of habitation.

2) The site is the Folsom Culture type locality, and a classic example of Folsom period bison killing and processing activities. It was here that paleontologists discovered the distinctive points in direct association with the extinct species. This was the first time that these striking, finely made projectiles were found in a datable and reliable cultural context. The site, the fluted points, and the culture were named for the town of Folsom.

3) The extinct bison remains found in 1926-1928 were recognized as a subspecies of *B. antiquus-B. antiquus taylori*.

4) The depositional and erosional sequence exposed throughout the valley where the site is located is detailed and fairly well defined and dated, which originally enabled adequate dating of the cultural remains. The Folsom deposit is located within a well-preserved geological sequence.

Additionally, the Folsom Site is relevant to interpretive themes at Capulin Volcano National Monument, in that its time frame coincides with the eruptions of Capulin Volcano and Baby Capulin. The coincidence of this time frame offers clear evidence of human landscape interaction dating to the earliest recognized occupation of the area.
E. THREATS TO RESOURCE INTEGRITY

1. Capulin and Related Volcanic Landforms

Volcanic cinders are widely used commercially in construction, roadway fill, and landscaping material, and increasingly for traction on icy roadways in winter. Locally, they are used for a variety of rural and ranch uses. Because the existing boundary does not include the entire cone of Capulin Volcano, the National Park Service lacks the authority to protect all of Capulin Volcano. Cinders continue to be removed from a pit adjacent to park property, even though the mineral rights for the State land have not been granted (figure 9). The pit scar is highly visible from the summit road. Part of the volcano slope inside the park has been removed by mining, and subsequent erosion has caused the boundary fence to be suspended in midair. For the purpose of protecting the volcano, the boundary at this location (as well as generally) has proven to be ineffective. Experience with much older cinder pits shows that many decades will pass before a vegetative cover softens the harsh appearance of the pit.

Many of the surrounding landforms are also potential cinder sources, as is evidenced by another active cinder pit on private property to the south of the park. An example of what cinder mining could do to some of the volcanic landforms that have been discussed in this report can be seen on Twin Mountain, in clear view from the road winding up Capulin Volcano (figure 10). It has been quarried for 30 to 40 years, and has been reduced to a fraction of its former size.

Baby Capulin has also been mined, but to a lesser degree. The scar is located on the opposite side from the road, and is therefore not visible to passers by, but a test pit was later dug on its western slope to determine the commercial utility of the cinders on that side. The test was stopped by the protests of local landowners and residents, but the raw gash of the bulldozer is in full view from New Mexico Highway 325.

It is clear that as cinder mining encroaches upon the park, it will further degrade the unique qualities of the site, and seriously impair visitor experiences.

2. The Folsom Site

The Folsom Site is owned by the Board of Regents of the Museum of New Mexico, and is administered by the Laboratory of Anthropology as a New Mexico State Monument. The State monument is unfenced, thereby allowing grazing on the site, which increases streambank erosion. Surface erosion has effectively removed most evidence of the original excavations.

There is no publicly owned access or right-of-way to the site; the only access is across private land. The National Park Service is not aware of any State plans for further site protection, nor are there any known plans to interpret the area. Researchers and academic groups can visit on an appointment basis, with the concurrent permission of the adjacent landowner, who presently leases the area for grazing.
IV. ALTERNATIVES FOR BOUNDARY EXPANSION

A. INTRODUCTION

The following criteria for boundary additions are found in National Park Service Criteria for Boundary Adjustments (National Park Service, 1991): The National Park Service will conduct studies of potential boundary adjustments and may recommend boundary revisions:

"... To include significant resources or opportunities for public enjoyment related to purposes of the park;

to address operational and management issues such as access and boundary identification by topographic or other natural features or roads; and

to protect park resources critical to fulfilling the park’s purposes

Recommendations to expand park boundaries will be preceded by determinations that

the added lands will be feasible to administer considering size, configuration, ownership, costs, and other factors; and

other alternatives for management and resource protection are not adequate."

Areas will be considered for inclusion in the boundary if they are needed to protect existing park resources, to protect resources outside the existing boundary that are significant and relate to the purpose of the park, or to resolve management difficulties due to inadequacies of the existing boundary. Resource values are considered first; then feasibility factors. Areas are considered for inclusion in National Park Service boundaries only if no other adequate management and resource protection options are available. Boundary delineations indicated on figure 11 are preliminary; further research, discussion, and consultation with landowners may be needed to refine the boundary prior to authorization.

B. ALTERNATIVES

1. Alternative A: No Action

In the "No Action" alternative, existing management of the park would continue with the existing boundary. No boundary expansion would occur. The slopes of Capulin Volcano would continue to be at risk from cinder mining; and significant natural and cultural resources related to the park purpose outside the present boundary would not be protected or interpreted.
2. Alternative B: Protection of the Capulin Volcano Cinder Cone and Boca
(See figure 11)

In this alternative--area "B" on Figure 11--approximately 4,190 acres would be added to the existing boundary. To protect Capulin Volcano and the boca, as intended by the initial proclamation that established the park, the boundary would be extended to, or slightly beyond, the contour that represents a naturally stabilized land surface, and protects potential adjacent lava flows from potential excavation. Fee acquisition by the National Park Service would ensure protection of all of the volcano and immediately surrounding flow areas in perpetuity. Consumptive and disruptive actions such as cinder mining and large-scale development within the alternative B area would be prohibited.

The cinder pit to the southeast of the park poses an imminent threat to the integrity of Capulin Volcano's features. The pit is highly visible from U.S. Highway 64/87. Commercial development of the pit has been explored by the owner. This use has the potential to deface the volcano, diminish air quality, impair the visitor experience, and further degrade the volcanic field surrounding Capulin Volcano through road construction and its associated equipment staging. Mining is an irreversible consumptive use of the fundamental resource and landform represented by Capulin Volcano.

Alternative B would preserve the geologic story of Capulin Volcano, by protecting the cinder cone itself, some of its flows, and the esthetic value of this outstanding landform, which rises 1,400 feet above the surrounding plains. The protection of this setting is essential to ensure resource integrity and educational opportunities for present and future generations of National Park Service constituents, including visitors, local residents, and researchers.

Current administrative and visitor facilities in the park already impose an inappropriate impact on a topographically limited resource. A steady increase in park visitation has corresponded to the deterioration of water lines, sewage handling capacity, and parking facilities over the past 30 years. To protect Capulin Volcano and to plan ahead for visitor and staff needs into the next century, this alternative proposes an additional acquisition of approximately 20 acres in the area of the Village of Capulin for park housing units and a maintenance complex.

3. Alternative C: Protection of the Volcanic Features and Contemporaneous Eruptive Sites in the Capulin Field
(See figure 11)

This alternative involves the addition of areas denoted as "C" and "B" on Figure 11--a total of approximately 11,610 acres--which include varied volcanic features and landscape surrounding and relating to Capulin Volcano. National Park Service scenic/conservation easements in this area would maximize resource and visual quality protection, with the potential for arranging visitor access with landowners. Consumptive or disruptive actions such as cinder mining and large-scale development within the alternative C area would be precluded by scenic/conservation easements.

At present, the volcano is an isolated resource, and does not contain any of the features or flows that emerged to the north or south from its eruptions. Addition of the southern flows would add pressure ridges, squeeze-ups, lava tubes, two enclosed basins, the ruins of a 19th-century homestead, a portion of the Goodnight-Loving Trail, and a segment of the Granada-Fort
"Note: Where boundary and property tract lines run parallel, property tract line runs in between: and boundary markers.

Where single boundary markers run, the boundary is set inside the property tract line.

"FEE OWNERSHIP"

1. Adams, Sam
2. Bennett, Vernon
3. Berg, Don W. and Catherine C.
4. Brown, William
5. Cornay, Carlos
6. Kropf, Archie
7. Doherty, William
8. King, John
9. Martinez, Margaret and Florence
10. Morrow, John
11. State of New Mexico
12. Satrupius, Caroline
13. Mondragon, Alberta
14. Cruz, Domingo

Figure 11. Boundary Study
CAPULIN VOLCANO N.M. NATIONAL MONUMENT
BOUNDARY AND OWNERSHIP MAP
UNITED STATES AND NEW MEXICO

LEGEND
A and Park Service Boundary
B
C
D Tract Boundary

ON MICROFILM
ALTERNATIVES  CAPULIN VOLCANO N.M. BOUNDARY STUDY  27
Union road to the park (see photos 2 and 3). The inclusion of the northern flows, and the addition of Mud Hill, a Clayton-age volcano, and of Baby Capulin, the youngest eruption of the Capulin Field, would provide protection for the viewshed and an opportunity for enhanced in-park interpretation of volcanism. Ongoing geological research will clarify any needed revisions to the north boundary of alternative C.

The volcanic field surrounding the park is a prime source for commercial cinders. This alternative would provide the field with a greater measure of protection against current and future threats of cinder mining and other irreversible development. Visitors, educators, and research personnel would have the opportunity to access the field and gain a greater understanding of the events that created this unique area of New Mexico.

As in alternative B, park housing and maintenance would be relocated near the Village of Capulin, away from the primary resource.

4. **Alternative D: The Holistic Volcanic Park**

   (See figure 11)

This alternative is the most extensive proposed boundary expansion. The area to the west of New Mexico Highway 325 labeled "D," in addition to areas "B" and "C" on figure 11, would be added, for a total addition of approximately 24,130 acres. National Park Service acquisition of this area would allow for the protection, study, and public enjoyment of a holistic volcanic landscape that encompasses largely undeveloped lands and geologic sequences spanning more than 7 million years of landform evolution. The scale and interpretive focus of the monument would change substantially.

This alternative has the potential to provide multiple benefits for long-term resource protection, public enjoyment and education, and on-going research opportunities in northeastern New Mexico on an ecosystem scale. The park would shift from being a casual recreation stop to becoming a destination site for an ever-increasing visitor population. Cinder mining within the proposed addition area would not be permitted.

Flora and fauna within the proposal area represent many of the life forms present on the High Plains of North America; and there is a diversity of landform, wildlife habitat, and cultural resources rare within other National Park Service units in the Southwest Region. Streams, ponds, and springs greatly enhance the area’s biological diversity; and large- and small-scale geomorphologic features such as peaks, cliffs, caves, cones, dikes, and volcanic rock are present.

This alternative would add a contiguous area to the existing, inadequately protected perimeter of Capulin Volcano National Monument, and would address the needs associated with projected visitor load for the park, which is the only natural area managed by the National Park Service in northeastern New Mexico. Visitation increased rapidly before the 1993 closure and the economic slump. Visitation is expected to continue on an upward trend, encouraged by improvements in traffic carrying capacity and signing along New Mexico Highway 64/87.

Cultural resources having both historic and prehistoric affiliations are scattered throughout the proposal area. In this alternative, it would be possible to preserve and interpret aspects of American history under a number of themes, some of which are not represented within the existing park and are minimally represented within the National Park System (see appendix H).
The area on the plateau to the west of New Mexico Highway 325 has potential for providing a great range of types of visitor experience opportunities, including backcountry use and longer interpretive hikes and tours. If the boundary were expanded to include this area, the General Management Plan process, which would include public involvement, would determine what uses would be appropriate in what locations, in addition to resource management strategies.

A significant aquifer within the proposed boundary expansion area supplies water to surface discharge points and natural reservoirs. These access points are utilized by a wide variety of indigenous wildlife, as well as by domestic livestock and permanent human residents. Increased protection of water quality and aquifer recharge capabilities within alternative D would enhance conservation of a resource of proven variable proportions in the face of ever-increasing urban demands from nearby communities. The City of Raton, New Mexico, 30 miles west, maintains a water well within the Village of Capulin, which gives an indication of potential future demands on the groundwater system.

As in alternatives B and C, park housing and maintenance would be relocated near the Village of Capulin, away from the primary resource.

5. Alternative E: The Folsom Site

In this alternative, the 10-acre Folsom Site would be transferred to the National Park Service, and be managed from Capulin Volcano National Monument as a research site. Proposals for scientific study from properly qualified archeologists, paleontologists, paleobotanists, and other specialists would be reviewed by National Park Service archeologists and park management. Due to the potential for resource impacts, and the right of adjacent landowners to privacy, unescorted public visitation would not be permitted. The Folsom Site would need to be fenced, and would be comprehensively interpreted at the existing park visitor center. Any transfer agreement would need to be reviewed and approved by the Board of Regents of the Museum of New Mexico, and would need to stipulate what types of research would be allowed at the site, and under what conditions.

Although the Folsom Site is not directly related thematically to Capulin Volcano National Monument, the national significance of the site is clear. Although designated as a State monument, the State does not have the resources to provide adequate site protection. The site is surrounded by State trust land that is leased for grazing, and no fences protect water-seeking stock from impacting the area. Local erosion is severe.
V. EVALUATION OF POTENTIAL BOUNDARY ADDITIONS

A. EVALUATION CRITERIA

The National Park Service Management Policies Criteria for Boundary Expansion discussed in chapter IV/A can be used to evaluate the alternatives. The alternatives section above includes discussion of how each alternative addresses the first three criteria (See IV. A.). Boundary expansion proposals need to have as their rationale at least one of the first three criteria, but do not need to meet all three.

In this section, the last two criteria--feasibility and management options--will be covered, along with a discussion of potential impacts to resources, neighboring communities, traditionally-associated communities, and visitors. The information in this section is provided to assist reviewers and Congress in the evaluation of alternatives; a full Environmental Assessment or Environmental Impact Statement would be prepared as part of the planning process if the boundary were expanded.

B. FEASIBILITY

All boundary expansion alternatives described in this study would be feasible additions to the existing park.

1. Size and Configuration

Alternatives B, C, and D include enough area to be feasible to administer. Only alternative B involves a non-contiguous boundary, and the detached section needed to relocate park facilities would be in close enough proximity to park resources to be cost-effective in terms of driving distance and resource protection functions. The 10 acres called for to protect the Folsom Site would be adequate for effective management.

2. Land Ownership

Land tracts and ownerships are shown on figure 11. In the course of the study, all directly affected landowners whose property is included within the proposed expansion areas were invited to discuss the alternatives with National Park Service staff.

At this time, some potentially-affected landowners who own property within proposed boundary expansion areas have expressed a willingness to consider selling portions of their property to the National Park Service. Some landowners are amenable to discussing National Park Service scenic/conservation easements (see also appendix B).

The Museum of New Mexico, present owner of the Folsom Site, recognizes the State's limited ability to provide full site protection, and has expressed interest in transfer of the 10-acre area to the National Park Service.
3. **Cost**

Acquisition, management, and facility relocation costs need to be balanced against the high cost of risking the deterioration of the valuable resources within the study area and the high potential for benefit to future generations through their protection within a National Park Service unit. A detailed acquisition cost estimate would be prepared prior to Congressional authorization if a boundary expansion were approved.

4. **Operations**

To provide adequate protection and visitor services, an additional six full-time staff would be needed for alternative B; eight for alternative C; and 12 for alternative D. Some or all of the new boundary would need to be fenced, and signage added as needed.

5. **Development**

In alternatives B, C, and D, there is ample space for any developments that may be needed for resource protection, visitor services, and operations. Facility development would be kept to the minimum necessary, and would not encroach upon or reduce the integrity of significant resources. No facility development would be needed at the Folsom Site for management as a research site; however, fencing and signing the site would be implemented as a basic management policy.

6. **Access**

In alternatives B, C, and D, access for management would be possible along existing roads and trails. Any additional access needed for visitor use would be considered in the General Management Plan, if an expansion were authorized. If the National Park Service acquires scenic/conservation easements from existing landowners, access to these lands would be maintained for the landowners. At some locations, gates within the fenced boundary may be needed to provide landowner access, while restricting general public access, as defined in the scenic/conservation easement.

At the Folsom Site, the existing access is across private land, and National Park Service management access would need to be negotiated with adjacent landowners as part of the land transfer process. Unescorted public access to the site would not be permitted.

C. **MANAGEMENT OPTIONS**

Options for managing lands and resources within the study area other than National Park Service control include continuing private ownership, management by a local or State agency, or a non-profit organization. With continued private ownership and State leases, the possibility of cinder mining would remain, and educational and recreational opportunities for the public would likely stay at present levels. Although managing the proposed boundary expansion
areas as a State park or a conservation area is a possibility, inclusion in the boundary of the existing National Park System unit is an appropriate solution because of the existing National Park Service presence in the area and the relationship between existing park resources and resources within the proposed boundary expansion areas.

D. IMPACTS TO RESOURCES / LOCAL COMMUNITIES / THE PUBLIC

1. Additional Criteria

The following are additional criteria considered for each alternative:

1) What may be the impacts to natural and cultural resources?

2) What may be the impacts to landowners and local community members?

3) What may be the impacts to groups with traditional associations with resources?

4) What may be the benefits to the general public?

See also appendix B for a description of major concerns expressed by area landowners and others during public review.

The following applies to all options: There are no known prime or unique farmlands, floodplains, wild and scenic rivers, or existing wilderness areas present in the study area that would be affected. Air quality would not be adversely affected, and reduction in cinder mining would reduce transient air quality impacts associated with that activity. At this time, no hazardous wastes are known to be in the area of the potential boundary expansions. National Park Service policies require a potential hazardous substances survey as part of the area evaluation process if a boundary expansion were to be authorized. Some resource impacts would occur if facilities were developed; facility location and design would be carefully guided by the General Management Planning process.

Although the primary reason for establishing the park was its volcanic significance, in its management areas the National Park Service is mandated to conserve and protect wildlife and natural processes unimpaired for future generations. All boundary expansion proposals consider the principles of wildlife conservation. There is a growing emphasis in the Department of Interior upon ecosystem management. The additions to the park proposed in this study are consistent with this approach. A General Management Plan/Environmental Impact statement would address wildlife-related impacts such as degradation of neighboring alfalfa fields by ungulates originating within the park.

For example, new boundaries would be designated to include, as much as feasible, entire drainages and other natural ecological divisions, rather than being drawn to conform to the traditional sectional survey lines. All attempts have been made in the development of the range of boundary expansion alternatives in this document to reduce habitat fragmentation by consolidating land ownership into large blocks. Ecological principles would be used to manage and protect native flora and fauna. This is particularly true when considering threatened and
endangered species, such as the peregrine falcon, where important and potentially critical habitat protection is mandated by the Endangered Species Act. Expansion of the park should ecologically reconnect Capulin Volcano with the surrounding landscape, as well as protecting its volcanic context.

2. **Alternative A: No Action**
   1) Existing problems with cinder mining could continue. The opportunity to protect all of Capulin Volcano and related resources in the study area would be lost.
   2) With no change in land ownership or management status, impacts to local communities from National Park Service activities would not change.
   3) At this time, there are no known concerns of traditionally-associated communities relative to potential boundary expansions. This situation may change in the future as the consultation process develops.
   4) There would be no additional benefit to the public.

3. **Alternative B: Protection of the Capulin Volcano Cinder Cone and Boca**
   1) All of Capulin Volcano would be protected in perpetuity from cinder mining and other threats. However, resources in the remainder of the study area may be vulnerable to threats such as mining and development.
   2) Five landowners would be directly involved in selling a part of their property or selling a scenic/conservation easement to the National Park Service. Payment in lieu of taxes by the National Park Service would reduce impacts to the local tax base for a period of 5 years. At this time, no significant, direct impacts to local communities are anticipated.

   Although Capulin Volcano National Monument is the only National Park System unit in far northeastern New Mexico, a number of elements, including the potential new scenic byway that would surround Capulin and run through New Mexico, Colorado, and Texas, would combine with Capulin to increase tourism interest and increase the potential for infusion of tourist dollars into the regional economy. An economic benefit analysis, which would quantify the expected regional economic benefits, could be completed as part of the Capulin Volcano National Monument General Management Plan process.
   3) Same as for No Action.
   4) Visitors would benefit generally by increased resource protection, but would not have the additional educational and recreational opportunities that would be available in alternatives C and D.
4. Alternative C: Protection of the Volcanic Features and Contemporaneous Eruptive Sites in the Capulin Field

1) All of Capulin Volcano and Capulin flows would be protected in perpetuity from cinder mining and other threats, and the protection of the groundwater recharge zone for the Village of Capulin may be enhanced. However, resources in the remainder of the study area may be vulnerable to cinder mining, development, and other threats.

2) Nine landowners would be directly involved in selling a part of their property or selling a scenic/conservation easement to the National Park Service. Payment in lieu of taxes by the National Park Service would reduce impacts to the local tax base for a period of 5 years. Park expansion would very likely attract more visitors, with the possibility of subsequent positive or negative impacts to local communities, such as increased tourism income and more traffic congestion. At this time, no significant, direct impacts to local communities are anticipated.

There would be the possibility of increasing regional tourism income through the combination of preservation and interpretation projects in the area, as in alternative B.

3) Same as for No Action.

4) Some additional educational and recreational opportunities would be available to visitors, but they would not have the diversity and amount of additional educational and recreational opportunities available in alternative D.

5. Alternative D: The Holistic Volcanic Park

1) All of Capulin Volcano, Capulin flows, and the diversity of natural and cultural resources in the study area would be protected from cinder mining and other threats, in perpetuity. Including this area within the boundary would allow for greater understanding of the effect of the Jemez Lineament on the volcanic eruptions in the area and comparisons with other National Park Service units. This alternative would work toward this goal by protecting unique habitats of Northeastern New Mexico. In addition, protection of the important groundwater recharge zone would be enhanced.

2) Ten landowners would be directly involved in selling a part of their property or selling a scenic/conservation easement to the National Park Service. Payment in lieu of taxes would reduce impact to the local tax base for a period of 5 years. Expansion of the park to include the entire study area would expand the focus of the park and potentially attract a greater number and different kinds of visitors, potentially negatively affecting local communities by increasing the amount of traffic, but also resulting in economic benefits from purchases of supplies, food, and lodging. As in alternatives B and C, there would be potential for increasing regional tourism income through the combination of preservation/interpretation projects in the area.

3) Same as for No Action.
4) With the expansion of park area, interpretive focus, and available visitor opportunities, there would be more potential in this alternative for benefits to the general public than in alternatives B and C.

6. **Alternative E: The Folsom Site**

1) As a detached area of Capulin Volcano National Monument, the Folsom Site would be actively managed under an established National Park Service program of proactive resource protection and monitoring. The site would need to be fenced.

2) The Museum of New Mexico would no longer manage the Folsom Site. Because the site would continue to be used for research and management access only, no impacts to adjacent landowners related to access are anticipated. Folsom Site interpretation at the park visitor center may increase general interest in the Capulin/Folsom/Des Moines region, potentially attracting more visitation, with the possibility of subsequent positive or negative impacts to local communities. At this time, no substantial, direct impacts to local communities are anticipated.

3) Same as for No Action.

4) Although properly qualified and reviewed scientific research would be permitted, members of the general public would not be permitted unescorted access.
VI. APPENDIXES
LEGISLATION
PUBLIC LAW 100-225—DEC. 31, 1987

Public Law 100-225
100th Congress
An Act

To establish the El Malpais National Monument and the El Malpais National Conservation Area in the State of New Mexico, to authorize the Mesaas Trail, and for other purposes.

Dec. 31, 1987
[H.R. 403]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

101 STAT. 1547

(1) Capulin Mountain National Monument is hereby redesignated as Capulin Volcano National Monument.

(2) Any reference in any record, map, or other document of the United States of America to Capulin Mountain National Monument shall hereafter be deemed to be a reference to Capulin Volcano National Monument.

(3) Section 1 of the Act of September 5, 1962 (76 Stat. 436) is hereby amended by striking the remaining portion of section 1 after “boundaries of the monument” and inserting “shall include the lands and interests in lands as generally depicted on the map entitled ‘Capulin Volcano National Monument Boundary Map’ which is numbered 125-60.014 and dated January 1987.”.

(4) Jurisdiction over federally-owned lands within the revised boundaries of the monument is hereby transferred to the National Park Service, without monetary consideration, for administration as part of the monument.

16 USC 431 note.

101 STAT. 1548
Proposed Withdrawal and Reservation of Lands

January 8, 1975.

The National Park Service, U.S. Department of the Interior, has filed application NM 23682 for withdrawal of the land described below from location and entry under the public land laws only.

The applicant desires the lands for use in connection with the Capulin Mountain National Monument.

On or before February 18, 1975, all persons who wish to submit comments, suggestions, or objections in connection with the proposed withdrawal may present their views in writing to the undersigned officer of the Bureau of Land Management, Department of the Interior, P.O. Box 1449, Santa Fe, New Mexico 87501.

The authorized officer of the Bureau of Land Management will undertake such investigations as are necessary to determine the existing and potential demand for the lands and their resources. He will also undertake negotiations with the applicant agency with the view of adjusting the application to reduce the lands to the minimum essential to meet the applicant's needs, to provide for the maximum concurrent utilization of the lands for purposes other than the applicant's, to eliminate land needed for purposes more essential than the applicant's, and to reach agreement on the concurrent management of the lands and their resources. He will also prepare a report for consideration by the Secretary of the Interior who will determine whether or not the lands will be withdrawn as requested by the applicant agency.

The determination of the Secretary on the application will be published in the Federal Register. A separate notice will be sent to each interested party of record.

If circumstances warrant it, a public hearing will be held at a convenient time and place, which will be announced.

The land involved in the application is:

New Mexico Principal Meridian

T. 29 N., R. 28 E.,
Sec. 5, NE¼ of lot 3, N½SE¼ of lot 3 and NE¼SW¼ of lot 3.

The area described contains 17.464 acres in Union County.

Fred E. Padilla,
Chief, Branch of Lands and Minerals Operations.

APPENDICES CAPULIN VOLCANO N.M. BOUNDARY STUDY
An Act To revise the boundaries of Capulin Mountain National Monument, New Mexico, to authorize acquisition of lands therein, and for other purposes, approved September 5, 1962 (76 Stat. 436)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to preserve the scenic and scientific integrity of the Capulin Mountain National Monument in the State of New Mexico, and to provide for the enjoyment thereof by the public, the boundaries of the monument are hereby revised to include the following additional lands:

NEW MEXICO PRINCIPAL MERIDIAN

Township 29 north, range 28 east; section 5, north half northwest quarter southeast quarter, northeast quarter northeast quarter southwest quarter, southeast quarter northwest quarter, northeast quarter southwest quarter northwest quarter, south half southeast quarter northwest quarter, south half south half northeast quarter northwest quarter, containing approximately 95 acres.

Sec. 2. The Secretary of the Interior, in furtherance of the purposes of this Act, may acquire, in such manner and subject to such terms and conditions as he may deem to be in the public interest, lands and interests in lands within the area described in section 1 of this Act: Provided, That the Secretary of the Interior is not authorized hereby to pay any amount in excess of the fair market value of the lands acquired pursuant to the provisions of this Act. When acquired, such lands and interests in land shall be administered as a part of the Capulin Mountain National Monument in accordance with the Act entitled "An Act to establish a National Park Service, and for other purposes," approved August 25, 1916 (39 Stat. 535), as amended and supplemented (16 U.S.C. 1 et seq.).

Sec. 3. There are authorized to be appropriated such sums as necessary to carry out the acquisition of this land, provided that the cost of the acquisition of private land shall not exceed $2,500.
CAPULIN MOUNTAIN
NATIONAL MONUMENT
NEW MEXICO

Embracing Lots 2, 3 and 4 SW 1/4 NE 1/4, SW 1/4, NW 1/4 Sec. 4, Lots 1 and 2, SE 1/4 NE 1/4 Sec. 5. T. 29 N., R. 28; Sec. 5, Sec. 32, SW 1/4 SE 1/4, SE 1/4 Sec. 33. T. 30 N., R. 28, all East of the New Mexico Principal Meridian, containing 680.37 Acres.

DEPARTMENT OF THE INTERIOR
Franklin K. Lane, Secretary
GENERAL LAND OFFICE
Clay Tallman, Commissioner
13. Capulin Mountain National Monument

Establishment: Proclamation (No. 1340) of August 9, 1916

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION


WHEREAS, Capulin Mountain, located in Townships twenty-nine and thirty North, Range twenty-eight East of the New Mexico Principal Meridian, New Mexico, is a striking example of recent extinct volcanoes and is of great scientific and especially geologic interest,

NOW, THEREFORE, I, Woodrow Wilson, President of the United States of America, by virtue of the power in me vested by Section 2 of the Act of Congress entitled, "An Act for the Preservation of American Antiquities"; approved June 8, 1906 (34 Stat., 225), do proclaim that, subject to prior, valid, adverse claims, there are hereby reserved from all forms of appropriation under the public land laws, and set apart as the Capulin Mountain National Monument, all the tracts of land shown upon the diagram hereto attached and made a part hereof, and more particularly described as follows, to wit: Lots two, three and four, the southwest quarter of the northeast quarter, the south half of the northwest quarter, the north half of the southwest quarter of section four; lots one and two, the south half of the northeast quarter and the northeast quarter of the southeast quarter of Section five, township twenty-nine north, range twenty-eight; the southeast quarter of the southeast quarter of section thirty-two; the southwest quarter of the southeast quarter, and the south half of the southwest quarter of section thirty-three, township thirty north, range twenty-eight, all east of the New Mexico Principal Meridian, New Mexico.

Warning is hereby given to all unauthorized persons not to appropriate, injure, remove or destroy any features of this Monument, or to locate or settle upon any of the lands reserved by this proclamation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington, this ninth day of August, in the year of our Lord one thousand nine hundred and sixteen, and of the [SEAL] Independence of the United States the one hundred and forty first.

By the President:
ROBERT LANSING,
Secretary of State.
B. CONSULTATIONS / PUBLIC INVOLVEMENT

1. Development of Initial Draft Boundary Study

In 1990, the Boundary Study began with three public meetings, which were held the evenings of July 17, 18, and 19, 1990, in Clayton, at park headquarters, and in Raton, respectively. Those attending were primarily landowners who might be personally involved in any of several boundary expansion alternatives. Discussion centered on the nature of scenic easements, various policy and legal issues related to State of New Mexico lands, and the strength of the landowners’ relationship to the land. During August 1990, preliminary alternatives were discussed with State Land Office staff and a number of landowners. Easements and land appraisals were also discussed.

2. Revision of the Draft and Completion of the Final Boundary Study

In 1993, the revision of the Draft Boundary Study began with an Open House on the evening of May 11, 1993, at the park visitor center. This meeting was attended by approximately 40 people—mostly local landowners and community members—and included a slide program by Ranger Reid Miller and a discussion of the Boundary Study by Superintendent Mary J. Karraker and team leader Jill Cowley. The purpose of this meeting was to let community members know that the Boundary Study was once again being worked on; to explain the scope and purpose of the Boundary Study; and to discuss issues of concern to community members.

During the revision of the Draft Boundary Study, individual discussions were held with potentially directly-affected landowners, including the State Land Office and the Museum of New Mexico. The Draft Revised Boundary Study was distributed to area landowners, neighboring communities, associated Indian groups, and those listed in appendix D, for review. A news release announcing the availability of the Draft Study for review was sent to regional media. Public meetings were held the evenings of February 1, 2, and 3, in Clayton, Raton, and Folsom, respectively. Attendance at these meetings ranged from 13 to 31. Fifteen written comments were received. All public comments, which are summarized below, were considered in preparation of the final document.

a. Major Concerns Expressed at Meetings and in Written Comments:

Comments received expressed a range from very strong opposition to any expansion, to strong support for expansion, even beyond alternative D. Among those in favor of monument expansion, support for alternative B was consistent, there was some strong support for alternative D, and some tentative support for alternatives C and D on the grounds that the impact to landowners required by these alternatives and likely very high cost would make these difficult to justify. In some written responses and discussion, there was not necessarily objection to monument expansion for preservation and education purposes if landowners wanted to sell property to the National Park Service, but strong opposition to the Federal Government forcing people off their land. There was general support for National Park Service management of the Folsom Site.

1) Preservation of long-time landowners’ lifestyles, livelihoods, and land stewardship: The majority of potentially directly-affected landowners and their families have owned, lived on, and worked their land for several generations,
some for over 125 years. Through the generations, a very strong identification with the landscape and the ranching lifestyle has developed. Representatives of several families expressed a desire to maintain the land in family ownership and continue ranching into the foreseeable future. They maintain that they preserve the ecological integrity of the land, including grazed areas, as well as or better than the National Park Service would, and that they do allow some access to their property for research and public education.

2) **Recognition of private property owners’ rights:** Some expressed that there is already too much Federal control of lands in the region, and that projects like the Capulin Boundary Study have the potential to violate private property owners’ rights through condemnation. For some, inclusion in an National Park Service boundary amounts to an automatic taking because of what they see as inevitable restrictions of their rights to use their land the way they see fit.

3) **Benefits of monument expansion:** Benefits cited included increased preservation of an ecologically valuable area and of valuable cultural resources; increased opportunities for public education and recreation; and a boost to local and regional economies, with an increase in tourism and tourist dollars in the region. Some expressed that grazing has had a deleterious impact on the ecology of the area, and that if boundaries were expanded, grazing should not be allowed. The need to expand the proposed boundary further to include valuable prehistoric cultural resources was raised--an issue that would be addressed within a General Management Plan if Congress were to effect a boundary expansion.

4) **Drawbacks to monument expansion:** In addition to issues of impact to landowners and landowner rights discussed above, comments on disadvantages of boundary expansion included wildlife impacts beyond the boundary, potential negative impacts of scenic/conservation easements, and limited potential for economic benefit. The concern was expressed that if hunting were not allowed within the boundary of alternative D, an overpopulation of ungulates would lead to damage to adjacent agricultural fields. This is recognized as a problem, and would need to be addressed in a General Management Plan if the boundary were expanded. The point was made that payment-in-lieu-of-taxes would extend only for 5 years, and that this money would go to the county, not the State, and thus would not benefit the school system. There was concern that easements would have negative impacts on livestock grazing operations, due to the need to fence easement areas and to the possibility of trespassing by the public.

5) **Cost/benefit:** A number of comments related to costs of boundary expansion. Some expressed that expanding to alternative C or D would be prohibitively expensive, and not a good use of taxpayers’ money, and that the National Park Service should concentrate on taking care of what they already have. A new alternative where the existing boundary would remain but National Park Service administrative, maintenance, and housing facilities would be relocated was suggested, but rejected by the team due to the inadequacy of the existing boundary. Some expressed that although relocating park facilities was a good idea, the cost would be too high to justify the relocation. From a different perspective, the comment was made that boundary expansion is needed so that the public’s investment to date--supporting the National Park Service in
protecting the majority of the volcano—is insured into the future.

b. **Major Concerns of the State Land Office**: The study team met with State Land Office representatives twice during the study to discuss potential impacts of boundary expansion on their ability to fulfill their State trust lands responsibilities. Three main State concerns were discussed: 1) fair value for the surface and subsurface estates in the event of a land exchange agreement would need to be ensured; 2) if an authorized new boundary rendered an area of State trust land outside the boundary difficult to lease and therefore uneconomical in the long term due to disruption of a larger grazing area, this would need to be addressed and resolved; and 3) if an authorized new boundary rendered a small area of State trust land within the new boundary difficult to lease and therefore uneconomical in the interim between National Park Service purchase of private land and completion of an exchange agreement with the State, this would need to be addressed and resolved.

In the event of a boundary expansion, the State would accept only a complete equal-value exchange, where both surface and mineral estates would be exchanged. Because an exchange of just the subsurface rights is not possible, the mineral values would need to be exchanged on a like-for-like basis, with the area in question being evaluated to determine complete mineral value present and the appropriate basis for exchange. In the event of a boundary expansion, these and other issues would need to be discussed in detail with the State land Office to ensure mutually agreeable solutions.
C: REFERENCES / PERSONAL CONTACTS FOR RESOURCE INFORMATION

1. References

Anderson, Adrienne.

Barbour, Michael G. and W. D. Billings.

Dick-Peddie, William A.

Lent, Stephen C. and J. C. Winter.

Museum of New Mexico.
Laboratory of Anthropology files. Santa Fe, New Mexico.

National Park Service.


National Park Service, Southwest Region.


Nielsen, R. L. and M. A. Dungan.

Sayre, William and Michael Ort.
Stormer, J. C., Jr.  


Trauger, Frederick D. and T. E. Kelly.  

Winter, Joseph.  

Wright, Henry A. and A. W. Bailey.  

2. Personal Contacts for Resource Information

John Morrow family  
Carlos Cornay family  
Ruby Kropf  
Mary Alice Owensby  
Curt Schaafsma, Museum of New Mexico
D. STUDY TEAM / CONSULTANTS / OTHER CONTRIBUTORS

1. Study Team
   
   Capulin Volcano National Monument
   Mary Karraker, Superintendent
   Nancy Wizner, Chief Ranger
   Geoffrey Smith, Resources Management Specialist
   Reid Miller, Interpretive Specialist

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   Office of the Associate Regional Director, Planning and Professional Services
   Julian Trujillo, Realty Specialist,
   Division of Land Resources
   Jane Harvey, Writer/Editor,
   Office of the Associate Regional Director, Planning and Professional Services
   Linda Lutz-Ryan, Visual Information Specialist,
   Office of the Associate Regional Director, Planning and Professional Services

2. Consultants
   
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   Planning and Professional Services
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   Planning and Professional Services
   Harlan Hobbs, Chief,
   Division of Land Resources
   Glenna Vigil, Cartographic Technician,
   Division of Land Resources
   Sam Kunkle, Chief,
   Division of Natural Resources
   Bob Krumenaker, Division of Natural Resources
   Neil Mangum, Regional Historian
   Larry Nordby, Chief,
   Division of Anthropology
   Ed Natay, Chief,
   Office of American Indian Programs

   Rocky Mountain Region
   Adrienne Anderson, Regional Archeologist

3. Other Contributors
   
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   Department of Science and Mathematics, College of Santa Fe, Santa Fe, New Mexico
   Dr. Michael Ort, Assistant Professor of Research,
   Department of Geology, University of Northern Arizona, Flagstaff, Arizona
Thomas Livesay, Director,
   Museum of New Mexico, Santa Fe, New Mexico
Dr. Curtis Schaafsma, Curator of Anthropology,
   Museum of New Mexico, Santa Fe, New Mexico
Robert Jenks, Assistant Commissioner,
   State of New Mexico, Office of Lands, Santa Fe, New Mexico
Dwain Glidewell, Director,
   Surface Resources Division, State of New Mexico,
   Office of Lands, Santa Fe, New Mexico
E. SUMMARY OF ALTERNATIVES ACREAGE

Acres for fee acquisition/easement are approximate, and do not include acres in current park area (792.9 acres).

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Private Land</th>
<th>State Land</th>
<th>Total</th>
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<tbody>
<tr>
<td>B</td>
<td>2,400</td>
<td>1,790</td>
<td>4,190</td>
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<tr>
<td>C</td>
<td>6,580</td>
<td>5,030</td>
<td>11,610</td>
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<td>D</td>
<td>16,200</td>
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<td>0</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
F. BOUNDARY CHANGE HISTORY

There have been two boundary extensions subsequent to the original proclamation, both by Acts of Congress:

1. Public Law 87-635, 1962: Extended the western boundary westward and slightly southward, reaching a point just west of New Mexico State Route 325. This extension, which acquired a 40-acre block of private land and 55 acres of State land, included the point of emergence of the Capulin lava flows. Its purposes were to prevent development immediately adjacent to the park entrance, to provide control over the park entrance road, and to provide a suitable location for the park sewage system. This brought the park to 775 acres.

2. Public Law 100-225, 1987: The Bureau of Land Management had previously acquired 17.5 acres from the State in a land exchange. This parcel, lying to the north of the earlier expansion, contains more of the lava flows, and is visible from the entrance road and from the summit. In addition to protecting this part of Capulin Volcano, the purpose was to prevent grazing, hunting, and mining there. This brought the park to its current acreage of 792.5.

Public Law 100-225: also changed the name of the park from Capulin Mountain National Monument to Capulin Volcano National Monument.

Acreage of Capulin Volcano National Monument

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1916</td>
<td>Proclamation establishing park</td>
<td>680.00</td>
</tr>
<tr>
<td>1962</td>
<td>Act of Congress added State and private land</td>
<td>95.00</td>
</tr>
<tr>
<td>1987</td>
<td>Act of Congress added BLM land</td>
<td>17.50</td>
</tr>
<tr>
<td></td>
<td>Total acreage</td>
<td>792.50</td>
</tr>
</tbody>
</table>
G. PHASES OF THE RATON/CLAYTON VOLCANIC FIELD

The volcanic landscape of which Capulin Volcano is part can best be understood by reference to the sequence of events that produced it. Areas contained within present Colfax and Union Counties were active geologically for a period of many millions of years. The entire period is divided into three stages: Raton, Clayton, and Capulin.

1. Raton Phase

The earliest stage of activity consisted of extensive lava flows that reached east from the vicinity of present-day Raton. These thick flows covered the Ogallala sedimentary formation—the sandstones and shales that formed the gently rolling plains surface. Because this caprock of lava was harder and more weather-resistant than the underlying rocks, it protected them from erosion. As more exposed areas of the older surface were worn down by erosion, the places capped by the Raton basalt were left standing as relatively high plateaus or mesas, remnants of the once-continuous sheet of basalt.

Johnson and Oak Canyon Mesas to the northwest of Capulin are the most prominent Raton remnants (figure 7). Immediately west of Capulin Volcano, on the promontory north of the Morrow homesite and the promontory jutting into the Cornell Ranch, remnants of the Raton Phase exist as projecting shelves, slightly lower than the mesa above.

2. Clayton Phase

The Clayton eruptions fundamentally changed the landscape, and created some of the most prominent volcanic landforms seen in the region today.

In the vicinity of the present-day park, this phase began with the eruption of Emery Peak, about 9 miles northeast of what is now Capulin Volcano. Lava flowed into and dammed the present-day Dry Cimarron River, forming a large lake near the present Village of Folsom. A series of eruptions then occurred 5 to 7 miles northeast of Capulin Volcano: the Augite Vents (on the west side of New Mexico Highway 72) and Purvine Hills (to the east) poured lava flows into the lake formed by Emery Peak.

Then, immediately below Capulin Volcano on the northeast, a series of flows erupted along a mile-long east-west-trending fissure. Mud Hill formed at its west end. This cone developed an unusual shape because of the nature of its eruption. It can be seen clearly from the road ascending Capulin Volcano. Mud Hill was breached by lava on its south side. Ripple marks and flow perimeters clearly show how the lava then turned and flowed to the east. The eruptions that occurred eastward along the Mud Hill fissure, called the Great Wall, consist of smaller cones and fissure flows.

Next, two volcanoes erupted through the mesa of Raton basalt just west of Capulin Volcano. Jose Butte, about 5 miles to the west, was the first, covering much of the mesa with new lava and building a cone that today reaches an elevation of 8,500 feet-1,000 feet above the surrounding mesa. Robinson Peak then erupted, pouring its lava over, and covering much of, the Jose basalt. It reaches an elevation of 8,200 feet. From the summit of Capulin Volcano one looks down on the mesa, with Jose and Robinson rising prominently above it in the background.

The eruption of Robinson Peak was the last event of the Clayton phase of volcanic activity. It was followed by a long period of inactivity, during which weathering and erosion modified the landscape.
3. Capulin Phase

The violent eruptions that built Capulin Volcano represent the most recent phase of volcanism in this 2,200-square-mile field. It is a classic cinder cone, consisting of the fallen pyroclastic materials forcefully ejected from the vent and piled steeply around it. In one important regard, it is different from adjacent Mud Hill. Liquid lava filled the Mud Hill cone and over-topped it, carrying away one side of the cone. In the case of Capulin Volcano, lava welling up within it forced open a vent along its western base rather than filling the cone and flowing over the rim. As a result, the cone was preserved intact, and it remains largely so today.

The lava that issued from Capulin Volcano's western base flowed in two directions, creating significant parts of the contemporary volcanic landscape. They are almost entirely within view from the Volcano Road and the summit.

One major series of flows went south, then east. It reaches almost to the present-day Village of Capulin and to U.S. Highway 64/87, east of town. It blocked the stream that flowed past the site of the village, forming the closed depression west of town. Because of the altered topography and insufficient time for erosion to cut an outlet, water does not flow out of the basin, so a lake formed west of the village.

As the lava moved, its surface cooled and hardened, while the interior stayed hot and fluid. As a result, ripple-like pressure ridges formed on top of the flows that are clearly visible to the south from Capulin Volcano. A curious landform occurred where the flowing lava broke through the surface crust. When these extrusions hardened on the generally level surface of the flow, they formed abrupt mounds of basalt called squeeze-ups, many of which can be seen in the area today.

About 1½ miles south of Capulin Volcano is an enclosed basin that was formed when a lava flow apparently separated into two lobes. The basin (on the John Morrow Ranch) comprises an ephemeral pond ringed by dramatic lava flow perimeters, which harbors remnants of an abandoned homestead.

A second major series of flows went north and northeast, reaching the base of the mesa to the west and flowing around Mud Hill and northerly on the west side of New Mexico Highway 325. One narrow tongue of the flow reached the Dry Cimarron River, where Folsom is situated today. Numerous squeeze-ups are found along the flow.

The Capulin phase (and all volcanic activity, to date) ended with a burst of activity along a 5-mile-long fissure to the northeast of Capulin Volcano. Probably simultaneously, or nearly so, three centers erupted. At the eastern end, the Purvine Hills renewed their activity; in the center, Twin Mountain erupted as an elongated cinder cone; and at the western end, Baby Capulin erupted an enormous quantity of lava that reached the Dry Cimarron just east of Folsom, and flowed some 20 miles down the valley.
H. NATURAL HISTORY / CULTURAL RESOURCES THEME REPRESENTATION

Natural and cultural thematic frameworks are intended to identify specific resource types represented in a park or potential park area, and to provide a basis for comparing potential new additions to the National Park System with other candidates and similar areas currently in the National Park System. Identified themes, along with park enabling legislation and planning documents, determine the focus of resource management and interpretation.

1. Natural History

The following natural resource themes from *Natural History in the National Park System and on the National Registry of Natural Landmarks* (National Park Service, 1990) are represented by resources within the existing park boundary.

GREAT PLAINS
I. Landforms of the Present
   3. Mountain Systems
   4. Works of Volcanism
   6. Sculpture of the Land
   12. Caves and Springs
II. Geologic History
   18. Paleocene-Eocene Epochs (Tertiary Period)
   19. Pleistocene-Recent Epochs (Quaternary Period)
III. Land Ecosystems
   23. Dry Coniferous Forest and Woodland
   25. Grasslands
   26. Chaparral (Montane Scrub)

Additional themes represented in the entire study area included:

GREAT PLAINS
I. Landforms of the Present
   1. Plains, plateaus, and mesas
II. Geologic History
   17. Triassic-Cretaceous Period
IV. Aquatic Ecosystems
   33. Streams (including intermittent streams and springs)

2. Cultural Resources

The park’s primary significance is its dynamic representation of volcanism, and relatively little study has been made of the cultural history of the park or local area. However, a general understanding of the region’s history, and a more limited knowledge of specific cultural resources in the study area suggest the presence of a number of prehistoric and historic themes and sub-themes, using *History and Prehistory in the National Park System and the National Historic Landmarks Program* (National Park Service, 1987):

I. Cultural Developments: Indigenous American Populations
   A. The Earliest Inhabitants
      19. Early Man and Late Pleistocene Environmental Adaptations
C. Prehistoric Archeology: Topical Facets
   2. Prehistoric Technology
      21. Major Contributions to the Development of Culture Histories
      22. Major Contributions to the Development of the Science of Archeology

D. Ethnohistory of Indigenous American Populations
   1e. Native Adaptations to Southwestern Environments
   1h. Native Adaptations to Plains Environments

II. European Colonial Exploration and Settlement
   A. Spanish Exploration and Settlement
      3. Southwest

X. Westward Expansion of the British Colonies and the United States, 1763-1898
   D. Western Trails and Travelers
   F. The Farmers' Frontier
   G. The Cattlemen's Empire
      1. Great Trail Drives, 1866-1885.

XIV. Transportation
   D. Overland Travel West of the Mississippi after 1840.
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.