RMP

CHCU

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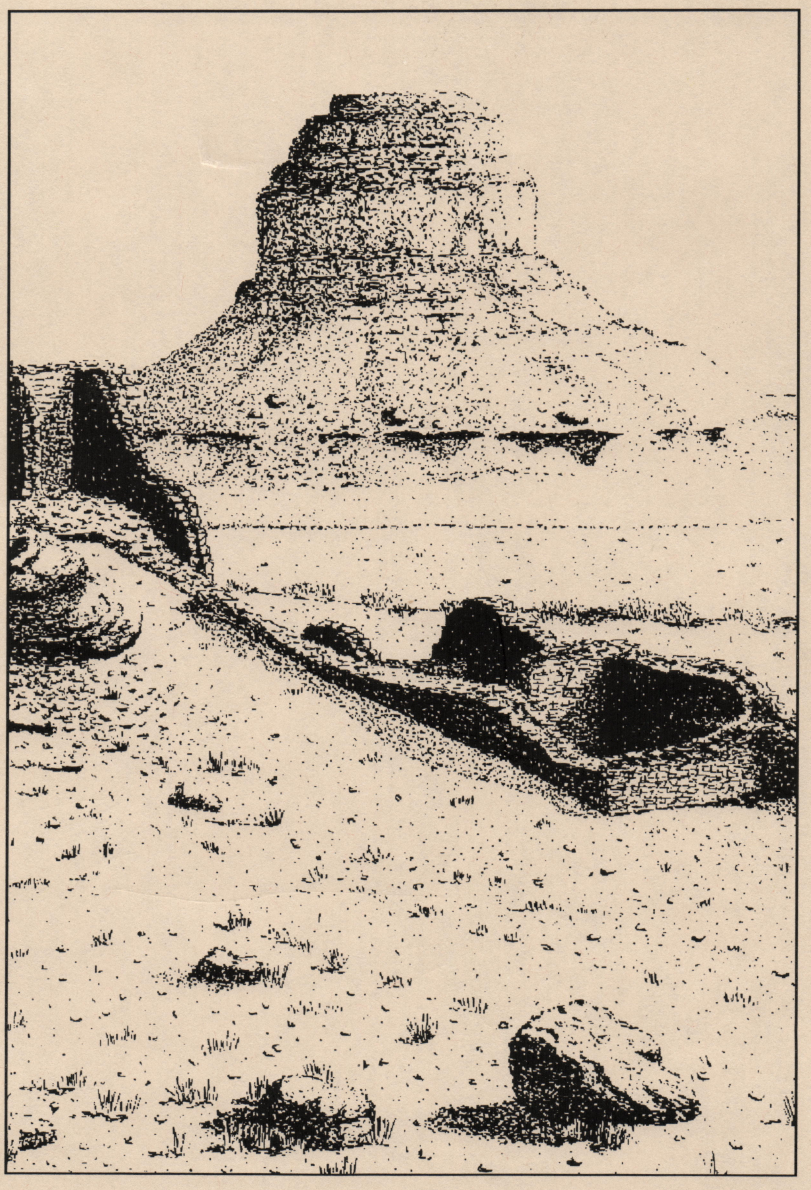
NOTES:

Resource Management Plan

Chaco Culture National Historical Park

April 1995



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Date:

4/27/95

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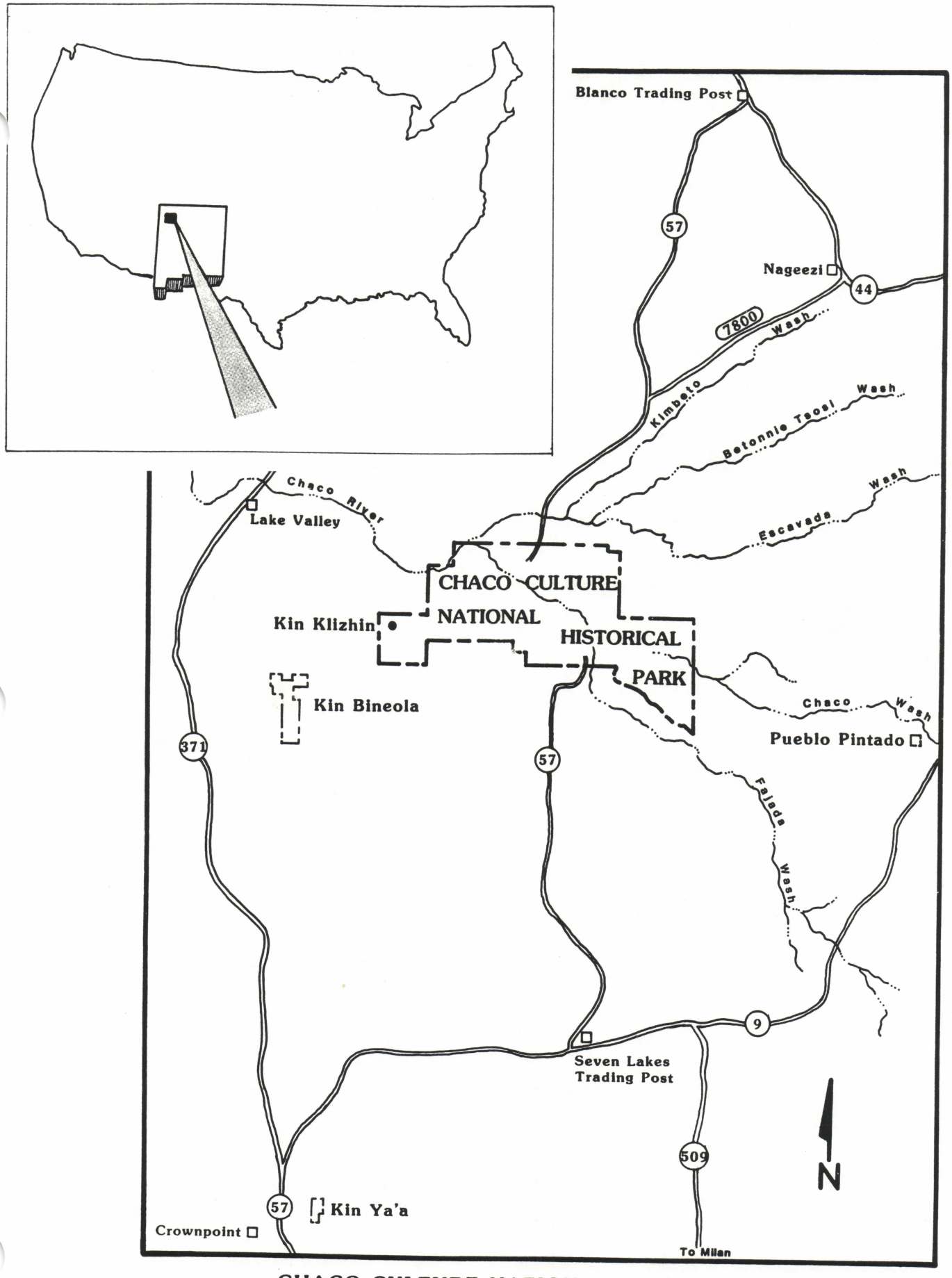
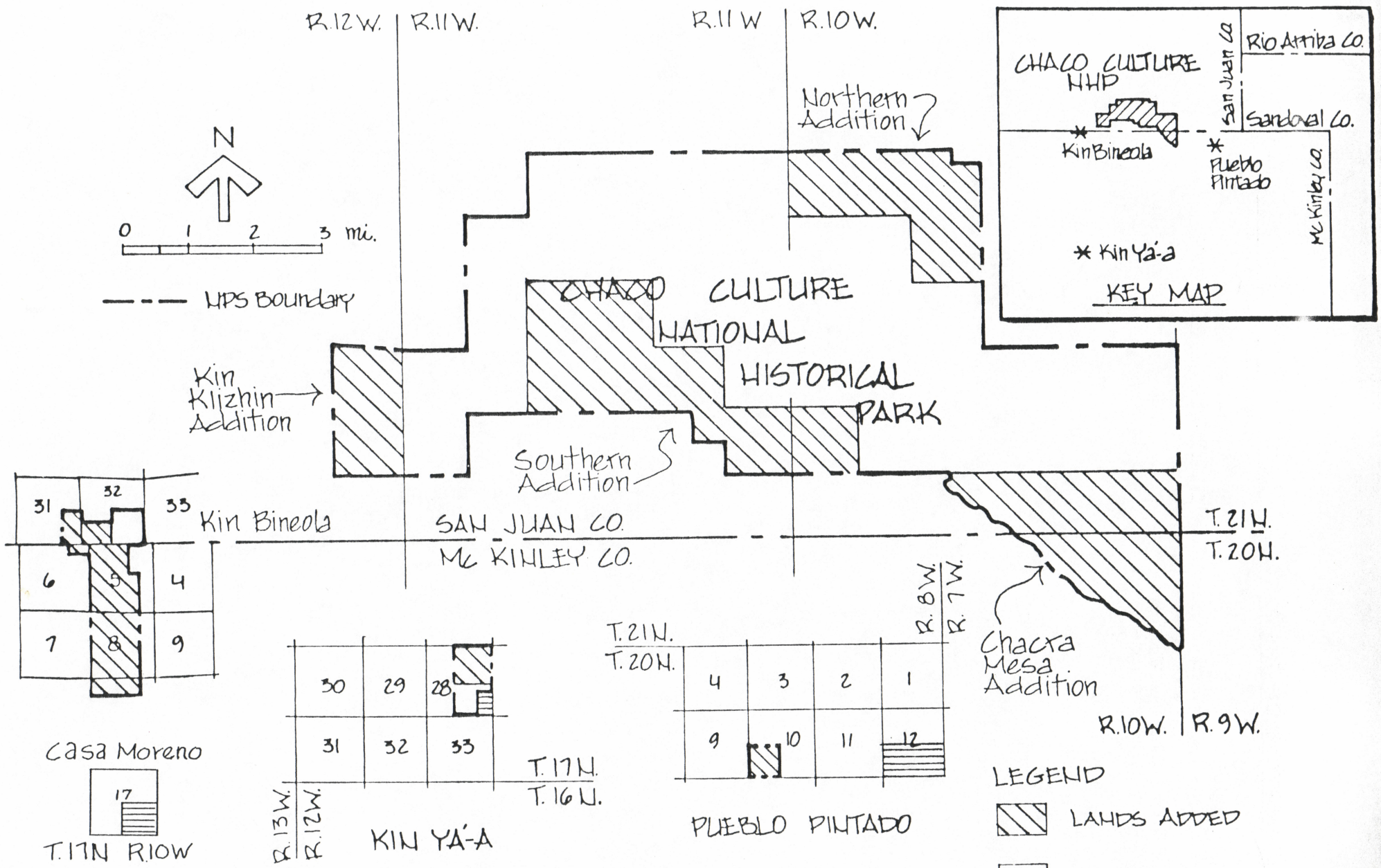


CHACO CULTURE NATIONAL HISTORICAL PARK AND DETACHED UNITS



CHACO CULTURE NATIONAL HISTORICAL PARK
NEW MEXICO

1980 BOUNDARY ADJUSTMENTS

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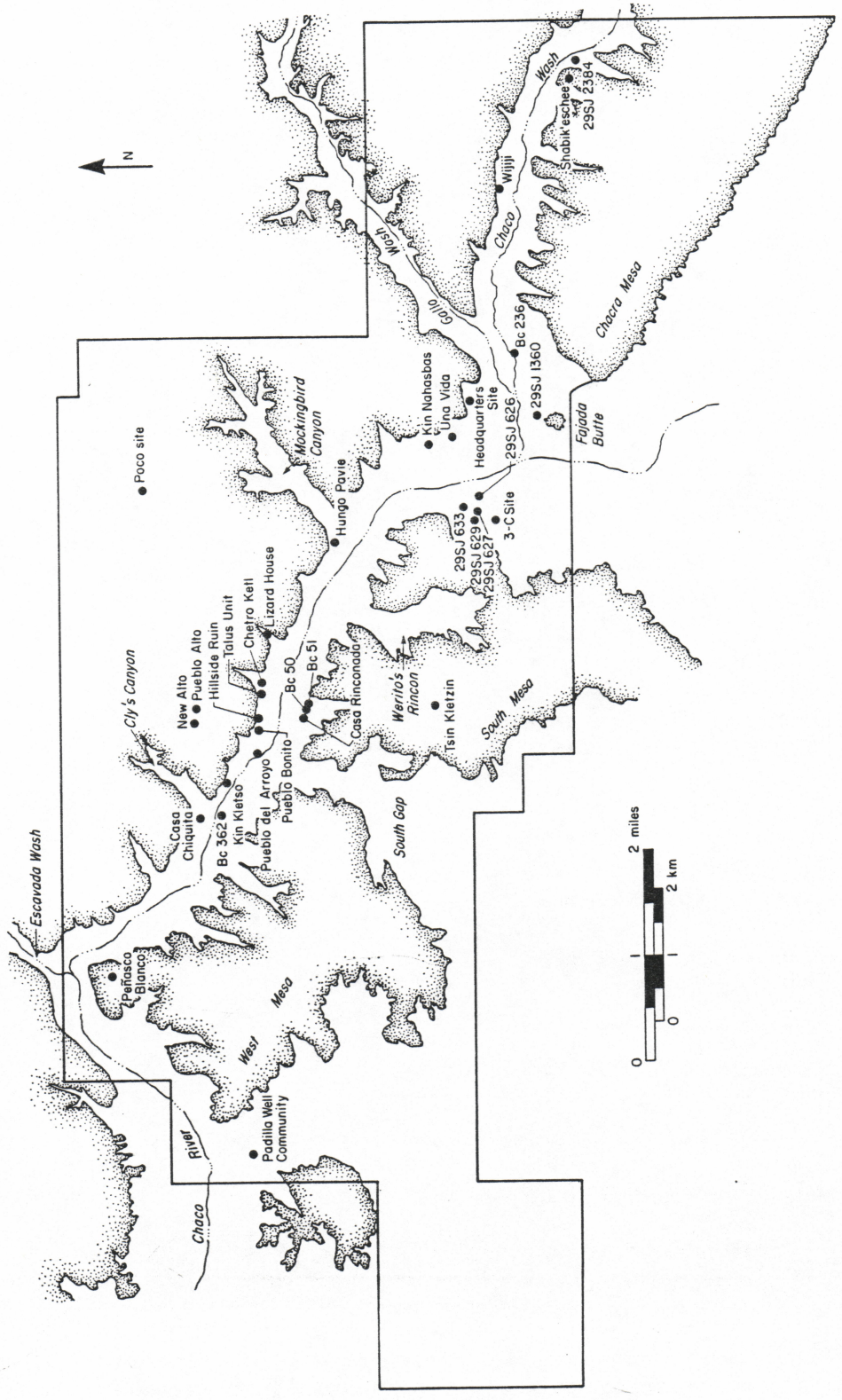

Figure 1.2. Important greathouse and small-house sites in Chaco Canyon.

INTRODUCTION

Chaco Culture National Historical Park is in the San Juan Basin of northwestern New Mexico. The park was originally designated as a national monument in 1907 to preserve "extensive prehistoric communal or pueblo ruins ... of extraordinary interest because of their number and their great size and because of the innumerable and valuable relics of a prehistoric people which they contain."

As research and discoveries identified the extent of the prehistoric Chacoan system beyond the monument's borders, the need to protect these areas became evident. In 1980, Congress passed a bill which enlarged the monument boundaries and renamed the monument Chaco Culture National Historical Park. The primary purpose of the bill was to provide for preservation, protection, research, and interpretation of the Chacoan System. In 1987 the park was inscribed on the UNESCO World Heritage List, which recognizes the signficance of the resources on a world-wide basis.

Chaco is of national and international significance because it contains approximately 4000 outstanding prehistoric and historic archeological sites representative of Paleo-Indian, Archaic, Pueblo and Navajo occupations. Ranging in age from about B.C. 8000 to A.D. 1275, the prehistoric sites contain architecture and other cultural material which illustrates the evolution and interrelationships of indigenous cultures through time.

Puebloan period sites, for which the park is internationally noted, vary in size from small lithic scatters, camp sites, and one-room pithouses to complex pueblos containing hundreds of rooms, dozens of kivas, surrounded by earthen mounds. Other features which compose the prehistoric cultural landscape include constructed road segments with carved stairways and masonry ramps, water control and distribution systems, a vast concentration of petroglyphs and pictographs associated with the habitation of the canyon, and calendrical markings documenting solar, lunar, and stellar events.

The core area of Chaco Canyon may have served as an administrative/economic center with ritual importance which integrated people occupying an extensive region of the Four Corners during the tenth and eleventh centuries. Many of the modern Pueblos and the Navajo Nation recognize strong historical and traditional connections with the cultural and natural resources in the park.

Navajo occupation in Chaco is reflected by seasonal camps, permanent habitations, plant and mineral gathering areas, and sites of ritual/sacred importance. These sites reflect the early occupation of the area around the time of the Pueblo Revolt, the introduction of domestic livestock production, and the period during the establishment of the park when families were removed from within the boundaries. There is a rich assortment of pictographs and petroglyphs depicting religious, ceremonial, and

domestic Navajo lifeways. Earlier occupation of the region is indicated in traditional Navajo oral history which describes their co-existence with pueblo people in the canyon.

The prominent Euro-American occupation of the canyon is the Richard Wetherill homestead and trading post, dating from the mid 1890s to 1910. The foundations of most of the habitations and succession of trading posts are present, as well as remains of a water control system and road network. Other Euro-American sites include Hispanic sheep camps, U.S. military expedition camps, institutional archaeological investigations, and rock art attributed to all of these tenants.

Although Chaco Culture NHP was primarily established to protect its unique cultural resources, the NPS has an equal responsibility to manage and protect the park's natural resources. Chaco is the only sizeable area (34,000 acres) managed by the National Park Service within the San Juan Basin, and as such, represents a valuable opportunity to preserve the biodiversity of the region.

Culturally affiliated tribes are beginning to actively participate in the management of these resources. These groups recommend a traditional approach to resource management that does not separate natural and cultural elements but manages them as an integrated system. This recommendation will become a guiding principle within applicable law, regulation and NPS policy (General Management Plan, 1985).

FUNCTIONS OF THE RESOURCE MANAGEMENT PLAN

This Resource Management Plan (RMP) outlines the strategy to meet the stated management objectives. Additional functions of the RMP are:

- to summarize the resource values and purposes for which the park was established, and to summarize other resources for which the park is legally responsible.

- to analyze the significance of resource management needs and problems and rank them by importance.

- to propose specific actions, including funding and personal services required for dealing with the most important and urgent needs and problems.

- to present a multi-year program to achieve measurable progress in accomplishing the proposed actions.

- to record accomplishments and measure the effectiveness of actions through annual reviews.

- to provide a forum for an interdisciplinary approach to the park's resource management issues.

- to provide the basis for subsequent action plans.

Legislation

Chaco Canyon National Monument was established by Presidential Proclamation No. 740 of March 11, 1907, (35 Stat. 2119). The Proclamation states "...the extensive prehistoric communal or public ruins...are of extraordinary interest because of their number and their great size and because of the innumerable and valuable relics of a prehistoric people which they contain, and it appears that the public good would be promoted by preserving these prehistoric remains as a National Monument with as much land as may be necessary for the proper protection thereof."

The initial acreage of the monument was 20,629.40 acres, however, 880 additional acres became part of the monument by Presidential Proclamation No. 1826 of January 10, 1928, (45 Stat. 2937).

Public Law 96-550, December 19, 1980, expanded the boundaries of the park by 13,000 acres, changed the name of the monument to Chaco Culture National Historical Park, and created a Chaco Protection Site System. Currently, the park consists of approximately 33,974 acres.

The Chaco Protection Site System is presently composed of 39 discontiguous archaeological units under the jurisdiction of the Navajo Nation, private ownership, and Bureau of Land Management. An amendment to PL96-550 submitted to Congress will add several units under the jurisdiction of the State of New Mexico, U.S. Forest Service, and San Juan County. The Chaco Protection Site System units are managed by the Interagency Management Group.

Because of its national and international significance, Chaco Culture NHP is listed on the National Register of Historic Places and was added to the World Heritage List in 1987. In accordance with the National Park Service Management Policies (1988), all National Register properties are classified as historic zones and will be managed in compliance with standards which stipulate that "physical development...shall be the minimum needed for preservation and interpretation of cultural values" and that "activities in historic zones generally shall be limited to sightseeing and the study of cultural features." In addition, all actions must comply with Section 110 and 106 of the National Historic Preservation Act of 1966, the latter is implemented by 36 CFR 800 and 53 FR 4728 respectively. These designations carry with them the responsibilities of managing the resources to national and international preservation standards.

The management of Chaco Culture NHP is also guided by various Acts of Congress, regulations, contracts and agreements as referenced in appendix A.

Management Objectives

Management objectives are derived from such documents as the enabling legislation, executive orders, and general environmental and cultural legislation. Following is a summary of current resource-related management objectives outlined in the park's General Management Plan (GMP, 1985), and subsequent management documents and policies:

--acquire surface jurisdiction for remaining land (state and tribal allotments) within expanded boundaries, and fence all new boundaries.

--preserve and protect the park resources in accordance with the 1972 UNESCO "Convention Concerning the Protection of the World Cultural and Natural Heritage" which has identified Chaco Culture NHP as containing exceptional and universal cultural values.

--develop and maintain an active consultation program with park-associated Pueblo and Navajo governments in compliance with NAGPRA and for the purposes of informing these groups about resource management and research issues and seeking their input and recommendations on resource actions.

--participate in the Interagency Management Group (IMG established in PL96-550), an organization of federal agencies, local governments, and Navajo Nation to coordinate the protection, preservation, and interpretation of Chaco resources.

--minimize external threats to Chaco (air and water quality, ambient noise, night sky, ground disturbance of related cultural landscapes, viewsheds, etc.) by working with other management agencies and private entities to limit/mitigate adverse effects resulting from development activities on their lands.

--backfill portions of excavated and exposed ruins in accordance with an approved backfilling plan. Implement appropriate preservation treatment, particularly on the exposed interpretive portions of the structures, in order to prevent further deterioration and loss of original fabric.

--assure that all new information and syntheses of data are incorporated into visitor interpretation programs where appropriate, and into visitor use management planning.

--access and catalog into the ANCS database all objects housed in the Chaco Collection in order to account for, conserve, and make these objects and archives available for research.

--maintain a repository for the curation, study, and exhibition of the Chaco Collection in collaboration with the Maxwell Museum of Anthropology at the University of New Mexico.

--monitor/mitigate the impacts of visitor activities and restore natural qualities to such impacted sites within the park.

--prevent adverse impacts to the outstanding night sky resources, by assuring all park development adheres to a night sky preservation policy.

--continue acquisition of baseline resource data necessary to manage, preserve, and protect natural and cultural resources.

--implement a long-term monitoring program for park resources.

--provide resource information to appropriate park divisions to facilitate management and protection of these resources.

--encourage research and data-gathering activities as directed by Congress "to further ... knowledge of the Chaco culture" (PL 96-550). The research program should follow specific guidelines and emphasize nondestructive methods directed toward improving resource knowledge, understanding, interpretation, preservation and protection.

--implement erosion control program based on proposed recommendations from NPS Water Resources Division for the purpose of protecting threatened resources.

--prevent development in the primary visitor-use areas (no additional roads, no expansion or addition of parking areas, and no further support facilities) that would adversely impact the historic landscape and setting.

--implement the existing general development plan to reroute the main park road to the Gallo Wash Entrance, and subsequently close the existing north entrance. The current access pattern is causing damage to the standing architecture at Casa Chiquita and Kin Kletso.

--continue to monitor underground water quantity and quality to provide baseline information for assessing potential changes in the hydrological regime that could result from nearby development.

--implement a long-term prescribed fire management program. The program will follow the Fire Management Plan that emphasizes use of fire to remove alien species, assist in the rejuvenation of indigenous species and remove potential wildland fire hazards.

PRESENT RESOURCE STATUS

Site Description

Chaco Culture NHP is located in the San Juan Basin, a generally semiarid region of mesas, canyons, plains and badlands.

The surface ownership surrounding the park is primarily Navajo Nation trust, fee, and alloted land. Other surface owners include the Bureau of Land Management, the State of New Mexico,

and private individuals. The park is also near the western pueblos of Acoma, Laguna, Hopi, Santa Ana, Zia, and Zuni.

Chaco Canyon bisects the main park unit from the southeast to the northwest. The canyon, drained by the ephemeral Chaco Wash, averages a half-mile wide and 350 to 400 feet deep. The grassland/shrubland-covered alluvial bottom of the canyon is bounded by cliffs and slickrock benches to the north and south. The cliffs rise to gently sloping mesa tops covered by shallow soils, scattered shrubs, and occasional pinion and juniper. Several extensive rincons cut into the mesas on the south side of the canyon. Fajada and Gallo Washes are the primary tributaries that drain the eastern portion of the park. Mockingbird and Cly's canyons are tributaries in the central and western sections of Chaco.

Elevations range from 6000 feet in the western portion of the park to 6800 feet on Chacra Mesa, which places Chaco within the Upper Sonoran life-zone with its associated flora and fauna.

In addition to the main park unit, the park also manages three detached units at Pueblo Pintado, Kin Ya'a, and Kin Bineola. The three detached units occur on open lands along broad washes. (Land Protection Plan, 1985)

Land Status

In December 1980, Congress passed Title V of PL 96-550 which enlarged Chaco by 13,000 acres to preserve, protect, research, and interpret the archaeological remains of the numerous prehistoric and historic people who have occupied Chaco. A land exchange completed in December of 1991 between the Bureau of Land Management and the Navajo Tribe gave title to over 8,700 of those acres to the National Park Service. Other exchanges have also been completed, leaving approximately 2,890 acres to be acquired by the NPS.

Management Zones

The park's General Management Plan (GMP) established management zones to define appropriate land uses within certain areas of the park. The GMP designated the following zones:

Historic Zone: (Entire park)	33,974 Acres
Preservation Subzone:	20,079 Acres
Park Development Subzone:	217 Acres
Special Grazing Use Subzone:	13,523 Acres
Special Mineral and Grazing Use Subzone:	155 Acres

a. Historic Zone - The entire park is designated as a historic zone, with the primary purpose of protecting and interpreting cultural resources.

b. Park Preservation Subzone - This subzone includes the lands within the former monument boundary and Mockingbird Canyon.

As with the Historic Zone, the primary purpose is to preserve, protect and interpret cultural resources in their natural settings. Development in this subzone is limited to trails, signs, and approved structures necessary for protecting cultural features.

c. Park Development Subzone - The area of the park where development to provide facilities and services necessary for visitor use and park management. Development may include roads, parking areas, visitor center, restrooms, campsites, offices, staff housing, etc... Natural and cultural resources will be preserved and protected to the degree practicable; however, some adverse effects may occur because use and development will be concentrated in this subzone.

d. Special Grazing Use Subzone - Management of this special use subzone has changed since the writing of the GMP. Most of the lands within the special grazing use subzone have been acquired by the National Park Service through the land exchange of December 19, 1991. These lands are now managed as de facto Park Preservation Subzone lands, although grazing will continue to occur until the new boundaries are fenced. Approximately 17.5 miles of fence is required to fence the contiguous boundary of Chaco Culture NHP. An additional 12 miles of fence is required for the three detached units (Kin Bineola, Pueblo Pintado, and Kin Ya'a).

e. Special Mineral and Grazing Use Subzone - A small special use subzone was designated on the northern half of the Kin Ya'a detached unit (155 Acres). The strategy in this zone will be to preserve and protect cultural resources while allowing traditional uses and controlled mineral exploration and extraction to continue where nonfederal rights exist.

At the present time all mineral exploration in this area has stopped. Leaching plant operations were removed in 1987 and the well holes filled with concrete. No mineral resources were extracted from this area.

PRESENT CULTURAL RESOURCE STATUS

Cultural Resource Baseline Data

General Information:

Because of the complexity of the cultural resources at Chaco, descriptions of the management of these resources are more easily discussed by dividing them into three major categories: 1) preservation, 2) collections, and 3) research/resource management (which encompasses compliance and other CRM activities). All three categories are integral and interrelated, as in the example of the archives, which are managed as part of the collection and contain the essential records of the preservation and archaeological research programs. However, in order to simply and clearly reference the major features of the program, the three categories are separated.

There probably has been more archaeological research conducted in Chaco and on the subject of Chaco than in and on any other prehistoric district in North America (perhaps in the entire New World). This research has taken the forms of field work, archival search, artifact analysis, theoretical study, etc., and while some of this work has been published, a great deal has not. There are several consequences of a volume of work this size. There are numerous and often conflicting interpretations of the data and a vast and complicated data set to manage. The large volume of work also provides an attraction to researchers, which assures continued growth and refinement of our knowledge of the resources.

Placement of Chaco on the World Heritage List has enabled the park to expand research into the fields of historic fabric preservation and other conservation treatment. Perhaps most importantly, the park has begun to work collaboratively with other institutions and governments who manage, research, and preserve similar World Heritage sites throughout the world.

Preservation:

Approximately 60 of the 4,000 archaeological sites in the park are listed in the active preservation program at the park (Table 1). This list does not include any of the sites in the expanded park boundaries because only recently did the park begin to acquire surface jurisdiction. The 60 sites include all interpreted sites, all excavated sites, and approximately 25% of the total number of sites with significant standing architecture (within the old boundaries).

Of the 60 sites in the preservation program, 37 are open for visitation as part of the interpretive tours in the park. The remainder are in the backcountry and are only visited with special use permits or by researchers. With the exception of the backcountry sites, most of the structures have received a notorious variety of preservation treatments. These treatments

range from repair/reconstruction of large sections of fallen walls and extensive stone replacement on one end of the scale, to minor mortar repointing, capping, or basic graphic documentation on the other end of the scale.

An extensive collection containing all extant documentation of preservation treatment activity is maintained in the Chaco Collection archives. These archives contain photographic and written records, generally in the form of "before/after" descriptions and photographs. The records are assembled into yearly preservation reports that begin in the 1938 and continue to present. Eventually these will be incorporated into an automated database being developed by the Navajo Nation Chaco Protection Program, in conjunction with the park.

All of the +/- 4,000 sites in the park are entered into a backcountry monitoring program. This is an automated database used primarily by the protection division at the park to monitor the condition of all sites in the park. Erosion, visitor use, vandalism, and other condition attributes are monitored on a prescribed cycle in order to identify and evaluate changes and impacts to the resources. This database is being transferred into the park GIS program to be integrated with other management and preservation data.

Collections:

The Chaco Collection currently consists of over 2 million artifacts including the entire spectrum of archaeological materials. The collection contains associated documentation including archives, photographs and negatives, maps, published and unpublished manuscripts, and field notes. The majority of the collection is housed in the Maxwell Museum of Anthropology where the park curator and staff conduct most of the cataloging and daily collection management. The small portion of the collection which has limited research value (because of inadequate or nonexistent provenience data) is housed at the park.

The Chaco Collection archives is one of the most valuable segments of the collection, containing original documentation associated with excavations, analyses, research, preservation, administrative history, and other aspects of park resources and operations. The archives are cross-referenced and indexed but not automated. The majority of the archives are housed at the Center for Southwest Research at Zimmerman Library (UNM), where one of the curatorial staff maintains office and work space.

Research/Resource Management:

In 1971-1972, an archaeological inventory survey was conducted on all lands within the monument boundary. In 1983-1984, an archaeological inventory survey was conducted on all lands within the expanded boundaries of the park. These two

inventories are considered a 100% survey of known archaeological resources.

The surveys generated a file of data on each identified site; these files constitute the core of the archaeological database. The data are entered into the New Mexico Cultural Resource Information System (NMCRIS) which is an integrated computer information system housed at the Laboratory of Anthropology in Santa Fe. Additionally, these data are currently being converted into an automated geographic information system (GIS) housed at the park, which will allow this database to be more easily used and updated.

The park is conducting several major research efforts that are directly related to the backfilling program. A project to inventory, document, sample, and analyze all extant architectural wood has been in progress for the past eight years. All such wood has been documented and entered into an automated database. Ninety percent of the wood has been sampled and analyzed, and this information is also contained in the database.

A second research effort involves the architectural documentation of the buildings that are being backfilled. This evolving program began as a combination of photographic and written documentation. As more accurate and useful photographic techniques and equipment are developed, these will become the major tools of the documentation. All of the architectural information collected as part of the park research will be merged with the Navajo Nation's Chaco Protection Program's documentation into a database shared by both organizations.

Current Condition

Preservation:

Preservation treatment is concentrated on those sites which are included in the preservation program (Table 1), although the condition monitoring documentation carried out in the backcountry monitoring program is considered an active and effective treatment as well. The sites that have been completely backfilled (Table 2) are in stable condition. The sites or portions of the sites that have been partially backfilled are in fair to good condition. The sites or portions of sites that are completely exposed are in fair to extremely poor condition. This latter group of sites are the ones included in the backfilling project.

Table 1 -- Structures Maintained by Cultural Resource Preservation Program

Structure:	Site #:	Structure:	Site #:
Bc 50, Tseh So	29SJ 394	Gallo Cliff Structure, Bc 378	29SJ 530
Bc 51	29SJ 395	Gallo Hogans & Oven	29SJ 531
Bc 53, Robert's Site	29SJ 396	Hogans W. of Casa Chiq.	29SJ 135
Bc 57	29SJ 397	Hungo Pavi	29SJ 1918
Bc 58	29SJ 398	Kin Bineola	29SJ 1580
Bc 59, Mathiew's Dig	29SJ 399	Kin Klizhin	29SJ 1413
Bc 122, W. of S. Gap	29SJ 834	Kin Kletso	29SJ 393
Bc 126, S. Gap Fld Sch	29SJ 838	Kin Nahasbas	29SJ 392
Casa Chiquita	29SJ 1167	Kin Ya'a	29MC 108
Casa Rinconada	29SJ 386	Leyit Kin	29SJ 750
Casa Sombreada, Bc 52	29SJ 400	Lizard House	29SJ 1912
Chetro Ketl	29SJ 1928	Marcia's Rincon, Road	29SJ 626
Chetro Ketl Ramp	29SJ 1925	Marcia's Rincon, Boulder	29SJ 635
Talus Rm Behind CK	29SJ 1927	New Alto	29SJ 388
Cliff Structure W. of Wijiji	29SJ 238	Penasco Blanco	29SJ 387
Cliff Structure between CK & HP	29SJ 266	Poco Site	29SJ 1010
Cliff Structure along Wijiji Trail	29SJ 544	Pueblo Alto	29SJ 389
Cliff Structure along Wijiji Trail	29SJ 546	Pueblo del Arroyo	29SJ 1947
Cliff Structure along Wijiji Trail	29SJ 554	Pueblo Bonito	29SJ 387
Cliff Structure W. of Wijiji	29SJ 572	Pueblo Pintado	29MC 166
Cly's Canyon Cliff Site	29SJ 1722	Rabbit Ruin	29SJ 390
Corn Mother Site	29SJ 1922	Shabikeschee	29SJ 1659
Doll House Site, Hogans	29SJ 1614	Solstice Marker, Fajada	29SJ 2387
Fajada Cliff Strctr, W.	29SJ 296	Talus Unit	29SJ 1930
Fajada Cliff Strctr, E.	29SJ 297	Three C Site	29SJ 625
Gallo Campground, Bc 288 & 347	29SJ 540	Tsin Kletzin	29SJ 395
		Una Vida	29SJ 391
		Voll's Site	29SJ 827
		Wello's Cabin, LC Ranch	29SJ 609
		West Mesa Shrine	29SJ 1088
		Wijiji	29SJ 577
		Zorro Bradley's Site	29SJ 589

Table 2 -- Status of Interpretive and/or Excavated Sites

Unexcavated Interpreted	Excavated Interpreted	Excavated Not Interpreted
Casa Chiquita	+# Bc 50	^ Bc 53
Hungo Pavi	+# Bc 51	Casa Sombreada
Kin Bineola	^ Bc 57	^ Corn Mother
Kin Klizhin	^ Bc 58	^ Kin Nahasbas
Kin Ya'a	+# Bc 59	^ Leyit Kin
New Alto	Casa Rinconada	X Lizard House
Penasco Blanco	+# Chetro Ketl	Poco Site
Pueblo Pintado	+ Gallo Cmpgrnd	+ Shabikeschee
Rabbit Ruin	+# Kin Kletso	Voll's Site
Tsin Kletzin	+ Pueblo Alto	X Zorro Bradley's
Wijiji	# P. del Arroyo	29SJ 838
	+#* Pueblo Bonito	29SJ 1927
	+#* Talus Unit	
	+ Una Vida	

+ = Partially backfilled prior to 1980 (7 sites)
* = Partially backfilled since 1980 (2 sites)
^ = Completely backfilled since 1980 (6 sites)
# = Partial backfilling proposed in current program
(8 sites, plus drainage repair in 1 site)
X = Mortar test sites established prior to 1980

The backfilling project is in its 5th year and will continue at least 10 more years at present funding levels. The target sites comprise roughly 400,000 square feet of exposed masonry. They have deteriorated to their deplorable condition because funding and support for routine preventative maintenance has been inadequate or non-existent for the past 10 to 15 years.

By deferring the needed routine maintenance, the scale of these erosion and deterioration problems has escalated beyond the acceptable preservation technologies available to the park. The only option is to continue partial backfilling. However, partial backfilling will only decrease the erosion, not eliminate it. The remaining 200,000 square feet of masonry will still require preventative maintenance, funded at adequate levels and performed on required cycles.

The remainder of the sites not included in the preservation treatment program, within the fenced portion of the park, are in stable condition. Most of the sites within the expanded boundaries are unstable because of the surface impacts of cattle and horse grazing, particularly those with standing architecture. As surface ownership is acquired by NPS, some of these sites will be included in the preservation program for fabric treatment. Fencing of the expanded boundaries will effectively protect the remainder of the sites.

As part of the preservation and documentation program, the park has entered into a collaborative testing program with the Getty Conservation Institute. These experiments involve design and testing of geotextiles and geodrains under existing conditions in order to develop systems for protecting fragile architecture and correct drainage problems. These tests articulate with the backfilling program and the results are being applied to other NPS areas as well as other World Heritage Sites suffering similar erosion problems.

Collections:

While the collection is actively used by researchers, scholars and NPS staff, the insufficient storage and work space severely limits this use. Presently all of the materials are accounted for at the accession level. Although approximately 98% of the accessions are completely cataloged into ANCS, the remaining 2% of the accessions, which still need to be cataloged, represent about 40% of all archaeological materials and all of the archives.

Until these objects are cataloged into the automated system, the collection is not fully accessible to researchers.
This cataloging need is a priority for the curatorial staff, as is upgrading storage conditions of both the archaeological objects as well as the archival component of the collection. Another priority that cross-cuts all aspects of curation is compliance with NAGPRA. Summaries and inventories are completed and initial consultations with park-associated groups are ongoing. These activities will continue for years as the process of repatriation evolves.

The park is actively working with the Maxwell Museum of Anthropology to plan and design a collaborative collection storage and research facility on

UNM Campus. This facility is a long-term solution to storage, research, and conservation of the Chaco Collection. Once the accountability of the existing collection is completed and the conservation facility is underway, the park will begin to research the vast portion of the collection housed in other institutions throughout the US and other countries.

This segment of the collection derives from the early institutional excavations carried out at the park between the late 1890s and the 1930s. Access to information about these materials (photographs, catalog records, analysis reports, etc.) will be available through automated computer link with the museum facilities housing the objects.

Research/Resource Management:

All of the research conducted by the park staff relates directly to curation and preservation programs. Much of the work is dictated by management needs as opposed to purely scholarly inquiry, but the two are not mutually exclusive. All of the recent ethnographic studies have been contracted to outside researchers, and that will probably continue. Any destructive research conducted by in-house staff or independent scholars is undertaken in consultation with Affiliated Native American tribes.

Most analysis, such as tree-ring dating, species identification, trace element analysis, etc. are contracted to laboratories specializing in this type of work. In-house research is generally published in completion reports relating to specific projects, or synthesized in journals.

The park coordinates with other agencies and governments that manage Chaco resources through the Chaco Protection Site System (PL 96-550), particularly the Navajo Nation. The Chaco Protection Program (CPP), an organization operating through the Historic Preservation Division of the Navajo Nation, is developing a joint research, preservation, and protection program with the park. The park provides preservation expertise to the Navajo Nation while the CPP concentrates their efforts on developing a detailed GIS/CAD program with which to document and research Chaco resources on a larger and more intensive scale.

Each year an average of 5 to 10 independent researchers request authorization to conduct non-destructive fieldwork at the park. These projects are generally intensive surveys of specific categories of sites, such as Basketmaker III site layout, petroglyph surveys, GPS locations of shrines, orientation and bearings of greathouse architecture, etc. About half of these research projects result in meaningful information that can be directly used at the park or by other researchers.

The park supports the SWRO Division of Anthropology archaeologists with partial funding, providing housing, etc. to complete the Chaco Center publication series. The write-up of these excavation reports, survey reports, artifact analyses, and synthetic reports are critical to the continued research potential of the park resources, as well as to the interpretive program.

External Threats

See Natural Resource section for a thorough discussion of external threats. Most of these have similar impacts to the cultural resource component of the park.

Summary

Preservation:

-- Backfilling as the primary preservation treatment for the major interpreted structures is the focus of the entire program.

-- Adequate preventative maintenance and documentation of exposed fabric is an equal and immediate requirement.

-- The backcountry monitoring program is maintained to develop long-term condition and erosion data.

-- Experimentation on new materials and methods is promoted for solving critical preservation problems in collaboration with GCI and others.

Collection:

-- Accession and cataloging accountability continues at a steady rate, focusing on consistency and accessibility for researchers.

-- Active involvement with NAGPRA activities is maintained to assure adequate inventories and consultation in preparation for repatriation.

-- Plans for development of a collaborative storage and research facility with Maxwell Museum are being finalized.

Research/Resource Management:

-- Data sets are being converted into automated databases such as GIS in order to simplify and coordinate monitoring, condition assessment, research, etc.

-- The program is supporting preservation-related research and coordination of management issues with other World Heritage sites.

-- Research on the collections and on other park resources by both independent and in-house scholars is being encouraged and facilitated.

-- Contracting for research/analysis services, particularly chronological analyses, ethnographic studies, and other specialties not available in the park is actively pursued.

CULTURAL RESOURCE DOCUMENTATION CHECKLIST

Place an X in the appropriate column. Leave columns blank if document is not required for the park. Remember that items in the first section, PLANNING DOCUMENTS, may also apply to natural resources. See NPS-28, Chapter 2 for description of each inventory or study.

TITLE	CURRENT AND APPROVED	INCOMPLETE; NEEDS REVISION OR UPDATING	NEEDED
PLANNING DOCUMENTS			
Preauthorization and Authorization			
Statement of Management (SFM)			
Outline of Planning Requirements (OPR)			
General Management Plan (GMP)	X	X	
Development Concept Plan (DCP)			
Resources Management Plan (RMP)		X	
Interpretive Prospectus (IP)		X	
SERVICEWIDE INVENTORIES, LIST, CATALOGS AND REGISTERS			
Cultural Resources Bibliography (CRBIB)		X	
Cultural Sites Inventory (CSI)	X		
List of Classified Structures (LCS)		X	
National Catalog of Museum Objects		X	
National Register of Historic Places	X	X(?)	
BASIC CULTURAL RESOURCE DOCUMENTS			
** Archeological Overview and Assessment		x	
** Archeological Identification Studies	X	X	
** Archeological Evaluation Studies	X	X	

** These studies constantly require updating as data, conditions, research, and other factors change. Additionally, "approval" does not apply to most.

SUMMARY CHART FOR ARCHEOLOGICAL SITES

Significance		CONDITION					IMPACTS				DOCUMENTATION		
		Good	Fair	Poor	Destroyed	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National	3,604	40% 1,442	40% 1,442	20% 720			20% 720	40% 1,442	40% 1,442			3,604	
State & Regional	3,604												
Local	3,604												
Not Evaluated													
TOTALS	3,604	1,442	1,442	720			720	1,442	1,442			3,604	

±± SUMMARY CHART FOR STRUCTURES

Significance	CONDITION					IMPACTS				DOCUMENTATION		
	Good	Fair	Poor	Destroyed	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National												
State & Regional												
Local												
Not Evaluated												
TOTALS												

±± Figures for these are included in the summary chart for archaeological sites (approximately 66% or 2,400 sites are structures and archaeological sites).

±± SUMMARY CHART FOR CULTURAL LANDSCAPES

Significance		CONDITION				IMPACTS				DOCUMENTATION		
		Good	Fair	Poor	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National	entire park	X	X	X		X	X	X			X	X
State & Regional												
Local												
Not Evaluated												
TOTALS												

±± The entire park composes several cultural landscapes...or a single integrated landscape, depending upon what parameters are used. It is not possible to characterize the landscape using this chart.

SUMMARY CHART FOR ETHNOGRAPHIC RESOURCES

NUMBER		DOCUMENTATION LEVEL				NATIONAL REGISTER	AUTHORITY	NON-RECREATIONAL USE
		good	fair	poor	unknown			
SITES	all		X	X		all		
STRUCTURES	all		X	X		all		
OBJECTS	most	X	X	X		all		
NATURAL RESOURCES	all	X	X	X		all		
ETHNOGRAPHIC LANDSCAPES	entire park		X	X		all		

SUMMARY CHART FOR OBJECTS

DOCUMENTATION Form 10254 Submitted to National Catalog at Harper's Ferry	Archeology	Ethnology	History	Archives	Biology	Paleontology	Geology	TOTALS
Registration Data Only	0	0	0	0	0	0	0	0
Registration & Catalog Data	470,906	46	175	59,509	424	0	1,160	532,220
Total Items Cataloged	470,906	46	175	59,509	424	0	1,160	532,220
Backlog to be Cataloged	639,689	0	36	162,274	0	16	0	802,015
Total Collection Summary	1,110,595	46	211	221,783	424	16	1,160	1,334,235

CONDITION The percentage of collection in the following categories:	Archeology	Ethnology	History	Archives	Biology	Paleontology	Geology
Excellent							
Good	95%	100%	95%	95%	100%	100%	100%
Fair	3%		5%	5%			
Poor	2%						
Unknown							

PRESENT NATURAL RESOURCE STATUS

Natural Resource Baseline Information

Many of the biotic and physical resources within the former monument boundaries of Chaco Culture National Historical Park have been inventoried to a minimum level or "checklist" standard of information. The inventories correspond to partial fulfillment of "Level 1" resource inventories as described in NPS-75, Guideline for Natural Resources Inventory and Monitoring. A resource basic inventory exists for vascular plants, vertebrates, and geophysical resources on the former monument boundaries, but generally not for the new lands added to the park in 1980.

(The inventory of vascular plants and vertebrates has been entered into the NPS D-Base Inventory program. This inventory is currently being updated with current nomenclature and new species.)

All wildlife observations are entered into a D-Base file.

Inventories are inadequate for invertebrates, non-vascular plants and paleontological resources.

A vegetation community map for the Chacra Mesa park addition was completed in 1993. The map used the Brown, Lowe, and Pace (BLP) classification scheme (adopted as the classification system by the Colorado Plateau Parks). The vegetation map is a data layer in the park's Geographic Information System (GIS).

The vegetation community research will be expanded to the remainder of the park in 1996. A vegetation map using the BLP classification will be produced for the entire park. Permanent plots will be established for long-term monitoring.

Data on the distribution, abundance and range of wildlife species is inadequate.

Air quality monitoring for ambient pollutants (particulate) and visibility values began in 1978 and ended in 1986 and 1991 respectively. A study of possible impacts to vegetation due to air pollutants was completed in 1980. The report concluded that there were no adverse effects to vegetation due to air pollutants at this time.

An additional report, completed in 1993 by the Los Alamos National Laboratory, established a database of sulfur concentrations in soils and pine needles for the park.

The park monitors groundwater levels at two wells.

The park collects precipitation samples, which are sent to the University of Utah to analyze the hydrogen (deuterium) and oxygen isotopic composition of the water.

A huge database of aerial photographs of the park is available at the NPS remote sensing lab at the Southwestern Regional Office in Santa Fe. The earliest aerial photos were taken in 1922, with the latest set taken in

1982/83. The photos represent a valuable resource to monitor trends in the park resources.

A great deal of the park's natural resource historical database is incorporated in the volumes of research pertaining to the park's cultural resources. In addition, there is a vast amount of remotely sensed data available for the park, which could serve as a component of a long-term monitoring program. Compilation of this data is critical in order to make it useful.

A summary of the park's natural resource database is included in Appendix B.

Natural Resources

Background

Native flora and fauna communities in Chaco have been greatly modified by human activities for centuries. Evidence from Atlatl Cave indicates human use of the present park area 10,000 years before present. For many centuries resource use was hunting and gathering, a subsistence method that probably impacted the botanical and zoological populations but did not involve land-clearing or stock-grazing.

Subsequent use of the Chaco area by the Anasazi also involved hunting and gathering, augmented by farming. Agriculture practices directly impacted the land by clearing areas of native vegetation and creating water-control devices to store and transport precipitation runoff. This agricultural lifestyle may have resulted in greater year-round impacts on the flora and fauna of the area, as the Anasazi built numerous permanent structures, at least some of which may have been year-round residences.

Subsequent use of the area was for winter grazing by ranchers to the north of the park, and by local herders. By the early 1900's overgrazing had been severe, and, coupled with drought and flash floods, led to an erosion cycle which damaged watersheds and destroyed large areas of vegetation (Resource Basic Inventory, 1973). Alien species such as cheat grass (Bromus tectorum) and Russian thistle (Salsola iberica) became commonplace in the park.

Current Condition

Over the past thirty years the condition of the park's natural resources has improved. This improvement occurred with the elimination of grazing within the former monument boundaries, adoption of better grazing practices outside of the park, and increased patrols to remote areas of the park.

Despite this improvement, many current land use activities continue to have adverse impacts on park resources. Grazing continues on the new additions to the park. Riparian communities in Chaco Canyon have been modified by erosion and subsequent erosion control efforts.

Large numbers of visitors (approximately 82,000 in 1994) are having significant impacts on the park's fragile desert vegetation. Native vegetation has been destroyed by trampling at trailheads, trails, pullouts,

the campground, and other public use areas. Social trailing at these areas expands the area of vegetation disturbance.

assessment of visitor experiences at the park was conducted in 1993. Preliminary results of the assessment identify specific park attributes (solitude, accessibility of ruins) that are important to park visitors.

Visitor impacts to resources need to be documented. This information, in conjunction with the visitor experience research, should guide future visitation management.

External Threats

Because the park does not encompass a total ecosystem, the park's wildlife, air, and water resources can be and are directly impacted by uses on surrounding public and private lands. Planning or managing the park in isolation is impossible. Ties with adjacent land managers guiding private land use and development are an essential part of planning for future management of the park.

External threats to park resources include grazing, energy development, access issues and low-flying aircraft.

Monitoring

Although the natural resource data base needs to be expanded and converted to digital format, the existing data base is sufficient for the design and implementation of a long-term monitoring program for some resources. A monitoring program would also generate data to augment the baseline inventories.

The purpose of such a natural resource monitoring program is to provide a rational basis for taking management actions, and specifically, to: 1) provide information on changes in resource conditions and their causes; 2) provide feedback between natural resource conditions and management objectives; 3) trigger management actions and evaluate their effectiveness; and 4) determine compliance with environmental standards/regulations (Natural Resources Inventory and Monitoring, NPS-75).

SUMMARY TABLE OF NATURAL RESOURCES BASELINE INFORMATION

Meets, does not meet, or exceeds the recommended minimal set of natural resources information in Appendix A of NPS-75, the *Natural Resources Inventory and Monitoring Guideline*

INVENTORY COMPONENTS	MEETS	DOES NOT MEET	EXCEEDS
Historical Data Base		X	
Species Information	X		
Species List	X		
Biologic Surveys (Species Field Inventories)	X		
Species Distribution		X	
Vegetation Maps	X		
Cartographic Maps		X	
Soils Map	X		
Geology Map	X		
Water Resources Inventory		X	
Water Quality Data	X		
Air Quality Stations	X		
Air Quality Data	X		
Precip./Meteorological Data	X		

**New inventory components not listed in NPS-75 should be added to the table as necessary to meet individual park needs.

For a description of the inventory components see NPS-75, Appendix A.

CULTURAL RESOURCE MANAGEMENT PROGRAM

Cultural Resource Program Overview and Needs

General Overview and Needs:

The current emphasis of the park's cultural resource program is the implementation of actions that address the significant resource issues listed below. Currently, there are 3.0 FTE funded out of the park ONPS and approximately 8 FTE (permanent, subject-to-furlough, and temporary positions) are funded out of various ONPS, Cultural Cyclic, and Cultural Resource Preservation Program.

In order to accomplish the preservation needs, the preservation crew has been converted to permanent subject-to-furlough status and must be funded out of ONPS accounts. Additionally, because of the ages of most of the preservation specialists, a mentor/apprentice position is needed in order to be ready to fill in as crew members retire. To accomplish the curation needs, one of the temporary position has been converted to permanent status as an archivist, and one of the Co-Op positions needs to be converted to permanent to fill a vacant assistant curator position. To accomplish research and resource management needs one additional permanent archaeologist is needed to address compliance requirements, coordination among independent researchers, and to carry out needed inventory and documentation projects.

Preservation:

-- Partially Backfill and Repair Drainage in Interpreted Sites

Without partially backfilling portions of the exposed sites, the prospect of preserving these fragile structures for scientific use and visitor enjoyment is bleak. As the general condition of the structures deteriorate, the costs of treatment increase and the funding available for preservation shrinks. The deterioration caused by unequal fill levels and inadequate drainage will be decreased, and in some cases eliminated, by a combination of partial backfilling, surface recontouring, and drainage installation. By decreasing these areas which require the most intensive treatment, the limited resources available for preservation can be put to better use.

-- Re-establish Cyclic and Annual Preservation Program

Routine cyclic maintenance reestablishes the structural stability of a site through the reinforcement of load-bearing members or by arresting material deterioration leading to structural failure. Cyclic maintenance reestablishes weather resistance to prevent further erosion. Deteriorated stones, eroded mortar, wall bulges, loose veneer and loose capstones are repaired. The repair is done to protect the integrity of the original fabric, as well as to take into consideration the safety of visitors and preservation staff.

An annual maintenance program differs from cyclic maintenance in that it focuses on routine, preventative treatment - generally minor repairs scattered throughout the buildings - and often relates to recent erosion episodes such as winter snows or summer thunderstorms. The preservation treatments used in the annual preservation program are similar to the cyclic program; they are used more extensively and less intensively than in cyclic work.

-- Develop a Comprehensive Visitor-Use Resource Protection Plan.

The continual increase in visitation and the popularity of backcountry trails results in the increase in vandalism, theft, site disturbance, soil compaction, erosion, and vegetation destruction. A regular trail maintenance program should be implemented. Staffing levels should provide for more regular patrols and interpretive roving in order to mitigate negative visitor impact and activities. The park should consider a carrying capacity plan or determine Limits of Acceptable Change (LAC).

-- Develop and Implement Architectural Documentation Program

Documentation of historic architecture is an essential component of preservation, yet it has never been fully implemented for sites at Chaco. Architectural documentation is conducted prior to initial fabric treatment to provide baseline data on the characteristics, appearance, and condition of architectural features. The collaborative project between the park and the Navajo Nation Chaco Protection Program will develop an automated CAD/GIS program to enable the documentation to be compiled, stored, and accessed. These records will be updated when preservation is implemented by means of "before and after" photography and completion of preservation documentation forms.

The yearly preservation documentation volumes comprise an invaluable database that is critical to ongoing and future preservation treatment. Without this database, it is not possible to design and implement preservation treatment, nor is it possible to conduct archaeological research on the architecture. Documentation records have been compiled and bound up to the early 1980s. From the mid 1980s to present, the records are in various stages of completeness. Some of the yearly volumes only need introductions and tables of contents and they will be ready to be bound. Some volumes will require more work to get to the stage where they are ready for binding. Negative files need to be cross-referenced with the bound prints and archived for curation.

A comprehensive ruins preservation plan will re-evaluate and outline preservation needs for all known archaeological sties within the old and new park boundaries. The plan will classify sites by management, architectural, geographic, archaeological, protection and other criteria. This plan can be a subset of the GIS that combines the master site file information with the backcountry monitoring program. The preservation plan will provide essential data needed to set priorities for treatment, evaluate development plans, assess research proposals, and perform other management activities.

Compile all existing records on each structure, and each room in each structure into preservation histories. Develop an easily referenced database containing this information, in addition to narrative accounts of the materials and methods used in each intervention.

-- Evaluate and Implement Erosion Control Measures

A proposal to the NPS Water Resources Division to evaluate the existing erosion control features near Pueblo del Arroyo and Kin Kletso and recommend measures for improving existing systems and/or adding new ones. They will prepare a detailed monitoring plan and assist the park in implementing the protection plan according to an identified schedule and measures.

Collections:

Accession and Catalog Park Collection

This is the elemental program for curating the collection. Having all materials fully cataloged will assure complete accountability of all items and enable the collection to be fully inventoried for NAGPRA, for consultations regarding repatriation questions, for researchers and exhibit, etc. Completion of this program will reconcile many of the sub-standard storage conditions that currently adversely impact the materials in the collection, and preserve original project documentation including maps, field notes, archives, manuscripts, photographs and slides.

-- Compile List of Chaco Archival Manuscripts

This is a multi-staged project that would provide for the compilation of a complete list of manuscripts and other archives dealing with Chaco Canyon on a computerized database that would list all available material and the location of copies, microfilming of all manuscripts and safe-keeping of archival manuscripts, plus working copies of all or most of these manuscripts in three locations: University of New Mexico/Center for Southwest Research, NPS regional Library in Santa Fe, and Chaco Culture National Historical Park.

-- Obtain Adequate Collection Storage

This project is a collaborative effort with the University of New Mexico's Maxwell Museum. The goal is to house, care for and make available for study, interpretation, and public exhibition archaeological and natural history collections. At the present time, the collections are grossly underutilized as shortage of work and storage space severely limits the ability to respond to increasing numbers of requests. The condition of objects and documents in the collection is deteriorating because they are housed under adverse conditions. Given the current rapid pace of archaeological research and the expansion of the collections due to reconditioning, we will be unable to accommodate new collections by the end of 1994.

-- Establish Guide to Chaco Collections

Compile an outline and schedule for developing a guide to all materials collected from Chaco which are now housed in institutions throughout the US and elsewhere. The guide, or finding aid, will provide a brief description of Chaco materials in a particular institution, and instructions on how to obtain additional information. The guide should contain a plan for cataloging all material in such a way that researchers could access information from a single database.

-- Develop Outreach Program for Collection

Develop traveling exhibits which illustrate the extent, content, and availability of the Chaco Collection. Use these exhibits, in conjunction with presentations, to develop research and non-technical interest in the collection.

-- Comply with NAGPRA Requirements

Through the NAGPRA consultation committee, formed in 1993, the park will continue to consult with park-associated Pueblo and Navajo governments and their designated representatives. The consultation

committee members will begin to review the inventory of all materials in the collection, particularly the archival in order to identify sensitive or sacred objects of particular patrimony. Once materials are identified that may be of interest, the park-associated groups will individually view the collection and begin to develop their repatriation requests.

-- Develop Temporary Exhibits for VC and Offices

Design and construct several temporary exhibit cases suitable for objects to be temporarily displayed in the Visitor Center and in the staff office areas. This will allow objects that have been donated, or are otherwise of current interest, to be exhibited for a period of time, enabling staff and visitors to become familiar with the collection.

Research and Cultural Resource Management:

--Compliance with National Historic Preservation Act

Virtually all activities such as development, repair, construction, research, etc. that involve the cultural resources are subject to the NHPA. Through the servicewide MOA, many of the minor, routine activities that the park engages in are covered under the "XXX" process, which exempts certain projects from full 106 consultation. Any project not covered by the MOA exclusions is subject to full 106 compliance and is done in concert with the SWRO compliance officer.

--Establish Research Goals and Review Process

This vast amount of data makes organizing and managing research at Chaco difficult, and a set of clear goals and a review procedure are needed. The plan is the basis for instituting and prioritizing the research topics, to insure that in-house and non-NPS research is coordinated and conducted in the most effective means possible. An automated database, probably tied to the GIS, will be developed to organize previous work, and relate past, ongoing, and proposed work.

-- Complete Chaco Center Publication Series

Actively support the personnel in the Division of Cultural Research (SWR) in completing the publication series resulting from the research and excavations during the Chaco Center Project. Completion of this research is critical to the interpretation, resource management, and future research at the park.

-- Continue Site Monitoring and Condition Assessment

An effective site-monitoring program has been developed and implemented. The program is being incorporated into the GIS in order to tie it into other management actions. This program needs to be reviewed annually and updated if necessary. Information should be synthesized periodically.

-- Compile Ethnographic Overview and Assessment of Entire Park

An ethnographic study of Fajada Butte and related resources, and an ethnobotanical study has been completed. The nature and extent of a parkwide overview and assessment should be developed.

-- Develop Cultural Landscape Management Plan

One of the most important and salient aspects of Chaco prehistory, but only recently identified, is the interrelationships and internal organization between sites/communities over a very large area. None of the architecture can be viewed as isolated or independent structures. This is a basic principle of cultural resource management at Chaco, but the development of a cultural landscape plan will help to identify and clarify significant aspects of this setting.

-- Synthesize Rock Art Studies

There have been several rock art inventories conducted in the park by outside researchers, one of which is currently ongoing. These inventories vary in quality, intensity, intent, etc. These various studies need to be summarized and synthesized to determine the state of the research, with future needs and directions developed.

-- Synthesize Prehistoric and Historic Water Control

The hundreds of water control features in the park have not been systematically documented or synthesized in a form that is easily accessible. Several researchers have worked independently and in concert with the park, and this information needs to be synthesized. Prehistoric, Navajo, and CCC/NPS water control or potential water control features need to be clearly identified, documented, and a database developed in order to properly manage the sites.

-- Monitor and Synthesize Below-Grade Resources

Almost every time ground is disturbed in the park for waterlines, toilets, and other development, cultural resources are encountered. Buried cultural resources are continually being exposed in the banks of Chaco Wash and its tributaries. These resources need to be comprehensively mapped and documented in order to synthesize the existing information and make recommendations on future development or research activities.

-- Prepare Historic Resource Study and Administrative History

The historic resources in the park, particularly those attributed to hispanic and other Euro-American occupation, have not been well documented or analyzed. Once these sites are adequately inventoried and documented, an administrative history of park resources should be contracted.

-- Complete National Register Forms

The resources in the park, including the detached units, have never been adequately documented on National Register of Historic Places. While all of the resources are included on the National Register, the documentation should be completed and updated.

NATURAL RESOURCE MANAGEMENT PROGRAM

Overview of Current Natural Resource Management Program and Needs

The current emphasis of the park's natural resource program is the implementation of actions that address the significant resource issues listed. To that effect, 1.0 FTE funded out of the park ONPS budget is devoted to the park's natural resource program. At least one, if not two, additional PFT resource specialist positions have been identified as needed in the Natural Resource Management Assessment Program (NR-MAP) at Chaco.

The park typically relies on "soft monies" to support the natural resource programs and projects. Without this money, new programs and the continuation of programs could not be implemented.

To reduce dependency on soft monies, a natural resource base increase is needed. At a minimum, the base increase should cover: 1) yearly supplies, materials, travel/training; 2) a GS-9 resource specialist; and 3) a resource management vehicle for daily use in operations. This increase is needed to adequately continue existing programs. Additional funds will be needed to develop and implement any new programs.

With limited funding the park has undertaken the following strategies to address the major resource issues:

Access

Access is one of the most controversial issues facing Chaco. Numerous proposals to improve access to the park have been studied. Increased visitation and development related to improved access has a great potential to impact the resources and visitor experience at the park.

Visitor-impact studies need to be conducted to determine how increased visitation would impact park resources.

The NPS has also been working for several years to open the Gallo Wash Entrance to Chaco Culture NHP. This will allow the NPS to better preserve and protect the park's main archeological ruins, while providing a high-quality experience for the increasing number of visitors coming to the park.

The NPS identified the need for a new access road to the park because: 1) the existing access road from the north (State Road 57) runs adjacent to several major ruins; seismic studies show that some of the ruins are being damaged by vehicle vibrations; 2) the existing road is a through road which cannot be closed at night, exposing park resources to vandalism and unauthorized uses; 3) the existing entrance makes management of park use more difficult and lessens interpretive opportunities for visitors entering the park from the North (SR44), since the visitor center is located at the Southeastern end of the park, and; 4) the existing road system does not facilitate control of commercial truck traffic through the park.

The NPS has entered into a Cooperative Agreement with San Juan County to work together to change access to the park as soon as possible.

San Juan County prepared applications to obtain the required rights-of-way to construct a portion of the new access road. Rights-of-way were acquired from the State of New Mexico and the Bureau of Land Management, and only the Navajo Tribe approval remains.

The park will continue efforts to close the north entrance road until successful.

Energy-Related Development

Chaco lies within the energy-rich San Juan Basin. One quarter of the nation's known coal reserves and one-sixth of the world's known uranium reserves are located within the Basin. Development of the region's oil and gas reserves has encroached to the park's eastern boundary. Development of a large coal reserve three miles north of the main park unit and a detached park unit has been proposed.

Because of the potential development of these resources, monitoring programs for night sky qualities, ambient noise levels and air quality need to be developed and implemented.

The BLM compliance office has agreed to contact the park whenever an oil or gas operation is proposed on BLM or tribal lands that fall within the viewshed of the park. At that time, the park will be asked for any mitigative actions - including directional drilling - in order to remove the drill rig and production facilities from view. The BLM's compliance office is also willing to deny a permit if necessary.

To assist the BLM, the park has provided a GIS-based viewshed to the BLM office. The BLM is currently obtaining a new GIS system which will be able to analyze this viewshed data.

The park will maintain close contact with appropriate BLM and tribal officials in regards to other potential energy development.

Aircraft

Chaco is experiencing a steady increase in documented low-flying aircraft incidents, with several resulting in formal complaints to the Federal Aviation Administration (FAA). Low-flying aircraft are those below the FAA's regulation of 500'AGL (Above Ground Level). In addition, numerous aircraft also fly below the FAA's advisory for park areas of 2000'AGL.

Low-level aircraft overflights endanger park visitors and irreplaceable park resources. Vibrations from aircraft noise have been documented to cause damage to prehistoric structures. In addition, the overflights also have/may have negative impacts on: 1) wildlife; 2) ambient noise levels and; 3) visitor experience.

The park has developed a monitoring system to record low-flying aircraft. This information is then passed on to the FAA's Albuquerque District Office. However, the FAA has taken only minimal enforcement actions. The park is striving to gain greater cooperation from the FAA in prosecuting these cases.

Grazing

The former monument's boundaries were fenced in 1948, eliminating impacts to this portion of the park's vegetation caused by grazing. This action permitted natural processes to once again operate without this interference.

However, it is likely that the vegetation currently developing in these areas is generally not that of the pre-agricultural or pre-herding periods, but rather an amalgam resulting from the: 1) effects of previous

cultural influences; 2) extirpation of some species from and introduction of alien species to the area; 3) altered hydrology; and 4) the impacts of park development.

There are approximately 31 miles of unfenced park boundary (13,000 acres) acquired in the 1980 Act which enlarged and renamed the park. Grazing occurs on much of this new land.

An archaeological site inventory, completed in the mid-1980's, documented adverse impacts to cultural resources including: disturbance of the ground surface; promotion of erosion; breakage of artifacts; and knocking over of standing walls. Similar destruction of cultural resources has been documented by Nickens, Larralde, and Tucker in "A Survey of Vandalism to Archaeological Resources in Southwestern Colorado" (Colorado BLM Cultural Resource Series #11, 1981).

Numerous studies have documented grazing-induced adverse impacts to vegetative and faunal communities. Similar impacts are assumed to be occurring on the recently acquired park lands.

Fencing the recently acquired additions is identified as a high priority by the park's Resource Management Plan and will greatly facilitate the area's closure to grazing and unauthorized entry.

The park has received $42,600 over the past three years through Challenge Cost Share Grants to begin fencing this boundary with Sierra Club volunteer labor. The park was able to purchase 12 miles of fencing material with this grant. The Sierra Club volunteers have constructed 6 miles of fence so far. The fencing project will continue in the future.

Air Quality

The park is designated as a Class II airshed. An attempt to redesignate the park to a Class I airshed was made in 1980 but did not make it through Congress. Air quality monitoring equipment was removed from the park in 1990.

It is unlikely to gain Class I designation for the park, however, air quality monitoring needs to be continued. Neighboring agencies in the Four-Corners do extensive air quality monitoring, and Chaco should establish and maintain contact with those entities.

Water

A inventory of park water resources was begun in 1992. Approximately 75% of the park was surveyed at this time. Additional funding is needed to continue this survey. All water sources should be located with a global positioning unit with locations and other attributes stored in GIS and DBASE III format.

The park has a groundwater level monitoring well south of the park. It was drilled because of concerns that proposed energy development in the area would affect the groundwater levels. The energy developments proposals were later dropped.

The park will continue to monitor water levels at the well to establish a data base.

Erosion

Extensive efforts to control erosion have been undertaken at the park. A compilation of the erosion-related studies relating to Chaco was completed in 1982 by Simons, Li and Associates. Unfortunately no monitoring system was put in place at that time.

Cultural resources at Pueblo del Arroyo, Kin Kletso and Atlatl Cave are threatened by arroyo bank, soil piping and/or cliff and shelf "pour-off" erosion.

The park has requested assistance from the Water Resources Division to: 1) Review/summarize effectiveness of existing erosion control measures undertaken at Chaco focusing on the Simons and Li material; 2) Relocate and resurvey Simons and Li cross-sections that WRD deems necessary to monitor erosion or suggest alternative measures for developing a park-based monitoring program; 3) Photo benchmark cross-section locations for future relocation and resurvey; 4) Conduct a detailed flooding hazard analysis for Pueblo del Arroyo, Kin Kletso, and Atlatl Cave including a microdrainage assessment at Pueblo del Arroyo; and 5) Develop a protection strategy for cultural resources that are directly threatened.

The park has also implemented or needs to implement the following natural resource programs:

Flora

A preliminary vegetation map for the old monument boundaries was completed in the late 70's. The map was generally incomplete and not in the same format that is currently being used at Colorado Plateau parks.

A more complete vegetation survey of the park was begun in 1993. The 1993 research (now complete), focused on the Chacra Mesa addition to the park. The research was expanded to the remainder of the park in 1994.

To date, no threatened or endangered species have been located in the park. A few state-listed species may be located in the park. Taxonomic work is proceeding on these species at San Juan College.

Effects of grazing on vegetation should be researched. Methods to rehabilitate areas impacted by grazing, visitor use, etc., need to be developed and implemented.

Fauna

A survey of avifauna has been performed on a monthly basis. The survey identified unusual species (osprey, hepatic tanager) for this area during the migratory periods. The surveys suggest that Chaco may be an important area to birds as a secondary migratory corridor. Monitoring should be continued to ascertain: 1) the importance of this area as secondary migratory corridor; and 2) any trends in avifauna populations.

A migrant peregrine falcon occasionally passes through the park. A pair of golden eagles nest within the park boundaries. Other than an unusual migrant, no other threatened, endangered or sensitive species are known to occur in the park.

Antelope were extirpated from the area prior to the 1920's. A feasibility study determined it was not feasible to reintroduce antelope to the park. In April 1995, several Antelope were sited in the area to the southwest of the park. The size of this herd and their range has not been identified.

There is a small mule deer population in the park. The herds have diminished since the 1970's. The New Mexico Game and Fish mule deer biologist attributes the decline to poaching and the development that is occurring in traditional migration routes between Northwestern New Mexico and Southern Colorado.

Mule deer observations are recorded in the park's D-Base files. An accurate mule deer count should be obtained. Mule deer ecology at Chaco should be researched to determine the current population trends and any necessary management actions.

Inventories should be conducted for mammals, avifauna, reptiles, and invertebrates, with subsequent development of monitoring and management programs.

Weather

The park monitors maximum and minimum temperatures and precipitation at the Visitor Center. Precipitation is also monitored at several locations in the park.

The park is one of many Colorado Plateau Parks that is collecting rainfall samples for a University of Utah researcher. The samples are analyzed for their isotopic composition, and will eventually be used in developing a Global Warming model. The isotope identification technique may also prove useful in cultural resources research, including identifying irrigation sources for prehistoric crops.

This data will continue to be gathered. A fire weather station should be installed at the park to gather additional weather data such as relative humidity and associated fuel moisture.

Revegetation

The park has implemented an active revegetation program. Social trails and other impacted areas are being revegetated. Of major significance is an IPM use of revegetation to eradicate weeds in the ruins.

Each year the park's stabilization crew devotes a great deal of time to eradicating weedy species from the public use areas in the park ruins. If desirable native grass species (which could out-compete the weedy species) can be established in these areas, time could be much more productively used stabilizing the ruins. Additionally, the native species will also transpire moisture out of these areas. Reduction of moisture should be beneficial to preservation efforts, because this moisture accelerates the deterioration of the masonry walls.

A number of rooms/kivas have already been planted at Pueblo Bonito. A monitoring system for the effectiveness of this program has also been implemented.

The park has received $20,400 in Challenge Cost Share Grants towards supporting this project. The Sierra Club supplies the volunteer labor to complete these projects, and the park provides the supervision and materials.

In order to provide adequate nursery stock for the revegetation projects, a greenhouse has been purchased.

Additional funding is needed and is being sought to enhance this program.

Night Sky

The park has initiated a night sky preservation program. New light fixtures were purchased to focus light downward. Motion detectors were bought to trip flood lights on public buildings. This effort has made a noticeable difference in the amount of light pollution at the park.

A night sky qualities monitoring program needs to be implemented to establish baseline data before additional development surrounds the park.

Monitoring

The park has had only a limited long-term monitoring program in place to guide/meet management objectives. Monitoring programs have now been implemented for the park's avian and groundwater resources, low-flying aircraft, and revegetation program.

No monitoring system is in place to determine the effectiveness of the park's extensive erosion control efforts. Past efforts may even be increasing erosion problems at some locations in the park.

A long-term monitoring program needs to be developed and implemented to detect changes and quantify trends in resource conditions.

Prescribed Fire

The cessation of grazing in 1948 has resulted in a significant increase of indigenous shrubs and grasses along with a number of alien species. In the campground and housing area, weeds, grasses and shrubs are at such a density that a wildfire could easily cause significant loss of property.

In 1993, the effects of a small human-caused wildfire resulted in a proliferation if a number of indigenous grasses. This result indicates the need to implement a prescribed fire program to assist in removing alien species, rejuvenate and increase native species, and remove potential wildland fuel load fire hazards.

Vegetation monitoring plots will need to be established to gather baseline data on vegetative species, density, etc. The effects of fire on the plots will be monitored to detect and quantify changes in vegetative composition.

GIS

The park is obtaining GIS capabilities. A draft GIS plan to guide the process has been written. The park has acquired a 486 computer, a color printer, and EPPL7 GIS software to support the GIS.

The park works closely with the Regional Technical Support Center in Albuquerque. The RTSC has provided: 1) the EPPL7 GIS software; 2) a color printer; and 3) several data layers (boundaries, roads, hydrology, and viewshed maps).

The park GIS plan identifies a need for additional GIS training for park staff to more effectively use this resource. A permanent GIS specialist to: 1) convert the vast amounts of available research about the park's cultural and natural resources; 2) update the system with new data as it comes in; and 3) provide GIS material to managers as needed, would greatly facilitate the use of this technology.

All future researchers will be required to supply a GIS data layer as applicable.

Compliance

The cultural and natural resource managers are responsible for compliance for all park projects. The park has established a very good working relationship with the regional compliance office.

Sociological Research

An assessment of visitor experiences at Mesa Verde, Wupatki and Chaco was completed in 1993. Preliminary results of the assessment identify specific park attributes (solitude, accessibility of ruins) that are important to park visitors.

Visitor impacts to resources need to be documented. This information, in conjunction with the visitor experience research, should guide future visitation management.

Automated Data Base

A great deal of the park's natural resource historical database is incorporated in the volumes of research pertaining to the park's cultural resources. In addition, there is a vast amount of remotely-sensed data available for the park that could serve as a component of a long-term monitoring program. Compilation of this data is an ongoing activity.

In order to have a more complete and easily accessible database, an automated bibliography of all descriptive documents and scientific studies pertaining to park natural resources should be developed (including an extended search for published and unpublished documents outside the park).

Other Needs

Other research and resource management needs at the park include the development of an ambient sound baseline and the development of a fire management plan, and the development of a parkwide IPM Plan. A list of research needs is attached as Appendix C.

Scoping Session

Park staff have also identified the need for a scoping session involving scientists and regional and park staff to: 1) identify additional resource inventory needs and priorities; 2) develop research protocol and priorities; and 3) identify monitoring priorities and develop statistically-sound monitoring protocol.

Summary

summary, the most significant natural resource issues currently facing Chaco Culture National Historical rk are:

-- Fencing new park boundaries for protection and preservation.

-- Visual, biological and other impacts associated with adjacent land use (park access, grazing, mineral development, and low-flying aircraft) on park resources .

-- Erosion control and monitoring.

-- Lack of basic resource data.

-- Lack of a long-term monitoring program (biotic and geophysical) to ascertain impacts to the park resources and direct management actions.

-- Lack of an automated/digital data base to facilitate data storage, retrieval, and manipulation/use.

--Inadequate understanding of visitor-impacts.

--Development of a vegetation management program.

--Development of a parkwide IPM Plan.

PPENDIX A1

Legislative Direction

The following legislative guidance is applicable:

Enabling Legislation

Chaco Canyon National Monument was established by Presidential Proclamation No. 740 of March 11, 1907, (35 Stat. 2119). The Proclamation states "...the extensive prehistoric communal or public ruins...are of extraordinary interest because of their number and their great size and because of the innumerable and valuable relics of a prehistoric people which they contain, and it appears that the public good would be promoted by preserving these prehistoric remains as a National Monument with as much land as may be necessary for the proper protection thereof." The initial acreage of the monument was 20,629.40 acres. 880 additional acres became part of the monument by Presidential Proclamation No. 1826 of January 10, 1928, (45 Stat. 2937).

Applicable Acts

-The National Park Service Organic Act, August 16, 1916 created the National Park Service and directed the service to "conserve the scenery and the natural and historic objects and the wildlife therein and to

provide for the enjoyment of the same and in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

the Act of February 17, 1931, (46 Stat. 1165) owners of lands adjacent to the monument were authorized to maintain access to their lands and to drive cattle across the monument at locations designated by the Superintendent. This access was granted only if those owners once held patented land in the monument and their lands outside had become separated by government acquisition of lands inside the monument. The authorization to drive stock across the monument at an accessible location was granted to any succession of interest to adjoining lands or to any lessee of such lands. The Act also provided for the elimination of private lands within the monument by exchange of those lands for public lands of equal quality elsewhere in the State of New Mexico.

The Act also specified means by which the University of New Mexico and the Museum of New Mexico and/or the School of American Research could continue to conduct scientific research.

-The Act of December 19, 1980, (P.L. 96-550) abolished Chaco Canyon National Monument and replaced it with an expanded Chaco Culture NHP. The act also established a system of Congressionally recognized Chaco Culture Archeological Protection Sites, which are administered by their respective land owners/managers. The act also directs the Secretary of the Interior to: 1) search for other Chacoan sites for Congress to consider adding to the System; 2) conduct further research into the Chaco Anasazi, and 3) develop a computer data base for the park.

-The National Historic Preservation Act of 1966, Section 106, requires federal managers to consider the effects of proposed undertakings on cultural resources and to allow the Advisory Council on Historic Preservation to comment. Amendments to this act require consultation with Indian tribes to identify and evaluate effects to historic properties of traditional cultural significance. 36 CFR 800 contains the regulations governing compliance with this act.

-The American Indian Religious Freedom Act of 1978 (42 USC 1996)/Public Law 95-341, requires Federal Land Managers to recognize the First Amendment rights of Native Americans to the extent consistent with other legal mandates in resource management. It also requires all Federal Agencies to evaluate their policies and procedures in consultation with Native Americans in order to determine appropriate changes. This led to the National Park Service's Native American Relations Management Policy (1987)

-The Native American Grave Protection and Repatriation Act (25 USC 3001)/Public Law 101-601 Illegal Trafficking in Native American Human Remains and Cultural Items protects American Indian human remains and cultural items from sale or purchase or from other uses for profit.

-The Archeological Resource Protection Act Public Law 96-95 of October 31, 1979 (ARPA) expands and updates the archeological protection provisions of the Antiquities Act of 1906. ARPA increases the penalties for convicted violators and is the key Federal statute available to enforce antiquities protection.

16 USC 470 ff applies civil liabilities for destruction of archaeological sites and includes archaeological or commercial value plus cost of restoration and repair.

In addition to ARPA laws, 18 USC 641 Theft of Government Property and 18 USC 1361 Destruction of Government Property can be applied to archaeological disturbances on Federal lands.

Additional Legislation

Several other Acts of Congress (and subsequent amendments) provide guidance for resource management activities. These include but are not limited to: 1) Endangered Species Act, 2) Clean Air Act, 3) Clean Water Act, 4) Fish and Wildlife Coordination Act, 4) National Environmental Policy Act, Redwood Amendments, 5) National Park System Mining Activity Act of 1976, and 6) the Concessions Policy Act.

Executive Orders

Several Executive Orders also provide guidance for resource management activities. These include but are not limited to: 1) E.O. 11988 (Flood Plain Management), 2) E.O. 11593 (Protection and Enhancement of Cultural Environment), E.O. 11991 (Protection and Enhancement of Environmental Quality) and E.O. 12003 (Energy Policy and Conservation).

Department and NPS Policies and Guidelines

Applicable policies and guidelines to resource management activities include but are not limited to: 1) NPS-28 (NPS Cultural Resource Management Guidelines), 2) NPS-77 (NPS Natural Resources Management Guideline), 3) The Automated National Catalogue System Handbook, 4) Archeology and Historic Preservation (Secretary of Interior Standards and Guidelines), 5) 36 CFR Compendium, 6) Chaco Culture NHP Closed Area Policy, and 7) Chaco Culture NHP Special Use Permit Policy.

Other Agreements

An historical Memorandum of Agreement (1949) between the Department of the Interior and the University of New Mexico Board of Regents documents the transfer of surface ownership from the University to the NPS and grants rights to the University to conduct research on resources within the park.

In 1971, a second Memorandum of Agreement between the National Park Service and the University of New Mexico created the Chaco Center, an NPS research institution dedicated to the study of archeology within the park. This unit has evolved into the Chaco Collection's primary repository, where the Maxwell Museum and park staff jointly manage the collections. Work space, offices, and storage are provided for the park collection as well as for a SWRO researcher who is completing the Chaco Center publications.

A 1933 Memorandum of Agreement between the National Park Service and the University of New Mexico, Center for Southwest Research (CSWR) (at Zimmerman Library) recognizes the park as an affiliated program that houses the archival portion of the Chaco Collection at the CSWR. CSWR provides storage and work space for the archives in addition to office space for a second SWRO researcher who is completing the Chaco Center publications.

A Cooperative Agreement between the Navajo Nation and the National Park Service provides guidelines for the use and general administration of funds appropriated for Chacoan sites on Navajo land. These funds provide support to the Navajo Nation Historic Preservation Department in their management and research of Chaco Resources identified in PL96-550 and subsequent amendments.

A continuing Memorandum of Agreement between the NPS and the Bureau of Land Management enables the NPS to provide preservation services to the BLM. These services include preservation treatment on Chaco and early Navajo architecture within BLM Farmington and Rio Puerco Resource Districts.

APPENDIX B1

ark Data Base

Climate

Chaco is located in a semi-arid region with an average annual precipitation of approximately 8.7 inches. Monthly precipitation is greatest in late summer. Winter precipitation, often in the form of snow, is heavier than fall or spring precipitation.

The average annual temperature is in the low fifties (10-13 C) with an average frost-free period of approximately 150 days.
Maximum temperatures rarely exceed the low 90's. Minimum temperatures often fall well below zero F in the winter.

Vegetation

The flora of Chaco is typical of the upper Sonoran life zone, with some remnants of Transition in the more sheltered coves and rincons (Vivian, 1977). The canyon floor is dominated by grassland/shrubland vegetation. Scattered pinion and juniper are found on mesa slopes with a well-developed pinion/juniper woodland present on Chacra Mesa in the southeast corner of the park.

A vegetation inventory of the then Chaco Canyon National Monument was completed in 1973, from which a simplified vegetation classification map was produced in 1974 (Kelly and Potter, 1974). The inventory identified 223 vascular plant species within the park.

Additional baseline information required includes: 1) A vegetation inventory of the park additions; 2) A threatened, endangered, rare and/or endemic plant survey of the entire park; 3) A non-vascular plant survey of the park; and 4) Digital maps of vegetation associations and locations of sensitive species.

Wildlife

The mammalian fauna of Chaco Canyon is represented by a variety of species typical to the Upper Sonoran life zone. A survey of mammals (did not include bats) completed in 1980 identified 25 species within the park. Seven other species have been reported to occur in the park by other sources.

A survey of avian species conducted in 1979 and 1980 identified 92 species within the park. A total of 132 species have been recorded at the park. The inventory indicated between 30 and 40 species breed at the park. A partial inventory of avian species conducted in 1992 indicates a higher number of breeding species in the park.

A survey of amphibians in 1969, identified two species of toads and the Tiger salamander within the park. The survey did not reveal any frog species (Jones, 1970). The Resource Basic Inventory (RBI), prepared for the park in 1973, indicates the possible occurrence of two additional amphibians.

The RBI also notes the presence of 14 reptile species within the park with an additional six species listed as ssible resident species.

The park has adequate baseline information for these species from which a long-term monitoring program can be designed. The monitoring program would also provide data to augment the baseline inventories.

Additional baseline information required includes: 1) Faunal survey for the park additions; 2) A survey of bat species within the park; 3) Digital maps of faunal distribution and 4) An invertebrate inventory of the entire park.

Geology

The walls of Chaco Canyon are primarily composed of the Cliff House sandstone, a formation which is approximately 350 feet thick in the area. It is underlain by the Menefee formation, a coal-bearing formation, at the base of the canyon walls.

Geologic maps of the entire park were completed in 1979, with the exception of a portion of Chacra Mesa and the detached units.

Considerable attention has been paid to the mineral and energy resources in and around the park's units. This information has been summarized in the park's Land Protection Plan.

A digital map of the park's geology is now available as an overlay in the park geographic information system.

Soils

The soils of the canyon bottom consist of textured clay loams and silty clay loams (USDA, SCS 1980). The soils are deep, slowly permeable, and formed in alluvium derived from sandstone and shale. The soils are highly susceptible to disturbance from erosion and piping. The soil cover on the canyon slopes is thin and also easily eroded when vegetation is disturbed. Gentle slopes above the canyon are covered with deep, well-drained loams and silty clay loams. Due to the highly erodible nature of the soils, a detailed digital soil map needs to be developed in order to guide any future park development.

Air Resources and Aesthetics

As of 1982, the air quality in the vicinity of the park was generally excellent. Concentrations of sulfur dioxide (SO2) and nitrogen dioxide (NO2) were well below state and federal air quality standards (BLM 1982). At that time, Chaco normally had the best visibility of any of the 28 NPS monitoring stations in the West (USDI, NPS, Yarborough 1982). The park is classified as a Class II clean air area under the 1977 Clean Air Act Amendments. This means some development may be permitted near the park as long as resultant TSP and SO2 levels do not exceed the maximum allowable concentrations (increments) established for Class II areas.

In Sept. 1979 the Assistant Secretary of the Interior for Fish, Wildlife, and Parks recommended reclassification the park as a Class I "attainment area" in order to "protect the long-range vistas essential to the full understanding of the relationships between the Anasazi culture and its physical environment". The recommendation was not accepted and the park remains a Class II area.

Air quality monitoring measurements were made at the park until May of 1991, at which time the equipment was removed by the NPS Air Quality Division.

Hydrology

Chaco Canyon is drained by Chaco Wash, an intermittent stream, and its intermittent tributary washes. There are a few small, naturally occurring seeps in the park. Flooding occurs irregularly in the park. When the washes do flow, the suspended sediment load is very high.

The floodplain of Chaco Wash are primarily within the incised channel. The floodplain in Gallo Canyon is broader, covering much of the canyon floor, including the existing campground.
A digital representation of the floodplain would be a useful overlay for a park geographic information system.

The park water supply is derived from a 3,100-foot well drawing from the Gallup sandstone. This water must be demineralized and cooled prior to use as drinking water.

Endangered, Threatened, and Rare Species

Threatened or endangered species that may occur in Chaco include: Blackfooted Ferret, Spotted Owl and Peregrine Falcon. A peregrine falcon survey (June 1992) of 70% of the park found no occupied nesting sites in the park. Seasonal peregrine sightings indicates the presence of a migratory population in the park (BLM, 1992).

A Threatened and Endangered, Rare and Endemic Vegetation Survey is needed and will be one of the top priorities within the Resource Management Plan.

Backcountry

As called for by the park's GMP, a Backcountry Management Plan to deal with issues of backcountry policy and the projected future needs of the public is being drafted.

The Backcountry Management Plan defines backcountry as all areas of the park except the roads and parking areas designated for visitor use, all administratively closed areas, the visitor center complex, the maintenance and housing area, the campground, and the interpretive trails at Una Vida, Hungo Pavi, Chetro Ketl, Pueblo Bonito, Pueblo del Arroyo, Kin Kletso, and Casa Rinconada.
The goal of the BMP as drafted is to provide for the need of future generations to find places of solitude, gain an understanding of past cultures, and preserve the cultural and natural resources of Chaco Culture NHP, and provide for the continuity of long-term management decisions.

Interpretation

The park's Interim Interpretive Prospectus (1991) identifies areas and issues wherein various forms of personal and non-personal media/programs can supplement resource management, protection, and preservation activities and operations.

GIS

A GIS plan was developed in 1992 to guide the implementation of a park geographic information system. The park has acquired the necessary equipment to implement a program to convert baseline data to a digital format. The following data are now available as GIS data layers: 1) boundaries; 2) digital elevations; 3) hydrography; 4) geology; 5) vegetation; and 6) roads. Future research projects conducted in the park will be required to present results in a digital format as appropriate.

APPENDIX C1

rk Research Needs:

1. Mule deer survey and ecology

2. Large mammal inventory

3. Comparison of grazed versus nongrazed areas of the park for flora and fauna composition and diversity

4. Reexamination of lichens within the park to check for any trends due to air quality

5. Paleontological resources survey

6. Vegetation trends based on aerial photos

7. Invertebrate inventory

8. Amphibian/reptile inventory

9. Prairie rattlesnake ecology

10. Soils survey and analysis of slope/erodibility

11. Juniper/pinon pine reproductive biology

12. Site restoration (revegetation) techniques

13. Avifauna survey/trends based on 1970's surveys

14. Golden eagle ecology

15. Small mammal inventory/trends based on 1970's survey

16. Ambient noise survey to collect a database of noise levels present at the park

17. Determine pregrazing vegetation communities

18. Develop monitoring protocols for flora and fauna

19. Exotic vegetation identification/inventory and eradication program

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