NATURAL BRIDGES NATIONAL MONUMENT
RESOURCE MANAGEMENT PLAN

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I. INTRODUCTION

A. Monument Purpose and Significance

The Monument was created to preserve three extraordinary natural sandstone bridges: Sipapu, Kachina, and Owachomo. The three bridges form the largest concentration of natural bridges in the world. Sipapu is the second largest natural bridge in the United States. Kachina Bridge is the fifth largest. The Monument was also established to preserve outstanding ancestral Puebloan cultural remains located throughout the Monument.

The purposes for which the Monument was established are evidenced in the various presidential proclamations addressing the establishment and enlargement of the Monument. These are reviewed below.

1. Legislative History

The Monument was first established in 1908. A total of 120 acres was originally set aside around the three bridges based on President Theodore Roosevelt's original Proclamation No. 804, April 16, 1908, 35 Stat. 2183. The main purpose for the Monument was stated by President Roosevelt as follows:

> "Whereas, a number of natural bridges situated in southeastern Utah having heights more lofty and spans far greater than any heretofore known to exist, are of the greatest scientific interest, and it appears that the public interests would be promoted by reserving these extraordinary examples of stream erosion with as much land as may be necessary for the proper protection thereof..."

Later, the Monument was enlarged to encompass 2,420 acres containing the three natural bridges, prehistoric structures, and cave springs, as stated in President William H. Taft's Proclamation No. 881, September 25, 1909, 36 Stat. 2502:

> "...at the time this Monument was created nothing was known of the location and character of the prehistoric

> ruins in the vicinity of the bridges, nor of the location of the bridges and prehistoric cave springs, also hereby reserved..."

The same area was resurveyed, and set aside by President Woodrow Wilson's Proclamation No. 1323, February 11, 1916, 39 Stat. 1764:

> "...whose purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

In August of 1962, President John F. Kennedy's Proclamation No. 320 withdrew 320 acres of land around Snow Flat Spring Cave and Cigarette Spring Cave from the Monument since these caves: "...no longer contain features of archeological value and are not needed for the proper care, management, protection, interpretation, and preservation of the Monument." In this proclamation, he expanded the size of the Monument, reiterated the public and scientific communities' interest in the preservation and protection of the bridges and prehistoric sites, and he set forth the main management objectives for the Monument, as discussed below.

2. Significance of The Monument

As previously stated, nowhere else are three such extraordinary natural bridges found in such close proximity to one another. These three bridges show three different stages of development from youth (Kachina), to maturity (Sipapu), to old age (Owachomo). Together with the canyons in which they formed, these three bridges are excellent examples of the result of an entrenched meander stream system.

The Monument was also created to protect its well-preserved ancestral Puebloan standing architecture. While archeologists now recognize that these structural sites are common throughout the region, their presence, as well as a range of archeological sites from Archaic through historic times, makes this area highly significant.

A high desert riparian environment combined with a year-round supply of standing water (the result of numerous seeps) creates a

unique biological climate where relict species (Douglas fir) maintain a foothold and where moist alcoves shelter hanging garden communities. It is here rare plants (such as the Kachina daisy) find refuge, and other water-loving flora thrive in riparian corridors that also provide food, shelter, and travel paths for wildlife. The Monument provides a breeding ground for peregrine falcons, is home to 15 species of bats, and has extensive public lands surrounding it that are candidates for Wilderness designation.

Pristine air quality ensures extensive vistas, and combined with the absence of artificial light provides outstanding opportunities to view night skies. The absence of human-generated sound leaves the visitor to confront the natural silence that is the hallmark of canyon country.

3. Setting

The Monument is located in San Juan County, Utah, 120 miles (200 kilometers) south of Moab, Utah. The area is accessible via Utah Highway 95 which connects Blanding, Utah with Hanksville, Utah. Blanding, Utah (population 3,100) is the nearest population center, located 40 miles (65 kilometers) east of the Monument. The surrounding area (San Juan County) is sparsely populated, with a density of less than 1.5 people per square mile (0.6 people per square kilometer). The area surrounding the Monument has never been settled by Anglos and has been used only for extensive livestock grazing and minor mining activities. The Monument is located in Utah's Third Congressional District.

Today, tourism is the most important economic component of southeastern Utah and the Four Corners area (where the states of Utah, Colorado, New Mexico, and Arizona meet). Farming, ranching and mineral extraction are also important economically, but these traditional sources of income are declining in importance. One reason for the rise in tourism in the region around the Monument is the density of other tourist attractions. Other major tourist focal points in the area are Lake Powell, Monument Valley, and the Canyonlands of Southeast Utah.

The Monument contains a total of 7,445.49 acres (3010 hectares) within its boundaries. An additional 191 acres (77 hectares) is included in the right-of-way for the entrance road. These acres

were withdrawn from further entry under the General Mining Laws to include the 1920 Mineral Leasing Act and the 1947 Acquired Mineral Leasing Act. This withdrawal was subject to valid existing rights.

The Monument contains two major canyons, White and Armstrong, which are deeply incised into the Cedar Mesa sandstone. The vegetation of the area is predominately pinyon-juniper woodland, a vegetation type common to most of southeast Utah at elevations of approximately 4,000 to 8,000 feet (1220-2440 meters). Riparian vegetation occupies the surface water drainages and small pockets of Douglas fir and associated mesic vegetation grow in sheltered areas along the canyon rims. The fauna of the Monument is typical of the Cedar Mesa area of southeastern Utah. Large mammals commonly seen are mule deer, coyote, and desert cottontail. Conspicuous birds are the common raven, turkey vulture, red-tailed hawk, and scrub jay. A variety of lizards can be seen during the warmer months, and the Monument is home to a large population of stunted prairie rattlesnakes. A complete description of the flora and fauna is detailed in the section describing Natural Resources.

The Monument was set aside in part for its spectacular ancestral Puebloan structural ruins. These ruins, as well as numerous smaller nonstructural sites left by peoples from the Archaic through the Protohistoric and Historic periods, comprise highly significant cultural resources. A detailed description of the archeological resources of the Monument is provided in sections that follow, along with management programs to preserve and protect these resources while allowing for increasing public visitation.

B. Administration and Management

Natural Bridges National Monument is administered as part of the Southeast Utah Group (SEUG) of the NPS along with Arches and Canyonlands National Parks. Economies of scale can sometimes be achieved in the SEUG by sharing human and material resources, most notably those concerned with some administrative, maintenance, and resource management functions.

A group superintendent (headquartered at Canyonlands National Park in Moab, Utah) provides overall direction for the SEUG. The superintendents of Arches National Park and Natural Bridges National Monument report to the SEUG superintendent.

At Natural Bridges, the chief ranger is responsible for the Resource Management Program, along with the Interpretation, Fee Collection, and Visitor Protection Programs. The chief receives support from the SEUG Resource Management Division, particularly from the field monitoring staff and the archeologist. Other than the chief ranger, there are no on-site staff dedicated to the resource management program.

C. Purpose of the Resource Management Plan

The purpose of this Resource Management Plan (RMP) is to describe the present status and condition of resources in the Monument, to describe cultural and natural resource management programs designed to preserve and protect the resources, to identify impacts to resources, and to identify specific management actions that are needed or are planned to preserve and protect the cultural and natural resources in compliance with NPS policies, standards, and other federal legislation and mandates. The contents of the RMP are specified by the Washington Office of the NPS, and by the Intermountain Field Area to ensure consistency across the NPS and the field area.

This RMP reflects joint cooperation between the NPS and affected private businesses and individuals, local, county, state, federal and tribal agencies for the coordinated management of the Monument's natural and cultural resources. The RMP is designed to be a working guide for the management of natural and cultural resources within the Monument. It will be used primarily by the chief ranger and superintendent of the Monument, the general superintendent of the SEUG, and by the Resource Management Division of the SEUG, although it is intended to be useful to other park staff as well.

The most important section of this RMP is comprised of the Project Statements. These statements, as well as the narrative that follows, describe actions that will be taken to fulfill the NPS's mandates to preserve and protect resources within the Monument. These statements serve as the basic funding requests for the Monument.

D. Management Objectives for Monument Resources

Resource management objectives for the Monument were stated by President John F. Kennedy's Proclamation No. 3486 as follows:

> "Protection and interpretation of the natural bridges, Indian ruins, and preservation of the natural setting are the mandates from which all management objectives for the Monument derive. These principals are fundamental in any decisions regarding management of the park's resources."

In addition to managing and protecting the natural and cultural resources of the Monument, the NPS is required to comply with federal laws and mandates such as the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA), the Archeological Resources Protection Act (ARPA), and various NPS policies.

1. Management Objectives for Natural Resources

Management objectives for the Monument are to protect and preserve the outstanding natural bridges, the desert plant and animal communities, air and water resources, natural quiet, and Quaternary and paleontological resources in such a way that human impacts on these resources are minimized and that management is consistent with legislative and executive requirements and NPS policies and guidelines.

Specific management objectives for the natural resource program are:

> Manage the developed areas for intensive visitor use while providing for the maximum protection of the natural environment.
>
> Provide for the public use and enjoyment of the backcountry areas while minimizing the environmental impacts of visitor use and by providing for the maintenance of the primitive character of the backcountry as well as affording protection of the natural resources and ecological processes.
>
> Provide for the protection and perpetuation of unique plant species and communities (including rare, threatened,

endangered and endemic species as well as pristine, disjunct and uncommon plant communities).

Provide for research efforts directed at understanding basic ecosystem processes at the Monument so human-induced impacts can be distinguished from natural processes, as well as to provide the interpretive staff with information concerning ecological processes occurring within the Monument.

Restore, wherever possible, the natural condition of Monument lands and plant communities altered by human activities.

Provide for mitigation of the impacts of exotic plants by feasible control methods wherever natural communities are threatened or where control methods are likely to be successful.

Provide for the protection of the Monument's resources by the provision of adequate fencing to control and prevent impacts due to trespass by livestock.

Provide for the maintenance of the quality of the air resources in the Monument such that the scenic quality of the viewshed is not hampered and deposition of particulate matter from combustion does not adversely impact Monument resources.

Provide for the protection of surface aquatic resources in the Monument such as streams, seeps, springs and potholes. Provide for the protection of the underground aquifer from pollution or drawdown so the natural surface waters are not altered.

Provide for the continued protection of the unique and high quality night sky and natural silence resources.

Provide for the protection of Monument lands and resources from outside threats due to land use and changes in ownership.

Provide for the collection and maintenance of information on the geologic and erosional features of the Monument thereby providing for documentation on the condition of those resources and natural changes that occur over time.

Provide for the continued inventory and monitoring of major

Monument resources (vegetation, wildlife, soils, clean air, clear vistas, natural quiet and clean water) to enhance the information database and to determine changes in critical resources such that management practices can be modified promptly to reverse and mitigate adverse impacts to those resources.

Identify quaternary and paleontological resources of the Monument. Particularly, research should be funded to locate, identify, analyze, and report on quaternary geomorphology (including paleosols), packrat middens, mollusks, pollen, tree-ring, and other records.

Educate the public and the staff about what has been and what can be learned from both Quaternary and paleontological resources of the Monument.

Teach the staff how to identify significant Quaternary and paleontological resources so that the resources can be reported, evaluated and monitored by scientists trained in Quaternary and paleontological research techniques.

2. Management Objectives for Cultural Resources

As with natural resource management, the objectives for the cultural resource management program are to preserve, conserve, and protect cultural resources of the Monument, while allowing the public to visit and enjoy their cultural heritage. Specific management objectives for the cultural program are listed below:

Continue to monitor and maintain at least 11 highly visited archeological sites in the Monument.

Expand the monitoring program to obtain more site-specific knowledge of the impacts visitors are having on the cultural resources of the Monument, and to devise management strategies to reduce visitor-related impacts to the sites.

Reduce looting and vandalism by increasing patrols by uniformed law enforcement officers.

Coordinate Archeological Resources Protection (ARPA) law enforcement activities with the BLM, San Juan Resource Area

and the USFS, Monticello Ranger District, the San Juan County sheriff, and other law enforcement agencies.

Perform an intensive archeological inventory of 100% of the Monument and document its cultural resources.

Nominate significant resources of the Monument to the National Register of Historic Places and otherwise provide legislative protection to the cultural resources of the Monument.

Provide direct physical protection for highly visited sites by all means available including: increasing the presence of uniformed, ARPA-trained rangers; reducing graffiti through the installation of signs and register boxes; redirecting the flow of foot traffic through and across sites through fencing; etc.

Coordinate management of cultural and natural resources within the Monument and with other federal, state, and tribal land managing agencies.

Ensure preservation of cultural resources through visitor education and through expansion and improvement of interpretation of cultural resources in the Monument.

Maintain an active program of Native American consultation and public involvement in the cultural resource management decisions of the Monument.

3. Management Objectives for Collections

Since museum collections from the Monument include both natural and cultural objects, collections management is an area that integrates both natural and cultural resources; however, collections management and curation have been assigned to the cultural resources management program and curatorial issues are described in the sections of this RMP relating to cultural resoruces.

The greatest need in collection management is to fund a professional curator to manage the collections to NPS and American Association of Museums standard. This need is listed below, along with some of the other important objectives in collections management.

Hire a base funded curator to manage collections and ensure accountability for NPS museum property.

Locate off-site collections and attempt to consolidate collections in one repository.

Perform special analyses of existing collections. Prehistoric ceramics need to be microscopically identified by someone trained in Southwest ceramic typology, lithics need to be properly typed as well. Natural history specimens such as snakes, birds, insects, plants, etc., need to be identified to the finest taxonomic level possible, preferably species or subspecies.

An historic photographic archive has been started, but additional work is necessary to locate additional important historic photographs, catalog them, and make them accessible to Monument staff, researchers and the public.

Obtain funding to process archival collections from the Resource Management division and other divisions besides Adminsitration.

Update and bring to standard existing accession and loan files or create these records were they do not exist.

Bring current natural history researchers' collections up to NPS museum standards.

II. PRESENT NATURAL RESOURCE STATUS: BASELINE INFORMATION

This section of the RMP summarizes the current status of baseline information for categories of natural resources within Natural Bridges National Monument. It identifies major resources, and assesses the completeness of baseline inventories. The categories of natural resources that are addressed are defined in NPS-75, the National Park Service Inventory and Monitoring Guideline. This document identifies the minimum baseline information needed for a viable RMP. This information is summarized in Table 1.

Table 1. Summary Table of Natural Resource Baseline Information.

Meets, does not meet, or exceeds the recommended minimal set of natural resource information in Appendix A of NPS-75.

INVENTORY COMPONENTS	DOES NOT MEET	MEETS	EXCEEDS
Historical Database	X		
Species Information			
Species List		X	
Biologic Surveys		X	
Species Distribution	X		
Digital Vegetation Maps		X	
Digital Cartographic Maps		X	
Digital Soil Maps		X	
Digital Geology Map	X		
Water Resource Inventory	X		
Water Quality Data		X	
Air Quality Stations		X (CANY)	
Air Quality Data		X (CANY)	
Precip./Meteorological Data		X	

Baseline resource information is essential in all these areas; first, to document these unique resources and assess their current status; second, to restore and maintain natural processes; and third, to prevent irreparable resource degradation through overuse. Three additional categories have been added due to their direct connection with resource management: Fire Management, Backcountry Management, and Paleontological/Quaternary Resources.

A. Historical Database of Natural Resources

Historical collections that contain natural resource information, including exploration records, Monument custodian journals, maps, photographs, and manuscripts, are currently scattered among the Monument's small library, the SEUG archives, and the SEUG Resource Management files. These collections need to be archived in a central repository and finding aids need to be prepared so the collections are easily retrievable, and thereby useful as resource management references.

Biological and geological specimens are maintained in the SEUG

museum storage facility at the headquarters of the SEUG in Moab, Utah. Many other natural resource specimens have been collected since the turn of the century, but these collections, if they still exist, are scattered in repositories across the United States. A thorough search for these off-site specimens is needed, and the specimens either need to be returned to the SEUG storage facility, or the loan records need to be updated and maintained so that both the specimens and the information about the specimens are useful.

B. Species Information

This section is broken into major natural resource groups. Some groups have been well-surveyed; others only marginally or not at all. The quantity and quality of information varies considerably. Available information on species within the Monument includes the following:

1. Vegetation Communities

Vegetation transects have been conducted annually since 1987 in White Canyon, in the pinyon/juniper community on the mesa top, and along the canyon rim. As of 1995, Natural Bridges' flora database contained 437 Taxa (species, subspecies, and varieties). Undoubtedly, this represents a provisional listing. Vegetation of the Monument is divided into five communities as described below.

a) Pinyon-Juniper Community
This community is the most extensive vegetation type, covering approximately 4,200 acres (1,700 hectares). The pinyon-juniper vegetation type is dominated by pinyon pine Pinus edulis and Utah juniper Juniperus osteosperma. Other major shrub components are broom snakeweed Gutierrezia sarothrae, roundleaf buffaloberry Shepherdia rotundifolia, big sagebrush Artemisia tridentata, and prickly pear cactus Opuntia sp.. Common forbs associated with this vegetation type are twinpod Physaria acutifolia, lobeleaf groundsel Senecio multilobatus, and Holboel rock cress Arabis holboellii.

b) Rimrock Community
Next in coverage, this community accounts for 2,700 acres (1,100 hectares). The rimrock community is a shrub-dominated type found on the canyon rims and is of varied composition. The primary components are pinyon P. edulis, Utah juniper J. osteosperma, manzanita A. patula, gambel oak Quercus gambelii, broom snakeweed

G. sarothrae, Utah serviceberry A. utahensis, longflower snowberry Symphoricarpos longifolius, and Haplopappos Haplopappos sp.

c) Riparian Community
Covers roughly 400 acres (160 hectares). The riparian vegetation communities are dominated by Fremont cottonwood Populus fremontii with the shrub understory being comprised of western sandbar willow Salix exigua, yellow willow S. lutea, and box elder Acer negundo. Of the many forbs and grasses that are incorporated in this vegetation community the principal species are phragmites Phragmites communis, horsetail Equisitum arvense and E. laevigatum, and hairy goldenaster Heterotheca villosa.

d) Douglas Fir Relict Community
Encompassing less than 400 acres (160 hectares), the Douglas fir community is a relict community (a holdover from a time when climatic conditions were more favorable; now these species exist within the Monument only in narrowly defined micro-environments). This community is characterized by Douglas fir Pseudotsuga menziesii, Utah serviceberry Amelanchier utahensis, mountain lover Pachystima myrsinites, dwarf mountain mahogany Cercocarpus intricatus and manzanita Arctostaphylos patula.

e) Hanging Garden Community
The smallest vegetal component covering less than 80 acres (30 hectares), the hanging garden vegetation type is characterized by moisture loving plants often not found elsewhere in the desert. These include plants such as the maidenhair fern Adiantum capillus-veneris, cliff-brake Pellaea sp., scarlet monkey flower Mimulus eastwoodiae death camus Zigadenus sp., columbine Aquilegia sp. and alcove bog-orchid Habenaria zothecina.

2. Vegetation Mapping

With the arrival of a GIS Specialist in 1994, a digitized vegetation map for the Monument was completed. Table 2 identifies vegetation types used on the map.

Table 2. Vegetation Classification Used for the GIS System, 1994.

Riparian
Grassland
Pinyon grassland
Douglas fir
Ponderosa pine
Pinyon juniper/sagebrush
Pinyon juniper/mixed shrub
Pinyon juniper/slickrock
Pinyon juniper/buffalo berry

3. Threatened and Endangered, Rare, and Endemic Plants

The rare Kachina daisy (Erigeron kachinensis) is found within the Monument. This species (candidate 2 federal status) was first described from Natural Bridges and is uncommon throughout its range. The Kachina daisy exists in the Monument in several moist alcoves associated with hanging garden communities and has been the subject of extensive research by Allphin and Harper (1994). It is endemic to San Juan County, Utah and Montrose County, Colorado and has previously been recommended for high priority species-level management (Heil et al. 1993).

4. Wildlife

Table 3 lists the number of species presently known for the Monument. Information is lacking on invertebrates. Information on these species follows.

Table 3. Number of Species in the Monument.

127 species of birds
68 species of mammals
17 species of reptiles
7 species of amphibians
0 species of fish

a) Birds

Common bird species likely to be found in the Monument are the Turkey Vulture Cathartes aura, Northern Harrier Circus cyaneus, Red-tailed Hawk Buteo jamaicensis, American Kestrel Falco sparverius, Mourning Dove Zenaidura macroura, Great Horned Owl Bubo

virginianus, Common Nighthawk Chordeiles minor, White-throated Swift Aeronautes saxatalis, Northern Flicker Colaptes auratus, Hairy Woodpecker Picoides villosus, Ash-throated Flycatcher Myiarchus cinerascens, Horned Lark Eremophila alpestris, Violet-green Swallow Tachycineta thalassina, Cliff Swallow Hirunda pyrrhonta, Scrub Jay Aphelocoma coerulescens, Pinyon Jay Gymnorhinus cyanocephalos, Common Raven Corvus corax, Plain Titmouse Parus inornatus, Canyon Wren Catherpes mexicanus, Western Bluebird Sialia mexicana, American Robin Turdus migratorius, Loggerhead Shrike Lanius ludovicianus, Bell's Vireo Vireo bellii, Solitary Vireo V. solitarius, Gray Vireo V. vicinior, Black-throated Gray Warbler Dendroica nigrescens, Green-tailed Towhee Pipilo chlorurus, Rufous-sided Towhee P. erythrophthalmus, Black-throated Sparrow Amphispiza bilineata, Dark-eyed Junco Junco oreganus, White-crowned Sparrow Zonotrichia leucophrys, and Brewer's Blackbird Euphagus cyanocephalis.

Annual bird surveys have been conducted since 1986. Two transects are monitored three times over a one month period. Among species of concern are the peregrine falcon (one breeding pair has been successfully nesting within the Monument since the 1993 breeding season), the bald eagle (occasionally seen, but not a resident), and the Mexican spotted owl (found in remote canyons nearby, but not within the Monument).

b) Mammals

Mammals have been systematically surveyed within the Monument from 1987-1994. The most common mammals inhabiting the Monument are the Western Pipistrel Bat Pipistrellus hesperus, Coyote Canus latrans, Gray Fox Urocyon cinereoargenteus, Whitetailed Antelope Squirrel Ammonospermophilus leucurus, Colorado Chipmunk Eutamias quadrivittatus, Canyon Mouse Peromyscus crinitus, Deer Mouse P. maniculatus, Pinyon Mouse P. truei, Desert Woodrat Neotoma lepida, Porcupine Erethizon dorsatum, Blacktailed Jackrabbit Lepus californicus, Desert Cottontail Sylvilagus auduboni, and Mule Deer Odocoilus hemionus.

c) Amphibians and Reptiles

Common herptofauna of the Monument are the Red Spotted Toad Bufo punctatus, Woodhouse Toad B. woodhousei, Great Basin Spadefoot Toad Scaphiopus intermontanus, Tiger Salamander Ambystoma tigrinum, Plateau Striped Whiptail Cnemidophoras velox, Collared Lizard Crotaphytus collaris, Short-horned Lizard Phrynosoma douglassi,

Sagebrush Lizard Sceloporus graciousus, Eastern Fence Lizard S. undulatus, Tree Lizard Urosaurus ornatus, Desert Night Lizard Xantusia vigilis, Side-blotched Lizard Uta stansburiana, Western Whiptail Cnemidophorus tigris, Gopher Snake Pituophis melanoleucus deserticola, Western Terrestrial Garter Snake Thamnophis elegans vagrans, and the Stunted Prairie Rattlesnake Crotalus viridis viridis.

C. GIS STATUS

1. Digital Cartographic Data

Table 4 lists the data that have been digitized as of 1996 while Table 5 lists GIS natural resource data that need to be digitized. Additional information on these needed data is provided below.

Table 4. GIS Data.

Elevations
Monument transportation system (roads and trails)
Boundary
Contour data
Building locations/infrastructure
Vegetation

Table 5. GIS Data Needed.

Soils
Geology
Hydrology

a) Digital Soils Map

Soils at the Monument are poorly developed and are derived from residuum of the Moenkopi formation, a sandstone, mudstone, and siltstone deposit of the Triassic Era. A soil survey has been completed and will soon be digitized.

b) Digital Geologic Map

A digital geologic map has not yet been prepared for the Monument. Monument elevations range between 6,000 feet (1,830 meters) to 6,600 feet (2,010 meters). The land surface of the Monument is a deeply incised plateau with two major canyons, White and Armstrong, which intersect in the western part of the Monument and contain an

intermittent stream flow. White Canyon is a major topographic feature of western San Juan County.

The geologic features of the Monument are the result of stream erosion of the massive Cedar Mesa Sandstone, a member of the Cutler formation which dates to the Permian Era. The formation is estimated to be 280 million years old. The canyons of the Monument are similar to the canyons of the surrounding area in that they are deeply incised into a relatively flat plateau. This is the result of uplifting of the area by the Monument Upwarp and the subsequent rapid downcutting that resulted.

The bridges were formed primarily by streambed erosion (running water) and are geologically distinct from arches, which are formed by the action of seeping moisture, frost, and chemical weathering. The Cedar Mesa sandstone is between 500-1,000 feet (150-300 meters) thick and considered to be the lithified remains of a coastal barrier island system.

c) Hydrology

While USGS hydrographic data on the Monument exists, it has not been digitized. Water resources are the key constituents influencing all natural systems, especially in the desert environment. The watershed of Natural Bridges consists of several well developed canyons and their tributaries, all of the Cedar Mesa Sandstone formation at depths up to 600 feet. These canyons contain intermittent streams; none of the headwaters are within the Monument, so activities on adjacent lands pose potential risks to water resources at the Monument.

Grazing is the major land use adjacent to the Monument, past mining activity occurred within several miles of the boundary, and some oil and gas exploration has occurred in the recent past. One well, within one mile of the Monument, was improperly capped, allowing brine seepage to the surface resulting in localized vegetation destruction (it has since been properly capped).

Springs, seeps, and hanging garden plant communities are subject to adverse affects due to potential drawdown of the aquifer to support groundwater wells for human and livestock use. Riparian and hanging gardens are considered to be wetlands and are subject to Federal wetland protection guidelines.

The Resource Management Division of the SEUG has been monitoring since 1983 the chemical and physical parameters twice a year of the following five springs and seeps within the Monument:

Table 6. Water Monitoring Sites.

Horsecollar Seep
Kachina Bridge seep
Owachomo Bridge Seep
Sipapu Bridge Seep
To-Ko-Chi Canyon Spring

Table 7 lists the physical and chemical parameters are monitored.

Table 7. Water Monitoring Data.

water temperature
water flow
pH
dissolved oxygen
specific conductance
copper
nitrate
sulfate
manganese
iron
phosphate
alkalinity
hardness
chloride

D. Air Quality

Air quality is not currently monitored at the Monument, but is nearby at Canyonlands. Data was recorded at Natural Bridges throughout the 1980's, but was judged too subjective to be of more than anecdotal value. It is worth mentioning, however, that declines in observed range of visibility coincided with the establishment of both the Navajo Generating Station near Page, Arizona and the Four Corners Power Station (both coal-burning power plants) to the south.

Nevertheless, southeast Utah is noted for its relatively clean air.

That, coupled with Natural Bridges' isolation and the relative absence of artificial light, ensures an outstanding night sky resource above the Monument. Being located atop a plateau, one has a nearly 360 degree view of the stars. This experience intensifies the perception that this place is indeed special and worth preserving.

E. Sound

A sound monitoring station was set up in the fall of 1994 and ran a year before being moved elsewhere in the SEUG. Ambient noise levels in the Monument are low. The degree of silence one encounters in most areas of the Monument is one of it's greatest resources. Most noise detected at the monitoring site was the result of aircraft overflights and automobiles. Other sound was associated with the effects of weather, wildlife activity, and backcountry hikers.

Within the developed area, most noise can be attributed to the diesel powered generator (although the Monument is solar-powered, the backup generator runs between 5-10% of the time). Other noise is associated with visitor activity.

F. Precipitation and Meteorological Data

The climate of the Monument is arid and is characterized by hot, dry summers and cold winters. The average annual total precipitation is 13.15 inches (33.4 centimeters). The majority of the precipitation falls between the months of July and December, mostly as summer thunderstorms. Snow falls between October and May with an average annual total snowfall of 51 inches (129.5 centimeters). Major snowfall occurs in the months of November through March. The mean annual temperature is 56° Fahrenheit (13° centigrade) and the extremes range from -16° Fahrenheit (-26.7° centigrade) to 105° Fahrenheit (40.6° centigrade). Potential evapotranspiration exceeds precipitation, making soil moisture a crucial environmental factor.

G. Fire Management

Some fire history information is available from 1923 onward, but it is sketchy. In part this is due to the nature, type, and spacing of vegetation and the topography. Fire has not been a significant

influence within the Monument in historic times. When fires have occurred, typically they have been the result of lightning strikes and involve single trees. Previous fire records indicate no single occurrence involving more than half an acre.

H. Backcounty Management

Ninety percent of the Monument's area is designated as backcountry, but because of the Monument's small size and its wealth of cultural and other nonrenewable resources, overnight camping, rock climbing, mountain biking, and other activities associated with backcountry use are not permitted within the backcountry. Pets are not allowed in the backcountry. For the most part, visitor use is confined to the roads, designated trails, and the canyons within the Monument.

Natural Bridges is managed as one unit within the Southeast Utah Group (SEUG) of the National Park Service. As use of the entire group's backcountry increases or otherwise changes, modifications may have to be made in Natural Bridges' backcountry management.

I. Paleontological Resources

Stratigraphic features of the Monument date to the Permian and Triassic. The only exposed formations are the Cedar Mesa and the Moenkopi. While paleontological resources are known from these formations, little is known of the paleontological resources within the Monument.

J. Quaternary Resources

Knowledge of Quaternary resources (those resources of the Pleistocene and Holocene epochs) was recently improved through a regional contract with Northern Arizona University which defined the potential Quaternary resources of the Monument. The most significant Quaternary resource is the presence of <u>Oreamnos harringtoni.</u> Bones of this extinct species were dated to 39,800 years B.P. and were discovered in the Monument in a dry alcove. This is the oldest known find of this species and the only location of this animal outside of the Grand Canyon. Packrat middens dating to the same period have been found at the same alcove site and pollen from the middens provides information on regional flora at that time.

III. CONDITION OF NATURAL RESOURCES

This section of the RMP gives an overview of the current condition of the natural resources within Natural Bridges National Monument. For many of the resources only marginal baseline information exists; for some none at all. Similarly, monitoring activities vary considerably.

A. Water Resources

As previously stated, five seeps within the Monument have been monitored since 1983. An extensive analysis of the data collected is currently underway. It is believed that the water quality, as measured by the parameters used, has not declined during that period. Monument staff and visitors alike continue to exercise water conservation measures so as to prevent aquifer drawdown. The Monument's wells continue to provide an adequate potable water source with sufficient recharge. Drinking water is tested according to State standards.

Sensitive areas (such as alcove seeps containing hanging garden communities) have been identified and mapped. It appears that the patterns, timing, and quantity of precipitation affect these resources most. A delay in drought indicators of up to two years can be seen with some species.

Effective fencing has excluded trespass cattle and the associated effects on water quality, and a tamarisk eradication program has kept this invader of riparian areas in check.

B. Wildlife

There is only one animal on the federal threatened and endangered list that is found within the Monument, the peregrine falcon. A breeding pair have successfully nested in 1993, 1994, and 1995 with a total of five young fledged. Nesting sites have been in a remote area in upper White Canyon that experiences little human disturbance. The Mexican spotted owl has also been located in the area, but surveys have failed to indicate its presence within the Monument.

Mammals have been surveyed annually from 1987-1994. Aside from the

species previously listed, the Monument is known to provide habitat to a large diversity of bats. According to Mike Bogan of the USFWS, Natural Bridges is a "hot spot" for bats on the Colorado Plateau. Of the 19 species thought to live in Utah, 15 have been captured in the Monument (including the spotted bat, a candidate species for federal listing). Mountain lion tracks are commonly seen within the Monument; actual sightings are rare. Black bear occasion the canyons and rim, but they, too, are rarely seen. Desert bighorn sheep were observed within the Monument prior to 1966 when the loop road was constructed. They probable still roam sections of lower White Canyon and surrounding environs.

Among the Monument's reptile and amphibian species is a rare stunted form of the prairie rattlesnake. Past reports have incorrectly referred to this species as the midget faded rattlesnake, however, based on the work of James L. Glenn of the Venom Research Lab, VAMC, Salt Lake City, its venom composition and morphology indicate the population should presently be referred to as (a stunted form of) Crotalus viridus viridus and not Crotalus viridus concolor. Past research by Tim Graham indicated fairly high numbers of individuals passing through the developed area of the Monument. While this was not necessarily a concern for humans (the species is quite docile) there was a concern that moving the snakes beyond the immediate area posed threats to their survival. As a result, a standard operating procedure was developed that guides the removal of snakes from areas where they are likely to encounter humans. Movement beyond 100 meters is rarely necessary.

There are no fish species within the Monument and little is known of the Monument's invertebrates.

C. Vegetation

Monitoring of the Monument's vegetation has occurred annually since 1987. The most apparent forces affecting the condition of vegetation are the invasion of exotics and ground disturbances in the developed areas that allow some aggressive species to proliferate.

The exotic plant species of most concern are tamarisk, horehound mint, and musk thistle. Many other exotics are present, but pose little threat to native species. The eradication of tamarisk is of primary concern because of its ability to quickly invade and crowd

out other species along riparian corridors. At present, mechanical/chemical means are being used to keep the exotics of concern in check. The program has been successful thus far; tamarisk is found in small numbers, infrequently, and usually quite young when discovered.

A major Federal Lands Highways Project (FLHP) completed in 1995 involved major changes along Bridge View Drive (a scenic 9-mile loop) and impacted vegetation considerably. Revegetation efforts are on-going in an attempt to promote rapid recovery of native ground cover.

D. Soils

As previously stated, a soil survey has recently been done for the Monument. Like much of the Colorado Plateau, erosional activity predominates over sedimentary deposition, accumulation, and other processes necessary for the development and maturation of thick soils. Relatively low primary production and low biomass per unit characterize the soils of the Monument due to aridity and relatively low levels of organic materials. The soils of the Monument are a fragile resource upon which all of the vegetation and wildlife ultimately depend.

Integral to the protection of soils is the ground cover consisting of both vascular plants and cryptobiotic amalgams. Areas of high visitor use such as trails, overlooks, and the campground show evidence of significant disturbance of ground cover leading to denuded, compacted soils and erosion. Switchback cutting and trail braiding are occurring on trails leading down to the bridges as well as trails that follow the canyon bottoms. Soil damage in developed areas has been mitigated somewhat by the installation of barriers and signing. Revegetation efforts to date have met with moderate to low success.

E. Air Quality and Sound

Air quality monitoring was discontinued at the Monument in the late 1980's, but continues nearby at Canyonlands. Data, thusfar, do do not indicate a significant change in air quality, however, it is worth mentioning that declines in observed range of visibility coincided with the establishment of both the Navajo Generating Station near Page, Arizona and the Four Corners Power Station (both

coal-burning power plants) to the south.

Nevertheless, southeast Utah is noted for its clean air. That, coupled with Natural Bridges' isolation and the relative absence of artificial light, ensures an outstanding night sky resource above the Monument. Being located atop a plateau, one has a nearly 360 degree view of the stars. These attributes greatly contribute to the visitors' experience at the Monument.

Ambient noise levels in the Monument are low. The degree of silence one encounters in most areas of the Monument is one of it's great resources. Most noise detected at the monitoring site was the result of aircraft overflights and automobiles either within the Monument or passing nearby on highway 95.

Pristine air quality ensures extensive vistas and combined with the absence of artificial light provides outstanding opportunities to view night skies. The absence of human-generated sound leaves the visitor to confront the natural silence that is the hallmark of canyon country.

IV. PRESENT STATUS OF CULTURAL RESOURCES: BASELINE INFORMATION

A. Culture History

Culture history of the Monument is divided into the standard temporal periods for Southwestern archeology, namely Archaic, Late Prehistoric, Protohistoric, and Historic periods. The Monument, like most of the Southwest, was repeatedly occupied and abandoned during these periods (cf. Berry 1982). Evidence for each of these temporal periods and occupations is briefly summarized below. However, before turning to this summary, it should be noted that very little of the Monument has been systematically and intensively inventoried for cultural resources, therefore much of the culture history of the Monument is derived from data from inventories conducted on adjacent lands managed by the BLM.

1. Archaic and Basketmaker II Periods

The Grand Gulch Plateau and Natural Bridges National Monument were first inhabited during the Archaic period, dating as early as 7000

B.P. Archaic people hunted game and gathered wild plant resources within the Monument and across Cedar Mesa and the Grand Gulch Plateau. Since the biotic resources used by Archaic hunter-gatherers were scattered in low densities and were only seasonally available, Archaic archeological sites are characteristically small, low density scatters of stone tools and debris left from the harvesting, preparation, and consumption of wild plants and animals.

While most of the culturally diagnostic materials of Basketmaker II were defined by poorly-controlled turn-of-the-century excavations in dry cave sites from nearby Grand Gulch, well-controlled excavations and inventory by the Cedar Mesa Project (Lipe and Matson, various) described the typical Basketmaker II site as a surface lithic scatter (debris left over from making stone tools) in the uplands or mesa tops.

Like Archaic lithics, Basketmaker II lithic technology was predominately a biface production technology. Since most of the Archaic and Basketmaker II sites on Cedar Mesa and within Bridges are open, surface lithic scatters, finding ways to carefully and scientifically distinguish between Archaic and Basketmaker II occupations is a major research question for the Monument.

2. Late Prehistoric Period

During the Late Prehistoric period, Natural Bridges and the Grand Gulch Plateau appear to have been occupied and abandoned at least three times in response to climatic fluctuations, fluctuations in population pressure from adjacent areas, or resource depletion associated with slash-and-burn farming (Matson, Lipe and Haase 1988; Matson and Lipe 1975, 1978). Sorting out the relationship between Late Prehistoric period Mesa Verde and Kayenta occupations, and between local ceramic production and importation are important issues in Bridges archeology.

The earliest Late Prehistoric occupation of Bridges falls within the Basketmaker III period from about A.D. 650-750. This occupation is marked by at least one BMIII slab-lined pithouse village. Based on results of the Cedar Mesa Project (Matson and Lipe 1975, 1978; Matson, Lipe and Haase 1988), there is probably a significant concentration of BMIII limited activity sites resulting from dry-farming the mesas within the Monument.

Based on analysis of extant collections of Bridges' ceramics, the BMIII occupation is represented by Chapin Black-on-white ceramics which were probably manufactured by Mesa Verde Anasazi living east of Comb Ridge and imported onto Cedar Mesa and into the Monument. Sand tempered Lino grey style ceramics are also present, either indicating a Kayenta affiliation or local production of sand-tempered culinary pottery. While a few dendrochronological samples have outside rings dating to the BMIII period, there are no cutting dates from Natural Bridges from this period so far.

Natural Bridges, like Cedar Mesa, appears to have been largely abandoned during the Pueblo I period. Only an ephemeral occupation from Pueblo I to early Pueblo II (A.D. 750-1000) is evident.

The dominant occupation of Bridges appears to have been a typical Kayenta Anasazi occupation resulting from migration into the area beginning about A.D. 1060, or during the Late Pueblo II to early Pueblo III period. In Bridges, this occupation is documented by a number of sites with typical Kayenta jacal architecture and with imported Kayenta ceramics. Ceramic assemblages are dominated by sand-tempered, corrugated gray ware, and classic Black Mesa, Sosi and Dogoszhi Black-on-white, and Tusayan Black-on-red, Citadel, Cameron, and Tusayan polychromes. Classic Mesa Verde ceramics (Mancos Black-on-white, Dolores Corrugated) are also present, but in lower frequencies than Kayenta wares. A few tree-ring dates from sites in Bridges are available from this period, but almost none of the dates are cutting dates, so probably older wood was used in construction of these structures.

Based on ceramic assemblages from Bridges, on tree-ring studies from Cedar Mesa (Ahlstrom 1994), and other results of the Cedar Mesa Project (Lipe, Matson, various), there is probably a relatively low number of sites within the Monument dating from the period A.D. 1060-1109. There should be a slight increase in the number of sites dating to the period from A.D. 1110-1139 and from A.D. 1140 to at least A.D. 1165, and possibly until A.D. 1209, Bridges, like the rest of Cedar Mesa, was virtually abandoned.

After this period of abandonment, there appears to have been a migration of Mesa Verde Anasazi into the area beginning at A.D. 1210, with a peak in construction and occupation between A.D. 1240-1269 (Ahlstrom 1994). Ceramically, this occupation is documented by the presence of Mancos, McElmo and Mesa Verde Black-on-white

ceramics. Many of these ceramics have a distinctive dark gray, vitrified, sherd-tempered paste that may indicate local production, rather than manufacture or importation of these ceramics from the east (Kramer, Osborn, and Hurst 1991; Bond 1993).

3. Protohistoric and Ethnohistoric Period

Considerable work is necessary before the Protohistoric occupation of the Monument can be defined with precision. According to Julian Steward (1938), the triangle formed by the Dolores River on the north, the Colorado River on the west and the San Juan River on the south was occupied by both Utes and Paiutes; however, Steward's own testimony in the U.S. land claim commission hearings indicate the Bridges area was occupied only by the Ute.

Archeological evidence indicates a Numic occupation from about A.D. 1400 to historic times, but of course, Ute and Paiute cannot be separated archeologically. The Navajo appear to have been in the general area from about A.D. 1500 onwards (Tipps 1988). It is likely that the Monument contains Navajo sites dating to the 1800s since Kigalia and his band were living on nearby Elk Ridge at this time.

These Protohistoric peoples moved about the Colorado Plateau to obtain scattered and seasonally available natural resources. Given their subsistence pattern, Protohistoric sites are usually small, ephemeral surface scatters of stone tools and flaking debris. Protohistoric sites are distinguished from Archaic sites by technological differences: Protohistoric peoples used the bow and arrow with small arrow points, as opposed to the large dart points used for the atlatls or spear throwers of the prehistoric Archaic people. Protohistoric sites can also be distinguished from Archaic sites by the presence of brownware pottery, and in some cases, by the presence of Hopi yellow wares. The presence of Hopi yellow wares does not necessarily indicate occupation by the Hopi, rather, it points to the extensive trade networks operating throughout the Colorado Plateau during the Protohistoric period.

Evidence of such Protohistoric and ethnohistoric use of Natural Bridges is presently limited, although an intensive cultural resources inventory of the Monument may well reveal more information about Protohistoric and Historic period Native American use of the Monument.

4. Historic Period

Hobler and Hobler (1978) and the Mehls (1986) have documented the historic period for the Monument and the following summary of early Monument history is based on their reports.

While Native Americans had been in the area for thousands of years, and while Euro-American ranchers grazed their cattle in Tuwa Canyon as early as 1878, the first documented visit to Natural Bridges was by four mineral prospectors: Cass Hite, Indian Joe, Edward Randolph, and Scotty Ross in September of 1883. From 1892 to 1893 W.C. McLoyd and C.C. Howard Graham collected prehistoric artifacts from Bare Ladder ruin and other archeological sites within upper White Canyon.

The next documented visits to the bridges were in 1895 by Emery Knowles and by Bluff cattlemen James Scorup, Tom Hall and Jim Jones. Then in March of 1903 Scorup led mining engineer Horace Long to the bridges. In 1904 Dyar published an article on the bridges in both National Geographic and The Century Magazine. These articles stimulated public interest in the bridges and prehistoric ruins and lead to two exploring expeditions. The first expedition was in 1905 by the Commercial Club of Salt Lake City, Utah. This expedition mapped and photographed the bridges and some of the prehistoric ruins. The expedition also left an inscription on Sipapu Bridge. In 1907 Byron Cummings, then of the University of Utah, explored the central portion of upper White Canyon, mapping the bridges and describing some of the more spectacular and accessible prehistoric ruins. Also in 1907 National Geographic published an article by Holmes which advocated the formation of a national park to encompass the bridges. This suggestion was followed by President Theodore Roosevelt's proclamation of the area as Natural Bridges National Monument on April 16, 1908. Following the proclamation, the General Land Office sent W.B. Douglass to survey and map the area in September of 1908. In September 25, 1909 the Monument boundaries were enlarged to include additional archeological sites described by Douglass. It was at this time that the bridges were given their present names: Sipapu, Kachina, and Owachomo.

From 1910 to 1940 the Monument was visited by an increasing number of scientists or exploring parties including Herbert Gregory, Byron Cummings, Alfred Kidder, and the Bernheimer Expedition. The

Monument also began to be visited by the public. Visitation was encouraged by Zeke Johnson, the first custodian of the Monument (1923-1941). Johnson was instrumental in exploring the Monument and in bringing knowledge of the resources of the Monument to the public's attention. In recognition of his importance, as well as the rise of the environmental and conservation movement in the United States, a trail developed by Zeke Johnson, the Owachomo Bridge Trail, has been listed on the National Register of Historic Places. In response to promotion of the Monument by Johnson, as well as to growing knowledge of the Colorado Plateau as a whole, both popular and scientific visits to the Monument have increased until in 1995 nearly 150,000 people visited the Monument.

B. Servicewide Inventories of Cultural Resources

1. Cultural Sites Inventory Base Maps (CSI)

Based on a variety of laws and policies, including the Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, Executive Order 11593, and the Archeological and Historic Preservation Act of 1974, the NPS is required to inventory lands it manages for cultural resources and to assess the significance of the resources. But while intensive inventory and assessment of cultural resources is mandated by law and NPS policy, as noted by Hobler and Hobler (1976), most of the inventories completed in Natural Bridges have been unsystematic, reconnaissance surveys biased towards the location and documentation of large, accessible ancestral Puebloan masonry structures.

So far, intensive archeological inventories have covered only 835 acres out of the total of 7636.49 acres in the monument. Based on data from Cedar Mesa and from intensive inventories recently completed in nearby Canyonlands National Park and Glen Canyon National Recreation Area, intensive inventory of the Monument would probably double the number of documented cultural resources and would dramatically increase the number of Archaic and Protohistoric sites, since these sites tend to be underrepesented in biased reconnaissance inventories. The high densities, varieties, and significance of cultural resources expected as a result of an intensive inventory would probably enable the entire Monument to be listed on the National Register of Historic Places as either an archeological district or a multiple property nomination could be

prepared. Placing the sites of Natural Bridges on the National Register of Historic Places would probably facilitate greater protection and preservation.

Data about the level and intensity of cultural resources inventory efforts are maintained by the NPS as the Cultural Sites Inventory or CSI. The CSI describes and documents the location of, significance of, threats to, and management requirements for the known cultural resources in the Monument. It includes maps showing the areas inventoried and the intensity of the inventory effort. The official CSI for the Monument is currently maintained by the Midwest Archeological Center. Copies of the inventory maps on USGS 7.5' topographical maps are maintained in the headquarters of the Southeast Utah Group and at the Monument visitor center and these records are updated as new sites are recorded.

2. CSI Site Records

There are 214 archeological site records from the Monument presently in the files of the headquarters of the Southeast Utah Group and the visitor center files at the Monument. Of these documented sites that are on file, 29 are considered eligible for listing on the National Register of Historic Places, 141 have not been evaluated for National Register significance, and 44 are considered not significant or ineligible for the National Register.

Clearly, there is an immediate need to revisit the 141 unevaluated sites and bring documentation and evaluation of these sites up to current standards. Only 73 of these site records are considered adequately recorded on current Intermountain Antiquities Section Site (IMACS) forms. Therefore, a critical cultural resource management priority is to improve documentation of known sites and to assess the significance and eligibility of the known sites (historic and prehistoric) within the Monument. This updated site information should be collected as part of an intensive, systematic cultural resource inventory of the unsurveyed portions of the Monument.

Of the documented sites within the Monument, 123 are above ground, prehistoric structural sites. Of the known structural sites, 12 are considered eligible for inclusion on the National Register of Historic Places, 88 have not been evaluated for the National Register, and 23 are considered ineligible for the Register. These

data are provided in the summary tables for sites (Table 8) and structures (Table 9).

Table 8. Summary Chart for Archeological Sites.

Eligible Sites	Eligible	Condition Good, Impact	Condition Fair, Impact Moderate	Condition Poor, Impact Low Severe	Condition Destroyed	Condition or Impact Unknown
Yes	29	13	11	0	0	5
No	44	0	1	40	2	1
Unknown	141	6	7	0	0	128
Tot.	214	19	19	40	2	134

Table 9. Summary Chart for Archeological Structures.

Eligible	Eligible	Condition Good, Impact	Condition Fair, Impact Moderate	Condition Poor, Impact Low Severe	Condition Destroyed	Condition or Impact Unknown
Yes	12	7	3	0	0	2
No	23	0	0	22	0	1
Unknown	88	5	5	0	0	78
Tot.	123	12	8	22	0	81

3. List of Classified Structures

The NPS defines the List of Classified Structures as an official inventory listing of structures that have historical, architectural, or engineering significance in which the NPS has or plans to acquire any legal interest. The LCS should include structures that meet the criteria of eligibility for the National Register of Historic Places, or are contributing elements of sites and districts that meet the National Register criteria. Also included are structures managed as cultural resources through NPS planning processes.

Within the Monument, the LCS is current for historic sites, and there is no need to update this particular document. The LCS includes a total of 27 historic sites. Only one of the LCS sites is eligible to the National Register and it is a listed property, as discussed below. The LCS documents lack scale plan maps, and in general are not as well documented as standard historic or archeological site records within the IMACs system. Therefore a management goal is to re-record the LCS sites on standardized IMACS site forms and improve the level and quality of documentation of the historic resources of the Monument, even though these resources have been determined ineligible to the Register by historians meeting the Secretary of the Interior standards.

4. National Register of Historic Places

Authorized by the National Historic Preservation Act of 1966 and administered by the NPS in WASO, the National Register of Historic Places is the official list of historic properties recognized by the Federal Government as especially worthy of preservation for national, state, or local significance. The NPS is required by law to inventory, assess, and nominate to the National Register properties of national, state, and local significance. Many of the sites within Natural Bridges should be listed on the National Register of Historic Places for their ability to yield important information about the past (Criterion D). With improved intensive level inventory data, a multiple resource nomination or a National Register District will probably be prepared for all prehistoric sites within the Monument boundaries.

At present, the only cultural resource within the Monument that is actually listed on the National Register of Historic Places is the

historic Owachomo Bridge Trail or Zekes Trail (LCS#-NABR-3). The Owachomo Bridge Trail is listed on the National Register for its significance in American history. It documents the rise of the conservation movement and the role of the NPS and Federal Government in promoting the growth of tourism in the Southwest and throughout the United States.

As stated in the National Register nomination, Zeke Johnson, custodian of the Monument, began construction of the trail about 1925 and work continued on the trail until 1935. The period of historic significance for the trail is 1925-1935, the period of construction and early use, although the trail was in use through 1965 as an access to Owachomo Bridge. The trail is 3-6 feet wide and approximately 0.25 miles long as it follows the natural contours of the sandstone from the rim to the bottom of Armstrong Canyon. It includes segments of rough-hewn log steps staked in place and filled with stones and earth, random and coursed fieldstone steps, and steps carved into the natural sandstone. Except for some erosion of the fill behind the wooden steps, the Trail retains a high degree of physical integrity.

In addition to this listed property, 29 of the documented sites are considered eligible to the register, 141 have not been evaluated, and 44 are considered ineligible, mostly due to poor preservation and lack of integrity.

5) National Register Cultural Context/Themes

The NPS defines cultural contexts as the framework within which the significance of a resource can be evaluated as it relates to an ethnographic, historic, or prehistoric theme, a particular geographic area, or a specific time period. Thematic frameworks are usually used when evaluating the National Register Criteria for Evaluation A, which is defined as properties that are associated with events that have made a significant contribution to history, or D, for properties that are capable of yielding information important in history or prehistory.

When the historic resource study for the Monument was prepared, Mehls and Mehls (1986) listed 10 historic resource themes for the Monument (Mehls and Mehls 1986). Based on these themes, Zeke's Trail was considered eligible to the Register since it was representative of the rise of the conservation movement in American history and because it retained integrity. Despite a recent update

in the thematic frameworks for the NPS (1994), the other historic resources in the Monument are still considered ineligible to the Register. These resources were determined ineligible using the other National Register criteria, namely, they were not particularly associated with events that made a significant contribution to the broad patterns of history; they were not associated with the lives of persons significant in our past; they did not embody the distinctive characteristics of a type, period, or method or construction, or represent the work of a master, and they were not capable of yielding important information about history based on current research designs. In addition, they were judged ineligible due to lack of integrity.

As for prehistoric properties, while the new thematic framework (1994) is designed to provide thematic significance for prehistoric resources, with the wealth of knowledge of the prehistory of the Monument, prehistoric and protohistoric sites, districts and multiple properties will be evaluated under Criterion D, not the thematic framework approach. Rather, archeological and ethnohistoric sites, districts and properties will be considered eligible for the Register if they have the capability of yielding important information about the past based on current and on-going research issues. Thus these sites will be evaluated under National Register Criterion D. Under this criterion it is likely that most sites within the Monument which retain integrity and which can be affiliated with a particular time period or cultural phase or occupation will be considered eligible to the Register.

C. Servicewide Baseline Databases and Reports of Cultural Resources

Servicewide baseline research reports and databases provide information that serve purposes from planning to interpretation. These reports are supposed to be completed before more specialized studies are undertaken. The status of each of the standard reports is listed below.

1. Archeological Overview and Assessment

An archeological overview and assessment has not been prepared for the Monument; however, formalized plans are in place from the Rocky Mountain Region (now Intermountain Field Area) for archeological overview priorities. It is supposed to describe and assess known

and potential archeological resources in the Monument. The overview should review, summarize, and evaluate all existing archeological data.

2. Archeological Identification/Evaluation Studies

These are studies that identify locations and characteristics of all or a sample of archeological resources in a particular area. Data on these resources are to be added to the CSI. In the Monument, a variety of small intensive inventories have been completed, as discussed in the section on inventories. Files and maps on these inventories are maintained in the Monument visitor center, the headquarters of the Southeast Utah Group, at the Midwest Archeological Center, and the Utah State Historic Preservation Office.

One of the most critical needs in managing the cultural resources of the Monument is for a complete, intensive archeological inventory and a synthetic report on the results of this inventory. This report would then provide the basis for a better interpretive program about the cultural resources of the Monument. An intensive inventory would also enable NPS to fulfill its legal mandates to evaluate cultural resources for the National Register of Historic Places. Without additional inventory and improved documentation of sites, the eligibility of sites to the register cannot be determined.

3. Ethnographic Overview and Assessment

An ethnographic overview and assessment has not been performed for the Monument. However, this is a basic report emphasizing the review and analysis of archival and documentary data on ethnographic resources and the groups who traditionally define such cultural and natural features as significant to their ethnic heritage and cultural viability. As discussed in the section on culture history and the Protohistoric period, this work is needed for the Monument since there are conflicting reports in the literature and the land claims commission reports on which groups were traditionally associated with the Monument. A completed ethnographic overview and a cultural affiliation study would serve as a scientific basis by which a consultation program could be designed and implemented.

4. Cultural Affiliation Study

This baseline ethnographic study has not been prepared for the Monument. These studies are designed to satisfy the need to identify cultural ties among past and present groups that occupied or used, and may still use, Monument resources. At the present time, no Native American traditional use or sacred or culturally significant sites are known within the Monument boundaries. However, the Bears Ears, outside Monument boundaries, are considered an important Navajo landmark. It is possible that sacred or significant traditional cultural use properties of the Navajo, Paiute, or Ute peoples may be present within Monument boundaries. A cultural affiliation study would provide a sound basis for determining traditional use and for guiding a formal consultation program.

Presently, without a formal study, consultation with potentially affiliated Native American tribes has been initiated and is on-going for the Monument, especially in conjunction with the General Management Plan and the Native American Graves Protection and Repatriation Act.

5. Rapid Ethnographic Assessment Procedures

REAP procedures have not been initiated, despite the completion of the Monument's General Management Plan in 1996.

6. Historic Resource Study

An historic resource study was prepared for the Southeast Utah Group by Mehls and Mehls. It forms the basis for the LCS which was described above. As stated, only one historic resource in the Monument is considered significant, the Owachomo Bridge Trail or Zeke's Trail. All other historic sites were determined ineligible for the National Register of Historic Places.

7. Administrative and Legislative Histories

The Monument administrative archives are complete and a finding aid has been prepared. An administrative history and a legislative history could now be prepared efficiently if funding could be allocated to the projects.

8. Scope of Collection Statement

The SAC was completed in 1995. It is the basic curatorial planning document that will guide the Monument's acquisition and preservation of museum objects and archival collections.

9. Cultural Resources Management Bibliography

Cultural resource reports about the Monument are maintained at the Resource Management Office of the SEUG. While the 32 cultural resource reports about Natural Bridges that are on file have not been entered in the CRBIB system, the reports are listed in a computerized database file. Copies of the major cultural resource reports are currently on file in the Monument, although a more complete library of the management reports should be placed in the Natural Bridges' files, and general archeological literature would be a welcome addition to the library of the Monument. By making available more literature on archeology and cultural resources, interpreters at Natural Bridges would be better able to present up-to-date programs about the human history and prehistory of the Monument.

10. Historic Property Preservation Database

The HPPD is a computerized database of technical information on treatment of historic and prehistoric structures and landscapes. While the computerized version has not been prepared, full documentation of all stabilization and intervention in historic fabric of structures (prehistoric) in the Monument is maintained in the headquarters of the Southeast Utah Group.

D. Special Cultural Resources Studies and Plans, Including Museum Documents

1. Archeological and Ethnographic Collections Studies

Research into the collections has been limited. So far, a compete report on the in-house prehistoric ceramic collections has been prepared. Tree-ring samples have been analyzed (and stored) by the Tree-ring Laboratory in Tucson. Results of the tree-ring analyses have been presented in the Tree-ring Laboratories quadrangle series.

2. Archeological Data Recovery Studies

Data recovery as a means of mitigating adverse effects of development projects on significant historic properties in the Monument has been limited. The only recent mitigation project was completed by Alpine Archaeology of Montrose Colorado who performed data recovery on two sites impacted by repaving of the Loop Road in the Monument.

In general, the management strategy is to avoid significant cultural resources so data recovery is not necessary; however, certain sites are being heavily impacted by visitation. In particular, sites in and around the visitor center, entrance road, and campground are being heavily impacted by visitors collecting surface artifacts and trampling erosional channels through sites. A data recovery plan should be prepared for these sites and funding sought to mitigate the impacts through data recovery.

3. Collection Management Plan

A collection management plan has not been prepared. As a first step in preparing a Collection Management Plan, a meeting was held to determine specific collection and specimen needs of the various SEUG divisions (e.g. Interpretation, Natural and Cultural Resources Management). The conclusion was the main collection needs are for interpretation, and possible use of objects for permanent and temporary Visitor Center exhibits.

4. Collection Storage Plan

A formal collection storage plan was not written, but all in-house collections were recently moved to the new headquarters of the Southeast Utah Group in Moab. Additional collections that are stored at MWAC may well be moved to WACC in 1996. A full collection storage plan is needed.

Natural and cultural specimens from the Monument have been collected since the turn-of-the-century, but these collections, if they still exist, are scattered in repositories across the United States. Off-site repositories of collections from Natural Bridges are the Dan O'Laurie Museum in Moab, UT; the Western Archeological Conservation Center, Tucson, AZ; and the Mid-West Archeological Conservation Center, Lincoln, NB.

The Western Archeological Conservation Center or WACC and the Midwest Archeological Center or MWAC are both currently storing archeological objects and archival documents, as shown in Tables 10 and 11. San Juan College in New Mexico is storing 372 biological specimens and Northern Arizona University is storing 41 Quaternary resources. Additional repositories of museum specimens collected at Natural Bridges may well exist. These off-site collections need to be identified and brought together in a central, preferably local, federally-approved curatorial facility.

On-site collections include exhibit specimens in the Visitor Center at Natural Bridges National Monument and limited museum collections in the SEUG museum facility in Arches National Park. These SEUG collections include archeological specimens, historical objects including the original signs for the bridges, archival documents, biological specimens, and paleontological specimens.

Documentation	Archeology	Ethnology	History	Archives	Biology	Paleontology	Geology	Total
In house Cataloged	428	0	33	9055	784	1	0	10301
WACC Cataloged	517	0	0	636	0	0	0	1153
MWAC Cataloged	0	0	0	2598	0	0	0	2598
Other Cataloged	0	0	0	0	445	41	0	486
In house backlog	0	0	0	2000	13	0	0	2013

WACC Backlog	118	0	0	0	0	0	0	118
MWAC Backlog	6447	0	0	1000	0	0	0	7447
Other Backlog	0	0	0	0	252	25	0	277
Total	7510	0	33	15289	1494	67	0	24393

5. Collection Condition Survey

The collection condition survey has not been prepared, but based on rought estimates, Table 11 provides the estimated percent of collection by condition.

Table 11. Summary Chart for Objects, Percent of Collection by Condition and Location.

Type	Location	Excellent	Good	Fair	Poor	Unknown
Archeology	SEUG	0	75	20	5	0
	MWAC/ WACC	0	0	0	0	100
History	SEUG	0	80	20	0	0
Archives	SEUG	80	0	0	0	20
	MWAC/ WACC	0	0	0	0	100
Biol	SEUG	0	80	10	0	10

ogy						
	Other	0	60	20	0	20
Paleontology	SEUG	0	100	0	0	0
	Other	0	10	0	0	90

6. National Catalog of Museum Objects and Collection Records

The computerized Automated National Catalog System is designed to list all cultural objects and natural history specimens that meet the criteria for museum objects in the NPS and the Monument's Scope of Collection Statement. Museum Catalog Records (Form 10-254) are required to be completed annually and filed in the SEUG museum storage area with copies to WASO.

Catalog records were backlogged until 1990 when a full-time seasonal curator was hired to reduce the backlog. The curator was able to input and update most pre-1986 catalog records using catalog backlog funding. The position was lapsed in 1994, so additional progress has not been made in completing accession records, loan forms, or maintaining current accession, loan, and catalog records from natural history researchers. While the previous curator was able to make considerable progress in reducing the pre-1986 catalog backlog for the Monument and the SEUG, current (post-1986) natural history researchers have generally not completed their catalog and accession records.

The collection management report is annually prepared and the counts of museum objects by discipline (i.e. archeology, ethnology, hisotory, archives, biology, paleontology, geology) are updated based on the call from WASO. The current status is listed in the summary tables on objects.

Annual reports (Form 10-94, 10-349) on the museum collections were prepared by the SEUG archeologist from 1987-1990. From 1990 to 1994, a professional curator prepared these records. In the absence of catalog backlog soft funding, the curatorial position has been eliminated and the responsibility for these records has

been returned to the archeologist.

Accession and loan files need to be updated and reconciled. Many accessions have no documentation. Some loans have not been reviewed for many years. Many off-site collections are believed to exist, these need to be located and documented as loans or the materials need to be curated in a single repository.

7. Exhibit Plans and Exhbit Environment

Monument visitor center exhibits were originally designed and installed by Harpers Ferry in 1967. In 1990 the SEUG temporary curator monitored and inventoried the permanent exhibits and determined that some of the perishable prehistoric materials were inadequately and inappropriately mounted, and the Visitor Center environment had exceedingly high levels of ultraviolet light and excessive fluctuations in humidity.

Therefore, in FY91 perishable objects which would be affected by these adverse environmental conditions were removed from the exhibits. In 1992 an insect infestation led to the deaccessioning of many of the biological specimens on exhibit. Clearly, an Integrated Pest Management system is not in place. Housekeeping and disaster management plans have not been formulated.

A security survey was completed in FY92 for all of the Southeast Utah Group. The survey found inadequate security and fire suppression systems in place in both the visitor center and the collection storage area.

In FY95 funds were received for a new exhibit plan. The plan will emphasize nonperishable objects. The exhibits should be installed by the end of 1996 and new fire and security systems are being installed at the same time.

8. Cultural Landscape Report

Cultural landscapes are defined in NPS-28 as "...a geographic area, including both cultural and natural resources, including wildlife or domestic animals therein, that has been influenced by or reflects human activity or was the background for an event or person significant in human history." No formal cultural landscapes have been identified for Natural Bridges. Given the

historic record, no historic landscapes are expected to be identified. However, it is possible that ethnographic landscapes associated with contemporary groups might be identified. A program of consultation about traditional cultural properties and potential cultural landscapes is needed.

9. Historic Furnishings Report

There are no furnished historic structures in the Monument so this report is not needed.

10. Historic Structure Preservation Guides and Reports

The 11 prehistoric structures in the Monument which are most subject to visitor impacts have been stabilized and as part of the stabilization process, full reports were prepared that guided the stabilization work. These reports also guide on-going maintenance of the structures.

11. Social Impact Study

While Monument development and programs are not anticipated to involve any significant change in the lifeways or resources of any traditionally related people, a social impact study analyzing the economic value of the Monument in the local or regional community would prove helpful in community relationships. Specific social impact analyses are included with environmental assessments as needed.

12. Special History Study

Special history studies have not been prepared for the Monument, but a grazing history would be particularly useful in managing the vegetation and soils of the Monument.

13. Traditional Use Study

Since the Monument was set aside in 1908, traditional uses of its resources were discontinued at that time. While there appears to have been some limited Navajo procurement of pinyon nuts within the Monument boundaries since the Monument was established, other than this use, there is little evidence for any traditional uses of the Monument's cultural and natural resources by people who were

historically or prehistorically associated with those resources.

To help determine the extent to which traditional uses of Monument resources might have continued, ethnographic consultation requirements established in the 1988 NPS Management Policies are being reviewed and formal procedures are soon to be developed to insure that NPS and federal policies are met. These procedures and the consultation program will be developed with the aid of the System Support Office ethnographic personnel.

14. Visitor Use or Behavior Study

A Visitor Use Survey needs to be conducted at highly visited cultural sites throughout the Monument. Such a survey would identify the actual behaviors of visitors occurring at specific sites, with a focus on inappropriate and damaging behavior. After identifying both inappropriate behaviors and the subpopulations of visitors responsible for such behaviors, site specific management plans can be developed to prevent adverse impacts of visitors to sites. In addition, appropriate interpretive materials could be prepared to target the specific subpopulations of visitors who damage sites through lack of knowledge or information.

15. Oral Histories

Oral histories should be collected and transcribed and curated for people traditionally or historically associated with the Monument. Such histories would be particularly useful from former Monument staff with knowledge of prior decision-making processes. Such oral histories are addressed in the Scope of Collection Statement.

E. Condition of Cultural Resources

1. Sites and Structures

Nineteen of the documented sites in the Monument are in good to excellent condition. These sites are well-preserved due to several reasons: 1) backcountry use of Natural Bridges is limited and as a result, visitor impacts to sites are limited; 2) the existence of an on-going stabilization and monitoring program, as well as a site monitoring program funded in FY92 by the Archeological Resources Protection Act (ARPA). Sites stabilized, monitored and consistently maintained under these programs are listed in Table

12.

Table 12. Monitored and Stabilized Sites in Natural Bridges.

Site #	Name or Location and Type
42Sa6788	Perfect Granary
42Sa6801	Conical Ruin
42Sa6802	Kachina Bridge Ruin
42Sa6803	Defensive Wall
42Sa6804	Defensive Wall
42Sa6819	Horsecollar South
42Sa6820	Horsecollar North
42Sa6845	Loop Road Ruin
42Sa6965	Bare Ladder Ruin
42Sa6967	Lightning House
42Sa16751	Sipapu Bridge Trail Ruin
LCS	Owachomo Bridge or Zekes Trail

Another 29 sites are in fair condition, 40 are in poor condition, and two have been destroyed. However, due to inadequate documentation, the present condition of 134 sites is unknown.

2. Impacts to Sites and Structures

The monitoring program has established that adverse impacts to these sites are caused by both natural and human agents. Of the human impacts, graffiti is the most consistent impact that visitors have on the sites in the Monument.

Looting of surface artifacts and subsurface deposits is also a common impact on the sites in the Monument. While most of the serious looting of alcove and rockshelter sites in Natural Bridges appears to have been conducted in the past, looting of surface artifacts remains a consistent impact that visitors have on the sites of the Monument today. Within the last five years, most of the artifacts on the sites within the canyon bottoms have been looted as a form of souveniring behavior.

Cattle trespass in Natural Bridges has been a serious impact to archeological sites. Fragile archeological deposits have been destroyed by trespass cattle. Fencing the Monument will eliminate this particular impact agent. And, with the continuation of the

stabilization and monitoring program, as well as the Archeological Resources Protection ranger patrol program, sites should remain in good to excellent condition. The continuation of these programs will enable the NPS to continue to fulfill its legal mandate to preserve and protect the cultural resources of the Monument.

V. OVERVIEW OF NATURAL RESOURCE MANAGEMENT PROGRAM AND NEEDS

A. Major Program Activities

The SEUG Natural Resource Division's major program activities are as follows:

1. Threatened and Endangered Species

Currently the peregrine falcon (Falco peregrinus) is the only endangered species of wildlife at Natural Bridges National Monument. A breeding pair of peregrine falcons have nested successfully within the Monument since the 1993 breeding season. They fledged two young in 1993, two in 1994, and one in 1995. The location of the aerie has changed with each breeding season, but has remained within a discrete area. The Chief Ranger has been monitoring the falcons as time allows. The threatened Mexican spotted owl is known to occur in similar habitats near the Monument, but thus far searches have not revealed their presence here.

2. Exotic Plant Control

Exotic plants such as tamarisk, horehound mint, and musk thistle have invaded Natural Bridges. The extent of the spread has been minimized so far by Monument staff who have made a concerted effort to control these exotics through both mechanical and chemical means. In 1995, the Monument lost the ability to fund a seasonal (5 month) position dedicated to in-the-field resource management activities (which had included mapping and control of exotics, as well as peregrine monitoring, archeological site monitoring and patrol, and revegetation work).

During the 1995 summer season, the Chief Ranger was able to get out on a sporadic basis to cut large pockets of tamarisk in the upper reaches of several drainages, but most of the rest of the Monument was neglected. Systematic and consistent exotic plant control activities need to be on-going for this program to be successful. Current staffing levels at Natural Bridges do not allow for this!

3. Boundary Fencing

The Monument's south and east boundaries have effectively been fenced to prevent trespass cattle. Through an arrangement with the BLM and using the natural topography of the land, Monument staff were able to erect a .4 mile fence on BLM land adjacent to the Monument that effectively blocks cattle over an extensive area. Without this cooperative effort, a fence line of over 2 miles would have had to be constructed through rugged terrain at much additional expense and labor. This particular project, which was completed in the fall of 1995, used volunteer labor supplied by the Sierra Club to supplement Monument staff.

Additional fencing on the Monument's north boundary was begun in 1994, but because of logistics and lack of staff this project has not been completed. It will require two weeks of additional labor by a two-person crew to complete this segment.

The remaining west boundary is not fenced and does not need to be. The terrain is such that cattle cannot enter the Monument from that direction.

4. Revegetation

Following major road work in 1993 and 1994 as part of a Federal Lands Highway Project, extensive revegetation efforts have been on-going in an attempt to promote a rapid recovery of native ground cover. Most of this effort has been focussed along the roadside where previous ground disturbances, the result of roadwork, have left bare soils. Native plants have been heeled in and native seed broadcast in an attempt to begin recovery.

Additional work has been done at pull-offs along Bridge View Drive and near bridge overlooks. The use of low-profile barrier fencing has been particularly successful in preventing trampling of revegetated areas by visitors. Constructed of native juniper posts and lodgepole rails, the fencing is attractive, low-cost, and effective. Its use along the Owachomo Bridge Trail has been responsible for the area's rapid recovery from trampling of cryptobiotic soils and subsequent loss of vegetation. Within a year of installation, noticeable recovery has occurred spontaneously.

Much still needs to be done. Additional revegetation work will proceed during the spring and summer of 1996 using remaining FLHP monies, however, funding to address an even greater problem in the campground is not available.

5. Oil and Gas Development

While lands within the Monument are withdrawn from mineral leasing, oil and gas leases exist on BLM lands within two or three miles of Natural Bridges' boundary (though none are currently in production), and there is increasing potential for oil and gas development within White Canyon. Oil and gas development is an external threat to the resources (clean air, night sky, solitude and wilderness) of Natural Bridges. To monitor this threat, the Natural Resource Specialist and Monument staff review and comment on oil and gas environmental assessments (EAs), review various planning documents from the Bureau of Land Management (BLM) and Utah Division of Oil, Gas and Mining; coordinate with NPS Mining and Minerals Branch; track local oil and gas activities; and review leasing sales for tracts adjacent to Natural Bridges.

The oil and gas monitoring program is expanding with expansion of the threat. Currently, oil and gas monitoring accounts for 15 percent of the Natural Resource Specialist's time. This need did not exist a year ago and will probably continue to be important for the near future. This function is likely to expand in the next year due to the backlog in planned drilling. Future demands on time will be dependent on the success of industry in exploiting this reserve.

6. NEPA Compliance

Natural Bridges' Chief Ranger and the SEUG Resource Management Division is routinely involved in the writing of Resource Management Plans (RMP's), environmental assessments (EA's), and other compliance documents. Small ground disturbing activities undertaken by the maintenance or other divisions are also monitored and NEPA compliance assured by Monument staff and the Natural Resource Management Specialist.

7. Geographic Information System (GIS)

In 1994, a GIS Specialist was hired by the SEUG to begin to bring

GIS capabilities to the Resources Management division serving all three NPS units. Natural Bridges is just beginning to make use of this technology.

8. Administration and Supervision

Approximately 300 hours per year are expended by the Natural Resource Specialist on administration and supervision of seasonal natural resource workers for the three NPS units that comprise the SEUG. The Chief Ranger at Natural Bridges estimates that he spends an additional 300 hours yearly on resource management planning and activities on-site. More time must be devoted to effectively manage the natural resources in the Monument.

9. Miscellaneous Natural Resource Functions

There are a number of programs which are important to the operation that account for a great deal of time cumulatively. These include Integrated Pest Management (IPM), spotted owls, reclamation inventory and planning, endangered species, raptors, and water quality. The Natural Resource Specialist handles IPM for all three parks. He is responsible for the annual reporting on the IPM program, submission of 10-21 A requests for pesticide use (eight per year), research into means of pest control (five per year) and coordination with various park personnel on the proper use and storage of pesticides. SEUG currently uses only Garlon 4, Round-up and Dipel 4L. Total time committed by the Natural Resource Specialist to IPM is 100 hours.

10. Improved Understanding of the Monument Ecosystem

The NPS needs to ensure comprehensive management of the Monument ecosystem. The "common" resources of the Monument such as coyotes, small mammals, birds, plant communities, soils, etc. are inadequately understood. Population dynamics are poorly known, and without additional information, these species and their role in the functioning of the Monument and regional ecosystem may well deteriorate with the increase in visitor pressure on the Monument.

One way management of the natural resources of the Monument can be improved, is by having a detailed, comprehensive soil map. The NPS needs to work closely with the U.S. Soil Conservation Service and Utah Agricultural Experiment Station to fulfill this need.

Periodic, low level fly-overs (such as on a ten year cycle) are necessary to obtain aerial photographs of the Monument. Aerial photographs obtained on such a cyclical basis, would enable the NPS to better manage resources within the Monument, and would enable the NPS to monitor external threats such as oil and gas development

B. Natural Resource Staffing

The Chief Ranger at Natural Bridges has programmatic responsibility for the Resource Management Program on-site in addition to his other program responsibilities. There are no other on-site staff committed to the Resource Management Program. Currently several natural resource management staff in the SEUG Natural Resource Management Branch assist the Monument. These natural resources positions available to the Monument are described below.

A full-time Natural Resource Specialist is based in the SEUG Resource Management division in Moab, Utah. His time is divided as follows: thirty percent to wildlife related issues such as Peregrine falcons, desert bighorn sheep and endangered species. Forty percent of his time is devoted to compliance issues, Resource Management Plans, and oil and gas monitoring. Thirty percent of his time is devoted to general resource management issues.

A full-time, subhect-to-furlough botanist is available from the SEUG Resource Management office. This botanist has primary responsibility for the long-term monitoring program for vegetation. This program has been in operation for 10 years. The program is base-funded and each year from one to two seasonal biological aids or technicians have been hired, and in addition, using funds from the Canyonlands Natural History Association sales, one to two Student Conservation Association biological technicians have been hired to work on long-term monitoring.

A full-time planner is on staff. The planner has a natural resource background and his primary responsibility is ensuring NEPA compliance, and writing and preparing planning documents as needed by the units of the SEUG.

A full-time GIS Specialist is also on staff. This person has primary responsibility for mapping functions of the SEUG, and for development of GIS models and data layers.

Another natural resource position that was allocated to the SEUG Resource Management division was recently transferred to the National Biological Survey, now a part of the US Geological Survey. This position was a research grade biologist, with a primary emphasis on soil science and studying the effects of visitor trampling on desert soils. This position was also a component in the long-term monitoring program prior to conversion to the NBS.

For the last few years, soft funds have been available for a natural resource biological aid to perform weed and exotic control work during the summer season. The weed control position has been utilized to control tamarisk, Russian knapweed, and other exotics in the Monument.

Because of the competing workload as well as the logistics involved in trying to service an area 120 miles distant from the SEUG Resource Management office in Moab, Utah, it would be most efficient to fund a subject-to-furlough GS-09 resources management position at Natural Bridges to administer the program here. Currently, the Chief Ranger has that responsibility included with his Interpretation, Fee Collection, and Visitor Protection program areas. While this arrangement worked nicely ten years ago, it ill-serves the Monument's needs now when visitation is increasing 10-15% yearly and management must respond rapidly to meet the challenges that this growth represents to the proper care of the resource base. Having someone on-site who is intimately familiar with the resources of Natural Bridges and able to devote the time necessary offers advantages not presently available.

Until such time that this position can be secured, funding for a seasonal GS-05 field position is critical for the continuance of a viable resource management program at Natural Bridges.

VI. OVERVIEW OF CURRENT CULTURAL RESOURCE MANAGEMENT PROGRAM AND NEEDS

A. Major Program Elements

The Monument was established to preserve and protect cultural resources, and to allow the public to enjoy the accessible and spectacular ancestral Puebloan ruins; however, visitor access to cultural resources is usually antithetical to preservation and protection. Therefore, the primary management objective is to balance the conflicting goals of allowing the public to visit sites and enjoy their cultural heritage, while preserving, conserving, and protecting the resources. Based on the Secretary of the Interior's directives for federal archeology programs, on NPS policies, as well as other federal laws and policies, several components have been established in the cultural resource program. These components are described below.

1. Direct Physical Protection of Sites

A monitoring program is in place to record impacts to highly visited and significant sites in the Monument. Most monitoring is performed by Monument staff (when funding and time allow) who regularly patrol and monitor 11 previously stabilized sites while also monitoring other more remote sites on a sporadic basis. The permanent SEUG archeologist provides support and guidance while also performing any re-stabilization or intervention in historic fabric. The monitoring program allows informed management decisions to be made about which sites need stabilization, and which sites are being adversely impacted by what types of visitor behaviors. Site specific management strategies can then be devised to reduce these impacts.

For instance, to help reduce the impacts of visitors on sites, a variety of interpretive materials are available at the visitor center. Sales items of books, postcards, videos, etc. help inform visitors and reduce souveniring of artifacts from sites in the Monument. A brochure about cultural resources is given out in the visitor center. This helps reduce inadvertent damage by well-intentioned, but poorly informed visitors.

At the most visited site in the Monument, Kachina Bridge Ruin, a register box has been installed to inform visitors and reduce graffiti. In addition, a low fence was erected in 1995 around the fragile structures on the site. This barrier helps direct visitor traffic and preserve the structures.

To help reduce visitor damage to other highly visited sites, registration boxes containing site-specific information that informs visitors about "their find" and enlists their support in the site preservation have been installed on site. These boxes also contain notebooks where visitors are encouraged to write their names and comments. These books help reduce graffiti on the sites, and by creating a management presence, they appear to help improve visitor etiquette as well.

While some of these direct physical protection strategies seem to be improving preservation and protection of sites, more information is needed. Specific management plans are needed for highly visited and fragile sites. For example, delineated paths could be established to control where people go in visiting particularly fragile sites. At certain sites, signs, barricades, and register boxes need to be developed, and site brochures written about the sites to prevent vandalism and to improve public knowledge of cultural resources. More information on visitor behavior is needed.

Since only 11-12 sites are consistently monitored, any additional sites that could be monitored or stabilized would benefit park visitors and the resource. Current Monument and Resource Management staffing does not allow for this. A major need is to base fund a seasonal GS-05 archeological technician to ensure that Monument site monitoring is continued and to ensure more consistent efforts at reducing the growing visitor imapcts on Monument cultural resources.

2. Site Indirect Protection

Many of the archeological sites within Natural Bridges have a long history of tourist use; in fact, Natural Bridges was set aside as a monument so the public could access the many ancestral Puebloan sites in White and Armstrong canyons. Sites which have been historically highly visited and which have an intensive level of management are promoted as visitor destinations as part of a formal

site disclosure policy. This policy was established as a means of complying with the National Historic Preservation Act and Archeological Resources Protection Act which state that federal agencies may only disclose to the public the locations and character of sites when the disclosure of such information will not result in harm or damage to the sites. Based on this policy which is articulated as a superintendent's directive, the highly publicized and highly visited sites which the Monument can protect from visitor damage are labelled "Class I" sites. Class I sites receive the greatest management intervention in terms of stabilization, monitoring, maintenance, ranger patrols, and installation of direct physical protection devices such as barriers, register boxes, signs, etc.

"Class II sites" are defined as sites whose location will be revealed to the public if they request information about the site by name. These sites, like Class I sites, generally have some form of management presence on them like a register box, or they are consistently patrolled and monitored. Thus a high level of protection is offered to these sites.

Class III sites are defined as sites whose location is withheld from the public to ensure preservation and protection. Class III sites are unstabilized, receive less direct management efforts, and generally they are not patrolled as frequently as the Class I and II sites where visitor impacts are more frequent.

The site disclosure management policy is a form of indirect protection that entails specific actions on the part of the NPS. Since the Class I sites receive greater visitor impacts, it is necessary to direct more managerial resources to these sites for fencing, paths, interpretation, signs, ranger patrols, etc. At the same time, Class II and III sites, though not as highly impacted by visitors, must still receive a share of the resource management budget for stabilization, monitoring, ranger patrols, etc. Over time the site disclosure policy is evaluated and the class of each site is reviewed based on funding available to ensure preservation and protection. For instance, when the monitoring program indicates that visitor impacts are rising at a Class III site, the site may be reclassified as a Class II or I site if managerial resources such as ranger patrols, register boxes, etc., can be installed to ensure protection of the resource. With dwindling funds for cultural resource preservation work, it should be noted

that the numbers of sites on the Class I and Class II list are expected to decrease.

3. National Historic Preservation Act (NHPA) and National Environmental Policy Act (NEPA) Compliance

In compliance with section 106 of the National Historic Preservation Act, when ground disturbing undertakings are planned, the areas of potential effect are inventoried for cultural resources and the appropriate reports and documentation is submitted for consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and interested parties. Major compliance work for FY96 involves undertakings associated with the General Management Plan and the addition of permanent housing at the Monument. Additional compliance inventories and report writing are conducted as needed.

4. Collection Management

The area of greatest program weakness in the cultural resource program is collection management. When combined with the other units of the Southeast Utah Group, the Monument has one of the largest collections in the Intermountain Field Area but no funding is available to handle collection accountability aside from a fractional share of the GS11 archeologist's salary and overhead on the museum storage facility and exhibits.

As described above, the archeologist is responsible for the writing of annual reports for WASO and the Colorado Plateau Cluster of the Intermountain Field Area including the annual random and controlled inventory report, curatorial work plan, collection management report, catalog record submission, collection backlog report, museum preservation and protection program fund request. The archeologist maintains loans, updates the Scope of Collection Statement, and ensures accountability for museum objects and collections on an on-going basis. Since this is a collateral duty which has taken approximately one third of the archeologist's time, the single greatest need in the cultural program is to base fund a permanent, professional museum curator position.

5. Museum Preservation and Protection

The archeologist monitors the museum storage facility for effects

of light, temperature, humidity, pests, etc. Electronic data loggers provided by the Intermountain Field Area have facilitated this effort by reducing the time needed to run paper-based hygrothermographs.

Housekeeping of the museum storage area is performed as needed. Each year the archeologist and chief ranger inventory the exhibits in the Monument visitor center and monitor the exhibits for any environmental problems, especially insect infestations. The Monument staff and archeologist have been working to bring the security and environment of both the museum storage facility and Monument visitor center exhibits up to NPS and American Association of Museums standards. This effort has been guided by a visitor center security survey that was conducted by Steve Layne and funded by the Rocky Mountain Region.

Once the security problems are resolved (target date end of FY96), the next greatest problem with the Monument exhibit environment is insect infestation. An Integrated Pest Management (IPM) system has not been implemented. Pests have been and continue to be a problem in both the storage facilities and in visitor center exhibits. For example, in 1990 numerous bird and mammal skins in the collections were deaccessioned and discarded due to insect damage. In 1992, biological specimens in the visitor center exhibit area had to be discarded due to insect infestation. An Integrated Pest Management (IPM) plan needs to be written and implemented.

6. Native American Graves Repatriation Act Compliance

The inventory and summary lists of human remains and associated grave goods and etc. were submitted on time to potentially affiliated and interested tribes as mandated by NAGRPA. Consultation and compliance with other provisions of the act are in process. No funding has been set aside if consultation visits by tribes or travel or other expenses are required.

7. Native American Religious Freedom Act Compliance

In compliance with the Native American Religious Freedom Act, the superintendent must consult with Native American religious leaders to develop and implement policies and procedures that will aid in determining how to protect and preserve Native American cultural and spiritual traditions. The superintendent has consulted with

various Native American groups in the development of the General Management Plan.

An active consultation program is just beginning. As discussed in previous sections, since the Monument was set aside at the turn-of-the-century, there is little traditional use of Monument resources. Nevertheless, local Native Americans (Southern Ute, White Mesa Ute, Paiute, and Navajo) will be consulted concerning potential traditional cultural properties within the Monument and other issues. The greatest obstacle towards such consultation is lack of funding for travel and related expenses to conduct on-site consultation.

8. Public Education

As mandated by the Archeological Resources Protection Act, permanent and temporary cultural resource personnel must work to foster awareness and appreciation of both historic and prehistoric cultural resources and to educate the public about the importance of protecting and preserving those resources. This is accomplished through a variety of programs including teaching classes at public schools, giving guided walks, outreach through local museums, educating commercial guides, sponsoring annual Utah Heritage Week activities, bringing speakers, craft demonstrators, and exhibits to local museums and communities, etc. Interpretive exhibits about archeology and history are an integral part of the new exhibits slated for installation at Natural Bridges visitor center in FY96 and these should improve public knowledge of the resources of the Monument and ways to minimize visitor impacts on those resources.

9. Interagency Cooperation and Information Exchange

As mandated by the Archeological Resources Protection Act, the archeologist frequently meets with BLM and USFS cultural resource professionals to resolve joint management problems. The archeologist attends the biannual Utah Professional Archeology Council meetings, and the archeologist generally attends the annual Pecos Conference for Southwestern archeologists.

10. Site and Object Documentation

Site records, base maps, inventory records, etc. were described above. A major responsibility of the cultural resource management

program is ensuring that these records are updated consistently and accurately.

B. Cultural Resource Staffing and Funding

Presently, the only permanent cultural resource staff member is a GS-11 archeologist based in Moab, Utah. This person shares responsibility with the chief ranger for the cultural resource management program of Natural Bridges. This position is base-funded from the SEUG Resource Managment division. The base funds also provide one four-wheel drive vehicle for the archeologist. Additional program support from the SEUG Resource Mangement division has been inconsistent.

Cultural Cyclical funds have been used for site monitoring and stabilization since the mid-1980s, but in the newly reorganized Colorado Plateau Cluster of the Intermountain Field Area, continued funding for monitoring programs will probably be discontinued. Other ways to continue the cultural resources programs need to be explored.

Catalog backlog funds were used to hire a full-time curator and a half-time archivist to catalog all backlogged collections made prior to 1986 and to complete the administrative archives of the Monument and SEUG. Work has also been initiated on a photographic archive for the Monument. However, in the absence of catalog backlog or cultural cyclcial soft money, the archivist and curatorial positions have been lapsed and all curatorial duties have been transferred to the archeologist. The curatorial workload has been rising due to increases in research and collections of natural history specimens within the Monument and the SEUG.

From FY92 to FY94, a temporary seasonal patrol ranger was hired with Archeological Resources Protection Act funding and a portion of the Cultural Cyclical Monitoring and Stabilization program funds. This Monument-based person patrolled highly visited and highly vulnerable sites at Natural Bridges. The goal of the program was to prevent looting, vandalism, and inadvertent damage to the cultural resources of the Monument through visitor contacts and education. Although Monument staff and the monitoring program data indicated the program was successful in meeting its goal, ARPA funding will probably be unavailable during FY96. The patrol ranger function will be supported in FY96 through the Monitoring

and Maintenance Cultural Cyclical program, but most on-site patrol will be done by Monument staff as an unfunded activity in addition to their other duties. Without soft funding, the future of this patrol function is unclear.

In summary, the greatest unmet personnel needs are in two broad areas: collections management and site physical protection. Two main positions are needed: a permanent, professional museum curator and a seasonal archeologist. These needs are described below.

The need for a permanent, professional curator is critical. Catalog backlog and cultural cyclical funds were used to hire both a temporary half-time archivist and a full-time curator. These professionals were able to reduce the catalog backlog, correct gross errors in the catalog records, update the museum accountability program, improve the physical environment of the collection storage areas and exhibits, and complete the finding aids for adminsitrative archives of the SEUG. However, the curatorial position funding was lost in FY94 and the archivist position was lost at the end of FY95. Without the soft funding and the personnel, the archeologist assumed responsibility for the collections and curation. With the progress made in reducing catalog backlog, the workload averages 10 hours per week, but the workload is growing as the number of collections increases. A permanent museum curator is needed to bring the collections up to standards, reduce the catalog and accountability backlog, maintain accountability, search for off-site collections, monitor the museum and exhibit environemts and correct any environmental deficiencies, etc.

Likewise, the need for a seasonal archeologist to monitor and maintain sites is critical. People visit Natural Bridges to see ancestral Puebloan structural sites, but visitation damages sites. To continue to allow visitors access to sites, the Rocky Mountain Regional Office contracted to stabilize some of the more popular sites in the Monument in the mid-1980s. To protect this fiscal investment in stabilized sites, and to continue to allow visitors access to the sites, Cultural Cyclical funds were used to monitor the stabilized and highly visited sites, and to provide management information about the impacts occurring and to devise ways to reduce those impacts. The funding was used different ways in different years: sometimes a seasonal archeologist (GS07) was

hired to perform the work. Other years untrained seasonal rangers were hired to contact vistiors and educate them about minimum impact visitation techniques. During FY96, a commissioned law enforcement ranger trained in ARPA enforcement will be used to perform the monitoring at all three park areas of the SEUG. However, the current Cultural Cyclical Funding Priority Committee for the Intermountain Field Area has determined that cylcical funds should not be used for such routine, annual programs as monitoring and maintenance. Hence, a critical need is to base fund either a seasonal archeologist trained in Southwestern archeology to visit at least the Monument's 11 routinely monitored sites in the spring and fall, and to maintain the sites, or to hire a trained ARPA law enforcement ranger with an interest in public outreach and education to perform the monitoring and maintenance. Either position could maintain sites and prevent visitor damage. To continue to allow visitors access to the nonrenewable cultural resources of the Monument, the SEUG needs to base fund either a seasonal archeologist position or a trained ARPA enforcement ranger who could help the permanent archeologist maintain, stabilize, and monitor these sites.

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