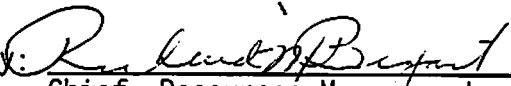


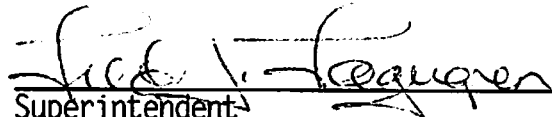
RESOURCE MANAGEMENT PLAN

BRYCE CANYON NATIONAL PARK

DECEMBER 1996

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Date: 12/13/96

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I. INTRODUCTION

A. PARK PURPOSE AND SIGNIFICANCE

The significance of Bryce Canyon National Park is best summarized in the following statements which attempt to capture the essence of the park and its importance to our nation's natural and cultural heritage:

- Bryce Canyon National Park is an example of specular geologic formations and rare erosional processes (ie: hoodoos, spires, fins, rock windows, natural bridges, pinnacles, etc.). The interaction of light, color, and shadows on those formations create a breathtaking landscape that challenges the limits of the imagination.

- Bryce Canyon National Park represents perhaps the best example of Claron Formation, deposited in an aquatic environment millions of years ago. This formation is a rarely studied strata which intrigues scientists as to methods of deposition, lack of fossils, etc. Physical processes, including up to 200 freeze-thaw cycles yearly, cause ever-changing shapes and forms.

- The exceptional clarity of the air at Bryce Canyon National Park and the surrounding area provides the rare opportunity to experience panoramic vistas. The absence of artificial light creates conditions to experience brilliant night skies as if possible to reach up and grasp the Milky Way.

- The peaceful setting of Bryce Canyon National Park provided the opportunity to experience natural quiet which conveys a mood of solitude and enhances the visitor's experience. One can hear the wind in the trees and the coyotes across the canyon.

- Bryce Canyon National Park provides protected habitats for natural life, both rare and interesting, that can be enjoyed by the public and studied by the scientific community.

- Bryce Canyon offers the opportunity to tell the story of changes in American and world recreation and leisure patterns, pursuits and trends.

- Bryce Canyon provides for a wide variety of recreational opportunities and the experiences of western culture.

Bryce Canyon was first set aside as Bryce Canyon National Monument under the Powell National Forest in 1923. The proclamation cited "...unusual scenic beauty, scientific interest and importance..." as the features to be protected. Provisional legislation was passed in 1924 to establish Utah National Park once all lands within the boundaries became property of the United States. In 1928, legislation changed the name to Bryce Canyon National Park, added lands to the 1924 boundaries and the park was established that year. A letter from Henry C. Wallace, Secretary of Agriculture, also says,

"The attractiveness of the canyon is a sublime spectacle viewed as a panorama from certain points of vantage."

More lands were added in 1930 "...for the purpose of preserving in their natural state the outstanding features to the south and west of Bryce Canyon National Park." 1931 additions were also "...for the purpose of preserving in their natural state and for rounding out the boundary..." Subsequent legislation provided for the road.

B. PURPOSE OF THE RESOURCE MANAGEMENT PLAN

This resource management plan is to document what is known of the natural and cultural resources of the park and to give direction in managing those resources to preserve them for continued use and enjoyment by not only this, but succeeding generations. The plan includes inventories, baseline studies, mitigation measures, manipulation and other management techniques to this end.

This is a fluid document. It will change over through time. As new concerns arise, new project statements will be developed. As projects are completed, a summary report will be added. Many of the project statements are broad overviews. When some portion of the main project can be accomplished with funds and staffing available, a new project statement will be written detailing actions to be taken on a subset of the main topic.

Bryce Canyon National Park is a portion of a much larger ecosystem. The park comprises only a portion of the Paunsaugunt Plateau. Precipitation on the park enters two drainages. That moisture on the east side of the park drains into the Paria River, which flows into the Colorado River. Moisture draining from the west side of the park flows into the Sevier River system, which enters Nevada and dries before entering an ocean.

As part of these larger ecosystems, Bryce Canyon must interact with the Dixie National Forest, Bureau of Land Management, private lands, and several political entities. The components of the ecosystem are not fully known. In the past, most studies dealing with plants or animals were limited to the park boundary. In the past few years, we have been sharing data with the surrounding agencies and have cooperated in several studies.

This plan is also used to seek funding, inform universities of potential research projects, and to inform new park staff members of projects completed and those that still need effort.

C. MANAGEMENT OBJECTIVES FOR PARK RESOURCES

The resources management objectives for Bryce Canyon National Park are:

- 1) To implement a strategy that clearly states existing conditions and desired futures for both natural and cultural resources and the actions needed to achieve the desired futures.
 - a. a baseline inventory of flora, fauna, water, and air resources is completed.

- b. identify, evaluate, monitor, preserve, and interpret the park's cultural resources, including archaeologic, historic, ethnographic, and oral histories.
 - c. museum collections are secured and maintained
 - d. historic structures are maintained and adaptively used as appropriate.
- 2) To protect and enhance natural scenic values of the park by eliminating existing incompatible uses and the possibility of such uses in the future.
- 3) To restore and protect natural processes and natural resources, with special emphasis on threatened and endangered species.
- 4) To promote nondestructive scientific research supportive of the park's mission.
- 5) To reduce the amount of solid waste produced by the park, to include recycling, reduction of hazardous waste, use of environmental friendly products, etc.
- 6) To measure the impacts of human activities on both the natural and cultural resources.
- 7) To identify, document, and preserve the ongoing culture of the park.

II. NATURAL RESOURCES BASELINE INFORMATION

This section summarizes the current status of baseline information existing for all categories of natural resources within Bryce Canyon National Park. It identifies major resources, and assess the completeness and reliability of baseline inventories. This information is summarized in the following table. Following the table, additional information on the knowledge of the baseline information is summarized.

A. SUMMARY TABLE OF NATURAL RESOURCES BASELINE INFORMATION

INVENTORY COMPONENTS	DOES NOT MEET	MEETS	EXCEEDS
Historical Data Base	X		
Vascular Plants			X
Nonvascular Plants	X		
T&E and Rare Plants		X	
Mammals		X	
Birds		X	
Reptiles and Amphibians	X		
Invertebrates	X		
Digital Vegetation Map			X
Digital Cartographic Data		X	
Digital Soils Map		X	
Digital Geological Map	X		
Water Resources		X	
Air Quality		X	
Meteorological Data	X		
Fire Management	X		
Backcountry Management	X		
Paleontology	X		

B. DATABASE SUMMARIES

1. Historical Database

Historical scientific material, including rare events records/sightings, maps, photograph, and manuscripts, is contained in the park Resource Management files, park archives, the park library, and in several other locations outside the park (ie. Union Pacific Railroad archives, Western Archeological Center, etc.). The National Biological Service has recently (1996) completed organizing the manuscripts and scientific reports located within the park library and Resource Management office and at Northern Arizona University. This project did not inventory the materials located in the park archives. This database is organized to be used with Procite software. Although this database is very useful, it does not include many of the documents located in sources outside the park.

Biological and geological specimens are maintained in the park's museum collection. The collection facility does not meet park service standards and the collections are housed in a building where temperature and humidity are not constant. Natural history objects include birds, mammals, reptiles, amphibians, insects, plants and geologic specimens. Specimens not consumed during analysis by permitted researchers are accessioned into the collection. The collection currently contains 2,172 biological specimens, 99 geological specimens, and 514 paleontologic specimens. All items have been entered into the Automated National Catalog System.

2. Vascular Plants

From 1993 through 1995, seasonal park botanist, Robert Foster updated the vascular plant list. He collected and forwarded to Dr. Stan Welch at Brigham Young University numerous plants not previously known for Bryce Canyon National Park. The provisional list includes 499 taxa (species, subspecies, and varieties). A number of additional plants are currently awaiting verification of identity by Dr. Welch. Included in the 499 taxa are several dozen species of non-natives plants. Several of these non-native plants are aggressive invaders and the park has instituted a program to slow the spread of these invaders.

3. Nonvascular Plants

No data is available on the nonvascular plants of the park.

4. Listed and Rare Plant Species

No species of plant is listed as threatened or endangered. Five species of plants were formally listed as Category 2. Since that designation was dropped by the U.S. Fish and Wildlife Service, those five species are not on the "candidate" listing.

5. Mammals

The mammal populations of the park have never received a systematic inventory, yet we feel confident in the list of species is fairly complete. Due to the narrow width, many larger species (bear, lion, elk, etc.) spend a small percentage of their time in the park. A mammalian species list includes 59 mammals. Small mammal trapping has been carried out in the late 1980's and again in 1995 and 1996. This was to determine the effects of prescribed fires on rodent populations and was not an attempt to perform a systematic park-wide trapping effort. The only listed species is the Utah prairie dog (threatened).

6. Birds

130 species of birds have been recorded within the park. An annual Breeding Bird Survey has been conducted for the last five years in early summer. Peregrine falcons (an endangered species) have been monitored within the park for the past eight years. Up to four eyries have been occupied and as many as eight young have fledged in a summer.

Surveys conducted over three years have failed to locate Mexican spotted owls. Recently southwest willow flycatchers (an endangered species) have been documented in the park. Goshawks nests have been observed at several locations in the park. Bald eagles (a threatened species) are frequent winter residents.

7. Reptiles and Amphibians

No systematic work has been done to identify herpetological species in the park. Hallows (1982) lists 11 species of reptiles and 4 species of amphibians in casual observations.

8. Invertebrates

No work has been completed to identify invertebrate species. Although a few species of butterflies have been observed and several collections of other insects have been started, none are adequate. A very limited sample of aquatic invertebrates was completed in 1994. Much more information is needed about these building blocks of the ecological systems.

9. Digital Vegetation Map

A new vegetation map was completed in 1996. This map was the culmination of three years of field work by seasonal park botanist Robert Foster and Geographic Information System (GIS) specialist Dan Foster. Using the vegetation classification developed by Spence/Romme/Floyd-Hanna/Rowlands for the Colorado Plateau, approximately 100 different plant assemblages were assigned to the park and a surrounding buffer area. This computer based map may represent one of the finest vegetation maps in the area. This map identifies dominate and co-dominate species in the canopy, subcanopy and ground level. The map also has estimates of fuel loading. Rare plant locations are also entered into this GIS mapping system.

10. Digital Cartographic Data

Bryce Canyon has made great strides in collecting GIS data. We have acquired digital elevation models (DEM), digital line graph (DLG) information, hydrology, etc. The park has also gathered data on roads, trails, buildings, former fire locations, etc. We have produced a GIS plan that establishes priorities for the gathering of data.

11. Digital Soils Map

The Soil Conservation Service has produced the "Soil Survey of Panguitch Area, Utah" in 1990. This map was not digitized and only offered in a paper copy form. The Resource Management staff has digitized the section in and around the park and entered this data in the park's GIS.

12. Digital Geologic Map

An updated geological map (1:100,000 - Paunsaugunt) is currently under development by USGS and is expected to be completed by 1998. Several of the quadrangles for the larger map are still in early stages of production and funding has been cut, so the completion date may be delayed.

13. Water Resources

An inventory of the water rights in the park was completed in 1991. Some minor items remain to be completed. The Tropic Ditch is a pre-existing right but the route across the park needs to be covered by a special use permit. In 1996, each of 33 known springs was inventoried and a flow rate and other physical parameters was documented. The park's culinary water supply is from a 100 acre plot located outside the legislative boundary. The government does not own the mineral rights under this parcel of land.

14. Air Quality

Bryce Canyon has had an NADP (particulate) sampler in operation since 1985. A camera has taken three photographs per day since 1985. Acid rain samplers have also been in operation for varying periods of time. Although there is a tremendous amount of data, the park has struggled with synthesizing this data down to a version that is easily understood by the park staff, neighbors, and visitor. Attempts to edit this mountain of data down to a summary that is comprehensible is an ongoing task.

15. Meteorological Data

Weather data has been collected by the park for over 40 years. However, there are gaps in the data. Also, the data is in hard copy format and not entered into a computerized data base.

III. CURRENT STATUS OF KNOWLEDGE OF NATURAL RESOURCES

A. VEGETATION

Fire played a major role in driving the system. Fire was a regular occurrence on the plateau with a fire return interval between 3 and 8 years. Regular, low intensity fires, which occurred prior to the arrival of the Mormon pioneers resulted in forests with an understory of grasses and interspersed with meadows of grasses and shrubs. Fire was the driving force of the system. All vegetation and wildlife were adapted to the regular fires.

Fire suppression has altered the forests and meadows of the park. Shifts in forest density, fuel loadings, species composition are result.

Vegetation in the park is a mixture of elements from the Colorado Plateau, Great Basin, and Cordilleran floristic regions. A range of vegetation community types exists over an elevational gradient from approximately 6,500 to 9,100 feet. The park's vegetation has been described by Buchanan and Graybosch (1981), Hallsten and Roberts (1990), and Roberts et al. (1990). Roberts et al. (1990) identified nine common community types in the park. Pinion pine-Utah juniper forest, along with sagebrush shrublands are dominant at elevations up to 7,000 feet. Gambel oak is common in the more mesic location. Between 7,000 and 8,500 feet, ponderosa pine dominate with Rocky Mountain juniper, douglas fir and limber pine in much smaller percentages. Dominant understory species are greenleaf manzanita and antelope bitterbrush. Openings in the forest support black sagebrush, rabbitbrush, and grasses. The mixed conifer community, dominated by white fir and douglas fir, with scattered aspen and blue spruce, is found in higher elevations.

Because of local edaphic and topographic features, the park is rich in plant species endemic to southern Utah (Welsh and Thorn 1979, Graybosch and Buchanan 1983). Five former Category 2 rare plant species have been identified in the park. Several other rare species inhabit areas near the park, in habitats which occur in Bryce Canyon.

In 1996, a study of rare (formerly Category 2) plants was completed. The field work on these rare plants was conducted in 1992 and 1993 and 28 monitoring plots were established to determine changes in population numbers. (Peabody 1995).

B. NON-NATIVE PLANTS

Over 50 species of non-native plants have been identified in the park. A small number of these species are considered (through an informal, undocumented rating process) to be noxious, invader species that warrant control. Action has been taken against tamarisk, Russian olive, several thistle taxa, knapweed, and several brome grasses. Several grass species are so widespread that any action to remove them is impractical.

C. SOILS

The soils of the park have been surveyed and mapped by the U.S. Soil Conservation Service. Park soils generally fall into several orders including entisols (recent soils), mollisols (grassland soils with dark surface horizons), alfisols (forest soils), and inceptisols (immature soils). Typical soils in the park are shallow and skeletal, a combination producing low moisture availability. However, a wide range of soils occur within the park. A large portion of the park is classified as badland, rather than as developed soil.

D. ANIMAL SPECIES

The park provides habitat for a variety of animal species. Common mammals include mule deer, striped skunk, badger, gray fox, mountain cottontail, red squirrel, golden-mantled ground squirrel, and various other small rodents. Elk, pronghorn, mountain lion and black bear are known to use the park as well as areas outside the boundaries, and are occasionally seen.

Utah prairie dogs are a threatened species in the park. Existing populations were reintroduced to the park in 1974. Monitoring of the populations inside the park has occurred yearly. In 1995, an outbreak of sylvatic plague reduced the population by 60 percent.

Common birds in the park are Stellar's jay, common raven, mountain chickadee, pygmy nuthatch, white-breasted nuthatch, junco, red crossbill, Clark's nutcracker, flicker, mountain and western bluebirds, white-throated swifts and violet-green swallows. Raptors that nest in the park include golden eagle, red-tailed hawk, kestrel, prairie falcon, goshawk, Cooper's hawk, and great horned owl. Surveys for Mexican spotted owl were conducted in 1993 - 1995, but none were observed. In 1995 and 1996, southwestern willow flycatchers (an endangered species) were conducted and presence was documented in drainages on the east side of the park.

Federally endangered peregrine falcons nest in the park. Monitoring of nests sites has occurred for the last eight years (1989 - 1996). Endangered bald eagles are occasionally seen in the park, but are not known to breed in the park.

E. GEOLOGY

The geology of the park has been described by Bowers (1991). The park is located along the eastern escarpment of the Paunsaugunt Plateau, which, along with the Markagunt Plateau to the west, forms the southernmost of the high plateaus of Utah. The Paunsaugunt Plateau forms the western side of the Paria amphitheater, a broad drainage basin of the headwaters of the Paria River.

Although there are at least 10 formations known from the Bryce Canyon region, most emphasis in the park is placed on the Claron formation. The unique scenery in Bryce Canyon has been created by forces of differential erosion acting on colorful Tertiary limestone exposed along and below the rim of the plateau, making up this formation. Below the Claron, Cretaceous rocks are

present over large areas. These rocks are less conspicuous because of their drab colors and poorer exposure due to cover by soil and vegetation. Underlying Jurassic rocks are not exposed within the park.

F. PALEONTOLOGY

Paleontological resources have been found within the park in the Straight Cliffs, Dakota, Tropic Shale, Wahweap, and Kaiparowits formations (Eaton, 1988 and Cabbon, et al, 1996). Fossils recovered include those of bivalves, gastropods, ammonites, inoceramids, turtles, dinosaurs, crocodiles and fish. Some of these are of great significance, as they provide a basis to biostratigraphically date the Cretaceous rock sequence within the park.

G. AIR RESOURCES

The park is designated a mandatory Class I air quality area. Air quality in the park is generally excellent. Various air quality parameters are monitored in the park, including particulates and acid deposition. Pollutants that reach Bryce Canyon come from urban areas located to the south and west. Generally clean air arrives from the north. Local sources of pollution include dust from roads and smoke from wild or prescribed fires.

H. SCENIC RESOURCES

Views from the park are outstanding, including unique geologic formations within the park, as well as wide expanses of undisturbed terrain in southern Utah and northern Arizona. Visitors are able to see a vast panorama across cliffs, canyons, and plateaus. Views on clear days extend up to 200 miles. Visibility of at least 75 miles occurs 90% of the time. Outstanding panoramas include views of the Black Mountains, Aquarius Plateau, Navajo Mountain, the white walls of Kanab Canyon, Coral Pink Sand Dunes, the Kaibab Plateau, and the Grand Staircase, one of the primary scenic attractions in the American west.

Visibility is generally best during winter and poorest during summer. Most visibility impairment is caused by pollutants emitted from sources located outside Utah and fires (either wild or prescribed).

I. NATURAL QUIET

Noise studies conducted in conjunction with studies of impacts from the proposed development of the Alton coal mine showed natural sound levels in the park to be as low as those in a sound recording studio. Threats to natural quiet in the park come from aircraft overflights, vehicles along the park road, and potential for external development. Sound monitoring conducted in 1995, indicated aircraft could be heard an average of 19 percent of the time. The amount of time an aircraft was heard varied by location throughout the park with Fairyland Overlook having the highest percentage of time (29 percent) and Bristlecone with the smallest percentage of time (11 percent) when aircraft could be heard. There are three different sources for aircraft noise: 1) helicopter tours based out of Ruby's Inn, 2) low elevation fixed wing that included both private aircraft and commercial sightseeing

operations, and 3) high altitude commercial jet traffic.

J. INTEGRATED PEST MANAGEMENT

Animal species which are at times considered pests in the park are bats and skunks. Little brown bats occasionally roost in park buildings, creating a mess and posing a safety problem for visitors and employees. Park staff have used several non-destructive techniques (mostly by installing physical barriers) to alleviate the problem.

Striped skunks frequent the park residential area and campgrounds during summer months. They have caused conflicts with residents, and occasionally posed a safety hazard to visitors and employees.

Several species of plants are being controlled with a variety of techniques, including manual removal, cutting, seed collection, and chemical herbicide use.

The park staff works with the concession to ensure the proper usage of cleaning supplies. Usage of EPA registered pesticides has been reduced to the minimum by the concession. In 1995, only one EPA registered chemical was used as treatment for bed bugs by a commercial applicator after approval by the IPM coordinator.

K. WATER RESOURCES

The park occupies the headwaters of two major watersheds: the East Fork Sevier drains the Paunsaugunt plateau, flowing north to the Great Basin, and the Paria River drains areas below the plateau rim, flowing south to the Colorado River. Three perennial streams, Yellow Creek, Willis Creek, and Sheep Creek are found in the park. All other streams are intermittent or ephemeral.

The Tropic Ditch is an irrigation canal constructed in the 1890's that crosses the northern part of the park. It is listed on the National Register of Historic Places.

Important ground water resources include several major aquifers and one aquitard. Recharge of ground water on the Paunsaugunt Plateau is principally from percolation of snowmelt. Many perennial seeps and springs throughout the area issue from saturated aquifers underlying the park.

The Utah Division of Water Rights reports that the NPS holds eight appropriative water rights in the park. They also list nine water rights not owned by the government with a point of diversion and/or use within or adjacent to the park in four areas: Water Canyon, Tropic Canyon, Campbell Creek, and Bryce Creek.

Federal reserve water rights have been claimed for surface and subsurface water including all perennial and intermittent streams and all springs, seeps and other natural sources of water. The USA has claimed in all surface sources, the minimum amount of flow necessary to fulfill reservation purposes which include preservation in their natural state of the outstanding scenic

features and conservation of the scenery and the natural and historic objects and the wildlife and provision for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.

IV. NEEDS OF NATURAL RESOURCES PROGRAM

Current resource management programs focus on crises oriented issues, rather than basic inventory and monitoring needs.

A. AIR QUALITY

The park has a well established air quality monitoring program. Monitoring began in 1978 and currently includes data collection for particulates, visibility, acid deposition. Formerly radiation monitoring also took place. Air quality monitoring needs to continue so that the database can be expanded. The huge amounts of data collected to date need to be interpreted so that non-technical individuals can understand the highly technical information.

B. PRESCRIBED FIRE

A prescribed fire program has been initiated, with the primary objective of restoring and maintaining natural vegetation conditions and processes to the extent possible. Fire effects on vegetation, fuel loads, birds, and small mammals are being determined using permanently marked plots in burn study areas. Over 2,900 acres of ponderosa pine have been treated with prescribed fire between 1990 and 1994. In 1995, approximately 600 acres of mixed conifer have been burned. Data collection from these prescribed fire monitoring plots will be analyzed to determine the effects of the fire and to determine if fire objectives are being met.

Since fire was such an important element of maintaining the forest on the plateau, and have been excluded for approximately 100 years, the reintroduction of fire is of vital necessity for the forest health. Efforts to both use fire and to monitor its impacts is of paramount importance.

C. ENDANGERED SPECIES

Endangered, threatened and rare plant and animal species are generally monitored at minimum levels. The five species of former Category 2 species of plants occur in the "breaks" area where the highest probability of human impact may occur. Over 25 monitoring plots were established by Dr. Peabody in the early 1990's. These plots need to be re-inventoried to determine impact to these plants. Since soil types in the park are similar to those in Red Canyon, the park needs to work with those researchers working in Red Canyon to determine the possibility of additional listed or rare plants occurring in the park.

The endangered peregrine falcon nests have been monitored on a yearly basis since 1989. Funding to perform this monitoring in 1994 and 1995 was provided by Federal Highways Administration as mitigation for the Rainbow Road Project. In 1996, monitoring was covered by base funding. No new territories were examined in 1996. Since the park has this database, we feel it is important to continue to determine nesting success. This monitoring is planned for 1997.

Threatened Utah prairie dog population levels are monitored on an annual basis in conjunction with state programs. Research into the behavior of Utah prairie dogs is in its fifth year. The research is conducted by Dr. John Hoogland and partially funded by the National Science Foundation. His work is the only known behavior research being conducted on Utah prairie dogs.

Surveys for Mexican spotted owls were conducted in 1993 - 1995. Using parameters of known habitats, areas of the highest probability were determined using the park's Geographic Information System. These canyons were surveyed numerous times over the three summers. No Mexican spotted owls were observed. Since these surveys were extensive, no further work is planned in the near future.

In 1995 and 1996, southwestern willow flycatchers were documented in drainages on the east side of the park. This species is listed as endangered. Survey work was performed by members of the Intermountain Field Area office in 1996. These surveys need to be continued and expanded to determine an accurate baseline of populations in the park.

D. VISITOR IMPACTS

In 1994, the park initiated a study of the impacts caused by visitors in and near the overlook areas. This Visitor Impact Monitoring Program (VIMP) has documented a five percent loss of vegetation in the developed areas near the campgrounds and major view points. The rapid loss of vegetation has prompted the park to install hundreds of linear feet of fencing designed to encourage visitors to remain on hardened trails. Many more thousands of linear feet of the fence is needed to protect overlook and rim areas. This monitoring program needs to continue each summer in order to determine the effectiveness of the barrier fences and to continue to make informed decisions on actions such as signing, interpretive efforts, fence construction, etc.

E. INFORMATION MANAGEMENT

The park has a UNIX-based Geographic Information System (GIS). Data bases have been developed for a number of themes, including land ownership, transportation, vegetation, soils, hydrology, topography, and geology. A permanent position has been created to operate the system and develop additional themes (layers). A GIS Plan has been written and implemented. This plan sets priorities for data acquisition. Roads and trails were nearing completion, but the incumbent transferred in spring of 1996. The position has been vacant since that time. This GIS specialist position will be filled in FY97.

F. RESEARCH

A variety of research has been conducted over the past four years. Examples include vegetation succession, rare plant distribution and abundance, fire history, spring inventory, small mammal inventories, geology, and paleontology. A study of the behavior of Utah prairie dogs has been underway for several by Dr. John Hoogland. This study is expected to continue for

several more years. The U.S. Forest Service has conducted a survey for insect damage and root rot. Efforts are currently underway to provide partial funding to local universities to encourage them to utilize Bryce canyon as a natural laboratory. With the disorganization in the NPS science program and the reorganization of the National Biological Service, it appears necessary that a small park like Bryce Canyon will need to encourage and fund the majority of research conducted by non-park personnel.

Additional funding and personnel are needed to go beyond the current program focus on immediate threats and single species of interest to a broader ecosystem oriented approach. A well established, scientifically based, long-term inventory and monitoring program for all park resources is critical. Currently, two Resource Management Specialists and one subject-to-furlough Biological Technician are base funded. Minimum immediate additional staffing needs are three seasonal biological technicians.

G. LIMITS OF ACCEPTABLE CHANGE

Many impacts are being observed. Many of these impacts directly result from large numbers of visitors and their actions. Examples include number of wildlife feedings by visitors or the number of social trails and the resulting decrease in vegetation at areas of high visitor use. Other changes are not the result of visitors. Examples include forest health, species composition changes, and spring flow rates.

Little work has been accomplished to document the current state of the resources, and to establish a threshold situation where some action would be taken to reduce the impacts. We have a monitoring system that looks at the impacts of visitors to the vegetation near the overlooks (Visitor Impact Monitoring Program - VIMP). This program has documented a substantial loss of vegetation. Although no threshold levels have been established, we have taken action by constructing wooden rail fences to force visitors to remain on hardened pathways.

A full range of Levels of Acceptable Change need to be developed to monitor backcountry campsites, front country campsites, trails (both designated and social), noise, wilderness, and parking area usage.

V. CULTURAL RESOURCES BASELINE INFORMATION

A. ARCHEOLOGICAL RESOURCES

Approximately 20 percent of the park has been surveyed to standards set by the Secretary of Interior. These surveys were usually conducted for construction projects, such as roads, fencelines, and buildings. Surveys have located 51 sites. Of these, 11 have been determined eligible for listing on the National Register of Historic Places. Three sites have been determined not eligible. 36 sites have not been evaluated. No archeological sites are listed on the National Register. Many of the sites consist of lithic scatters and these lithics can be easily removed by visitors in the areas of high visitor use. Most sites, however, are located in areas of low visitor use.

B. HISTORIC STRUCTURES

In 1994, a private contractor completed an inventory and evaluation of the historic resources in the park. Following their recommendations, 42 buildings, 10 trails, and the Tropic Ditch (irrigation system) were added to the National Register of Historic Places. Most of the listed structures were declared significant under Criteria A (broad patterns of American history) or Criteria C (architecture). Twenty-eight of the buildings are associated with the Union Pacific development of the park. Twenty-three of those buildings are being maintained by TW Services, one of the park concessionaires. Funding to maintain these structures comes as a percentage of net revenue. These buildings are in good condition, requiring only ongoing cyclic maintenance.

The National Park Service is responsible to maintain eight structures used for employee housing, three restrooms, five Standard Cabins, one service station, and the Rainbow interpretive shelter. The five Standard Cabins are currently undergoing preservation maintenance. The employee housing, restrooms, and interpretive shelter are still in use as originally intended, and are in good condition requiring only routine on-going maintenance. The service station is in fair to poor condition and in need of exterior repairs.

The trails system within the park requires yearly maintenance due to the erosive geological layers where the trails exist. Many segments of the trail system are listed on the National Register. An occasional rock fall necessitates minor rerouting of short segments of trails, but the general location is maintained. The park road system (determined eligible) is failing due to age and lack of maintenance. The southern eight miles (Farview to Rainbow) were rebuilt in 1994 and 1995. Additional segments (unknown distance) are scheduled for rebuilding in 2000.

C. CULTURAL LANDSCAPES

Two cultural landscapes are identified in the park. One landscape is that associated with the buildings constructed by the Union Pacific Railroad. The Lodge district has been altered extensively by the removal of approximately 80 cabins. New structures have replaced some of the lodging space. A parking

lot now exist where some cabins used to be. Vegetation in the Lodge district has been pretty much ignored in the last 20 years. There are current plans for the Historic Structures Report (currently in preparation) to evaluate the historical cultural landscape in the Lodge district.

A second cultural landscape exist in relationship to the trails system. The appearance of both the overlooks and the below the rim trails needs to be evaluated. The area in the vicinity of the overlooks is being heavily impacted by human footsteps. In areas adjacent to Sunrise and Sunset Point, we have documented the loss of 5 percent of the vegetation per year. This really means that social trails are either being enlarged or created at this rate. The trail system is listed on the National Register of Historic Places.

D. MUSEUM COLLECTIONS AND ARCHIVES

The park has not had personnel available to manage the collections or archives for the last several years. Many museum items were catalogued in 1994. Only annual inventory and yearly cleaning have occurred in 1996. Many archival items need to be entered into the ANCS. There are over 22,200 catalogue entries. Through the last few years, many papers/documents have been located in park files and need to be entered into the archival collection.

Some objects are not located in the park, but are stored in other locations including Midwest Archeological Center, Western Archeological Center, and University of New Mexico (Albuquerque). The majority of the objects and archives are stored in the park. The storage area is a converted maintenance bay and has no temperature or humidity control. In winter months, temperatures in the storage area can fall to near freezing. Humidities can fall below 15 percent. The storage area does have an alarm but not fire suppression.

There are no human remains nor any associated funeral objects in the collection.

E. SOCIAL SCIENCES

A Visitor Service Project (the one week survey of park visitors conducted by Machlis/Madison) was conducted in the summer of 1988 and the fall of 1993. No other studies of visitor wants/needs or economic impacts have been conducted specific for the park.

No ethnographic studies have been made for the park. Nearby Paiute tribes are suspected to have cultural affinities to the park.

A few individuals have been interviewed to gain their knowledge concerning the early periods of the park. Many of the people around during the early years of the park are now elderly. Many more individuals need to be interviewed in order to gather these oral histories before they individuals die.

VI. CURRENT STATUS OF KNOWLEDGE OF CULTURAL RESOURCES

The Cultural Resources of Bryce Canyon National Park can be divided into archeological sites, historic structures, historic objects/archives, and human-related studies. Social sciences (specifically dealing with economic benefits of the park to the surrounding communities and profiles of park visitors) are also needed to gather information about how the park and its visitors interact with the local residents.

A. ARCHEOLOGICAL RESOURCES

Generally, the archeological resources in the park are poorly documented. The limited areas of the park that have been adequately surveyed, were done for construction-related activities. Sites tend to consist of lithic scatters and historical camps. A number of dendrographs (carvings on aspen trees) made within the last 100 years also exist.

About 20 percent of the park has been surveyed. In general this includes the developed areas, the roadsides and portions of the fenceline. Findings include both sites and isolated artifacts. Surveys are included in the park's Cultural Sites Inventory. Maps were last updated in 1994. Fifty-one archeological sites are recorded within the park. Many of these archeological sites have been determined eligible, but no formal nominations have been forwarded to the National Register.

No effort has been attempted tie in the archeological story of Bryce Canyon with that of surrounding areas. Most sites located in the park are near rim areas with access (natural trail area) to the valley to the east of the park. In 1993, a large site with evidence of multiple years of use was found on the East Fork of the Sevier River, a location approximately 2½ miles west of the park boundary.

B. HISTORIC STRUCTURES

Numerous historic structures associated with early park development fall into two categories: 1) structures built by the Union Pacific Railroad and 2) structures built by the National Park Service. Numerous foot trails and the road system in the park are also of historic importance.

In 1995, the National Register of Historic Places added 42 buildings, 10 trails segments and the Tropic Ditch. The buildings include the following:

Bryce Canyon Lodge District

Lodge, Deluxe Cabins, Standard Cabins, Linen House, Recreation Hall, Boy's Dormitory, Pump House. The Lodge is also listed as a National Historic Landmark.

Bryce Inn (General Store)

Original NPS Administration Building (HS-31)

Horse Barn

Loop C and D Comfort Stations (North Campground)

Rainbow Point Comfort Station and Overlook Shelter

NPS Housing Area (HS-2 through HS-10)
Utah Parks Service Station

Trails listed on the Historic Register include the following:

Navajo Loop
Queens Garden
Peekaboo
Fairyland
Rim Trail
Riggs Springs Fire Trail
Under-the-Rim Trail

There are an uncounted number of wooden check dams in the park. These were installed in the 1930's through 1970's as part of erosion control projects. The dams range from brush filled gullies to rather substantial gabion and wood structures. Most are still functional. Some are almost completely filled in behind and covered with the soils they were designed to trap. A few appear to be in areas where they cannot function due to the extent of the drainage.

Although the Civilian Conservation Corps was an active presence in the park, the camp in this area was a spike camp out of Zion National Park and only the site remains.

The Lodge had a major overhaul in 1988. It continues to be used from spring to fall for lodging and is operated by TW Services. A recent change in concession contract/operating agreement calls for a percentage of the gross revenues to be spent on the Lodge and associated cabins. Repairs and on-going maintenance of the Lodge and Deluxe Western Cabins results in these structures being in very good condition.

In 1994, TW expressed interest in operation of the Lodge on a year-round basis. Since the original construction envisioned only a summer use, it would require major renovations in order to allow for winter use. This idea of year round use has not been mentioned since TW Services was purchased by Amfac.

C. MUSEUM COLLECTIONS AND ARCHIVES

The park houses a collection of curated objects that include floral and faunal species, rocks and minerals, paleontological specimens, furnishings from the Lodge and cabins, and photographs of the park. Some of the objects are on display in the Visitor Center and most are housed in a storage area.

Bryce Canyon has a collection of several thousand objects (defined as material things possessing functional, aesthetic, cultural, symbolic, and/or scientific value; an object is usually movable by nature or design) relating to the park, its geology, natural and cultural history. In addition, there are collections made and housed in external institutions. The bulk of these are small mammals located at the Small Mammal Ecology Center in Ft. Collins, Colorado and archeological objects in the National Park Service Midwest Archeological Center.

The park staff is now analyzing the library and photographic collections for archival materials. An archival plan is being developed. In addition to rare books from the library, park land and water documents will be included in the park's archives.

Maps and building plans are archived in the Denver Service Center with microfilm or microfiche copies for the park.

The staff has compiled microfilm copies of documents relating to the development of the park. These came from the Union Pacific Museum in Omaha, Nebraska, Zion National Park and other sources. It is hoped to also develop a comprehensive bibliography of information relating the park's natural and cultural history. This will of necessity be a long term and continuing project.

The development of an Administrative History should be facilitated by obtaining the records from Union Pacific and from Zion National Park.

Archives (defined as papers, books, photographs, legal papers and other printed matter relating to park history) include the park's extensive photographic collections. Most of these photographs are neither stored nor treated as a part of the collections. Original negatives are used for historic documentation in publications.

The Union Pacific (UP) files as they relate to the park are on microfilm. UP's photographic collections were examined and a video catalog made of park relevant photographs.

The park is just beginning to work on separating documents relating to lands, water rights, building construction, early resource studies and rare books from park files, library and other inadequate storage.

D. SOCIAL SCIENCES

Human related studies are very poorly represented at Bryce Canyon. Although Native Americans (primarily Paiute) acknowledge their former usage of the Bryce area for hunting and gathering activities, we have very little ethnographic information documenting the extent of this usage. Early park history is incomplete, as is an adequate oral history of the individuals associated with the early park development.

Ethnographic resources are defined as park resources that have traditional subsistence, sacred ceremonial or religious, residential, or other cultural meaning for members of contemporary park-associated ethnic groups, including Native Americans.

Prehistoric Native Americans have inhabited the area within and surrounding Bryce Canyon National Park. Archeological evidence exists near Bryce Canyon of Paleoindian, Fremont, and Kayenta Anasazi. Archeological sites and isolated finds within the park represent the Archaic Period and the Late Prehistoric Period. During the late Prehistoric Period, Numic-speaking peoples like the Southern Paiute occupied Bryce Canyon and the surrounding

vicinity. Ethnohistorical accounts and the oral history of contemporary Southern Paiute include the Bryce Canyon area. Contemporary descendants of the southern Paiutes and the Kaibab Tribe should be considered Native American tribes who have traditional affiliation with Bryce Canyon National Park.

VII. NEEDS OF CULTURAL RESOURCES PROGRAM

A. ARCHEOLOGICAL RESOURCES

At present, archeological work is done in direct response to construction needs. Completion of an archeological survey and determination of eligibility for all sites would facilitate park planning for projects such as fencing, roads and trails work and further development of park facilities in keeping with other management plans. Once sites are identified, it is essential to determine their eligibility for the National Register and their significance.

Compliances are accomplished for each project on an individual basis. The Cultural Sites Inventory and subsequent studies are consulted frequently to determine impacts of park projects on archeological resources. When appropriate, the Memorandum of Agreement with the State of Utah is utilized to facilitate paperwork related to compliance.

The park has a good working relationship with the Utah State Historic Preservation Office (SHPO). The SHPO recognizes that the current park exhibit specialist (Kirby Mathew) meets the Secretary of Interior Standards for archeology. This allows the park to perform surveys for archeological sites for individual projects (fenceline construction, construction of pit toilets, placement of underground utilities, etc.). However, due to work commitments, the exhibit specialist does not have time to survey areas of the park not scheduled for disturbance.

The park has committed to performing archeological surveys on the areas of the park treated with prescribed fire. These pedestrian surveys are performed after the areas have been burned and only areas of high probability for archeological sites are surveyed. This decision was made (and approved by the SHPO) since the area has experienced repeated fires and the prescribed fires conducted by the park are of a low intensity (relatively cool) nature. The areas to be burned are not surveyed prior to ignition since the ground is covered with needle litter and is not readily visible in most locations.

Therefore, the park needs to have a complete archeological survey performed to determine the overall archeological resources. We also need to work with the Dixie National Forest in develop an Archeological Resources Overview to relate the archeological resources in the park to the surrounding Paunsaugunt Plateau.

B. HISTORIC STRUCTURES

In 1994, Historical Research Associates, Inc. completed an evaluation of the historic buildings within the park and made recommendations as to which should be listed on the National Register. In 1995, 42 buildings, 10 trails, and the Tropic Ditch were added to the National Register of Historic Places. Many other structures were evaluated and were not added to the Register for various reasons (structure has been moved from original location, modified extensively, of very recent construction, etc.).

In the late 1980's most of the Standard Cabins were removed from the Lodge District. In 1983, the park agreed to maintain examples of both standard and economy cabins and to interpret them to the public. The park failed to maintain any economy cabins. To date no effective interpretation of the existence/location of the 104 cabins removed in the late 1980's. This deficiency needs to be remedied. A wayside exhibit or interpretive guide needs to be prepared to adequately explain to the public what the Lodge area looked like prior to the cabins removal. Documentation to HABS standards was to be made of the cabins in the Lodge area. That documentation is not available to park management.

Six Standard Cabins were kept along the paved access road to the south of the Lodge. One cabin, the Nurse's Cabin, is utilized by the concessionaire and maintenance of the cabin is the responsibility of the concessionaire. The other five Standard Cabins are in the process of being preserved and will retain their appearance which is representative of the post-World War II period. The interior of the cabins is being upgraded to include fire suppression systems, new electrical service, and restoring the floor surface. Two of the cabins will become office space and three cabins will be converted into summer housing. Areas adjacent to the cabins is currently being revegetated and sidewalks are being repaired. This preservation of the five cabins will be finished by 1998.

A recent change in the concession contract with TW Services (recently purchased by Fred Harvey- Amfac Corporation), allows a percentage of the gross revenues to be used by repair of the structures. In 1996/1997 these funds are being used on the following projects on historic structures:

1. repaint male dormitory
2. reroof four Deluxe Cabins
3. repair porch floor on General Store
4. fire suppression system for General Store
5. replace rotting logs on Deluxe Cabins
6. repair door and replace floor in Linen Cabin

This fund is also being used to contract for an Historic Structures Report (HSR). This report is being prepared by Jim McDonald Architects, from Missoula, Montana. This study will also include historic landscapes. The HSR will be a plan to what work is needed to maintain the historic buildings associated with the Union Pacific Railroad. This report will not cover those structure directly associated with the park service (such as the housing district built by the NPS in the 1930's). The HSR will spell out the cyclic maintenance needed over the next 10 years as well as the immediate needs of maintaining these historic buildings.

The Standard Oil Service Station was also listed on the National Register. Currently the service station is being used as office space for the horseback concession. The park wishes to restore this building to its appearance of c.1950 or so. Although gas pumps will be re-installed, no gas or services will be available. Instead the station will be use to interpret the changes in travel patterns to national park areas over time.

In order to restore the service station, the horseback concession must be

relocated. The current plans call for the construction of a visitor contact station/wrangles office near the horse corral. Funds to construct this new cabin would come from a percentage of the gross revenues of the horse concession. Once the wranglers have vacated the service station, restoration may proceed. Current plans call for construction of the new wrangler cabin in 1997 or 1998, with service station restoration beginning the following year.

The original park headquarters (Historic Structure 31) is currently being used as a district ranger office. The exterior was restored in 1993 and the interior was refinished in 1995/1996.

Several other historic structures listed on the National Register are maintained by the park. This includes two comfort stations in North Campground, eight housing units, and the Rainbow Point comfort station and overlook pavilion. These structures are all still in use and no plans call for this to change. All these structures do require on-going cyclic maintenance (painting, reroofing, etc.).

With the large number of historic structures in the park, it is essential the park continue to fill the position of exhibit specialist and to fund a crew to maintain these buildings. The exhibit specialist is also necessary to oversee the contract personnel who perform repair and rehabilitation on those historic buildings operated by the park concessionaire.

Ten trails are also listed on the National Register. These trails will be maintained in their current conditions.

The Bryce Canyon Road System has been declared eligible for listing on the National Register. During a recent consultation with the SHPO, it was decided that the concept of having a main road with lateral spurs leading to overlooks and their associated parking areas was what made this road system eligible. Therefore it was determined that modifications to the system could be made so long as the basic system did not change.

C. MUSEUM COLLECTIONS AND ARCHIVES

Over the past few years, little has been done with museum collections. In 1994, two seasonal employees performed backlogged cataloging of museum collections. They were able to catalogue many of the objects but a large number of archives (papers and photos) remain to be entered into the ANCS. Annual inventories of the collection objects have been performed. Items on display in the visitor center museum are inventoried yearly and general housekeeping is completed.

Until the spring of 1991, land documents and papers were kept in an administrative safe. These were removed and filed with the collections documents. All of the park's construction drawings have been microfilmed by the Denver Service Center. The microfilm is stored with the maintenance division. The park has many land documents, construction drawings, papers, books, photographs, etc. which need to be evaluated and archival plans made. Other parks and regions also will have papers pertinent to Bryce Canyon which

should be available at least in microfilm version. Collections storage will have to consider archival needs also.

In-park storage is not in compliance with Special Directive 80-1. However, the collections are secure from incidental intrusion and inventoried annually. The storage area does not have climate control, appropriate work space, wet or dry labs and is not readily accessible to interpretive offices so that time must be taken from other duties to permit visiting researchers to use the collections.

Maintenance of the collections is difficult because the storage area is generally uncomfortable cold. New storage needs to be developed to permit effective maintenance of the collections.

The collections are inventoried and maintained each year to meet requirements. Cataloguing is current for objects but not for archival materials. All cataloged items are in ANCS. All of the objects need to be photographed. The Scope of Collections Statement is in draft. Other planning documents need to be developed.

No objects in the Bryce Canyon collection are directly tied to Native American groups, except the lithics associated with archeological sites. No burial or associated funerary objects are in the collection. At present, we are unaware of any items that would be covered by the Native American Graves Protection and Repatriation Act.

With the current collections housed in substandard conditions, some change needs to occur. Options include moving the majority of the collection to another repository, such as Western Archeological Center, building a new storage facility at the park (to store all or a portion of the collection), or to continue to store the collections in the substandard area.

The staff member responsible for maintaining the collections is currently furloughed for nearly half the year. The remainder of the year, this person is performing interpretive activities. This position needs to become year-round and a substantial portion of the position dedicated to curatorial duties.

D. SOCIAL SCIENCES

No study of the ethnographic data has been completed for the park. What little knowledge of the interrelationships of former occupants of the area and their descendants is poorly known. Limited contacts with the Kaibab Tribe (Arizona) and the Paiute Tribe of Utah have allowed the park to begin to understand their interest in park. No attempts have been made to interact with Navajo or Puebloan peoples. We have submitted several funding requests which seek to review and summarize the existing ethnographic data of those communities affiliated with Bryce Canyon. The ethnographic overview and assessment would evaluate the data, identify any gaps, and make recommendations for future work.

In keeping with various federal laws and NPS policies, particularly Section

106 of the National Historic Preservation Act, the 1988 NPS Management Policies, Native American Graves Protection and Repatriation Act, and NPS-28, American Indians are consulted by the park if any action by the NPS has the potential to negatively affect lands and resources important to these communities.

Over the past few years, an oral history program has been in place. In 1995, the Natural History Association provided funds so that several individuals could be interviewed. The tape recordings were transcribed and both the tape and the written transcription are in the park. Additional funds have been provided by the Natural History Association in 1997 for additional interviews.

The park should develop an Administrative history. While Zion National Park does have a draft Administrative History which should include Bryce's early years until 1956, it is not considered adequate.

VIII. APPENDICES

A. CULTURAL RESOURCE DOCUMENTATION CHECKLIST

TITLE	CURRENT/ DATE APPROVED	INCOMPLETE; NEEDS REVISION OR UPDATING	NEEDED
PLANNING DOCUMENTS			
Preauthorization and authorization	N/A		
Statement for Management (SFM)	1993		
Outline of Planning Requirements (OPR)	4/91		
General Management Plan (GMP)	1987		
Development Concept Plan (DCP)	1987		
Resources Management Plan (RMP)	1996		
Interpretive Prospectus (IP)	1987	X	
SERVICEWIDE INVENTORIES, LISTS, CATALOGS AND REGISTERS			
Cultural Resources Bibliography (CRBIB)			X
Cultural Sites Inventory (CSI)	1992		
List of Classified Structures (LCS)	1989		
National Catalog of Museum Objects	Current		
National Register of Historic Places	1995		
Interpretive Prospectus (IP)	1987	X	

BASIC CULTURAL RESOURCE DOCUMENTS

Archeological Overview and Assessment		X
Archeological Identification Studies		X
Archeological Evaluation Studies		X
Historic Resource Study		Scheduled
Scope of Collections Statement	1985	Draft, 1990

SPECIAL RESOURCE STUDIES AND PLANS

Archeological & Ethno. Collections Studies		X
Archeological Data Recovery Studies		X
Collection Management Plan		X
Collection Storage Plan		X
Collection Condition Survey		X
Cultural Landscape Report (CLR)		X
Ethnohistory		X
Exhibit Plan	1989	
Historic Furnishing Report	1985	
Historic Structure Preservation Guide (HSPG)		X
Historic Structure Report		X
Social Impact Study		X
Special History Study		X
Traditional Use Study		X

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Project Statement
Last Update: 12/12/96
Initial Proposal: 1994
BRCA-N-180.000
Priority: 999
Page Num: 0045

Title : DEVELOP WATER RESOURCE MANAGEMENT PLAN

Funding Status: Funded: 0.00 Unfunded: 4.50

Service-wide Issues : N20 (BASELINE DATA)
N11 (WATER QUAL-EXT)
Cultural Resource Type:
N-RMAP Program codes : Q00 (Water Resources Management)
Q01 (Water Resources Management)

10-238 Package Number :

Problem Statement

Park management must frequently address water resource issues including water quality, water use, water rights and water development outside the park. There is no management plan in place to guide management and research needs. The NPS Water Resource Division (1990) prepared a document titled "Hydrologic Characterization and Inventory of Water Rights, Uses, and Requirements at Bryce Canyon National Park" which summarizes relevant water resource information.

Three perennial streams, and numerous intermittent water sources in the park are important to resource values including maintaining wildlife and riparian communities. Water sources are also important for recreational and aesthetic purposes. Existing water quality and quantity necessary to support these values has not been documented.

In 1990, approximately 3,000 visitor use nights were spent in the backcountry. Backcountry campers rely on several perennial and ephemeral water sources. A monitoring program is needed to provide visitors information on quantity and quality of water available.

Three water supply systems serve different visitor and administrative uses in the park. The main system, supplied by two wells in East Creek, supplies park headquarters, residential area, and the main visitor service area including the Bryce Canyon Lodge. The East Creek wells were constructed in the 1950's, and are 90 and 52 feet deep. This system provides fire protection for the park. An estimated 15 million gallons is used annually from this system. Yovimpa Spring supplies the Rainbow Point water system at the south end of the park. Facilities at Rainbow Point include restrooms, a drinking fountain, and outside tap. Annual water usage is estimated at 250,000 gallons. The Peek-a-boo spring supplies a system which provides water for horses below the rim. Impacts of water use on other resources in the park have not been evaluated.

During drought years water conservation measures have been

Project Statement

Last Update: 12/12/96
Initial Proposal: 1994

BRCA-N-180.000
Priority: 999
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adopted to minimize water use. Visitor facilities, including restrooms and drinking fountains, have been shut down during extreme water shortages. Some consideration has been given to closing the RV dump station in order to conserve park water, and to the need to truck water into the park during extreme shortages. Water levels in the wells have dropped to low levels during drought years, however the capacity is unknown.

The East Creek wells lie on a 100 acre parcel of land owned by the NPS, surrounded by USFS land that is subject to livestock grazing. Standards for minimum area required to protect a drinking water source are currently not being met. The NPS and USFS are jointly considering measures necessary to meet standards.

The Tropic and East Fork Irrigation Company maintains the "Tropic Ditch", an irrigation canal that crosses the northern part of the park. The ditch diverts irrigation water from Tropic reservoir across the Paunsaugunt plateau to the town of Tropic. The ditch was constructed in the late 1800's and is a cultural resource. The ditch joins a natural drainage for a distance of approximately 1/4 mile, immediately northeast of Mossy Cave. During winter and spring the ditch is shut down and water from a spring at Mossy Cave should flow in the natural channel. Occasionally this water is diverted into the ditch. Park staff need to work with local communities to properly maintain diversion structures during times when the ditch is not flowing.

The Utah Division of Water Rights lists eight appropriative water rights held by the NPS in the park. They also list 9 alien water rights (those not owned by the USA with a point of diversion and/or use within or adjacent to the park) located in Water Canyon, Tropic Canyon, Campbell Creek and Bryce Creek. The NPS Water Resource Division (1990) prepared a document summarizing the status of all water rights in the park.

Various development proposals outside the park have had the potential to impact water resources and related values.

Description of Recommended Project or Activity

DEVELOP A WATER RESOURCE MANAGEMENT PLAN

A management plan will be prepared to develop a comprehensive strategy to address water resource issues. The plan will consider inventory and monitoring, water conservation, and research needs and alternatives. Adequacy of the existing park water systems, as well as impacts of the system on other resources will be evaluated. Measures necessary to protect land around the East Creek wells to prevent well contamination will be evaluated. Potential threats outside park boundaries will be evaluated. Information consolidated by the NPS Water Resources

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Division (1990) will provide a basis for the plan.

BUDGET AND FTEs:

-----FUNDED-----				
Source	Activity	Fund Type	Budget (\$1000s)	FTEs
			=====	
Total:			0.00	0.00
-----UNFUNDED-----				
	Activity	Fund Type	Budget (\$1000s)	FTEs
Year 1:	ADM	One-time	4.50	0.00
			=====	
Total:			4.50	0.00

(Optional) Alternative Actions/Solutions and Impacts
(No information provided)

Compliance codes : EXCL (CATEGORICAL EXCLUSION)

Explanation: 516 DM6 APP. 7.4 B

Last Update: 12/12/96
Initial Proposal: 1996

Project Statement

BRCA-N-085.000
Priority: 9
Page Num: 0041

Title : INVENTORY SPRINGS FOR WATER QUALITY AND FLOW

Funding Status: Funded: 2.50 Unfunded: 0.00

Servicewide Issues : N12 (WATER FLOW)
N20 (BASELINE DATA)

Cultural Resource Type:

N-RMAP Program codes : Q00 (Water Resources Management)
Q01 (Water Resources Management)

10-238 Package Number :

Problem Statement

Collect baseline data on flow rates and basic water quality parameters on the 31 known springs throughout the park. These springs are important for wildlife and are used by backcountry campers and hikers. These springs provide the water sources for riparian areas which are the most diverse areas of the park in terms of both vegetation and wildlife species.

Description of Recommended Project or Activity

After training from NPS Water Resources Division, a staff member or contractor will hike to each of the 31 known springs in the park. At each spring, collect flow rate, pH, temperature, dissolved oxygen, and a variety of other physical characteristics. Data will be summarized in a file to provide a baseline data level for future compromises.

BUDGET AND FTEs:

		-----FUNDED-----		
Source	Activity	Fund Type	Budget (\$1000s)	FTEs
1996:	NON-PROFI MON	One-time	2.50	0.00
Total:			2.50	0.00
		-----UNFUNDED-----		
	Activity	Fund Type	Budget (\$1000s)	FTEs
Total:			0.00	0.00

Project Statement
Last Update: 12/12/96
Initial Proposal: 1996

BRCA-N-085.000
Priority: 9
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(Optional) Alternative Actions/Solutions and Impacts

No baseline information will be available on springs in the park.

Compliance codes : EXCL (CATEGORICAL EXCLUSION)

Explanation: 516 DM6 APP. 7.4 E(2)

Last Update: 12/12/96
Initial Proposal: 1994

Project Statement

BRCA-N-084.000
Priority: 13
Page Num: 0039

Title : PROTECT AND REHABILITATE SPRING AREAS

Funding Status: Funded: 0.00 Unfunded: 52.00

Servicewide Issues : N04 (NON-NAT ANIMAL)
N12 (WATER FLOW)

Cultural Resource Type:

N-RMAP Program codes : Q00 (Water Resources Management)
Q01 (Water Resources Management)

10-238 Package Number :

Problem Statement

Several springs exist in the backcountry of BRCA. These springs provide water both for backcountry hikers and for native wildlife. Many of these springs have been severely impacted by cattle and water is no longer available to visitors or wildlife. Water is no longer flowing down stream, therefore riparian plants and animals are also impacted. The disturbance to the spring areas has introduced non-native vegetation (tamarisk, Russian olive and thistle) which further impacts the availability of water.

Description of Recommended Project or Activity

1. Replace damaged fencing to exclude cattle from spring areas.
2. Rehabilitate springs to reestablish historic flow rates.
3. Remove non-native vegetation.
4. Construct metal crossing fences to allow elk to gain access to water sources. (this portion of the project would make a good challenge cost-share project, with the local high school constructing the metal step-over fences.

This will require two workers to build the fence and perform rehabilitation work. Materials will consist of fence materials and transportation cost.

BUDGET AND FTEs:

-----FUNDED-----				
Source	Activity	Fund Type	Budget (\$1000s)	FTEs
			=====	
Total:			0.00	0.00

Last Update: 12/12/96
Initial Proposal: 1994

Project Statement

BRCA-N-084.000
Priority: 13
Page Num: 0040

-----UNFUNDED-----				
	Activity	Fund Type	Budget (\$1000s)	FTEs
Year 1:	MIT	One-time	22.00	1.00
Year 3:	MIT	One-time	15.00	1.50
Year 4:	MIT	One-time	15.00	1.50
Total:			52.00	4.00

(Optional) Alternative Actions/Solutions and Impacts

Failure to exclude cattle from spring areas will further impact native faunal species who formerly used these spring as a source of water. Backcountry users will continue to be forced to utilize areas where water is still available and therefore be less dispersed. Rehabilitation of spring areas will allow greater dispersal of hiker and will lessen impacts to backcountry areas with water available.

Compliance codes : EXCL (CATEGORICAL EXCLUSION)

Explanation: 516 DM6 APP. 7.4 C(3)

	Project Statement	BRCA-N-181.000
Last Update: 12/12/96		Priority: 999
Initial Proposal: 1991		Page Num: 0001

Title : TRACK WATER RIGHTS

Funding Status: Funded: 1.20 Unfunded: 0.00

Servicewide Issues : N13 (WATER RIGHTS)
 Cultural Resource Type:
 N-RMAP Program codes : Q00 (Water Resources Management)
 Q02 (Water Rights Management)

10-238 Package Number :

Problem Statement

A variety of water rights exist in the park as described under project statement BRCA-N-180. The NPS Water Resources Division (1990) prepared a document summarizing current status of all water rights in the park. The town of Tropic owns rights to several sources that have been used at different times in the past. Park staff must track the status of use and work with the town to ensure environmental concerns are met.

Description of Recommended Project or Activity

TRACK WATER RIGHTS

Park staff will continue to track the status of alien water rights and use of park water sources. As necessary, park staff will work with representatives from Tropic to protect park resources while allowing them to exercise their valid water rights.

Consultation with Water Resources Division, Ft. Collins, will be initiated by BRCA to review long-range water issues related to the legal rights the park has as it relates to water rights.

BUDGET AND FTEs:

		-----FUNDED-----			
	Source	Activity	Fund Type	Budget (\$1000s)	FTEs
1991:	PKBASE-NR	ADM	Recurring	0.20	0.10
1992:	PKBASE-NR	ADM	Recurring	0.20	0.00
1993:	PKBASE-NR	ADM	Recurring	0.20	0.00
1994:	PKBASE-NR	ADM	Recurring	0.20	0.00

Last Update: 12/12/96
Initial Proposal: 1991

Project Statement

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Page Num: 0002

1995:	PKBASE-NR ADM	Recurring	0.20	0.00
1996:	PKBASE-NR ADM	Recurring	0.20	0.00

Total:	=====	1.20	0.10
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-----UNFUNDED-----			
Activity	Fund Type	Budget (\$1000s)	FTEs
Total:		0.00	0.00

(Optional) Alternative Actions/Solutions and Impacts
(No information provided)

Compliance codes : EXCL (CATEGORICAL EXCLUSION)

Explanation: 516 DM6 APP. 7.4 B

Project Statement
 Last Update: 12/12/96
 Initial Proposal: 1994
 BRCA-N-182.000
 Priority: 999
 Page Num: 0003

Title : MANAGE WATER USE

Funding Status: Funded: 0.00 Unfunded: 21.00

Service-wide Issues : N12 (WATER FLOW)
 N20 (BASELINE DATA)

Cultural Resource Type:
 N-RMAP Program codes : Q00 (Water Resources Management)

10-238 Package Number :

Problem Statement

Three different systems supply water for visitor and administrative needs in the park as described for project statement BRCA-N-180. During the high visitor use season, May through October, park staff regularly monitor water quantity and quality in maintained systems. In drought years appropriate actions are taken to conserve water supplies.

Description of Recommended Project or Activity

CONTINUE TO MONITOR WATER SUPPLIES

Park staff will continue to monitor the water supplies for visitor and administrative uses. Recommendations called for in the Water Resource Management Plan will be implemented as appropriate.

Staff will continue to cooperate with park concessionaire to reduce water usage. As toilets are replaced, low flush models will be installed. Low volume shower heads will be used. Automatic shut-offs are being used on sinks. Landscaping requirements call for lawns that require little or no water.

BUDGET AND FTEs:

-----FUNDED-----				
Source	Activity	Fund Type	Budget (\$1000s)	FTEs
Total:			0.00	0.00
-----UNFUNDED-----				
	Activity	Fund Type	Budget (\$1000s)	FTEs
Year 1:	MIT	Recurring	10.00	0.20

Last Update: 12/12/96		Project Statement		BRCA-N-182.000	
Initial Proposal: 1994				Priority: 999	
				Page Num: 0004	
Year 2:	MIT	Recurring	8.00	0.20	
Year 3:	MIT	Recurring	3.00	0.10	
			=====		
Total:			21.00	0.50	

(Optional) Alternative Actions/Solutions and Impacts
(No information provided)

Compliance codes : OTHER ()

Explanation: PUBLIC HEALTH