

**general management plan
development concept plan**

May 1984



**Cedar Breaks
National Monument**

General Management Plan
Development Concept Plan

for
Cedar Breaks National Monument
Iron County, Utah

May 1984

National Park Service
United States Department of the Interior

I. FINDING OF NO SIGNIFICANT IMPACT

The selected plan outlined in this document affects less than .01 percent of the lands within Cedar Breaks National Monument. The plan provides for relocation of one structure and repair and maintenance of existing structures to upgrade operational and safety standards, for development of trails for recreational purposes, and for interpretation of the park's resources while assuring preservation of the aesthetic values. It is the conclusion of the National Park Service that the selected plan is not a major Federal action that would significantly affect the human environment, therefore an environmental impact statement will not be prepared.

Recommended:

Clay Alderson
Superintendent, Cedar Breaks National Monument

April 24, 1984
Date

Approved:

Lorraine Mintzinger
Regional Director, Rocky Mountain Region

5-10-84
Date

II. SUMMARY

Cedar Breaks National Monument is a huge natural amphitheater which has eroded into variegated pink cliffs (wasatch formation), which are 2,000 feet thick at this point. The area was proclaimed a national monument on August 22, 1933. Boundary changes occurred on March 7, 1942, and June 30, 1961. There are 6154.60 acres all in Federal ownership.

When the monument was established the early facilities available were the lodge and cabins near Point Supreme operated by the Union Pacific Railroad. These buildings deteriorated through the years and were removed in 1971. In 1937 a temporary Civilian Conservation Corps (CCC) camp was established near Sunset Point. Camp members worked on construction of the log visitor center and the caretaker cabin. The visitor center (H.S.1) and caretakers cabin (H.S.2) remain in use today. In 1959, Mission 66 funding provided construction of a maintenance building, a four unit seasonal apartment building, and a new campground with a modern restroom. In 1980, a new restroom was constructed at Point Supreme to serve the visitor center area.

Pioneer roads from nearby communities served visitor needs until 1961 when the road through the monument was realigned and an all weather surface was provided.

Cedar Breaks National Monument has experienced an increase in visitation and changes in demands and needs. Since establishment as a monument the old lodge and cabin have been removed and the areas restored to a natural condition. The visitor center, a 750 sq. ft. structure was built in 1937. Access roads and visitor use have not changed substantially since the park was established, although some road realignment and resurfacing was done in the 50's. A master plan was developed in 1966 and changes in issues have arisen. The general management plan is an update of the master plan. Issues that have been identified are:

A. The Point Supreme Visitor Contact Facility is Inadequate to Serve Visitor Needs

B. State Highway 143 and Panguitch Lake Road is Not Safe for Modern Traffic Demands

C. Limited Recreation Opportunities Restricts Visitor Use and Length of Time in the Park

A range of alternatives has been developed to respond to these issues and they include:

A. Point Supreme Visitor Contact and Administrative Facility

1. Retain as is
2. Enlarge the existing structure
3. Construct new facility

B. State Highway 143 and Panguitch Lake Road

1. Repair surface only, improve drainage
2. Resurface and realign road
3. Resurface, realign, and widen road

C. Limited Recreation Opportunities

1. Retain as is, improve Alpine Pond Trail
2. Improve existing trails
3. Improve existing trails, add Rim Trail and Forest Service trail links, improve campground facilities, and construct trail registration Kiosk at North View overlook.

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V. PURPOSE AND NEED FOR THE PLAN

A. Introduction

The general management plan sets forth the basic management philosophy for a park and provides the strategies for solving issues and achieving identified management objectives over a 10-15 year period. Two types of strategies are presented in the general management plan: those required to properly manage the park's resources, and those required to provide for appropriate visitor safety and use and interpretation of the resources. Based on these strategies, programs, actions, and support facilities necessary for efficient park operation and visitor use are identified. Throughout the planning effort, the park is considered in a regional context that influences and is influenced by it.

The current Master Plan for Cedar Breaks National Monument was approved in 1966. Since that time annual visitation has risen from approximately 150,000 in the mid-60's to 408,875 in 1981. The dramatic rise in visitation has increased pressures on the park facilities. Nonpark traffic traveling through the park to reach the developing Brian Head Ski Area and Panguitch, and the natural aging and weathering process have created several road related issues that need to be resolved. Long range planning through the general management plan process will enable the National Park Service to develop alternatives to the following issues. This will enable the park to meet increasing demands while protecting the natural resources for which the park was created and provide a high quality- and safe-visitor experience.

B. Legislative and Planning History

In 1905, the Cedar Breaks National Monument geologic amphitheater area was included as a part of Sevier (now Dixie) National Forest and administration was provided by the Department of Agriculture, National Forest Service.

Cedar Breaks National Monument was established by Proclamation Number 2054 (40 Stat 1705), President Franklin D. Roosevelt August 22, 1933, under authority of the act of Congress approved June 8, 1906 (34 Stat 225), known as Act for the Preservation of American Antiquities and the Act of June 4, 1897 (30 Stat 34).

The documents which the park currently use are the General Development Plan, approved in 1966; the Resource Management Plan, updated in 1983; the Statement for Management, approved January 20, 1982, and the Statement for Interpretation approved in 1983.

The monument is in Utah's first congressional district.

C. Influences on Management

1. Legislative and Administrative Constraints

The enabling proclamation forbids the appropriation, injuring, destroying, or removal of any feature of the monument and forbids settling or locating by unauthorized persons.

Cedar Breaks National Monument is administered under proprietary jurisdiction.

Cedar Breaks National Monument is designated as a Federal Fee Collection area, but entrance fees are not collected. Campground user fees are collected. Authority for campground fee collection is derived from the Land and Water Conservation Fund Act of 1965 (86 Stat 461).

Special Use Permits:

a. Utah Power and Light Company provides a 12.47-KV electric powerline from the campground through the monument to serve Brian Head Ski Area and other landowners in the vicinity (Sp 1360-6-0001).

b. Mountain States Telephone Company provides telephone service for Cedar Breaks National Monument.

Contract:

Utah Power and Light Company provides electrical services to Cedar Breaks National Monument.

Memorandum of Agreement:

A Memorandum of Agreement between Iron County, Utah, Sheriff's Office and the National Park Service, Cedar Breaks National Monument, allows for deputization of qualified National Park Service personnel as special deputies for enforcement of State and local laws and ordinances within Cedar Breaks National Monument. The National Park Service will provide emergency assistance upon request from Sheriff's department.

A Memorandum of Agreement between Iron County, Utah, and the National Park Service, Cedar Breaks National Monument, allows Iron County to assume liability for maintenance costs incurred as a result of snowplowing activities of roads in the park. The agreement also specifies Iron County as responsible for safety of road users. A total of approximately 1.38 miles of road in the park will be snowplowed and maintained by personnel from Brian Head Ski Area. On 1.0 miles of Utah 143 and .38 miles of the Panguitch Lake road snow removal will be done to provide access for local labor and for access to U.S. Highway 89.

Memorandum of Understanding:

Forest Service, Dixie National Forest, agrees to haul solid waste material from Cedar Breaks National Monument to an approved landfill outside the park on an actual cost basis.

2. Regional Influences

With the exception of 120 acres of private property in multiple ownership, running south from the Panguitch Lake road for approximately 3/4 of a mile adjacent to the monument's east boundary, all land adjoining the monument is administered by Dixie National Forest. Presently, only a few summer cabins are located on this private property. Future development of this area could affect aesthetic values of the adjacent monument.

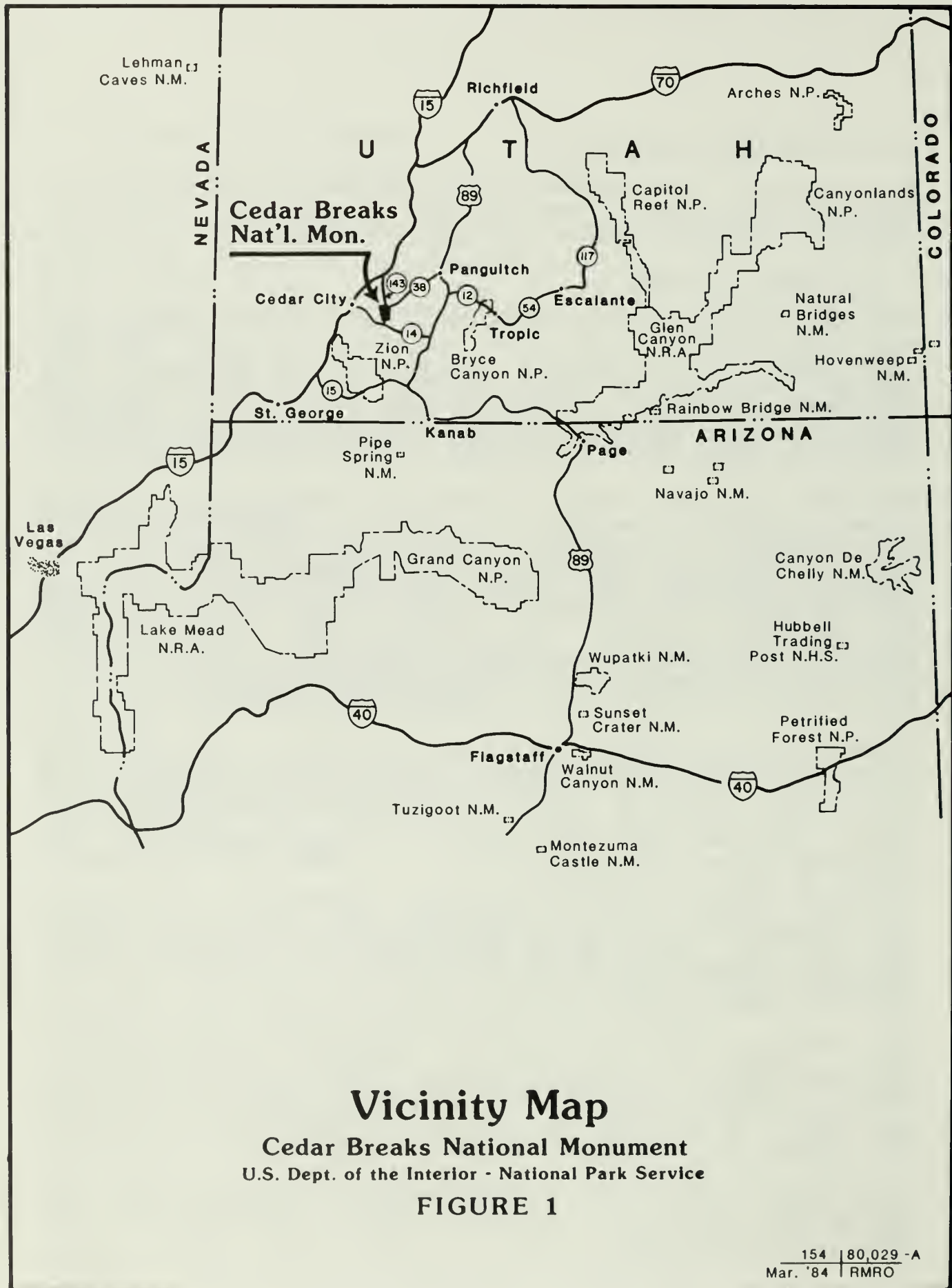
Management of Dixie National Forest is based on a multiple-use concept. Timber harvesting in the immediate monument vicinity is not extensive. Harvesting is restricted to mature and over mature trees on a 25-year cycle. Presently there are no agreements between Cedar Breaks National Monument and Dixie National Forest to restrict or confine timber harvesting along the monument boundary. The sparse timber along monument boundaries has thus far resulted in no harvesting within 1/4 of a mile of the boundary. Location of previously harvested areas has not detracted from the scenic values of the monument.

Livestock grazing (sheep) is allowed by permit on Dixie National Forest lands, and animals graze to the monument boundary on the north, east, and south. While trespassing of grazing animals has been greatly reduced by cooperation of livestock owners in recent years, continued patrols are necessary to insure against it. Lay down fencing was completed in the fall of 1983. There are cattle guards at each road entrance.

The national Forest Service Ashdown Gorge Proposed Wilderness Area (No. 253), consisting of 7000 acres, lies to the west of and adjoins the lands proposed for wilderness designation in Cedar Breaks National Monument.

Deer hunting, both bow and rifle, is extensive on National Forest lands adjacent to the monument. Boundary patrols must be increased during hunting seasons to insure protection of the wildlife within the monument. In the past, evidence of poaching was found. In 1982 two individuals were arrested and convicted of poaching within Cedar Breaks National Monument.

Snowmobile use adjacent to the monument is a popular activity. During the winter months, the unplowed monument roads are available to snowmobiles.



There are private summer homes to the east and northeast, within 2 miles of the monument boundary. These private homes are located on private property. Land use on this National Forest inholding is not regulated by forest service planning. The Brian Head Ski Resort is 2 miles north. Continual growth of this area would result in additional visitor use of the monument. Winter usage, such as snowmobiling, cross-country skiing, and snowshoeing would be the most noticeable additions. If such winter activities continue to increase, then additional manpower will be required to insure protection of the environment and safety of visitors.

Air quality at Cedar Breaks National Monument may be affected by coal fired power plants in southeastern Nevada as well as by the transport of pollutants from as far away as Los Angeles. Some air quality monitoring has been conducted in the Cedar Breaks area, but the information from the study was insufficient to establish baseline data or to determine the existence of air quality deterioration. Visibility monitoring is being conducted at two nearby class I areas - Bryce Canyon and Zion National Parks.

State Route 143 connects the monument with U-14 to the south and I-15 at Parowan to the north. County Collector Road 38 (Panguitch lake road) runs east to Panguitch Lake and US-89 at Panguitch. Local recreational traffic from Cedar City to the Panguitch-Bryce Canyon area has increased since the paving of the Panguitch Lake Road in the fall of 1974. There is pressure from local business interests (Brian Head and Panguitch lake) to keep park roads open during the winter.

Airports are located at Parowan and Cedar City, with Cedar City served by one commuter airline. Regional transportation facilities (rental cars and bus tours) appear to be adequate within the area to serve the needs of park visitors.

3. Within Park Influences

Monument visitation continues to fluctuate due to weather conditions and availability of gasoline. Trends show increased traffic but decreased use of the campground and visitor oriented activities. Visitation in 1982 is an 11.8 percent decrease over 1981. Campground use increased by 19.5 percent, but was still below recorded usage from 1975 through 1978.

Visitor use is mostly seasonal with over 90 percent of traffic between mid-May and October.

The average visitor stay is short--estimated at 2 hours. Two improved trails are well used. However, the bulk of use is fairly passive consisting of viewing the geologic amphitheater at overlooks (readily accessible from parking lots), photography,

viewing wildflower displays in meadows, and wildlife observation. The visitor center received more than 50,000 visits in 1981. Visitors are counted on a person by person basis by seasonal personnel.

Each year volunteers, through the Student Conservation Association and other work assistance programs such as Comprehensive Employment Training Act (CETA), assist in interpretation and maintenance activities.

Overhead power and telephone lines within the monument are located in the developed area and natural zone of the monument. In their present location, they detract from the scenic attractions of the monument, and are a safety consideration.

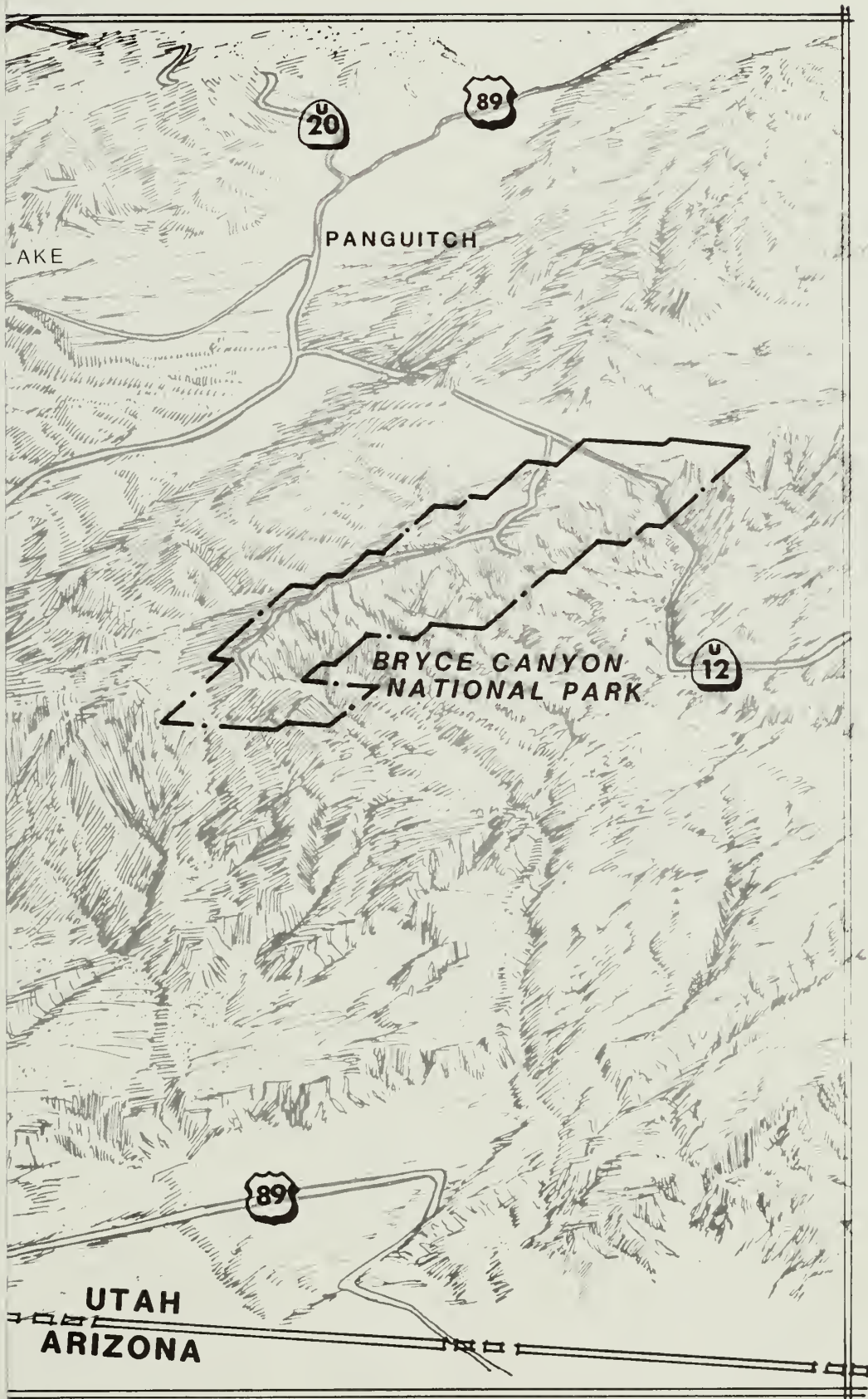
Mule deer populations which have decreased drastically in the past are currently increasing. While summer populations previously numbered in the hundreds, the current summer population probably does not exceed 100, based on National Park Service observation and statistics provided by Utah Division of Wildlife resources. Reasons for the decline of the deer population in Southern Utah have been attributed to severe weather during winter and spring months, low fawn births, and a continual loss of suitable deer habitat. The loss of habitat is attributed to commercial and residential year-round development. The Utah Division of Wildlife Resources is continuing management practices to increase the area's mule deer population. Results of these efforts have had a beneficial effect on the transient herd within the monument. An influx of elk has also been noted in areas surrounding the park in recent years.

Certain park facilities are inadequate to meet present needs. The visitor center and employee residence cabin, built in 1938, are deteriorating and should be restored. The visitor center cannot serve the increasing number of visitors adequately due to lack of space available for evening programs, exhibits, etc. Roads in the monument are narrow and substandard. Requests have been submitted for funding of these deficiencies.

Prior research on the monument's natural and cultural resources is inadequate in providing the knowledge needed for planning and management decisions. Needed research programs have been proposed and submitted for funding.

A historic survey of the monument has been completed and the results are currently being drafted. Historic structures include the visitor center (H.S.1) and employee cabin (H.S.2)(caretakers cabin).

Ashdown Creek is the only perennial stream in Cedar Breaks National Monument. The area surrounding this creek is located within the (geological) amphitheater and not suitable for



REGIONAL OVERVIEW

U.S. DEPT. OF THE INTERIOR - NATIONAL PARK SERVICE

FIGURE 2

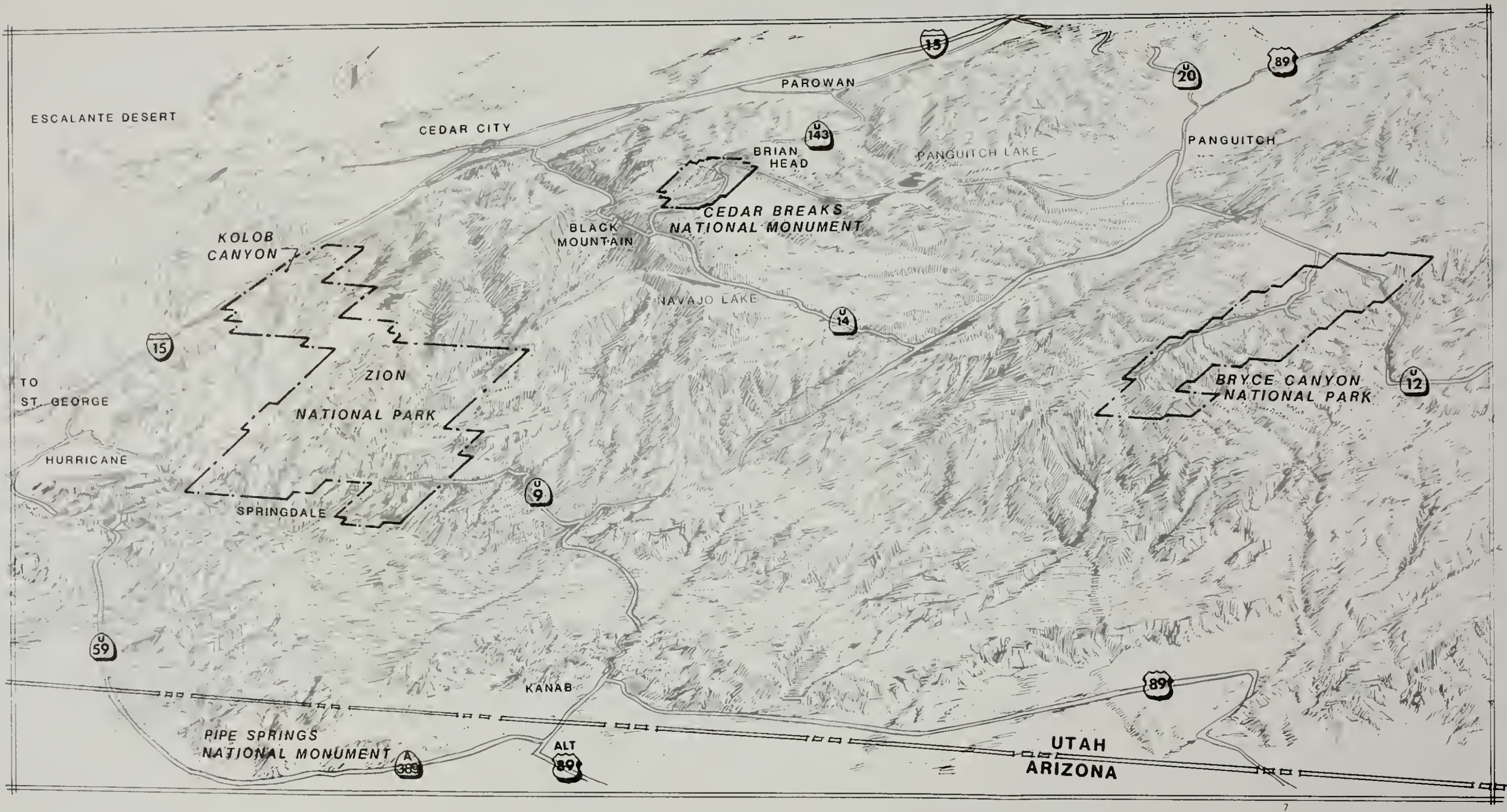


FIGURE 2

development. Therefore, no further compliance or studies need to be done for E.O. 11988 (Flood Plain Management) and E.O. 11990 (Protection of Wetland Habitats). A Water Resource Management Plan for the monument is needed to bring the park into compliance with existing policies and requirements on the National and State level.

D. Park Purpose and Management Objectives

Park Purpose

The purpose of the monument as stated in Proclamation number 2054 is "* * * include said lands within a national monument for the preservation of the spectacular cliffs, canyons, and features of scenic, scientific, and educational interest contained therein * * *."

MANAGEMENT OBJECTIVES

Natural and Cultural Resource Management

To preserve the spectacular cliffs, canyons, wildlife, and other features of scenic, scientific, education, and cultural value within Cedar Breaks National Monument.

Visitor Use and Safety

To encourage year-round use of the monument and to foster public appreciation and understanding of the park's cultural, geological, and scientific values through the provision of adequate interpretive and information facilities.

To increase visitor awareness of the hazards associated with hiking, snowmobiling, and other visitor use activities within the monument.

Management, Administration, and Support

The park strives to work cooperatively with all Federal, State, local governments and agencies, and private interests to reduce the adverse effects on the park's resources and setting caused by mining, livestock grazing, hunting, timber harvesting, power plants, and other uses and developments within the area surrounding the park and to encourage educational uses of the park's resources through cooperative efforts with schools and interested groups.

E. ISSUES

Following is an identification of the issues and general summary of existing conditions.

1. Visitor Contact and Administrative Center and Viewing Area, Point Supreme

The existing visitor center (H.S.1) was built as a CCC project in 1938 when annual visitation was 22,500. Since that time the building has been a focal point of visitor activity in the park. This structure serves as a sales area for the Cooperating Association, interpreter's office, museum exhibit, audiovisual room, rim view room, and general information center. All of this is currently accomplished in a 750 square foot, three-room log structure. The shortage of available space in the existing visitor center makes it difficult to accommodate the increased visitor use in an efficient manner.

The present log structure is on the National Register of Historic Places.

The presence of development and concentration of visitors on Point Supreme has accelerated the rate of soil erosion due to concentration and channelization of water. (For more information, refer to Appendix A, Geologic and Hydrologic Analysis of the Proposed Development Zone, Cedar Breaks National Monument.) Approximately 4 inches of soil from the rimside of the visitor's center has eroded away from the foundation. In addition a 4-foot deep notch has formed about 10 feet west of the visitor's center and is eroding more rapidly than the cliff face.

Access into the existing visitor center by handicapped persons is severely hampered by a door sill, a 36-inch wide entrance door, and an extremely narrow concrete ramp to the entry porch. The access path to the viewing area is dominated by the "buck and rail" fence, which interferes with views from the level of the wheelchair.

2. State Highway Route 143

In 1923, Iron County built the road that is now State Route 143 which runs north and south from the town of Parowan to State Highway 14. The road within the park boundary is 6.01 miles (9.7 kilometers) long with a .38 mile (.6 kilometer) segment of Panguitch Lake Road that extends from the Panguitch Lake junction east to the park boundary. The road is narrow and subgrade preparation and drainage is inferior. The road is substandard since it was designed only for passenger cars, light weight vehicles, and for summer use only.

Heavy construction traffic has increased, passing through the monument enroute to the developing Brian Head Ski Area. In addition, an increased number of bus tours have been visiting the monument.

The road has received minimal routine maintenance. It was chipped and sealed in 1976.



CEDAR BREAKS NATIONAL MONUMENT, UTAH

REGIONAL INFLUENCES

- A-BRIAN HEAD SKI AREA
- B-ASHDOWN GORGE
- C-DIXIE N.F. PROP. WILDERNESS
- D-CEDAR BREAKS WILDERNESS
- E-DIXIE N.F. SNOWMOBILE ROUTE
- F-RATTLESNAKE TRAIL (N.F.)
- G-HANCOCK PEAK TRAIL
- H-STATE HIGHWAY 143
- I-STATE HIGHWAY 14
- J-BLACK MTN. SKI AREA (PROP.)
- K-U.S.F.S. CAMPGROUND
- L-PRIVATE OWNED LAND
- M-U.S.F.S. GRAZING LEASE AREA
- N-U.S.F.S. WINTER PLAY AREA
- P-BLOWHARD MTN.(FAA)

FIGURE 3

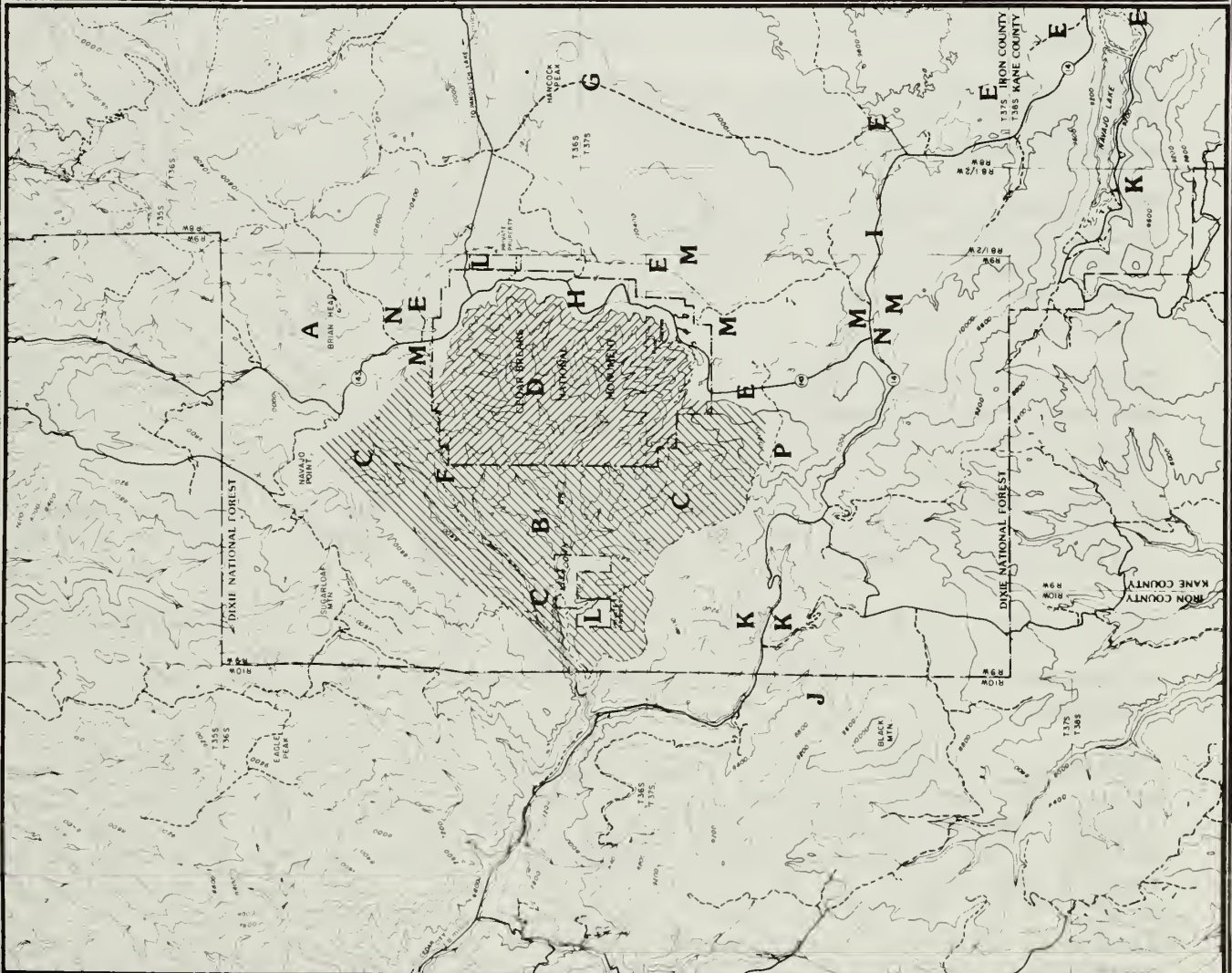
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LEGEND:

NOTE: Map base is USGS
SCALE: distance shown on level



UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE



As a result the inferior subgrade conditions, poor drainage, and increased flows of heavier and wider vehicles, the road is rapidly deteriorating thereby creating serious safety and maintenance problems.

The National Park Service is responsible for maintenance, rehabilitation, and operation of the section of Utah State Highway 143 and a short portion of the Panguitch lake road, which is in the park.

The roads in Cedar Breaks are subject to heavy snowfall due to its 10,000+ elevation. Areas along/adjacent to the rim are in a snowdrift zone. Snowdrifts in these areas can often be as much as 20 feet deep, which makes snowplowing difficult, and are a source of danger to road users during the winter months.

3. Trails

There are two trails in the park; the Wasatch Ramparts Trail, and the Alpine Pond Trail. None of these trails are designed to accommodate handicapped persons.

The Wasatch Ramparts Trail is a 2-mile (3.2 kilometer) trail from Point Supreme to Wasatch Ramparts via Spectra Point along the rim of the amphitheater. Trails have branched out from each of the overlooks creating an informal but unconnected rim trail from North View overlook to the existing Wasatch Ramparts Trail.

The Alpine Pond Trail is a 3-mile (4.8 kilometer) selfguiding nature trail between the Chessman Overlook parking area and the Alpine Pond parking area. The Alpine Pond Trail brochure guides visitors through the trail referring to color coded markers. The markers have been a constant target for vandals. They have been defaced, removed, or--in some cases--relocated. This causes considerable confusion and frustration for trail users.

The Alpine Pond Trail leads visitors 200 yards from the Chessman Overlook parking lot to a stand of bristlecone pines, an attraction for visitors who require easy access to this unique feature.

There is a demand from park visitors for longer trails in the area. Presently, there are no trails from the rim to the bottom of the amphitheater due to the steep topography and unstable soils. Two opportunities exist to tie National Park Service trails to points on National Forest land. The first would be a trail from the North View overlook northwest to connect to the National Forest Rattlesnake Canyon Trail. The trail leads southwest just west of the monument boundary, crossing Ashdown Creek. A spur trail could reenter the monument near Blowhard Spring at the head of Shooting Star Canyon.

The second trail option is to construct a new trail, east from the campground to Hancock Peak. The Forest Service has indicated an interest in these two proposals.

Point Supreme is the focal point of visitor activities throughout the year and primarily during the summer months. The viewing area is located on the rim of the amphitheater with 1,000-foot dropoffs on two sides. Originally the area was designed so that visitors could drive to the point and observe from their vehicles. Logs were placed at the edge to prevent cars from going off the rim. Presently, day use is limited to pedestrian access. Considering the potential for accidents along the canyon rim, visitor safety is a primary consideration in redesign of the Point Supreme attraction. Impacts to the area can be limited by channeling visitor use through facilities designed to insulate the resources. The visitor must be guided along established trails and encouraged to participate in environmental recovery.

A depression occurs in the center of the paved viewing area and along a path at point supreme. The runoff from the asphalt combined with the runoff from a steep hill to the south collects in this low point causing an unnatural concentration of water. This is a concern from the standpoint of both erosion and aesthetics.

4. Seasonal Housing

Seasonal housing is provided for by adaptive use of the "caretakers" cabin. This log cabin structure (H.S.2) was built in 1938 and has received only routine maintenance since then.

The structure, in addition to exterior renovation and preservation, needs interior work. The electrical system is unsafe and the windows and doors are not tight. In general, the building is not efficient and is rapidly deteriorating structurally. Requests for funding have been submitted for renovation of this structure.

Additional seasonal housing is located near the maintenance area. The building contains two efficiency apartments and two 1-bedroom units and is occupied during the summer months by seasonal employees. The building has not been landscaped. An archeological site was disturbed by construction of the building, and a dense concentration of lithic debris surrounds the front and side of the building. Landscaping would further destroy the archeological site.

5. Visitation Season

An increasing new source of visitation is from bus tours. This brings many older persons and international visitors. A rapidly

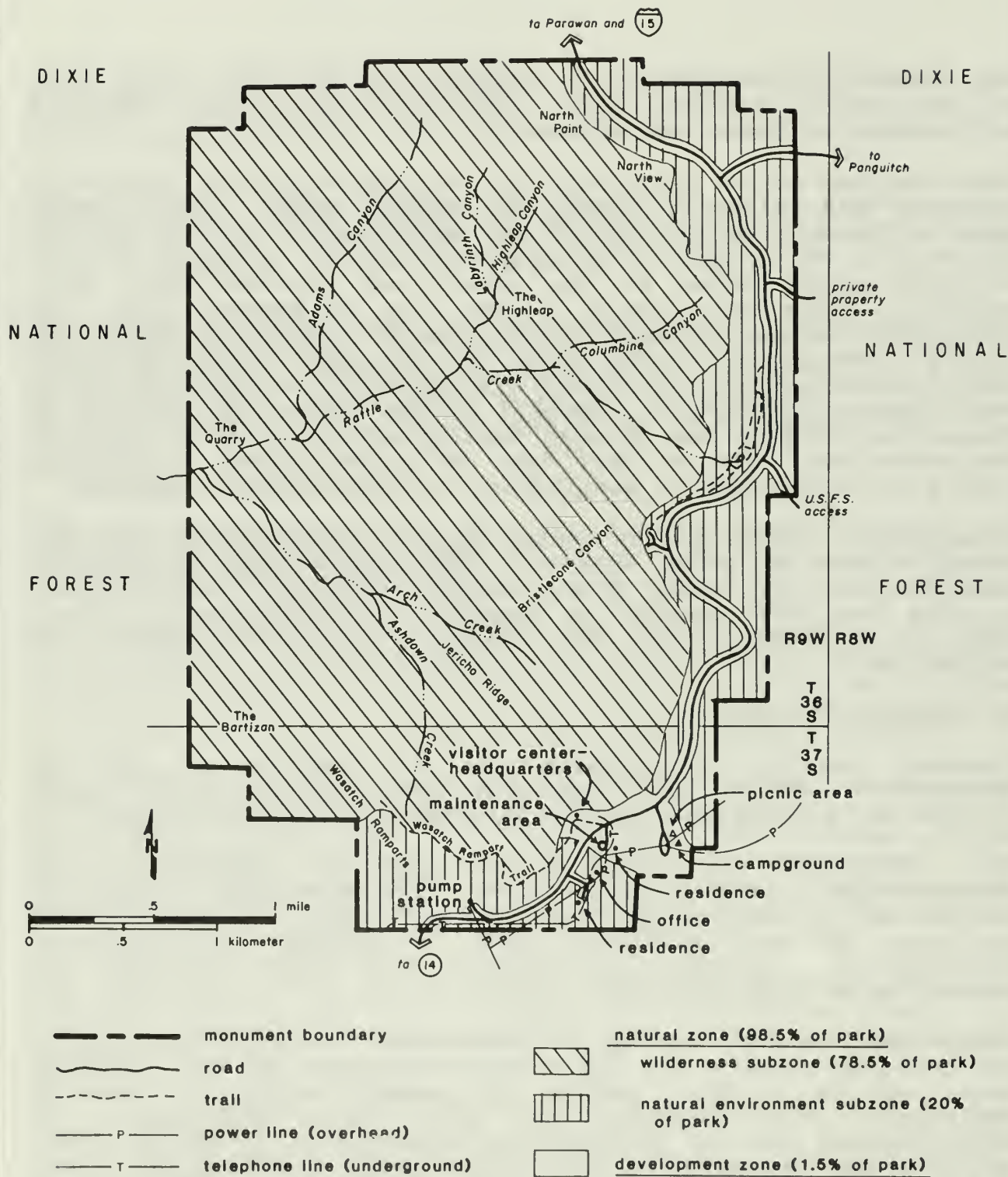


FIGURE 4 Existing Management Zoning Map

Cedar Breaks National Monument - Utah
U.S. Dept. of the Interior-National Park Service

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Mar. '84 | RMRO

increasing segment of visitors arrives in the fall after Labor Day to view the spectacular fall color.

A study should be made to determine the costs associated with keeping the park open approximately 5 weeks longer than the traditional season. Perhaps an increased awareness of an extended season by tour companies and the general public would increase visitation during this period.

6. Picnic Area

The picnic area is located adjacent to the campground near the Point Supreme area. There are 10 picnic sites, an open field, and paved parking for 10 cars. There are no facilities for the handicapped. The picnic area is within the northern end of a large and diffuse archeological site that also encompasses the campground.

7. Campground and Ampitheater

The campground is designed as a loop with 29 individual sites, one group site, and a comfort station located in the middle. Many of the parking sites are not on level ground making it difficult to level a recreation vehicle, camper, or trailer. Few of the sites have level spots for pitching tents. The overhead powerline which passes through the park bisects the campground. The restroom and path leading up to it should be made handicapped accessible. The campground restroom facilities are currently inaccessible to the handicapped. The entrance doors are too narrow to admit most wheelchairs. None of the restroom stalls are large enough nor are they equipped with grab bars. Modifications should be made where possible in accordance with Public Laws 90-480, Architectural Barriers Act of 1968, and 93-112, Rehabilitation Act of 1973. A request for funding has been submitted for this project which includes the restroom and the access paths.

Evening interpretive programs are usually held at the amphitheater located near the campground loop. Currently, there is no sign to direct visitors to the amphitheater. Only an informal unimproved path leads to the area. Most of the interpretive programs conclude after dark and the walk back to the campground may be hazardous.

8. Private Adjacent Ownership

Cedar Breaks National Monument is surrounded by the Dixie National Forest with the exception of 120 acres near Panguitch Lake road to the east. Access to the summer cabins located on this property is via a short dirt (.2 mile) road leading east from Highway 143 to the park boundary. The present cabins are not visible from Highway 143. Development of this property could

significantly impact the visual resources of this portion of the rim drive.

9. Overlooks

There are six developed overlook points in the park: Wasatch Ramparts, Spectra Point, Point Supreme, Sunset View, Cheesman Ridge, and North View.

Wasatch Ramparts Overlook

Access to the overlook is by foot via the Wasatch Ramparts trail. The area is sparsely vegetated with bristlecone pines. This overlook receives less visitation than the overlooks near the rim that are accessible by car with only a short walk. Logs are placed on the ground near the rim edge to provide a limited barrier and warning to visitors to this overlook. New barriers should be designed and installed that are compatible with the environment. The design should consider runoff and aesthetics to provide visitor safety, avoid excessive erosion, and provide visitors enhancement of the views.

Spectra Point

Access to this point, is also by foot via the Wasatch Ramparts Trail. With the exception of several of the oldest bristlecone pines in the park, the area is sparsely vegetated. This is due to a combination of the heavy clay soils and the constant exposure to wind, rain, and snow. Large logs that have been placed on the ground at the rim edge as barriers for visitor protection have deteriorated. The design considerations for the Wasatch Ramparts overlook apply here also.

Point Supreme (viewing terrace)

The visitor's center and park headquarters are located here. The asphalt path and viewing area on the point are the remains of an old road. This serves as a catch basin for rainwater runoff as well as being aesthetically displeasing.

Sunset View

A short trail from the parking pulloff leads the visitor to a rock platform viewing area. The soil around the base of the platform is eroding away and should be stabilized. About 2 feet from the base are drainpipes. The concentration of runoff from the drainpipes is accelerating erosion of the surrounding soil.

Visitors often walk around the bases of the platform and onto the points. This causes a concern for visitor safety as well as resource protection from soil compaction and erosion.

Chessman Ridge

The parking lot also serves as a trailhead for the southern portion of the Alpine Pond self guiding nature trail. As with the Sunset View overlook, the handicapped access ramp is inadequate and should be replaced.

North View

This overlook is accessible from a parking lot. The pathway is paved; however, the paving is marked by the years with bumps and weathered areas. The path is accessible to handicapped and elderly persons. Some minor repair is needed. The handicapped access ramp is inadequate and should be redesigned and replaced. The viewing platform is uneven. Depressions of surface wear and compaction due to the large visitor use have created large areas that exhibit standing water after rain.

This area is the closest access to the Rattlesnake Canyon Trail. The area is a likely beginning point for overnight hikers. A hiker registration station with information and interpretation materials could be located in this area.

VI. DESCRIPTION OF THE PARK AND ENVIRONMENT

A. Region

1. General

The southwestern corner of Utah and the adjacent States of Nevada, Arizona, and New Mexico provide a wide range of activities and encompasses some of the most scenic canyon country in the United States. This region abounds in natural, cultural, and recreation attractions such as Bryce Canyon, Grand Canyon, and Zion National Parks; Glen Canyon National Recreation Area; Cedar Breaks and Pipe Spring National Monuments; and Kiabab and Dixie National Forests.

Cedar Breaks National Monument is located on the western edge of the rolling green alpine meadows atop southern Utah's Markagunt Plateau. This area is in the southwestern section of the Colorado Plateau physiographic province.

2. Regional Development

Proposed energy-related development, in the Ashdown Gorge area, west of the monument and recreation development (year-round) is slowly moving into the region with expansion of facilities at Brian Head Ski Area 2 miles north of the monument and proposed development of Black Mountain Ski Area, which potentially increases levels of construction related activities. In conjunction with these areas, roads, power transmission lines, and vehicles will become an increasing reality.

According to county and State projects, there could also be as much as a 30 percent increase in population as a result of the many jobs which energy-related and recreation-oriented industries create. In areas that have population increases related to such developments, many of the existing communities, such as those near Bryce Canyon National Park, have experienced sudden uncontrolled growth of totally new trailer type communities. These "boom-towns" could mushroom overnight in nearby areas. Population growth could create increased demand for recreation activities in this area which could impact Cedar Breaks National Monument.

The impacts associated with these energy and commercial recreation developments include socioeconomic and environmental. Socioeconomic impacts include inflation and rapid population growth. Environmental impacts are demonstrated by loss of vegetation and wildlife, and degradation of air quality. Visual aesthetic values are degraded by transmission lines, air and noise pollution, and visual scars on the land. Both surface and subsurface water is needed for energy and recreation development and pursuits. Many of these impacts could directly affect Cedar Breaks National Monument due to its central location.

Air quality at Cedar Breaks may be affected by secondary emissions emanating from the possible development of the Alton coal field near Bryce Canyon National Park and the subsequent construction and operation of coal-fired power plants in Utah and in nearby Nevada.

3. Population and Growth

The five county region is small rural town in character. The 1970 census shows a population of 35,224 for the five counties. In 1980 estimates by Utah Department of Employment Security shows the five county population at 55,346, an increase of 57.1 percent.

4. Socioeconomics

This area of the State is in an economic transition. Historically the economy centered around small-scale farming, ranching, logging, and mining the remnants of which are still visible today. However, improved access specifically along Interstate 15 and Interstate 70, has attracted an increasing number of vacationers from once-remote metropolitan centers such as Los Angeles, Las Vegas, Salt Lake City, Denver, and Phoenix. Tourism has begun to dominate the regional economy. Indicative of the changing economy is the fact that St. George and Cedar City, this region's major urban centers, have both recorded economic upswings, in part the result of enterprise evolved to serve the need of park visitors. The concern that the tourist industry presents to the counties is that it is highly seasonal and therefore, does not present a consistent year-round economic base and employment opportunity for local residents.

B. Park

1. General

The natural resources at Cedar Breaks National Monument are the reason for its establishment. Visitors are attracted to the 55 million year old multicolored geologic amphitheater. Plants and animals are a secondary attraction. Located in this area are 1600 year old bristlecone pines and diverse wildflowers along with mule deer, marmots, ground squirrels and pikas, and a wide range of bird life which include the golden eagle.

2. Location and Access

Cedar Breaks is the hub of a 200-mile circle--the Golden Circle of the southwest--containing Utah's five national parks; Zion, Bryce Canyon, Capitol Reef, Canyonlands, and Arches; and Glen Canyon National Recreation Area; Natural Bridges National Monument; Pipe Springs National Monument; Dixie and Fishlake

National Forests; and numerous State parks, reserves, and recreation areas.

Cedar Breaks National Monument is located on the Markagunt Plateau in southwestern Utah in Iron County between Bryce Canyon National Park and Zion National Park. Access from Cedar City (23 miles west) is via State Highway 14 to State Highway 143, from Panguitch (16 miles north) is via State Highway 143, and from Panguitch (17 miles northeast) is via County Collector Road 38 (Panguitch Lake Road).

Cedar City is served by Sky West Airlines as well as commercial bus lines. Rental cars are available in Cedar City. Color Country tours in Cedar City provides bus tours to Cedar Breaks and other southwest Utah points of interest.

3. Existing Land Management and Use

a. Natural Zone

The majority of the monument's 6,154.6 acres is classified as a natural zone composed of a wilderness subzone and a natural environment subzone. In these subzones, the natural resources and processes have remained largely unaltered by human activity except for the approved developments essential for management activities and visitor use. Development is absent in the wilderness. Development is marginal in the natural environment subzone and includes dispersed recreation facilities, such as interpretive facilities, and unpaved interpretive hiking trails.

(1) Wilderness Subzone

Approximately 78.5 percent of the monument lands (4,830 acres) have been officially recommended for inclusion to the wilderness system.

The wilderness subzone contains the land and water now being considered for wilderness designation. The lands are managed to protect wilderness values in accordance with wilderness management policies.

(2) Natural Environment Subzone

Approximately 18.8 percent of the monument lands (1,160 acres) fall in this classification.

The natural environment subzones are lands that are managed to provide environmentally compatible recreational activities based upon and protective of the environment.

b. Development Zone

Approximately 2.7 percent of the monument lands (165 acres) are in the development zone.

This zone includes land and water where park development and intensive use have altered the natural and cultural environment. This zone is managed to provide and maintain development that serves the needs of park management and relatively large numbers of visitors. Aggregations of buildings, parking lots, service roads, and utilities have been included in this zone along with park roads and the overlook points. The development zone has been restricted to the smallest area necessary to accommodate existing or proposed development and use.

4. Climate

The park visitor use season is determined by weather. The climate at this 10,000-foot altitude is subject to heavy snowfall, strong winter wind and generally cold temperatures.

The visitor season begins in June and extends through September. Winter use in the park includes cross-country skiing and snowshoeing. There are no park personnel on duty during the (off season) winter at the park. However, personnel from Kolob Canyon Administration Office make weekly or periodic checks throughout the winter.

The subalpine location is subject to a wide variety of temperature extremes.

AVERAGE TEMPERATURES AT CEDAR BREAKS NATIONAL MONUMENT

Weather

Temperatures

Extreme temperatures: Averages of highest highs and lowest lows for the last 10 years.

	H	L		H	L
January	45	-16	July	69	40
February	42	-05	August	68	34
March	46	-05	September	61	23
April	47	02	October	56	06
May	57	12	November	46	02
June	66	22	December	44	-07

CEDAR BREAKS NATIONAL MONUMENT, UTAH

EXISTING DEVELOPMENT PLAN



VICINITY MAP

MANAGEMENT AREA

Point Supreme Development Zone

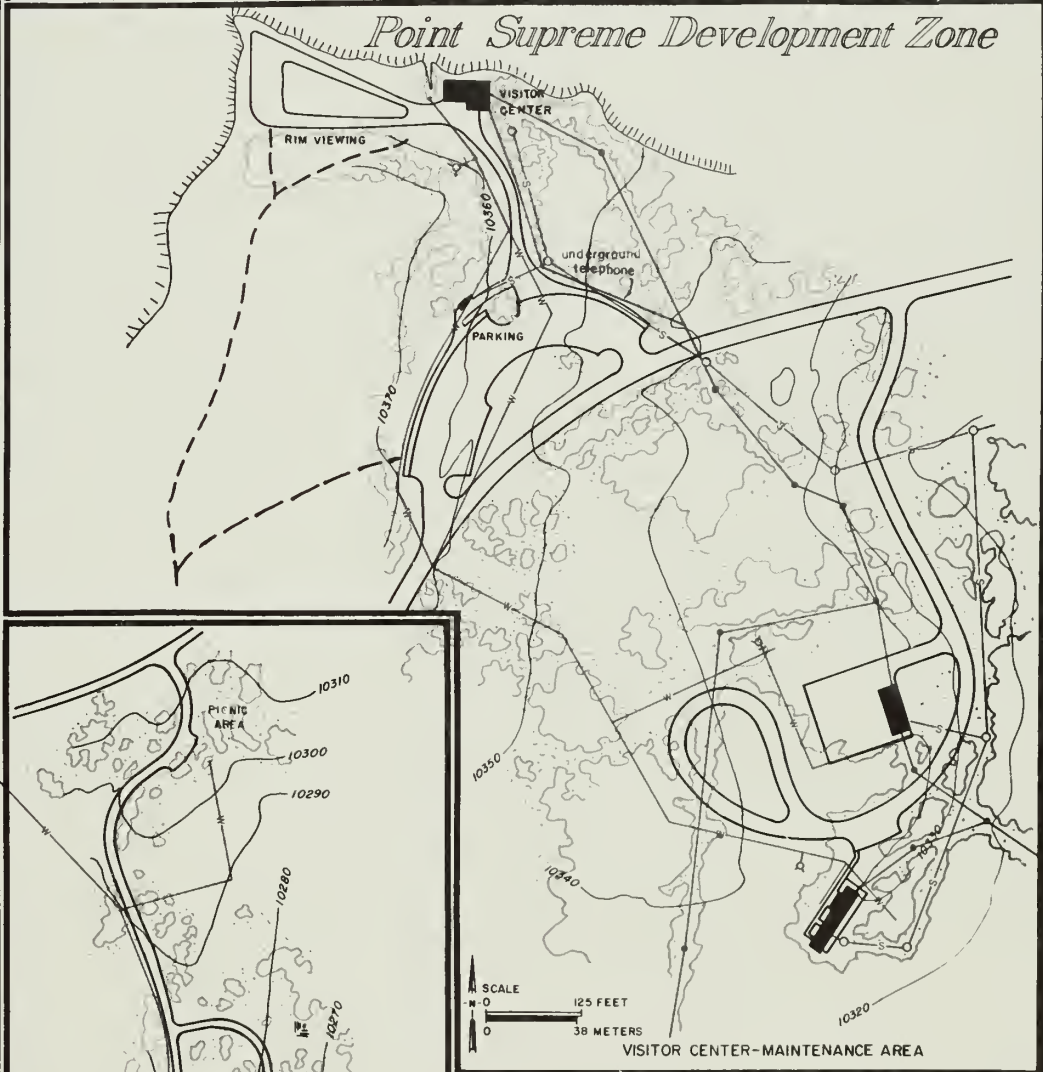
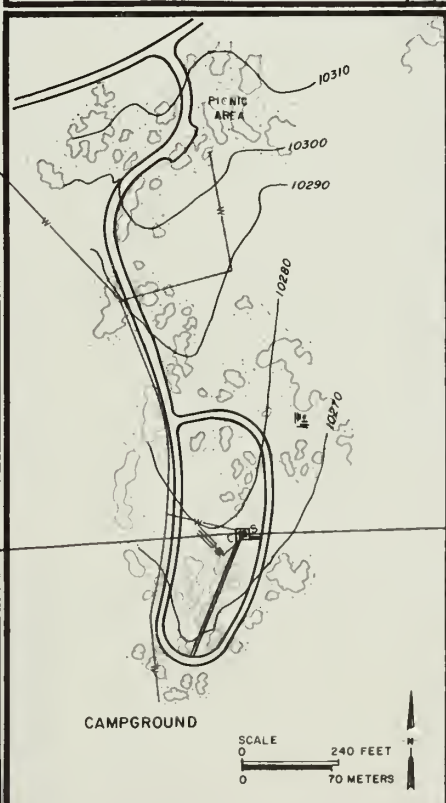


FIGURE 5

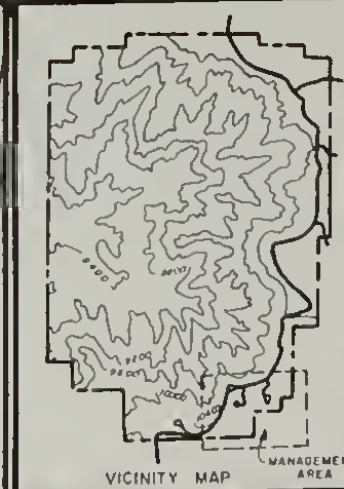
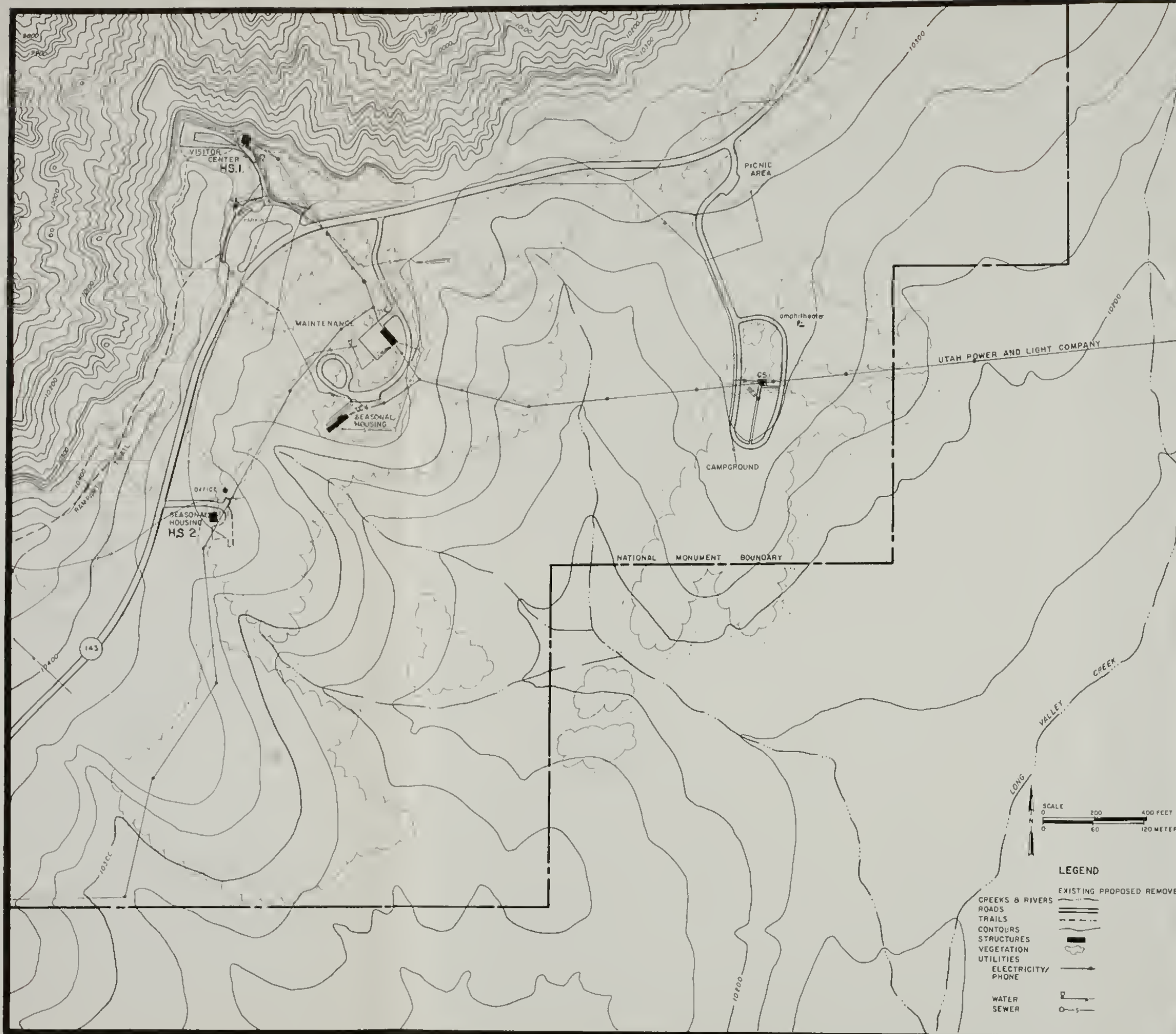


CAMPGROUND

SCALE
0 240 FEET
0 70 METERS

UNITED STATES DEPARTMENT OF THE INTERIOR/
NATIONAL PARK SERVICE

REVISIONS	DATE	DRAWN BY: McHarr/Miles
		DESIGNED BY: Miles
		CHECKED BY:
		DATE: SEPTEMBER, 1982
		DRAWING NO.: 154 / 80,021



CEDAR BREAKS NATIONAL MONUMENT, UTAH

EXISTING DEVELOPMENT PLAN

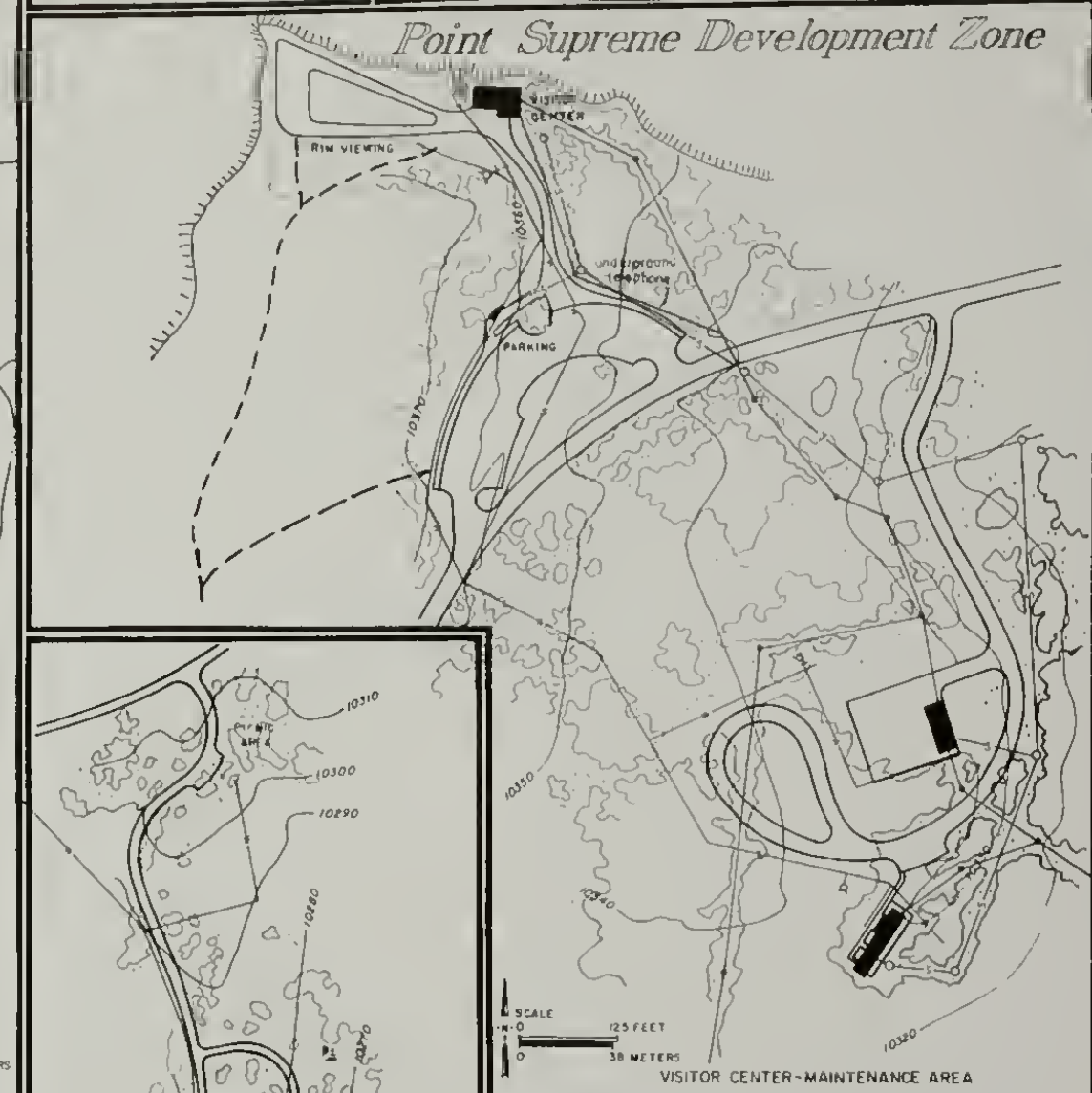


FIGURE 5

UNITED STATES DEPARTMENT OF THE INTERIOR/
NATIONAL PARK SERVICE

REVISIONS	DATE	DRAWN BY: McMen/Miles
		DESIGNED BY: Miles
		CHECKED BY:
		DATE: SEPTEMBER, 1982
		DRAWING NO.: 154 / 80,021

Average Rainfall (Over last 10 years)

	<u>Inches</u>
January	3.36
February	2.83
March	3.14
April	4.79
May	1.54
June	1.17
July	2.19
August	2.78
September	1.93
October	1.44
November	2.99
December	3.90

5. Flora and Fauna

The monument is well known for an abundant and colorful display of subalpine wildflowers. These include the marsh marigold, columbine, larkspur, Indian Paintbrush, lupine, and many more. There are also a variety of pine, spruce, and aspen located within the monument. The rim is particularly spectacular with examples of bristlecone pines some of which are estimated to be over 1,650 years old. There are four plant species in the park identified by the Utah Native Plant Society as being endangered. The identified plants are: Draba subalpina, draba; Cymopterus minimus, wild parsley; Eriogonum panguicense, Panguich Buckwheat; and Castilleja reveallii, Indian Paintbrush. Silene petersonii, Petersons Catchfly, is recommended as threatened. Panguich Buckwheat and Indian Paintbrush are listed as outside or near the parks north boundary. Also, identified was the potential for a natural research area (s) that may exist in the wilderness subzone which currently have not been identified. Pristine tracts may be found in the wilderness area.

Plants in the park that have been identified as on the list of Federally threatened or endangered species require protection. Until the vegetation management plan is completed, the areas identified as containing one or more of these species, will be isolated from the visitor use.

There are two areas identified as needing special protection methods. These areas are Point Supreme and Northview Overlook. At Northview special signing will be installed prohibiting walking in areas other than those with paved surfaces. Signing prohibiting picking flowers are currently in place. At Point Supreme the area of concern is immediately southwest. This area has earlier been identified as in need of vegetative restoration

and protection. The trailhead at Point Supreme will be relocated to the south end of the parking area and the area of concern will be fenced where necessary and foot traffic prohibited.

A short portion of the Wasatch Trail near Spectra Point will be rerouted to provide special protection for plants near there.

The wildlife at Cedar Breaks is as diverse as the flora and include some 22 species. Among the more interesting are the pika or cony, mule deer, marmot, and badger. Brook trout, an introduced species, are found in Alpine Pond. Many varieties of birds are associated with this area and include the golden eagle, the blue grouse, and the violet green swallows. There are no known rare or endangered fauna present within the monument. Cedar Breaks National Monument works in continuing consultation with the Utah Division of Wildlife Resources to monitor conditions in the park and general area. As a part of Section 7 consultation, the U.S. Regional Office of Fish and Wildlife and the Utah State Division of Wildlife Resources, will receive copies of this document for review.

6. Water and Air

The rim at Cedar Breaks National Monument is a natural surface drainage line. The area east of the rim tilts to the east, and drainage to the east is part of the Colorado River watershed. All the area west of the rim drains into Ashdown Gorge. Potable water in the park is obtained from two natural springs. This water is treated and pumped to a storage tank, and distributed to facilities in the development area. A water rights determination will be required for the park to ensure that water resources are adequately protected.

While visibility at the monument is assumed to be excellent, no visibility monitoring has been conducted to quantify visual air quality. Data from visibility monitoring being conducted at nearby Bryce Canyon and Zion National Parks should give some indication of the condition of visibility at Cedar Breaks.

7. Visitation

Many people have discovered Cedar Breaks National Monument while touring Southern Utah and have returned to spend longer portions of their vacation away from the big crowds and warmer temperatures of Zion and Bryce Canyon National Parks.

A large increasing segment of visitors arrive in the fall after Labor Day. Bus tours and senior citizens make up the majority of these visitors. The park usually closes all facilities after Labor Day weekend. In 1981, for example, the visitor center was open through mid-October and contacted over 12,500 visitors. Of these 2,700 arrived by bus.

Surveys conducted in the park by seasonal personnel indicate the majority of the visitors come from California. The State of Utah also supplies significant numbers of visitors with Nevada ranking third, unofficially. The Great Lakes States of Illinois, Michigan, and Ohio are the major sources of visitors from a long distance. Many visitors are touring Southern Utah but some are enroute to Yellowstone, Grand Teton, and Glacier National Parks. Increasing numbers of visitors are making Southern Utah a vacation destination.

The average day use stay is estimated at 2 hours.

Very few campers stay more than 1 night. Those that do stay for longer periods of time are often repeat visitors. There is very little opportunity to extend the camping season into the spring or fall because of snow and cold temperatures at the 10,350 foot (mean sea level) location of the park.

8. Cultural Resources

a. Archeology

It was once believed that high mountain areas such as Cedar Breaks were rarely, if ever, utilized by aboriginal groups and that traces of prehistoric occupation in these areas were nil. However, very recent archeological surveys in the Cedar Breaks headquarters area, which includes all of the proposed development zone and the area to the south around the caretakers cabin and site of the old lodge and cabins, yielded three archeological sites, two of which have been significantly affected by park development. Analysis of the materials from these three lithic sites suggests that in addition to seasonally using the floral and faunal resources of the area, the aboriginal occupants were making use of chert eroding from the Brianhead Formation for tool manufacture. Little else is known about the park's prehistory, although it should be assumed that archeological sites are plentiful, particularly in the upland areas.

None of the recorded sites have been evaluated for the National Register of Historic Places, although the badly disturbed nature of the sites in the campground/picnic area and seasonal housing area make them unlikely candidates for the National Register of Historic Places. A very small lithic reduction area on a point behind the seasonal housing is in no way unique or outstanding. Until an evaluation of the sites is completed, the National Park Service will ensure that all work undertaken will be carried out in conformity with NPS-28.

The draft Cultural Resource Management Plan addresses the need to complete the archeological survey of the park and evaluate both

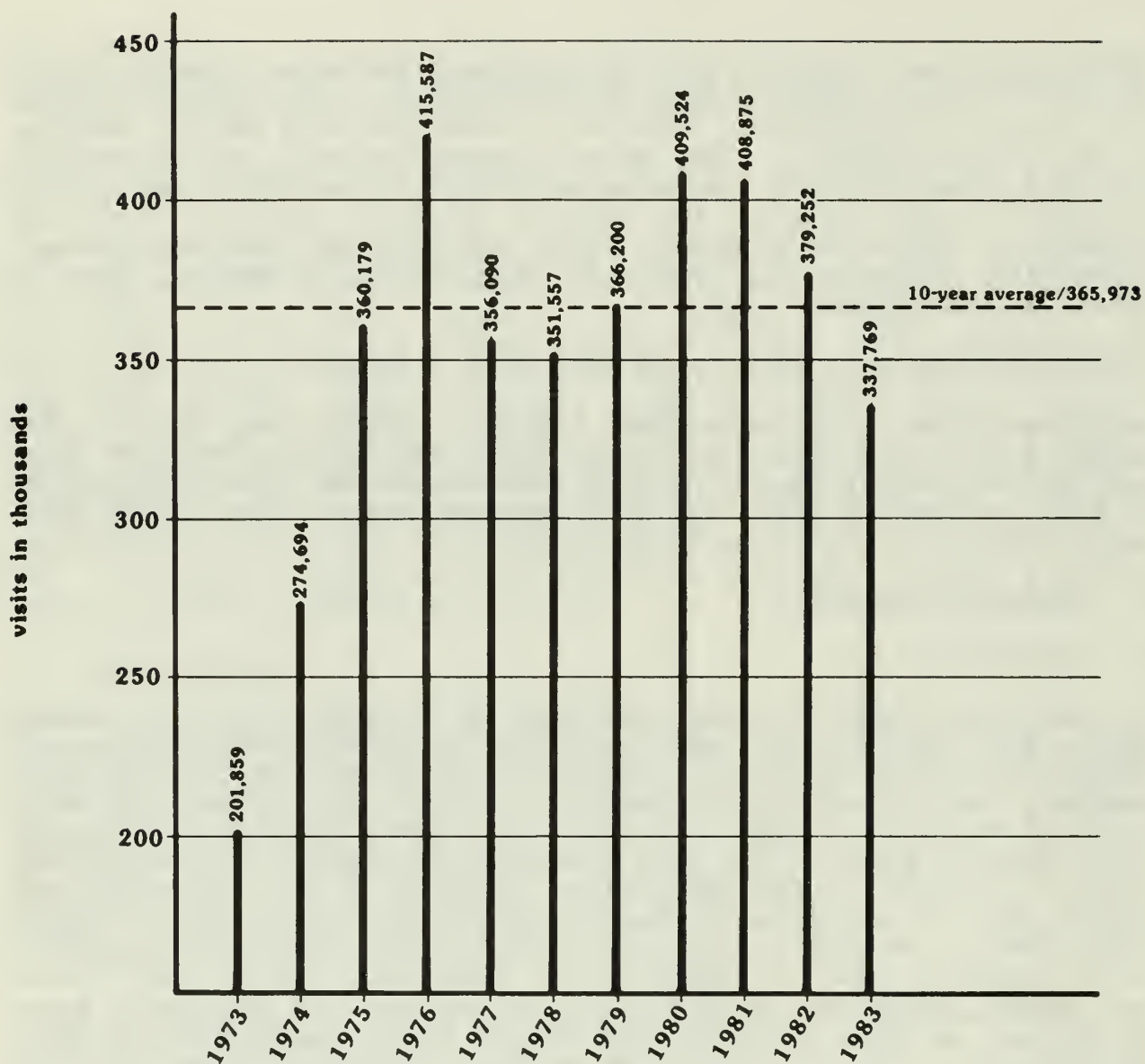


figure 6

annual visitation

Cedar Breaks National Monument

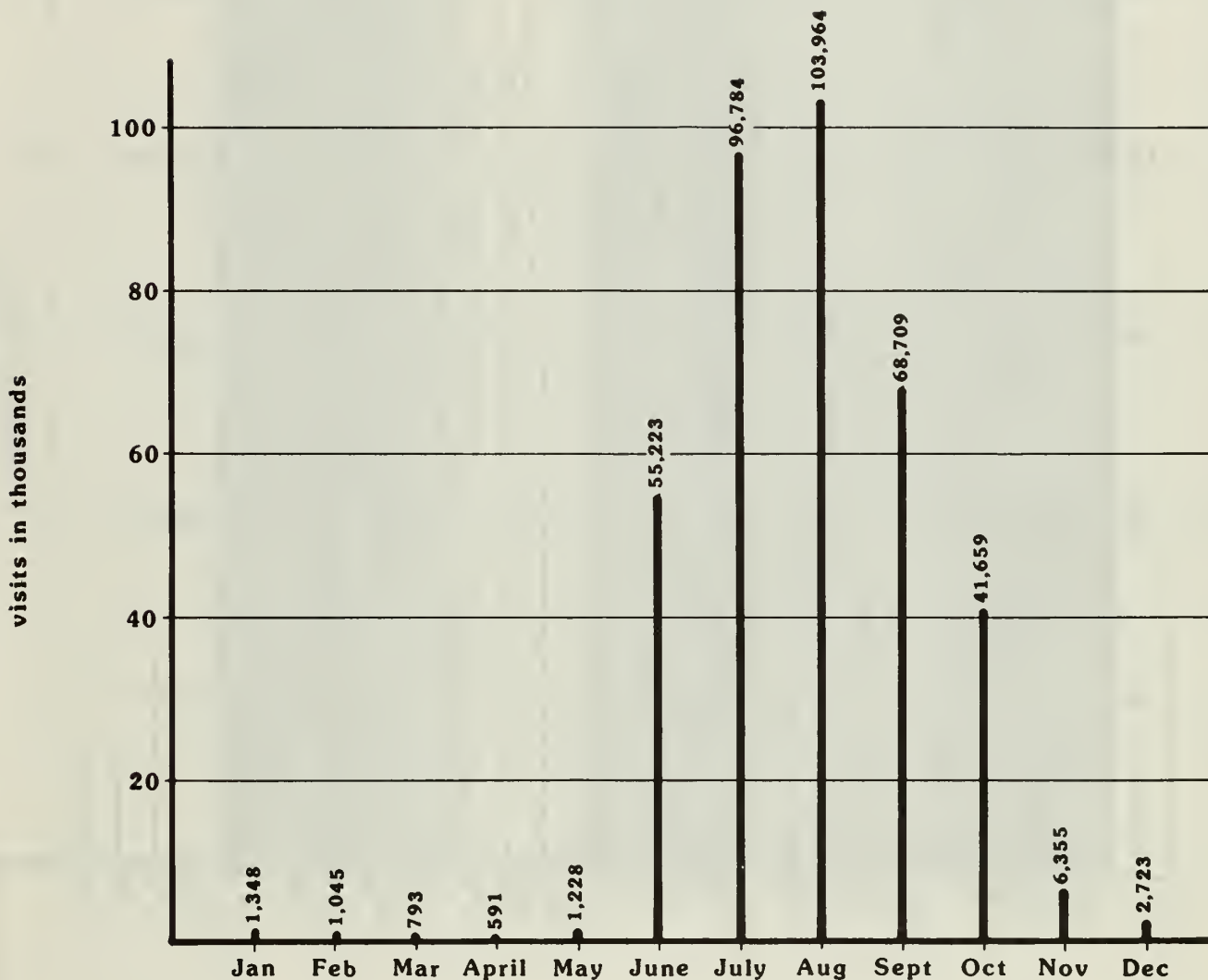
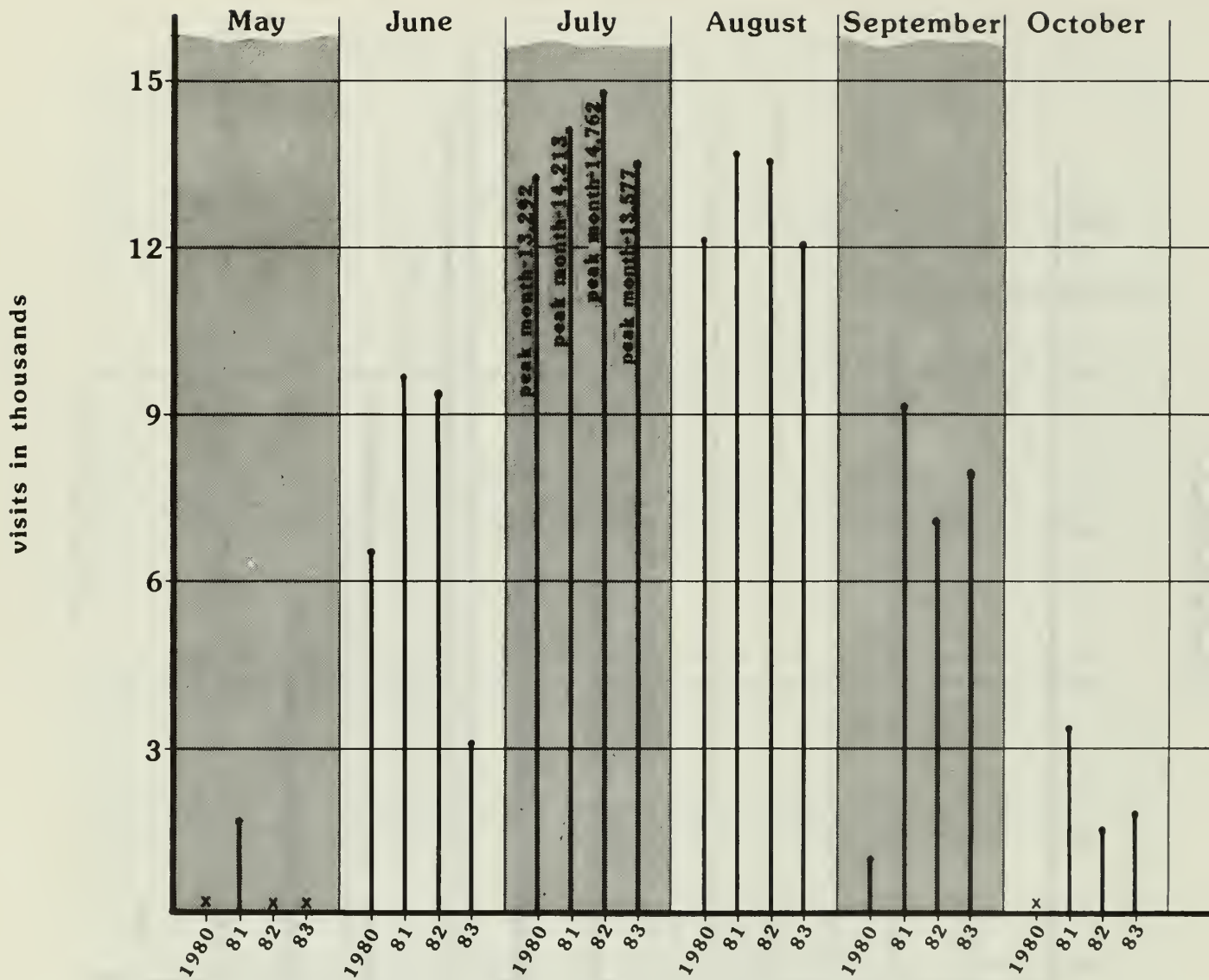


figure 7

5-year average monthly visitation 1979-1983

Cedar Breaks National Monument

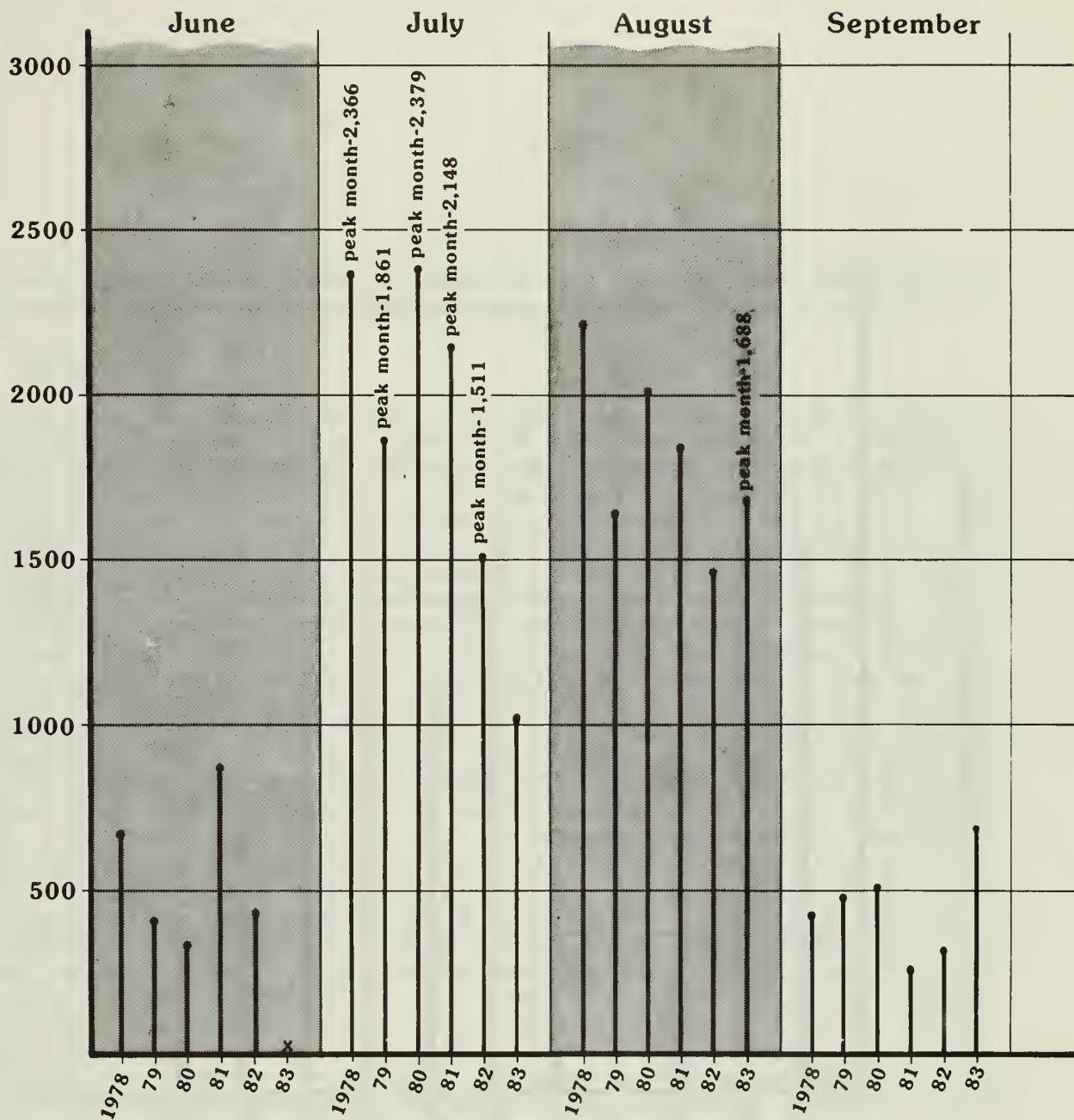


total number through
the visitor center

1980-33,110	1982-46,195
1981-51,786	1983-38,297

figure 8
visitor center use
Cedar Breaks National Monument

overnight campers



total campground visits

1978-5,808	1981-5,108
1979-4,396	1982-3,725
1980-5,244	1983-3,420

figure 9
total overnight camping by month
1978-1983
Cedar Breaks National Monument

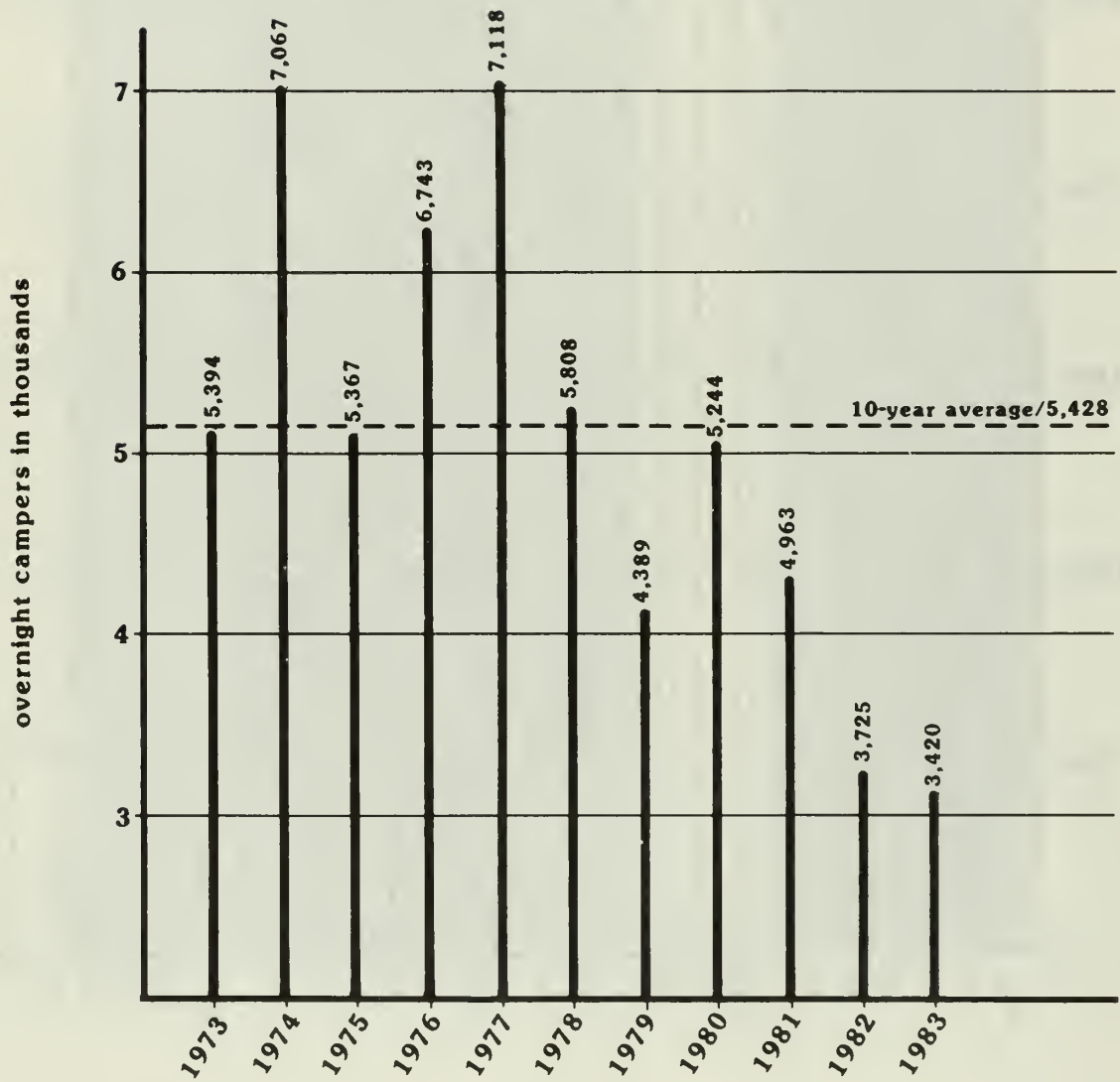


figure 10

10-year total overnight camping Cedar Breaks National Monument

the historic and prehistoric remains for the National Register of Historic Places and an Administrative History Study.

b. History

In planning for Cedar Breaks, the National Park Service must be sensitive to the values embodied in the National Register properties. Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470f) the National Park Service must take into account the effect of its actions on those historic properties included in or eligible for inclusion in the National Register of Historic Places. For those actions that may cause a change in the characteristics that qualify a property for inclusion in the National Register the National Park Service is required to afford the Advisory Council on Historic Preservation an opportunity to comment on the action prior to its approval. This is done in accordance with the regulations for the "Protection of Historic and Cultural Properties" (36 CFR Part 800). In accordance with Section 800.8 of the regulations for the "Protection of Historic and Cultural Properties" the National Park Service entered into an agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers for its nationwide park planning program. In accordance with that agreement, the Council's staff and the Utah State Historic Preservation Officer have been invited to participate in the development of the Cedar Breaks General Management Plan through informal consultation with the park staff and members of the planning team at each stage of the planning process. When deemed necessary the Resource Development Coordinating Committee, which provides a central forum to coordinate State involvement in Federal planning actions throughout the planning process with appropriate State agencies, will be contacted for input. This consultation will continue until the Regional Director selects an alternative. At that time the Council's Executive Director has 30 days to note an objection, otherwise the plan will be approved and all subsequent implementing actions that will effect historic properties will be carried out in accordance with Cultural Resource Management Guidelines (NPS-28) of the National Park Service. The Council need not be afforded an opportunity to comment on those implementing actions. If the Executive Director notes an objection to the implementing actions of the general management plan the Chairman of the Council will review the plan and the objection and determine if the plan should be scheduled for consideration by the Council. If the Chairman chooses the Regional Director must delay any decision with regard to the plan until the Council has provided its comments, and the National Park Service has taken these comments into consideration.

VII. THE PLAN

A. Land Use and Management

There are two management zones in the monument, the development zone and the natural zone.

1. The development zone consists of 165 acres or 2.7 percent of the monument's land: This zone will continue to be managed to provide and maintain development that serves the needs of visitors and park maintenance and management. The only recorded archeological sites are within this zone. The development zone will be restricted to the smallest area necessary to accommodate existing or proposed development and use. Policies, regulations, and procedures for protection of the resources will be employed to ensure compliance is achieved in all areas of concern.

2. The natural zone is the largest zone in the monument and contains 5,990 acres or 97.3 percent of the land. There are two subzones in the natural zone, the wilderness subzone contains 4,830 acres and the natural subzone contains 1160 acres. The natural resources in these areas have remained largely unaltered by human activity.

Policies, regulations, and procedures for the preservation of natural resources will continue to be employed in the administration and management of Cedar Breaks National Monument.

B. Resource Management

To preserve the essentially unspoiled example of natural history and the diverse ecosystem, the management strategies that will be employed are:

1. Vegetation

Vegetation will be managed to maintain the characteristics of the existing landscape. Grazing, which was permitted prior to establishment has since been terminated. To maintain and perpetuate the natural plant communities, a Vegetation Management Plan will be developed. This plan will also address those sites which may require special vegetation management to mitigate impacts of previous land use and development.

The Vegetation Management Plan will also assess the need to establish a monitoring program to evaluate trends in the ecosystem, especially the presence of exotic or noxious species that may require modification or eradication. Special attention will be given to the preservation of habitats that are uncommon, unique, or of special interest. There are four known threatened or endangered plants in the monument area, these are included

under the section on Flora and Fauna. Should identification of others occur, appropriate protection measures will be initiated. The Vegetation Management Plan will be developed to provide continuity to the problems identified in the park's Resource Management Plan.

2. Grazing

Grazing is not permitted on any lands within the monument. A boundary fence will be maintained to ensure that trespassing of grazing animals, from adjacent National Forest lands, does not occur within the park. Coordination and interaction between the National Forest, National Park Service, and Shepherders will continue.

3. Wildlife

There is no record of any threatened or endangered forms of wildlife within the park. The National Park Service will, however, remain aware of such conditions and develop appropriate documentation, monitoring, and protection programs.

C. Visitor Use

1. Interpretation Objectives

Cedar Breaks National Monument is located within a region of highly diverse resources, activities, and opportunities. The following are general objectives for interpretation at Cedar Breaks National Monument:

- a. Provide public understanding and appreciation for the outstanding natural resources and features at Cedar Breaks National Monument.
- b. Provide public understanding and appreciation of the cultural resources at Cedar Breaks National Monument.
- c. Promote public understanding and support of the monument's policies and practices developed to insure the safety of visitors and the preservation of resources for future generations.
- d. Provide information concerning visitor use opportunities at Cedar Breaks National Monument and throughout the region.

2. Interpretation

The existing Interpretive Prospectus was approved in 1971. The document is outdated and inadequate. Currently, the Interpretive Prospectus is scheduled to be updated in fiscal year 1985. After this document has been updated and approved the following will be needed:

a. Museum Exhibit Plan

A Museum Exhibit Plan will be required to provide in detail the plans for interpretation and thereby confirm space requirements. The museum plan should be developed in conjunction with comprehensive visitor center planning to insure that appropriate space is available and design is accomplished in relationship with other functions within the structure.

b. Wayside Exhibit Plan

A Wayside Exhibit Plan will be developed to provide details and methods of interpreting those values as identified in the interpretive prospectus. Preparation of the plan will include a evaluation of elements along the existing trails and an inventory of values not provided for through existing trail locations to insure that trail planning and locations, where appropriate, be designed to provide and enhance the visitor's experience and enjoyment.

The Wayside Exhibit Plan will also provide guidance in conjunction with interpretation and safety for the overlooks.

D. Park Operations

The 10,350 foot elevation of the development zone makes it impractical to establish year around housing within the park. Employees who are stationed at Cedar Breaks on a year around basis must obtain housing in nearby communities.

Seasonal housing is available in a four unit apartment complex constructed in 1959 and in a log cabin which was constructed in 1937 by CCC workers. The log cabin is a historic structure.

Maintenance and administrative facilities for summer operations are located in the developed zone of the park. Year around administrative offices are located in the Kolob Canyons section of Zion National Park. From this location 18 miles south of Cedar City and 41 miles from Cedar Breaks the management and administrative function for both Cedar Breaks and Kolob Canyons is conducted by the staff assigned to Cedar Breaks.

The short season at Cedar Breaks and the relatively low volume of routine maintenance work done annually makes it unlikely that any park operations could be accomplished by contract. Cooperation with Zion National Park for maintenance and administrative support makes the Cedar Breaks operation very self-sufficient and efficient for a seasonal operation.

The short summer season at Cedar Breaks makes payback fairly lengthy for any energy conservation project. Park buildings are

maintained in good condition, and low cost energy conservation modifications have been completed. Fuel efficiency in park vehicles is dependent upon the type of equipment that is provided by General Services Administration. Fuel savings is accomplished through better scheduling of trips and use of bicycles whenever possible. The Utah Energy Office can provide expertise and information in many energy related areas.

E. General Development - the Proposal

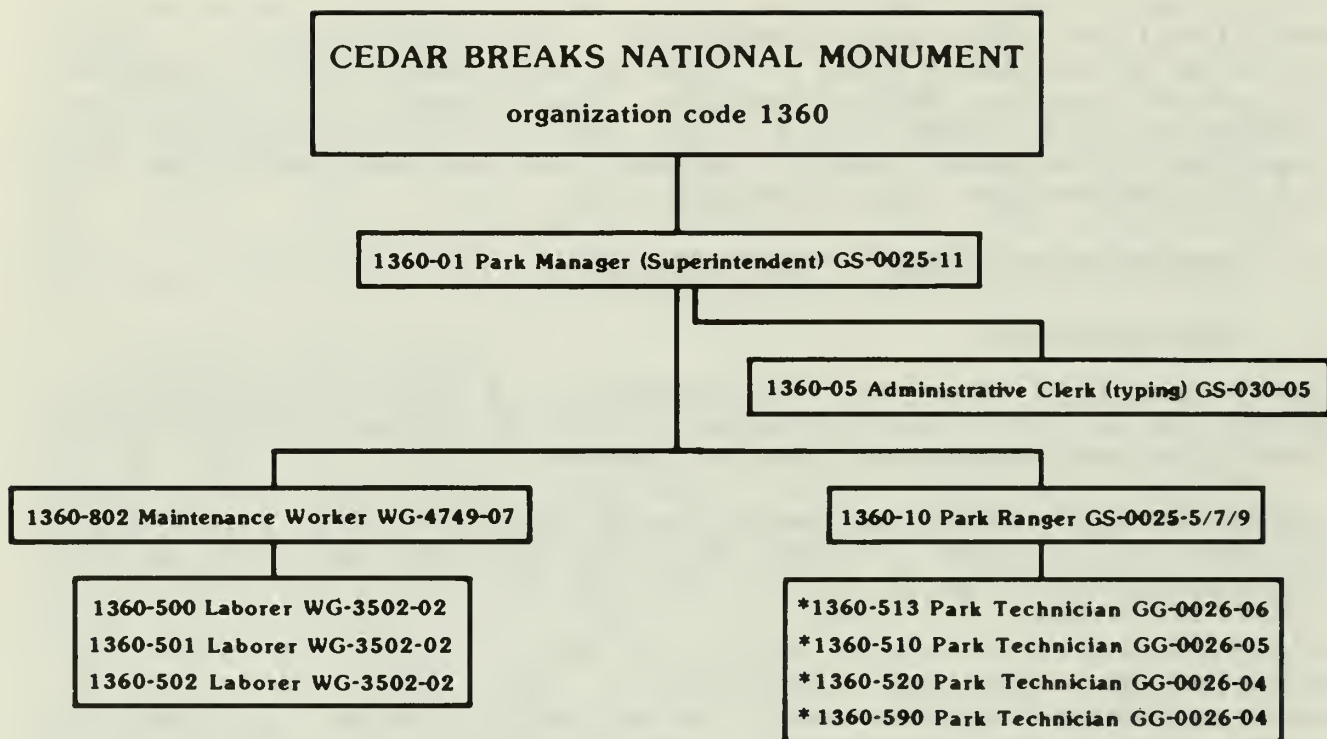
1. Point Supreme

The proposal is based on a continuation of Point Supreme as the center of activity and dispersal point for other opportunities and activities available for the visitor.

Expansion and rehabilitation of the relocated visitor center will be done in materials to match the existing architecture theme and the new comfort station.

Visitor orientation would begin here with a dispersed variety of opportunities provided elsewhere in the park. The existing visitor center (H.S.1) would be relocated nearer the parking area. The exact location and orientation will be determined during the project planning/design phase. The visitor contact facility would be oriented with sensitivity to the mature trees. It is important that this structure be sited to intercept the visitor before their arrival on the Point Supreme View terrace. The visitor contact facility would be designed to provide visitor orientation, a museum, and sales. The orientation would include a brief 5- to 10-minute rear projection presentation providing an introduction to the geologic story of Cedar Breaks National Monument. The museum and sales area would be designed to accommodate visitor orientation to other opportunities, a display of the diversity of life zones, and flora and fauna. The sales area would overlap with the museum to provide the visitor with interpretive contact and sales simultaneously. The orientation at this facility should allow divergence of visitor use of the park and lessen crowding and impacts upon the Point Supreme area.

A combination of road and trails would link other activities in a variety of sequences, dependent upon the visitor needs. A 1/2-mile long by 4-foot wide paved loop trail would be routed in the Point Supreme area. This trail would serve handicapped and elderly visitors with an opportunity to experience the forest edge to canyon rim environment. There will be occasions when portions of this area would be under restoration and interpretation would be provided to allow the visitor to observe the restoration. The design of this loop trail would provide the visitors with a narrow trail upon which a less distracting, natural environmental experience and appreciation could be provided. A one-way system would also provide less conflicts



* positions with organizational title of
"Seasonal Park Ranger"

figure 11

between visitors beginning and ending this activity, as well as decreasing the need for wheelchair pullouts. The edges of the trail should be well defined and periodic signs would be placed to remind users to remain on the paved surface.

The paved path from the parking area to the Point Supreme view terrace would be lighted for visitor safety during evening activities to the new visitor contact facility. The Wasatch trail link along the rim to Point Supreme would be rerouted, and the short portion would be restored to a natural condition. The new trail head would be established at the south end of the Point Supreme parking area.

Enlargement and rehabilitation of the visitor center will be designed to accommodate less than peak visitation. The primary concern of enlarging the visitor center is to provide needed space for the variety of functions necessary.

2. Roads

The roads in Cedar Breaks National Monument would be completely reconstructed. The road alignment would remain essentially the same with the exception of reducing one hill crown and widening curves. The road width would be 22 feet wide with 2 feet wide paved shoulders. The paved shoulders would help to protect the road due to the extreme weather at this altitude and extend the life of the road. These measures would bring the road into compliance with Federal Highway Administration safety standards. The reduced hill crown would improve site distance for traffic approaching the Alpine Pond wayside parking, and reduced speed limits in the Point Supreme area would be retained to ensure safety. Visitor use of the monument during the off-season is limited to cross-country skiing, snowshoeing, and snowmobiling. The unplowed park roads are the designated snowmobile routes. Snow removal at Cedar Breaks has historically proven to be infeasible due to the high altitude and severe drift areas. Due to cost/benefit, visitor safety, and lack of adequate housing the National Park Service will not undertake snow removal for visitor use during the winter. In 1981, Iron County, Utah, began a 3-year trial period of snow removal in the park. Extremely heavy snowfall during the winter of 1982-83 made road clearing impractical and the county discontinued the program. During February of 1983 a new 3-month Memorandum of Agreement was reached between Iron County and the National Park Service. Snow removal was reinstated in the north section of the park only. The National Park Service will continue to work with all agencies, groups, and interested persons toward resolution of problems as they arise and as needs change. Further environmental documentation on impacts to the park may be required as a result of road use during the winter. Park personnel will monitor and document any environmental degradation or changes.

3. Trails

The rim trail would be developed which would provide a hiking corridor from the south boundary to the north boundary. Trail links would be established to connect Point Supreme with all other visitor activities. The trail would be approximately 2 feet wide by 6 miles long.

The park rim trail would connect the overlooks into a system with divergent trails at various points.

The existing park trails would be upgraded where required. The Alpine Pond Trail brochure would be redeveloped.

New trail developments would include: Northview overlook to National Forest land at the park's north boundary. This trail would be the departure point for overnight hikes into the Ashdown Gorge area. A trail registration station would be installed at the northview parking area with maps, interpretive and safety information, and trail user registration. The Ashdown Gorge route would provide a loop system with return through the Forest Service Shooting Star Canyon trail which would bring the visitor back to Point Supreme via the south boundary. Construction and maintenance of trails will be coordinated with the Forest Service as plans are developed for implementation.

The campground and picnic area would be connected to the rim trail by a short trail link. A road crossing site would be required with highway signing and a reduced speed zone established.

The campground would also have a trail link to the east boundary which would provide the visitor with an opportunity to hike the Hancock Peak area east of the park, in the Dixie National Forest.

4. Overlooks

The improvements at the overlooks would include both visual appeal and physical access. The railings would be replaced with wood and stone design that is compatible with the Point Supreme railings. The exception to this is the Spectra point overlook and Wasatch overlook. These two overlooks will require special design and application techniques due to their isolated and special locations. The environment around each of the overlooks would be improved to mitigate impacts of visitors and design drainage problems that have increased erosion at the base of the overlooks. Signs would be installed to warn visitors of safety hazards associated with the rim and provide awareness of the measures enacted to restore the environment.

5. Campground

Campground improvements would include installation of an honor system collection box and an information board at the campground entrance. The overhead utility lines that bisect the campground would be removed and placed underground for visitor safety and for aesthetic reasons. Recreational vehicle and camper pullouts would be leveled and a wearing surface installed. The wearing surface would also be installed around tables and charcoal braziers and tent pads to reduce impacts of visitor use. The wearing surface would provide a more defined use-area and would reduce these impacts.

A paved trail from the campground road to the amphitheater would be installed and lighting would be incorporated to provide visitor safety access to the nighttime camp fire interpretive presentations. A small interpretive presentation stage, rear projection system, and storage area would be constructed in the amphitheater.

6. Picnic

A wearing surface would be installed around one picnic table and charcoal brazier and along the access path to the picnic area. This wearing surface would be installed to provide handicap access and use in the picnic area. The remainder of the picnic tables and braziers would remain as they are and be moved periodically to reduce impacts.

7. Water

Current potable water supplies are sufficient during wet weather cycles. It is unknown how much water is produced during wet or dry cycles. In the event of a dry cycle a supplemental water supply may be required. The site of the old CCC camp in the park is a potential area where water may be developed, another potential site is the Shooting Star Seep near the Shooting Star Spring. Current storage of water is accomplished on a high point south of Point Supreme. Two storage tanks are located here and have a combined storage capacity of 91,487 gallons. The exact quantity of water used on a yearly basis is unknown because monitoring has not been established. Determinations for quantities of water needed on a yearly basis will be initiated in a Water Resource Management Plan. Expansion or development of new potable water supplies will be submitted to the Utah State Department of Health for approval.

A Water Resource Management Plan is needed. The plan will be a component of the monument's Natural Resource Management Plan. The information base currently available is insufficient to aid management in decisions related to water matters and provide data for the interpretive program.

The purpose of the plan is to define a course of action based on law and on National Park Service policy for the protection, conservation, use, and management of park water resources. The plan will address all water resources in the park--ground and surface, ponds and streams, springs and bogs or marshes. The plan will contain: (1) Information Base--current condition and status of park water resources; (2) Park-Specific Objectives for Management of Water Resources--problem identification and planning goals; (3) Analysis of Alternatives; and (4) Plan Formulation. This study is mandated under the Clean Water Act, Management Policies (Ch. IV-15), and the National Environmental Policy Act (1969).

8. Sewage

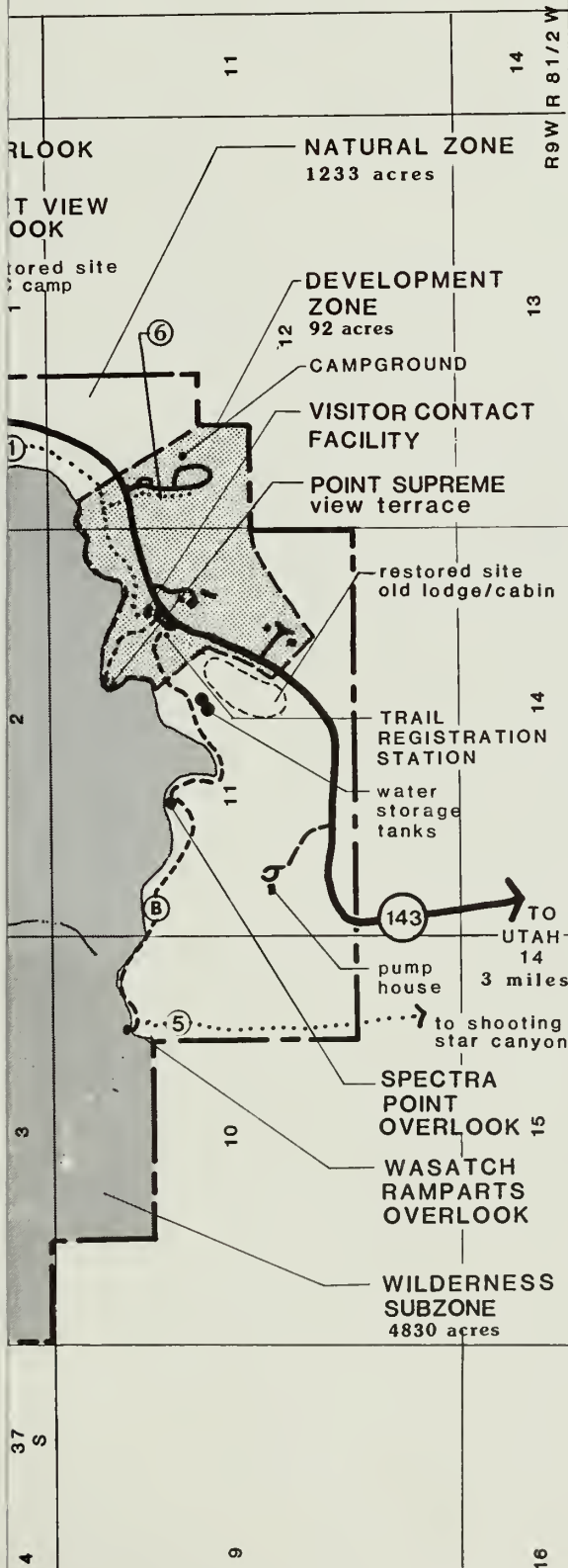
Construction of additional facilities in the vicinity of Point Supreme would necessitate the expansion of the existing sewage field. Although the field is already large because of the low-permeability clay soil, sufficient space is available for modest expansion of the field. Impacts of enlargement would, to a great extent, be short-term in the form of surface excavation, backfilling, and revegetation. Long-term operation of the enlarged field is not likely to result in any significant surface runoff problems if fractures in the underlying limestone are uniformly distributed, and the field size is not increased beyond 30 to 50 percent of its present size. Expansion of sewage treatment facilities will be submitted to the State Department of Health for approval.

9. Utilities

All utility lines in the development zone will be placed underground to ensure visitor safety and maximize the aesthetics of the area.

CEDAR BREAKS NATIONAL MONUMENT, UTAH

GENERAL DEVELOPMENT PLAN



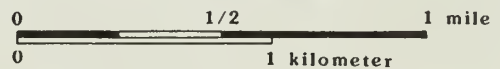
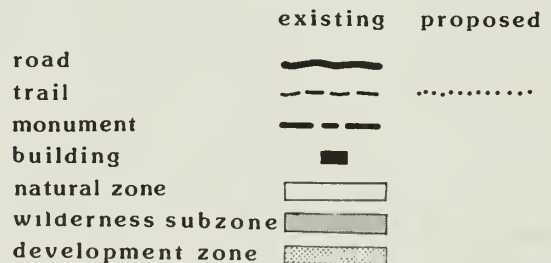
LEGEND:

TRAILS (EXISTING)

- A - ALPINE POND TRAIL (approx. 3 miles)
- B - WASATCH/RAMPARTS TRAIL (approx. 2 miles)
- C - USFS TRAIL

(PROPOSED)

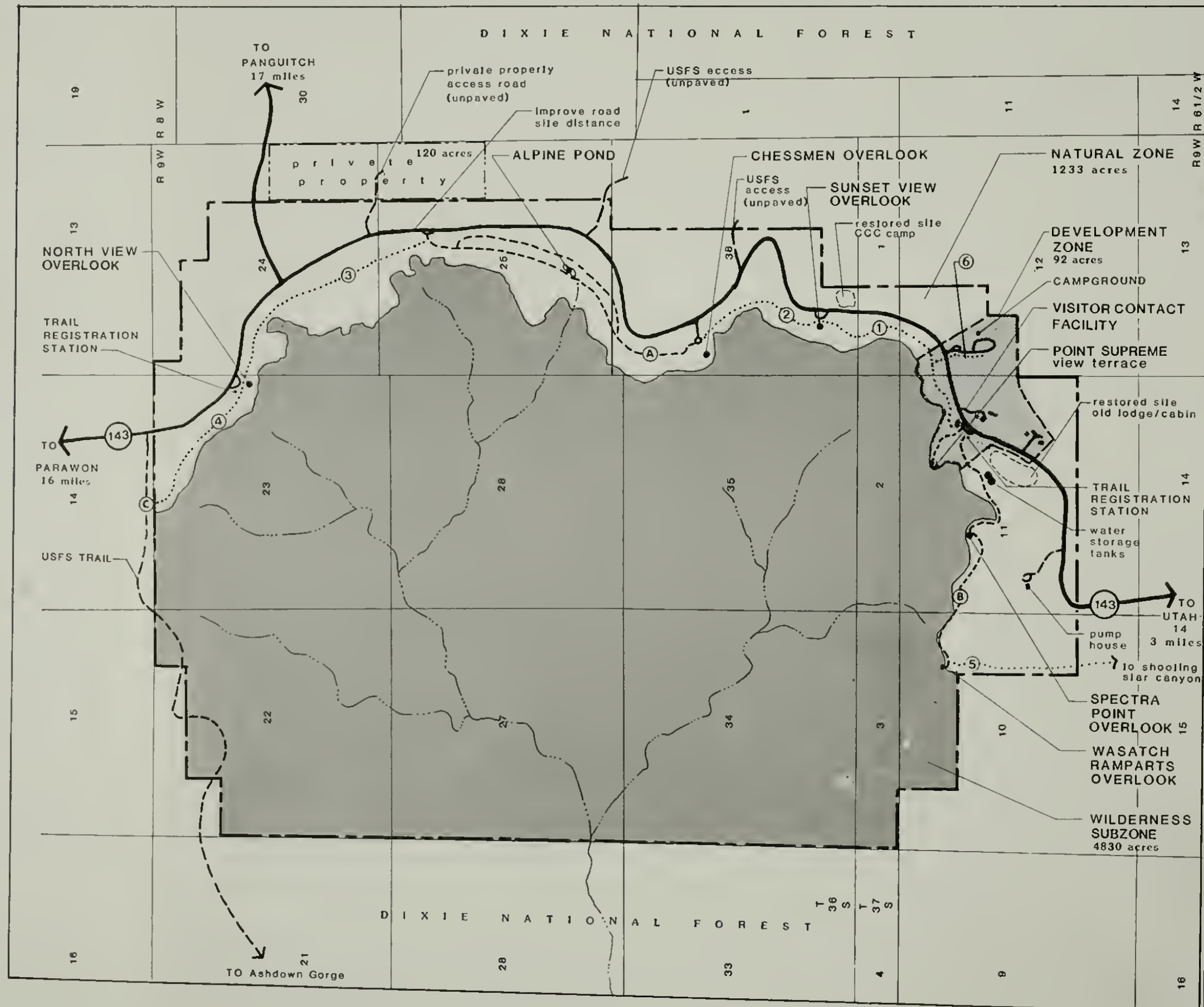
- 1 - POINT SUPREME TO SUNSET (approx. 1 mile)
- 2 - SUNSET TO CHESSMEN (approx. .6 mile)
- 3 - ALPINE TO NORTH VIEW (approx. 1.2 miles)
- 4 - NORTH VIEW TO BOUNDARY (approx. .7 mile)
- 5 - WASATCH TO BOUNDARY (approx. .6 mile)
- 6 - RIM TRAIL TO CAMPGROUND (approx. .25 mile)



NORTH

FIGURE 12

154	80,033-A
3-84	RMRO



CEDAR BREAKS
NATIONAL MONUMENT,
UTAH

GENERAL
DEVELOPMENT
PLAN

LEGEND:

TRAILS (EXISTING)

- A - ALPINE POND TRAIL
(approx. 3 miles)
- B - WASATCH/RAMPARTS TRAIL
(approx. 2 miles)
- C - USFS TRAIL

(PROPOSED)

- 1 - POINT SUPREME TO SUNSET
(approx. 1 mile)
- 2 - SUNSET TO CHESSMEN
(approx. .6 mile)
- 3 - ALPINE TO NORTH VIEW
(approx. 1.2 miles)
- 4 - NORTH VIEW TO BOUNDARY
(approx. .7 mile)
- 5 - WASATCH TO BOUNDARY
(approx. .6 mile)
- 6 - RIM TRAIL TO CAMPGROUND
(approx. .25 mile)

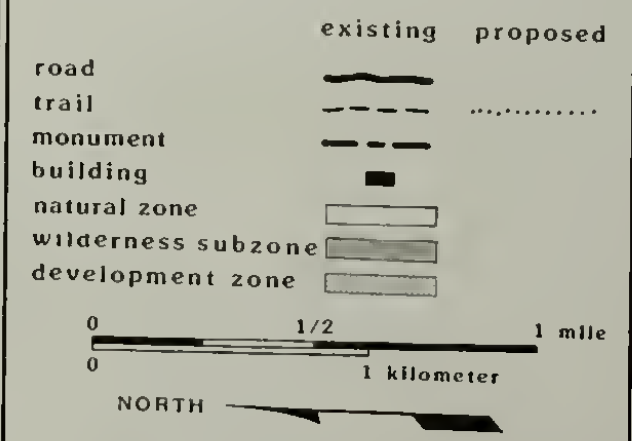


FIGURE 12

154 80,033-A
3-84 RMRO

F. Plan Implementation - Service Proposal *5-year plan

10-238	Project Title	FY1	FY2	FY3	FY	FY5	FUTURE	TOTAL
114	Reconstruct 7 mile main park road and parking	(C)2134	--	--	--	--	--	2134
101	Rehab. historic buildings for visitor and park use (includes expansion of V.C.)	(P)57	(D)57	(C)484	--	--	--	598
None	Construct campground self-registration, rehab campground, underground utility lines, improve amphitheater, and access paths	--	(P)10	(D)10	(C)85	--	--	105
None	Improve overlooks, access paths, restore landscape. Construct trail registration station construct approximately 6 miles of foot trails	--	--	(P)26	(D)26	(C)202	--	254
Total		2191	67	520	111	202	--	3091

Costs are gross and in thousands.

(P) Planning
(D) Design
(C) Construction

STAFFING NEEDS

<u>WY</u>	<u>TITLE</u>	<u>GRADE</u>	<u>YEAR NEEDED</u>	<u>ESTIMATED COSTS</u>
7	Park Tech	GG-026-04	GMP + 0	\$ 9,263
4	Park Tech	GG-026-05	GMP + 3	\$ 5,922
3	Laborer	WG-3502-02	GMP + 2	\$12,730
4	Park Tech (Law Enf.)	GG-025-05	GMP + 3	\$ 5,922

CEDAR BREAKS NATIONAL MONUMENT

LIST OF PLANNING NEEDS IDENTIFIED AS A RESULT OF THE PLAN

<u>Planning Needs</u>	<u>Responsibility</u>
EO/Survey of Historic/ Archeology	Park/State/Region
Update Interpretive Prospectus	Park/Region
Museum Exhibit Plan	Harpers Ferry
Wayside Exhibit Plan	Harpers Ferry
Trail Management Plan	Park/Region
Back-Country Management Plan	Park/Region
Water Resource Plan	Park/Region

VIII. LIST OF PREPARERS

Gary R. Miles, Team Captain, Landscape Architect, Rocky Mountain Region.

Clay Alderson, Superintendent, Cedar Breaks National Monument, Utah.

John Conoboy, Supervisory Park Ranger, Cedar Breaks National Monument, Utah.

Dr. Adrienne Anderson, Archeologist, Rocky Mountain Regional Office.

Marcy Culpin, Architectural Historian, Rocky Mountain Regional Office.

Don McLane, Professional Engineer, Rocky Mountain Regional Office.

Jan Harris, Recreation Planning, Rocky Mountain Regional Office.

Les Siroky, Architect, Rocky Mountain Regional Office.

Dr. Ralph Root, Geologist, Rocky Mountain Regional Office.

Dr. Henry E. McCutheon, Biologist, Rocky Mountain Regional Office.

IX. APPENDICES

Appendix A - Geologic and Hydrologic Analysis of the Proposed Development Zone, Cedar Breaks National Monument

Appendix B - Summary of Review Comments and Responses

Appendix C - Bibliography

Appendix A

GEOLOGIC AND HYDROLOGIC ANALYSIS OF THE PROPOSED DEVELOPMENT ZONE, CEDAR BREAKS NATIONAL MONUMENT

Ralph R. Root, Geologist, Remote Sensing Section

Denver Service Center
August 25, 1982

GEOLOGY OF CEDAR BREAKS NATIONAL MONUMENT

Cedar Breaks National Monument contains the western edge of the Markagunt Plateau, which is a large uplifted block of sediments covering much of southwestern Utah. The plateau, presently a low-relief, rolling surface at an elevation of approximately 10,500 feet, was uplifted during Miocene time, between 10 to 20 million years ago. Sediments underlying the Markagunt Plateau are geologically very young. At the top of the plateau within the monument is the Miocene (?) age Brianhead formation, which consists of layers of welded tuff of rhyolitic composition thickening toward the north in the direction of Brianhead. This layer of well indurated volcanic rock overlies Eocene age continental sediments which form the sharp, leading edge of the west extent of the Markagunt Plateau. These sediments are described by Gregory (1950) as the Wasatch Formation. Hintze (1975), in his geological highway map of Utah, call this group of sediments the Claron or Cedar Breaks Formation. The top of this sequence consists of thickly bedded white, pure, dense limestone. About 30 feet of this layer forms a vertical wall all the way around the upper edge of Cedar Breaks, interrupted only by local faulting in 3 or 4 locations within the monument, causing displacements of no more than 50 feet. According to Gregory (1950), the white limestone is 190 feet thick, most of which is covered by talus. Below the white limestone layer are 500 to 900 feet of pink limestone and calcareous shales, underlain by a basal unit of red conglomerate and sandstone ranging in thickness from 5 to 150 feet. The thick, intermediate beds of the Wasatch Formation are the rocks comprising what is known as the "pink cliffs" which form most of the scenic, rugged eroded landforms of Cedar Breaks, as well as those at Bryce Canyon. A major difference between Cedar Breaks and Bryce Canyon, however, is that at Cedar Breaks the pink cliffs can be viewed at their westernmost extreme, along the faulted edge of the Markagunt plateau where total relief is in excess of 4,500 feet between the plateau surface and the desert floor at Cedar City. Below the

Wasatch Formation lies the upper Cretaceous age Kaparowits Formation. This sequence, measured at a thickness of 880 feet and 3 miles southwest of the monument (Gregory, 1950), consists of crumbly, fine bedded sandstone interbedded with calcareous, sandy, and iron-bearing shale, limestone, conglomerate, and lignite. These rocks are generally dark gray to green gray, contrasting with the red, pink, and buff colors of the overlying Tertiary rocks. Rocks of the Kaparowits Formation occupy only the east-central portion of the monument, at the lowest elevations in the major drainages.

GEOLOGY OF THE PRIMARY DEVELOPMENT ZONE

The zone in Cedar Breaks National Monument where most development is likely to occur is located in the vicinity of Point Supreme. The present visitor center, comfort station, maintenance area, employee quarters, campground, and picnic area are all situated above the upper Wasatch Formation, which consists of approximately 190 feet of massive, pure white limestone. Above the limestone are varying thicknesses of heavy clay soil supporting subalpine forest and meadow. Remnants of younger Tertiary age welded tuff from the Brianhead Formation may be found locally at higher elevations on hilltops and knobs. The white limestone displays vertical fracturing at the cliff face along the breaks, and very likely is fractured throughout by tensional stress as the Markagunt Plateau was uplifted. No direct evidence of solution of the limestone was observed in the vicinity of Point Supreme, although two circular depressions and a linear trench oriented N 25° E were observed within 1/2 mile of Alpine Pond. These surface features hint at the possible development of underground cavities and joint-controlled solution channels within the limestone in the vicinity of Alpine Pond. Presence of solution features in the limestone would require special care in preparation of foundations for structures built over this type of geologic environment. Although there was no surficial evidence of solution features in the Point Supreme area, substantial drainage was observed from outcroppings of the white limestone along the breaks at Point Supreme shortly after a brief, but intense thundershower. This indicates that a portion of surface runoff is percolating into fractures in the limestone in the area around Point Supreme, and thus some solution must be taking place.

The vertical cliff face in the Point Supreme area appears to be undergoing rapid headward erosion, in the context of geologic time. Geologists have estimated that the natural rate of headward erosion is approximately 1 foot per 100 years on the average. Examination of historic photographs of Point Supreme

during August 1982 permitted some estimates of erosion and soil loss to be made for approximately the last 60 years. Comparison of the west cliff face at Point Supreme with a 1923 photograph revealed a 1- to 2-foot loss of limestone at the very tip of the point, but no measurable change in the west cliff face itself. However, the north cliff face presently contains a large, open vertical fracture about 5 feet behind the leading edge of the cliff. This fracture could not be found in a 1973 photo of the same area. Rates of erosion of the vertical cliff face are difficult to quantify because actual loss of material is usually in steps of a few inches to several feet at a time as blocks of limestone of varying size crack away from the cliff face. Frequency of spalling of blocks from the cliff face will depend on the density and spacing of vertical fractures and character of the winter weather, as much of the cliff face weathering is due to the freeze-thaw cycle. As temperatures rise above the freezing point water seeps into fractures in the limestone. When temperatures drop, the moisture in the fractures expands as it freezes, exerting tremendous pressure resulting in widening of the fracture. The overall effect is the loosening of the limestone into multiple blocks near the cliff face. Eventually, blocks of varying sizes, depending on the fracture pattern, will spall off the cliff and become part of the talus slope below. A major portion of the north cliff face appears to be ready to spall off in the near future, but it may take decades for a new major crack to develop at this same location. Additional processes affecting the rate of cliff deterioration are the degree and intensity of local runoff, and the amount and rapidity of annual snowmelt. The average rate of 1 foot of cliff face loss per 100 years appears to be substantiated by observing little change in 60 years of photographic records of the parking area at Point Supreme. The parking lot was estimated to be 104 feet wide from north to south parallel to the west cliff face in 1923 and 1946 photographs. Actual measurement of the overlook at this same location on August 19, 1982, also showed a distance of 104 feet. It must be emphasized, however, that natural recession of the cliff face can occur in steps, where up to several feet at a time may be lost in a single rockfall.

UNNATURAL EROSION OF THE CLIFF FACE AT POINT SUPREME

The processes described above refer to natural mechanisms which are causing the cliff face at Cedar Breaks to recede. However, the presence of development and concentration of visitors in localized areas can accelerate the rate of erosion. The manner in which this occurs is by concentration and channelization of runoff water. There are two basic ways that natural runoff is affected in the Point Supreme area. The first is the

introduction of impervious surfaces, such as building rooftops and paved roads and walkways. The second is compaction of soil by concentrations of visitors. The heavy clay soil covering Point Supreme is easily compacted, resulting in the disappearance of vegetation which helps aerate the soil and physically hold it in place. Comparison of present day surface conditions (August 1982) with a 1923 photograph at Point Supreme showed a loss of about 4 inches of soil over a 59-year period. As soils are lost and become more compacted, runoff increases disproportionately. Combined with rapid runoff from rooftops and walkways, water is channelized into a few drainages with rapid, high volume flow. During the spring, summer, and fall this flow causes greater than normal physical erosion at the points of spillage over the cliff face, causing unnatural notches to work back into the plateau surface. One such notch has formed about 10 feet west of the present day visitor center and is eroding much more rapidly than the cliff face on either side.

GEOLOGIC/HYDROLOGIC IMPACTS AND MITIGATIONS

1. No change in existing facilities: Under this alternative no new structures or developments would be built. Use of existing facilities would continue, and would probably intensify with increasing visitation to the monument. The problems with concentration of drainage due to impervious surfaces and compacted clay soils would continue, with gradual headward erosion of the cliff face at Point Supreme. The notch cut by artificially directed drainage 10 feet west of the visitor center building will continue to erode headward at a rate of perhaps 2 to 3 times that of the neighboring cliff face. About 5 feet of the north cliff face can be expected to fall within the next 2 to 5 years, or possibly sooner if a moderate earthquake should occur. Barring any unforeseen natural events, such as a major earthquake or highly abnormal precipitation or snowmelt conditions, the cliff face at Point Supreme can be expected to remain close to its present position for the next 15 to 20 years. The portions of the cliff face most likely to experience spalling are the north wall and the extreme tip of the point. If this should occur, minor alterations of the safety barrier would be necessary. After 20 years of weathering, the receding cliff face behind the visitor center and the notch 10 feet to the west is likely to result in the loss of sufficient overburden above the limestone to begin undermining the foundation of the visitor center cabin. Observation of the back of the visitor center building in August 1982 showed about a 4-inch loss of soil around the foundation and around tree roots within 5 feet of the back and sides of the building.

Under this alternative, the most effective mitigating measure would be to alter present day drainage channels, which tend to concentrate runoff, and to increase the amount of permeable land surface to reduce rapid rates of runoff. This can be accomplished by designing a highly dispersed drainage system, perhaps with drain distribution tiles buried in a gravel matrix to distribute runoff over the fractured limestone. Percolation of runoff water into the soil could be improved by eliminating all unnecessary paving, and by aerating highly compacted soils followed by revegetation with native species and protection from further intensive visitor use.

2. Retain visitor center at present location and enlarge to include administrative facilities: The impacts of this alternative would be the same as for the "no action" alternative, but would be of greater magnitude with the introduction of an additional structure. More development in the vicinity of Point Supreme will introduce a greater area of impervious surface, and soil compaction is likely to increase. Mitigations for this alternative would be the same as for "no action," but to achieve the same level of benefit they would need to be more extensive. A greater effort would be required to design effective water dispersal drainage systems because of the introduction of another building and associated walkways, and greater care would have to be taken to prevent further soil compaction in the vicinity of the buildings and the overlook. Construction of a masonry barrier around the overlook at Point Supreme may introduce sufficient weight over the limestone to widen fractures near the cliff face. For this reason, the barrier should be constructed of light materials if possible, and it should not be located too close to the cliff face. The barrier should also be designed to accommodate and disperse runoff from the overlook area. Drainage from the slope south of the overlook should be dispersed and prevented from running out onto the overlook area.

The addition to the visitor center should be constructed as far from the cliff face as is feasible, to avoid excessive weight over fractures in the limestone near the edge, and to allow sufficient space for design of a drainage system that would effectively disperse runoff from the roof. Construction of additional facilities in the vicinity of Point Supreme would necessitate the expansion of the existing sewage field. Although the field is already large because of the low-permeability of the clay soil. Sufficient space is available for modest expansion of the field. Impacts of enlargement would largely be short-term in the form of surface excavation, backfilling, and revegetation. Long-term operation of the enlarged field is not likely to result in any significant surface runoff problems if fractures in the underlying limestone are uniformly distributed, and the field size is not increased beyond 30 to 50 percent of its present size.

3. Construct a new visitor center and administrative facilities at a location further from the cliff face than the present visitor center:

Impacts from this alternative are virtually the same as for alternative 2, both in character and in magnitude. One difference, however, is that the new structure can be located and designed in such a manner as to optimize the dispersal of drainage before it approaches the cliff face. Combined with maximum aeration and protection of soils from further compaction followed by revegetation. This alternative could be expected to minimize the increase in headward erosion of the cliff face due to man-cause alterations of the physical environment around Point Supreme.

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- Hintze, Lehi F. 1975. Utah Geological Highway Map. Dept. of Geology, Brigham Young University, Provo, Utah.
- Welsh, Stanley L. and Glen Moore. Utah Plants: Tracheophyta. Third edition, Brigham Young University, Provo, Utah, 1973.

Appendix B

The 30-day public review period for the Cedar Breaks National Monument Draft Environmental Assessment, General Management Plan, Development Concept Plan ended on January 7, 1984. Comments received as a result of the public involvement were reviewed and, where pertinent, incorporated into this plan. There are no areas of controversy that have been identified as a result of this plan and comments received. Most of the people felt that the Service proposal is of appropriate scope and scale for the area. An overwhelming majority of the people feel that maintaining the overall character was of prime importance to the general park experience.

A total of 10 letters were received. Primary concerns centered around potential omissions and corrections to the document, these were made where necessary. A list of copies of all comments are on file with the Superintendent of Cedar Breaks National Monument. A list of respondents follows:

U.S. Environmental Protection Agency, Region VIII, 1860 Lincoln Street, Denver, Colorado 80295

U.S. Forest Service, Dixie National Forest, P.O. Box 580, Cedar City, Utah 84720

Garfield County Commission, Panguitch, Utah 84759

Washington County Commission, 197 East Tabernacle, Box 579, St. George, Utah 84770

Five County Association of Governments, Box 0, St. George, Utah 84770

National Parks and Conservation Association, 1701 Eighteenth Street N.W., Washington, D.C. 20009

Utah Native Plant Society, P.O. Box 1555, Salt Lake City, Utah 84110

State of Utah, Division of Wildlife Resources, Southern Division, 622 North Main, Box 606, Cedar City, Utah 84720

Russel D. Butcher, National Parks and Conservation Association, Box 67, Cottonwood, Arizona 86326

York and Evelyn Jones, 228 South 800 West, Cedar City, Utah 84720.

Appendix C

Bibliography

A. Documents and Publications:

1. Master Plan of Cedar Breaks National Monument, 1964, prepared by Byron A. Hazeltine, Management Assistant, Chapters 1 and 2.
2. Master Plan of Cedar Breaks National Monument, 1965 prepared by William G. Binnewies, Management Assistant, Chapter 3.
3. Index - National Park System and Related Areas, June 1979, U.S. Department of the Interior, National Park Service.
4. Part One of the National Park System Plan History, 1972, U.S. Department of the Interior, National Park Service.
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7. Environmental Analysis for Land Use and Site Planning, William M. Marsh, 1978, McGraw-Hill Book Company, N.Y.
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9. Visitor Center Design Evaluation, 1976, U.S. Department of the Interior, National Park Service.
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14. Planning and Zoning Administration in Utah, A Basic Reference for Local Governments, April 1977, University of Utah, Bureau of Community Development, Utah League of Cities and Towns.
15. Data Base, Five County Association of Governments, July 1981, John S. Williams, Executive Director, St. George, Utah.
16. Maintenance Impact Statement Handbook, April 1980, U.S. Department of the Interior, Heritage Conservation, and Recreation Service.
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18. Geological and Hydrological Analysis of the Proposed Development Zone, Cedar Breaks National Monument, August 1982, Ralph Root, Geologist U.S. Department of Interior, National Park Service, Denver Service Center.
19. Environmental Documents Writing, November 1982, Prepared by Shipley and Associates, P.O. Box 40, Bountiful, Utah 84010.
20. Weather Records, (unpublished) Blowhard FAA site, Iron County, Utah. 1970-1982.
21. Vascular Plants of Cedar Breaks National Monument, (unpublished) Bret Palmer, Southern Utah State College, 1982.
22. Mammals of Cedar Breaks National Monument, listing (unpublished).
23. Birds of Cedar Breaks National Monument, listing (unpublished).

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National Park Service
U.S. Department of the Interior

