MONTEZUMA CASTLE NATIONAL MONUMENT

RESOURCE MANAGEMENT PLAN

FEBRUARY 1996

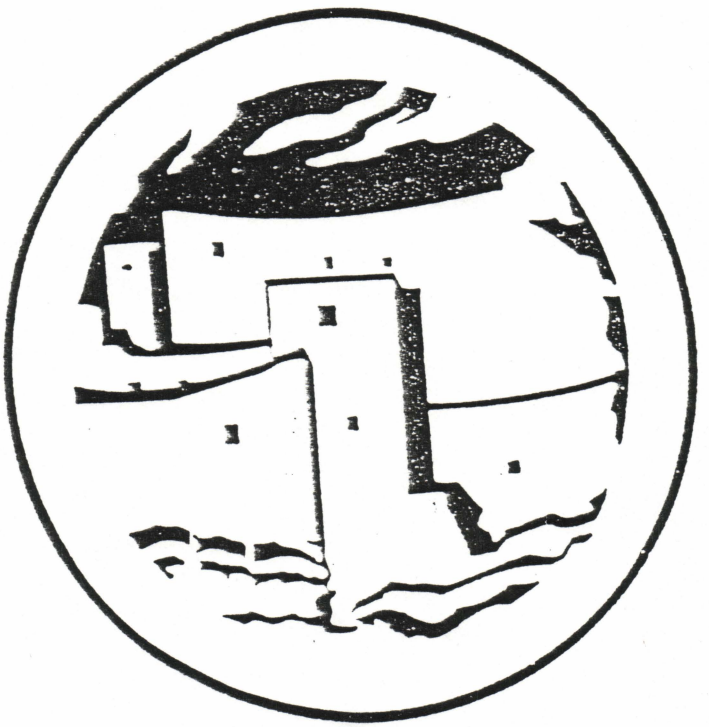


Natural and Cultural Resources Management Plan

Montezuma Castle National Monument

National Park Service
U.S. Department of the Interior

February 1996



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February 1996 Revision

Approved By:

Glen E. Henderson — 2/20/96

Superintendent, Montezuma Castle National Monument **Date**

TABLE OF CONTENTS

PART I NARRATIVE I-1
INTRODUCTION I-2
Legislation and Purpose I-2
Location I-3
Land Uses and Trends I-3
Visitor Use Analysis I-4

MANAGEMENT OF RESOURCES I-8
Planning I-8
Management Objectives I-9
Management Issues I-10

NATURAL AND CULTURAL RESOURCES ENVIRONMENT I-12
Climate I-13
Topography, Geology, and Soils I-13
Vegetation I-14
Wildlife I-14
Threatened and Endangered Species I-14
Water Resources I-14
Cultural History I-15

STATUS OF CURRENT RESOURCES DATABASE I-16
Cultural Resources Baseline Information I-16
Cultural Resources I-16
Sites I-16
Structures I-17
Objects I-17
Cultural Context/Theme I-17
Natural Resources Baseline Information I-18

RESOURCES MANAGEMENT AND RESEARCH PROGRAM I-20
Overview of Current Program and Needs I-20
Resources Management Assessment Program I-22
Description of Major Programs I-26
Relevant Legislation, Policies, and Guidelines I-26
Overview of Major Programs I-29
Summary of Major Programs I-32
Programming Sheets I-58

PART II PROGRAM STATEMENTS II-1
MOCA-I-001.000 Develop, Manage, and Administer Cultural and Natural Resources Program II-2
MOCA-I-001.001 Develop, Manage, and Administer Natural Resources Program II-6

MOCA-I-100.000	Design Monitoring Program and Train Staff in Monitoring Aircraft Overflights	II-9
MOCA-I-100.001	Monitor Aircraft Overflights	II-12
MOCA-I-101.000	Evaluate and Define Fencing and Patrol Needs	II-15
MOCA-I-101.001	Construct/Upgrade Fencing	II-18
MOCA-I-101.002	Increase Boundary Patrols and Monitor Effectiveness	II-20
MOCA-I-102.000	Manage Pest Species	II-23
MOCA-I-103.000	Conduct Visitor Use Survey	II-26
MOCA-C-104.000	Improve Security Systems	II-29
MOCA-I-105.000	Analysis of Adjacent Land Use and Status	II-31
MOCA-I-105.001	Implement Long-Term Monitoring and Management Strategies to Protect from Potential Threats of Adjacent Land Uses	II-34
MOCA-N-106.000	Characterize Hydrology of Groundwater System Supporting and Maintaining Montezuma Well and Develop Long-Term Monitoring Protocols	II-37
MOCA-N-106.001	Implement Long-Term Monitoring and Management Strategies to Protect the Hydrologic Characteristics of the Archaeological and Historical Setting at Montezuma Well	II-40
MOCA-N-107.000	Identify Flood-Prone Areas for Protection of Lives and Property	II-42
MOCA-N-108.000	Determine Visitor Impacts and Use Limits and Develop Long-Term Monitoring Protocols	II-44
MOCA-N-108.001	Implement Long-Term Monitoring of Visitor Impacts and Use Limits	II-47
MOCA-I-200.000	Conduct Ethnographic Overview and Assessment Including an Ethnobotanical Study	II-49
MOCA-I-201.000	Conduct Literature Search, Compile and Annotate Reference List in Computerized Bibliographic Information Retrieval System	II-52
MOCA-I-201.001	Update Bibliographic Database Annually	II-54
MOCA-I-202.000	Prepare a Geographic Information Plan	II-56
MOCA-I-202.001	Implement a Geographic Information Plan	II-58
MOCA-C-203.000	Update Administrative History	II-61
MOCA-C-204.000	Compile and Maintain Comprehensive Photographic Documentation	II-63
MOCA-C-205.000	Complete Oral Interviews of People With Historical Knowledge of the Monument	II-67
MOCA-N-206.000	Develop an Annotated Natural Resources Bibliographic Database	II-69
MOCA-N-206.001	Update Annotated Natural Resources Bibliographic Database Annually	II-72
MOCA-N-207.000	Inventory the Basic Natural Resources of Montezuma Well and Adjacent Riparian and Terrestrial Habitat and Develop Long-Term Monitoring Protocols	II-75

MOCA-N-207.001	Implement Long-Term Monitoring of the Basic Natural Resources	II-78
MOCA-N-208.000	Develop Program to Continually Integrate Long-Term Monitoring of Ecosystems	II-80
MOCA-C-300.000	Stabilize Pithouse Floor	II-82
MOCA-C-301.000	Complete Archeological Site Management Information System	II-84
MOCA-C-302.000	Date Montezuma Castle	II-86
MOCA-C-303.000	Conduct Archeological Overview and Assessment	II-88
MOCA-C-304.000	Maintain Stabilized Prehistoric Ruins	II-90
MOCA-C-400.000	Conduct Study of Montezuma Castle Irrigation System	II-93
MOCA-C-401.000	Prepare Historic Structure Preservation Guide: Historic Structures	II-95
MOCA-C-402.000	Prepare Historic Structure Preservation Guide: Prehistoric Structures	II-98
MOCA-C-403.000	Maintain Historic Structures	II-101
MOCA-C-404.000	Establish Program for Long-Term Monitoring of Cultural Setting	II-103
MOCA-C-405.000	Conduct Historic Resource Study	II-105
MOCA-C-500.000	Conserve Museum Objects	II-107
MOCA-C-501.000	Manage Park Museum Collection	II-109
MOCA-C-502.000	Update and Maintain Automated National Catalog System	II-112
MOCA-C-503.000	Rebuild Montezuma Castle Museum	II-114
MOCA-C-504.000	Survey and Inventory Collections for Montezuma Castle Cultural Objects	II-116
MOCA-C-505.000	Update/Correct the Cultural Resources Bibliography	II-119
MOCA-C-506.000	Write Collection Management Plan	II-121
MOCA-C-507.000	Establish Exhibit Maintenance	II-123
MOCA-I-508.000	Survey and Inventory Collections for Natural History Specimens	II-125
MOCA-I-600.000	Prepare a Management Plan for Prehistoric Sinagua Fields	II-127
MOCA-I-601.000	Manage Vegetation: Rehabilitation, Landscaping, and Hazard Tree Removal	II-130
MOCA-N-602.000	Inventory Sensitive and Threatened/Endangered Flora and Develop Long-Term Monitoring Protocols	II-133
MOCA-N-602.001	Monitor Sensitive and Threatened/Endangered Flora	II-135
MOCA-N-603.000	Conduct Inventory and Assessment of Vegetation and Flora and Develop Long-Term Monitoring Protocols	II-137
MOCA-N-603.001	Implement Long-Term Monitoring Protocols for Vegetation and Flora	II-140
MOCA-N-604.000	Inventory, Assess, and Evaluate Control of Non-Native Flora and Develop Long-Term Management Strategies and Monitoring Protocols	II-143

MOCA-N-604.001	Implement Long-Term Monitoring Protocols of Non-Native Flora	II-146
MOCA-N-605.000	Examine Old Fields	II-149
MOCA-N-606.000	Prepare Cultural Landscape Inventory	II-152
MOCA-N-700.000	Inventory Sensitive and Threatened/Endangered Fauna and Develop Long-Term Monitoring Protocols	II-155
MOCA-N-700.001	Monitor Sensitive and Threatened/Endangered Fauna	II-157
MOCA-N-701.000	Assess Habitat Requirements of Aquatic Organisms at Montezuma Well and Develop Long-Term Monitoring Protocols	II-159
MOCA-N-701.001	Implement Long-Term Monitoring and Management Strategy for Habitat Requirements of Aquatic Organisms at Montezuma Well	II-162
MOCA-N-702.000	Conduct Inventory and Assessment of Invertebrates and Develop Long-Term Monitoring Protocols	II-164
MOCA-N-702.001	Implement Long-Term Monitoring of Invertebrates	II-166
MOCA-N-703.000	Conduct Inventory and Assessment of Amphibians and Reptiles and Develop Long-Term Monitoring Protocols	II-168
MOCA-N-703.001	Implement Long-Term Monitoring Protocols for Amphibians and Reptiles	II-170
MOCA-N-704.000	Conduct Inventory and Assessment of Birds and Develop Long-Term Monitoring Protocols	II-172
MOCA-N-704.001	Implement Long-Term Monitoring of Birds	II-175
MOCA-N-705.000	Conduct Inventory and Assessment of Mammals and Develop Long-Term Monitoring Protocols	II-177
MOCA-N-705.001	Implement Long-Term Monitoring Protocols for Mammals	II-179
MOCA-N-706.000	Inventory, Assess, and Evaluate Control of Non-Native Fauna and Develop Long-Term Management Strategies and Monitoring Protocols	II-181
MOCA-N-706.002	Implement Long-Term Monitoring Protocols for Non-Native Fauna	II-184
MOCA-N-707.000	Manage Feral Honey Bees	II-187
MOCA-N-708.000	Conduct Inventory and Assessment of Fishes and Develop Long-Term Monitoring Protocols	II-190
MOCA-N-708.001	Implement Long-Term Monitoring Protocols of Native Fishes	II-192
MOCA-N-800.000	Measure Outflow for Montezuma Well	II-194
MOCA-N-801.000	Identify and Inventory Water-Related Resources	II-196
MOCA-N-802.000	Conduct Analysis of Existing Water Monitoring System	II-198
MOCA-N-802.001	Construct New System and Correlate Old Data with New Data	II-200
MOCA-N-803.000	Conduct Riparian Ecosystem Research and Develop Monitoring Protocols	II-202

MOCA-N-803.001 Implement Long-Term Monitoring and Management Strategy for Riparian Ecosystem II-205
MOCA-N-804.000 Delineate and Evaluate Strategies for Wetlands Protection and Develop Long-Term Monitoring Protocols II-208
MOCA-N-804.001 Implement Long-Term Monitoring and Management Strategies for Wetlands Protection II-211
MOCA-N-805.000 Evaluate Effects of Hydrologic Characteristics on Morphological Properties of Flowing Streams II-214
MOCA-N-806.000 Evaluate Effects of Hydrologic Characteristics on Regeneration of Vegetation in Riparian Areas II-216
MOCA-N-807.000 Determine Vulnerability of Unique Biota to Changes in Hydrologic Regimes II-218
MOCA-N-900.000 Conduct Survey and Assessment: Soils II-222

REFERENCES II-224

APPENDICES II-230
Appendix 1. List of Preparers for Montezuma Castle National Monument Natural and Cultural Resources Management Plan II-231
Appendix 2. Cultural Resources Status Summary Charts for Archeological Sites, Structures, Objects, and Cultural Landscapes II-232
Appendix 3. Cultural Resources Documentation Checklist II-237

LIST OF FIGURES AND TABLES

List of Figures

Figure 1. Regional Map of Montezuma Castle National Monument. I-5
Figure 2. Map of Montezuma Castle National Monument. I-6
Figure 3. Map of Montezuma Well unit of Montezuma Castle National Monument. I-7

List of Tables

Table 1. Comparison of current and fully funded RMAP allocations (November 1993) for the natural resources program in Montezuma Castle National Memorial. I-24
Table 2. Comparison of current and fully funded RMAP allocations (November 1993) for the natural resources program in Tuzigoot National Memorial. . . I-25
Table 3. National Park Service Resources Personnel for Current Year I-27
Table 4. Current Year Natural and Cultural Resources Funding I-28

PART I NARRATIVE

INTRODUCTION

This Resources Management Plan is a revision of the original 1975 plan, including environmental assessment (NPS 1975a), and the subsequent updates in 1981, 1984a, 1985, 1987, and 1989a. In developing this current plan, an interdisciplinary approach was used with a team of cultural and natural resources managers and scientists. As a result, the program was enhanced from seven program statements in the original plan to over 50 resources program statements in this one. Several of the original program statements remain, but have been expanded.

This plan, as with the previous documents, guides the resources management program at Montezuma Castle National Monument. Through the plan, resources issues are identified and actions are proposed to deal with problems and threats or to conduct research in order to gather information for management.

This resources management plan (like its predecessors) was prepared in conjunction with other park documents in order to be consistent with the purpose for establishment and with operational plans. It also complies with environmental and cultural legislation.

The primary accompanying park documents include the Master Plan (NPS 1975b), Statement for Management (NPS 1995), and Scope of Collection Statement (NPS 1992a). Other relevant documents consulted were NPS Management Policies (NPS 1988), NPS-28 Guideline: Cultural Resources Management (NPS 1993), NPS-75 Guideline: Natural Resources Inventory and Monitoring (NPS 1992b), and NPS-77 Guideline: Natural Resources Management (NPS 1991), and NPS-18 Guideline: Wildland Fire Management (NPS 1990a).

Legislation and Purpose

Montezuma Castle was established in 1906 under the authority of the Antiquities Act. The monument preserves a prehistoric structure known as Montezuma Castle, which is a 20-room, 5-story cliff dwelling of the prehistoric Sinagua culture. It is one of the best preserved cliff dwellings in America. The legislation states it "...is of the greatest ethnological value and scientific interest..." (Presidential Proclamation No. 696, December 8, 1906, 34 Stat. 3265). In 1937, government lands adjacent to the monument were added as "...required for the proper care, management, and protection of the said prehistoric ruins and ancient cliff dwellings..." (Presidential Proclamation No. 2226, February 23, 1937, 50 Stat. 1817). In 1959, the boundaries were again enlarged "...in order to facilitate the administration and protection..." of the monument by an Act of Congress (June 23, 1959, 73 Stat. 108). The final boundary change came in 1978 with an Act of Congress to incorporate the adjacent fossil mammal tracks and exclude a section used as right-of-way for the freeway (Public Law 95-625, November 10, 1978, 92 Stat. 3473).

Montezuma Well was added in 1943 as a detached unit of the monument with an Act of Congress (October 19, 1943, 57 Stat. 572). It preserves an unusual example of a spring fed, large limestone sink as well as ruins and sites of prehistoric Hohokam and Sinagua periods and also historic Apache sites. In 1959, a few acres were added "...to facilitate the

administration and protection..." of the monument by an Act of Congress (June 23, 1959, 73 Stat. 108).

Location

Montezuma Castle National Monument, totalling 842 acres, is located in Yavapai County, Arizona, about 70 miles north of Phoenix and approximately 50 miles south of Flagstaff (Figure 1). The monument consists of two separate operating units, the Montezuma Castle section and the Montezuma Well section. These two sections are about 19 miles apart and are located along Beaver Creek in the Verde Valley (Figure 2). The monument is centrally located in the state and is within the third Congressional District.

Land Uses and Trends

There is one 16.83 acre parcel of privately owned land within the monument's exterior boundaries. It is adjacent to Beaver Creek in the Montezuma Well section. The property is currently utilized for grazing, but in the past has had agricultural use. These uses are compatible with the park, therefore, acquisition of a scenic easement would be adequate to protect park values.

The Yavapai-Apache Tribe is seeking legislation to transfer approximately 6,500 acres of Forest Service managed federal land to reservation status. Some of the property consists of lands that are part of the Montezuma Castle Management Backdrop Unit. The legislation, as currently proposed, would make the Tribe a participant in the Memorandum of Understanding between the Forest Service and the National Park Service to protect the scenic and cultural environmental integrity.

Non-dedicated county roads cross the northwest corners of both sections of the monument. These roads not only provide access to the park, they provide access to landowners beyond the park. Maintenance by Yavapai County is sporadic and the roads are not always in good condition.

Mining for sand and gravel along Verde Valley rivers has been fairly prevalent. A request to mine and process gravel one-fourth mile upstream of the Montezuma Castle section of the park was submitted to Yavapai County. The county denied the request to process the material. Although there has been no activity to date, it does point out the pressures that increased development within the Verde Valley put on the monument.

The Verde Valley is experiencing a tremendous growth. Farmers and ranchers have converted land holdings into subdivision and housing developments. Residents are moving in to take advantage of the excellent climate and the pleasant living conditions in the Verde Valley. Middle-income homes are the predominant developments. Land values have escalated and valley communities and Yavapai County are severely strained to meet the challenge.

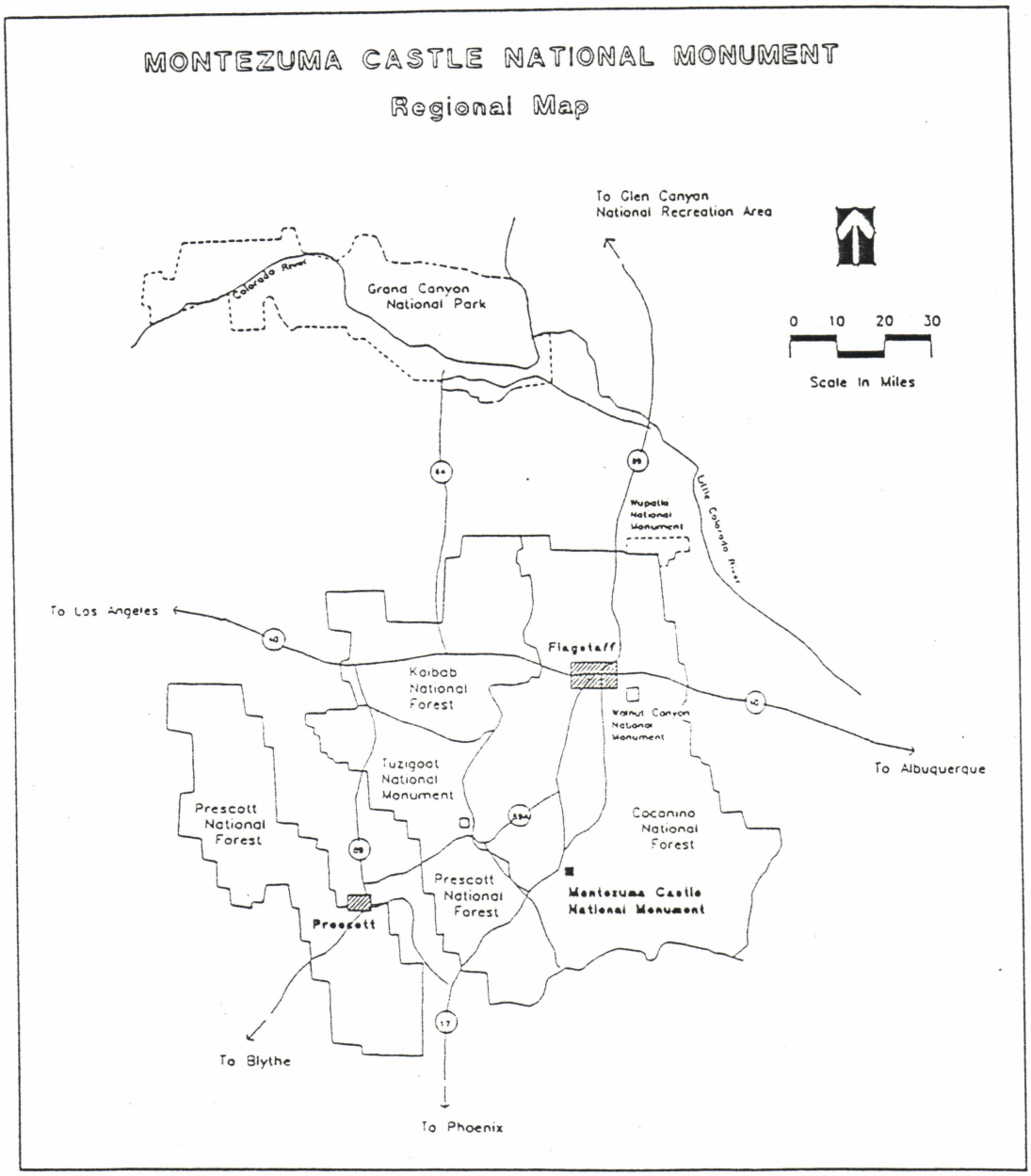
Visitor Use Analysis

Montezuma Castle and Well have become increasingly well known and popular park units. This, coupled with efforts by the state to enhance tourism in Arizona, has led to significant increases in visitation. Tourism is the dominant economic base for the area. Jerome, Sedona, Oak Creek, Canyon, Fort Verde and Jerome State Parks, Tuzigoot, and Montezuma Castle are all popular tourist attractions. The Phoenix metropolitan area with a population in excess of one million is less than two hours' drive to the south over Interstate 17. The Verde Valley has become a favorite day trip for many as well as a stop for travelers along the Interstate. Due to the close proximity to Interstate 17, the major north-south route through the state, visitation figures are significant. In 1994, the Montezuma Castle section had 820,936 visitors while the Montezuma Well section received 205,497 visitors. The official travel figures for the park include only 40% of the Well weekday visitors and 60% of the Well weekend and holiday visitors, because the statistical unit estimates the remaining visitors also visit the Castle section. Below are figures that show visitation changes for the past twenty years:

Year	Montezuma Castle	Montezuma Well
1968	253,008	72,573
1978	398,578	114,607
1988	708,093	195,739
1994	820,936	117,265

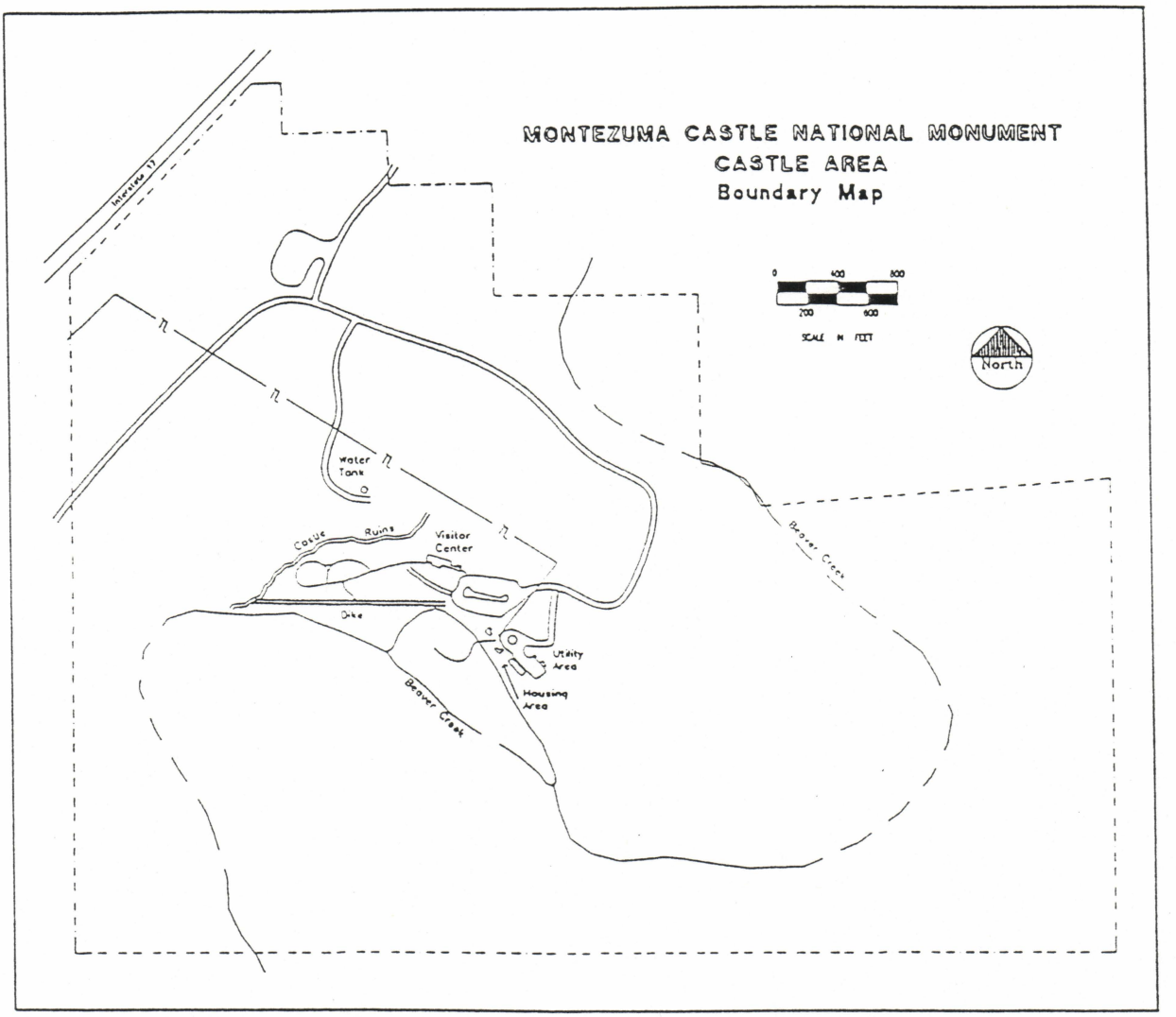
Peak visitation based on monthly trends begins in March and continues through October. November and December can average nearly 35,000 monthly with peak daily visitation occurring during the prime holiday season. January and February are traditionally the slowest months of the year. Weather also plays a role in the visitation pattern as it alters destination points creating fluctuations in daily totals.

Commercial tours frequently stop at the monument as tourists travel from the major destination/departure points of Phoenix or Grand Canyon. Visitors to the monument stay about 50 minutes in each section of the monument. Since the monument is usually a side trip and not their principal destination point, they are usually pressed for time and are interested in only briefly seeing the monument. The origin of visitors to the area can be characterized as 5% local, 40% regional, 30% national, and 25% international.



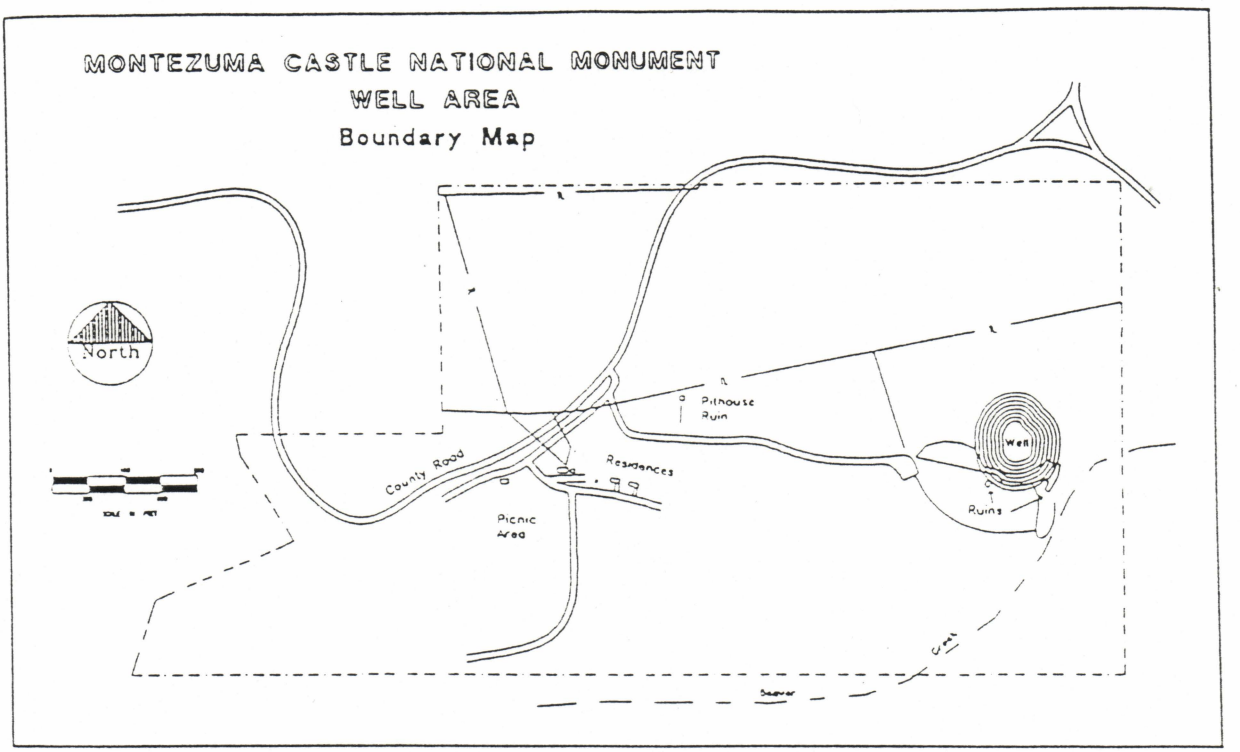
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Figure 1. Regional Map of Montezuma Castle National Monument.



309/80,015
1/91 WRO

Figure 2. Map of Montezuma Castle National Monument.



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Figure 3. Map of Montezuma Well unit of Montezuma Castle National Monument.

MANAGEMENT OF RESOURCES

Planning

NPS Management Policies (NPS 1988) state that the "National Park Service will conduct planning activities to evaluate possible additions to the national park system; to identify how park resources will be preserved and how parks will be used and developed to provide for public enjoyment; to facilitate coordination with other agencies and interests; and to involve the public in decision making about park resources, activities, and facilities. NPS plans will represent the Park Service's commitment to the public and to congress of how parks will be managed." Planning will be conducted as a dynamic, continuous process for making choices about how to accomplish the NPS preservation and enjoyment mandate.

NPS Management Policies (NPS 1988) state that "each park will have an approved general management plan (GMP) which will set forth a management concept for the park; establish a role for the unit within the context of regional trends and plans for conservation, recreation, transportation, economic development, and other regional issues; and identify strategies for resolving issues and achieving management objectives...." All other plans will be consistent with the direction established in this lead planning document. The monument does have a Master Plan (NPS 1975b) and a Statement for Management (NPS 1995). Master plans were the predecessors of GMPs for parks. Although it is dated, it is an important reference along with the Statement for Management.

The SFM identifies lands within the park as classified into four management zones: Natural, Historic, Development, and Special Use.

- The Natural Zone is managed for the conservation of natural resources and processes, and accommodation of uses that do not adversely affect these resources and processes. The only area in the monument in this zone is the water surface of Montezuma Well. It is included as a natural zone because unique biota (i.e., a water scorpion, leach etc.) are found nowhere else in the world.

- The Historic Zone is managed for the preservation, protection, and interpretation of cultural resources and their settings. The majority of the monument is classified in this zone.

- Within the Development Zone occurs the provision and maintenance of park development to serve the needs of park management and visitors. This zone includes areas where park development and/or intensive use substantially alter the historically significant resources. Roads, trails, buildings, and utility systems are the principle items classified in this zone.

- The Special Use Zone accommodates uses carried out by other governmental agencies or private interests on lands within exterior park boundaries. NPS administrative control over the use of lands in this zone is either lacking or qualified in terms of permitting uses not covered in the three preceding zones. Lands classified in this

zone for the monument include the 16.83 acre inholding currently used for grazing and the right-of-way for the county road.

Implementation plans follow the lead planning documents. This natural and cultural resources management plan (RMP) is such a plan. It describes the park's natural and cultural resources, depicts and evaluates current resources management activities and deficiencies, and prescribes an integrated action program based on legislative and executive mandates, NPS management policies, management zoning and other provisions of related planning documents. The RMP is a long range program plan and an essential tool to prepare budgets and allocate funds and staff in parks. Action plans are subordinate to the RMP and are written to specifically carry out certain programs and operations. Examples are the fire management plan, water resources management plan, vegetation management plan, etc. These may also be written for special species, especially threatened and endangered individuals or even those with special status, such as black bears, bighorn sheep, saguaro, and others.

The Washington Office issued a guideline for resources management plans (NPS 1989b) that said a plan would do the following:

- Summarize the resource values and purposes of the park.
- Analyze the significance of resources management needs and problems and rank them in importance.
- Propose specific actions, including dollars and FTEs, for dealing with the most important and urgent needs and problems.
- Present a multi-year program to achieve measurable progress in accomplishing the proposed actions.
- Provide for an annual review and recording of accomplishments to measure the effectiveness of actions.
- Provide the forum for an interdisciplinary approach to the park's resources management issues.

Management Objectives

The management objectives regarding cultural and natural resources are listed below. They are subsequent to the objectives found in higher level plans:

- Preserve and protect prehistoric and historic resources, including ruins and museum collections.
- Manage the collection of cultural objects so they do not deteriorate.
- Restore and/or perpetuate the cultural landscape.

- Preserve ecological processes in a manner to perpetuate native species and suppress non-native species.

- Preserve water rights and protect water resources.

- Gather data through research programs in archeology, history, natural science, visitor use, and land use.

- Monitor cultural and natural resources to detect change.

- Cooperate and plan with government agencies and community groups to protect the integrity of the cultural and natural environment within and surrounding the monument.

- Acquire lands and/or covenants necessary for protection and management of cultural resources.

- Minimize visual and aesthetic impacts of non-historic facilities and vistas to protect and preserve the historic structures and scene.

Management Issues

There are several issues facing management in protecting natural and cultural resources. A few program statements are intrinsic to different issues. They are listed below:

- Lack of Resources Staff and Fiscal Support - Park base funding has not increased with inflation and demands on management and programs. Funds are lacking to support existing permanent personnel and utility costs, much less a ~~minimally acceptable~~ desirable program of cultural and natural resources management, ~~stabilization and maintenance of structures~~, inventory and monitoring, protection patrols, visitor education services, interagency relationships and community involvement. ~~Visitation is increasing and at peak periods the visitor capacity exceeds the existing facilities.~~ Equally ~~More~~ important is the decreased capacity of staff to protect the resources due to limited personnel to monitor and patrol the ~~perimeters~~ present. The requirements placed on staff time and facilities by the new acquisitions, as well as changing programs and procedures, reduce the time available to fulfill basic park needs and coordination with local entities. The increasing professionalization and specialization of resources management require additional dedicated staff positions with adequate funding. ~~Continuing to treat resources management planning and compliance as a collateral duty of existing staff does not yield a comprehensive, coordinated program.~~ The park's mission to preserve ~~and protect historic resources~~ cannot be fulfilled without resolution of funding problems. see ACT. Cannot be

- Lack of Basic Resources Data - There is an insufficient understanding of park ecosystems and threats to them. This makes it difficult to properly assess the condition of resources or identify threats. This lack of data represents a threat of its own and renders it difficult for the superintendent to make well reasoned decisions

regarding proper management of the resources. More data must be acquired to serve as a basis for documenting the condition of cultural and natural resources and monitoring change. Basic information needed includes historic structure reports and Inventory and Condition Assessment Program (ICAP) and Maintenance Management System (MMS), historic resources study, archeological overview, vegetation inventory, and addition to the Archeological Site Management Information System. Basic information must be gathered on the flora, fauna, water, soils, air, and geology to identify components of the natural resources, ecosystems, related processes, and individual threats that may be present. Monitoring protocols for cultural and natural resources must be designed and carried out on a regular and systematic basis to provide management with sound information to document threats, evaluate trends, and make decisions. Comprehensive data gathering, integration, and long-term monitoring must be implemented.

- Lack of Information Management System - Data base management is often done best with computerized information systems and programs. The park has ~~experimented with~~ a valid GIS program ~~through cooperation with CPSU/UA~~, but ~~has no operational program. Connections must be established between the park and an off-site GIS operation.~~ needs a more robust There are other data management programs that are essential to develop and maintain. They include as examples the Automated National Catalog System, Archeological Site Management Information System, resources management plan, bibliography systems, and others.

Conflicts between GIS and other Park computer programs needs continued to encroach on the GIS specialist's time.

Deterioration of Primary Cultural Resources - Cultural sites are subject to erosion due to natural elements and human impacts. The Historic Structures Report and ICAP/MMS need to be updated with advanced techniques and materials information. The current staff has ruins stabilization skills and continue routine maintenance as described in the Historic Structure Preservation Guide. However, due to lack of funding and personnel, the current staff is barely able to keep up with the minimum routine stabilization work much less-long term, cyclic work which must be done in a timely manner to prevent further deterioration.

- Adjacent Land Uses - ~~The Verde Valley is one of the fastest growing areas in Arizona~~. Increasing development on lands adjacent to and surrounding the ~~monument~~ preserve results in direct and indirect impacts, i.e., ~~mining~~ development, feral animals, ~~woodcutting~~ timber harvesting, freeway, subdivisions, water demands, and visual intrusions to the ~~cultural and~~ natural setting.

Southeast Texas and the Beaumont area continue to grow at an unprecedented rate.

flooding

- Groundwater Withdrawal - Montezuma Well could dry up or become polluted as the result of increased land development when more wells are drilled and septic tanks are installed. Although no evidence is currently available showing a drop in the water table, the Verde Valley is one of the fastest growing areas in Arizona. The potential is great for a problem in the future.

- Alteration of Natural Flow Regimes - Water diversion, gravel mining, and other human manipulations in the Beaver Creek watershed can cause down cutting or deposition in the channel, flooding, or change of flow regime. Most or all of

perennial Beaver Creek is diverted for irrigation during the summer months each year. Such activities pose a serious threat to the integrity of native ecosystems.

- Lack of Secure Water Rights - The monument's water rights are presently under adjudication. In addition, the existing system for monitoring delivery of water to parties having rights thereto is inadequately installed. The result is a poor data set and possibly inappropriate apportionment of available water.

- Lack of Comprehensive Vegetation Management - Protection of prehistoric landscapes, preservation of native vegetation such as the Arizona sycamores, landscaping around buildings and facilities, and hazard tree management all require careful attention on the part of the monument staff. Landscaping should represent the period of the prehistoric ruins, create an aesthetic environment, provide a setting and a screen, and/or remove plants harming ruins. A plan must be developed. It would include activities consistent with the enabling legislation, management policies, and guidelines. Vegetation management primarily includes rehabilitation of disturbed sites and landscaping. A comprehensive vegetation management plan would identify rehabilitation, preservation, restoration, and maintenance techniques. It would develop a landscape plan that integrates the cultural features and natural environment.

- Pest Management - Non-native species accompanying human occupation have invaded the monument with varying degrees of impact to native fauna and flora as well as the visiting public and employees. The park has several plant and animal pest species that are damaging to structures and artifacts and pose public health and safety hazards. These include termites, rodents, museum pests, ants, bats, birds, and exotic weeds. Some work has been done regarding pests, and the park must continue developing its integrated pest management program.

- Visitor Use Impacts - Enhanced notoriety and popularity has resulted in increased visitation. The physical and social human impacts cause a strain on the monument's natural and cultural resources, facilities, and the quality of the visitor experience.

- Management of Prehistoric Fields - Options are being explored for managing the open fields once cultivated by the prehistoric Sinaguan inhabitants.

- Flood Hazards - An assessment of flood hazards and possible means to minimize potential loss of life and property is needed.

NATURAL AND CULTURAL RESOURCES ENVIRONMENT

The 1975 Master Plan and 1995 Statement for Management both state the purpose of Montezuma Castle and Montezuma Well is to preserve and interpret the prehistoric features and related natural environment of the area in a way that will enable the public to better understand and appreciate this ethnic heritage. While preservation of cultural resources was the impetus to create the monument, the importance of the natural setting was recognized as an integral part in the life of prehistoric and historic peoples. The early residents were attracted to the natural communities in the riparian area and adjacent uplands. The water,

flora, and fauna resources created a productive environment for farming, gathering, and hunting. The geological formations, sculpted by erosion, provided not only materials to build houses, but also the alcoves for the cliff dwellings. Maintaining the natural environment is crucial to the cultural setting of the monument.

The two units of the monument lie six miles apart along the meandering channel of Beaver Creek, which is a tributary of the Verde River. The Castle unit contains 580.38 acres located along Beaver Creek. It includes the creek bottom, the sheer limestone cliff where the ruin is located, and an area of small hills north of the cliff. The Well unit is upstream along Wet Beaver Creek and contains 278.17 acres. It includes the creek bottom and a large flat-topped hill that contains the sink known as Montezuma Well. The denser, riparian vegetation along the creek bottom provides an oasis in the semiarid landscape surrounding the monument.

This area is topographically diverse with terrain including valleys, mesas, canyons, plateaus, and peaks. There is a large area of flat, fertile land along the creeks in the monument. Parts were farmed intermittently starting with the Sinagua since around 600 to 800 A.D. Farming was interrupted with their departure but was initiated again by European settlers in the 1800's.

The natural environment in this rich riparian area and adjacent uplands provided shelter and sustenance as well as an aesthetic setting for the Sinagua and Hohokam people. Because the geological forms and biotic components are integral features of the cultural resources, the monument is dedicated to maintaining the landscape that attracted the early residents. To that end, it is essential to protect and preserve the ecological processes that created the cultural setting.

Climate

The climate is semiarid with mild winters and hot summers. Annual precipitation has varied from 4 inches to 22 inches, with an average of 11.4 inches. Snowfall is generally insignificant, and if it occurs, melts off rapidly. Temperature extremes are minus 3 and 117 degrees. Daily temperature variations of 40 to 45 degrees are common.

Topography, Geology, and Soils

The geology of the Verde River Valley is a long depression sunk by earthquake actions along several faults below the level of the Coconino Plateau. The middle Verde, where the monument is located, flows through a broad valley approximately 35 miles long. About 10 million years ago, large scale volcanic activity blocked the river's outlet and formed a huge lake. Deposition of sandstone and limestone on the lake bottom continued for thousands of years until the river cut a new outlet and exposed the broad middle Verde Valley. Many of the monument structures are located in alcoves in the limestone deposits. The Well is a limestone sink.

Vegetation

The juxtaposition of upland and lowland habitats dissected by floodplains produce unique and diverse biological communities. This area is one of the most significant bioregions of Arizona. Five plant associations occur in the monument and include the snakeweed-honey mesquite association, creosote bush-crucifixion thorn association, mixed deciduous association, honey mesquite association, and pondweed association.

Wildlife

The diversity of aquatic and terrestrial habitats are also notable. Birds are the most commonly observed wildlife, and breeding densities in undisturbed riparian habitats are reported as being among the highest recorded from North America. Other fauna include the coyote, fox, bat, bobcat, mountain lion, ground squirrels, and other common rodents. Reptiles include several snakes and lizards. The Well is habitat for unique invertebrates known only from that location.

Threatened and Endangered Species

A few sensitive species are found in the monument or have potential habitat. They include the Arizona cliffrose (endangered) for which habitat exists, an amphipod in the Well (category 2), and the southern bald eagle (endangered) nests in the area. Some endangered fish species, the razorback sucker and Colorado squawfish have been reintroduced into the Verde River. The endangered spikedace occurs in part of the Verde River.

Water Resources

Increased land and water use patterns in the Verde Valley indicate that water rights, water quality, aquifer protection, floodplain regulation, instream mining, instream flow, riparian habitats, wildlife, and endangered species are among the concerns to park management. A water resources management plan is being prepared to identify and help address problems such as those listed below.

Surface and ground water resources create and sustain aquatic and riparian ecosystems in the monuments and supported prehistoric and historic land occupation and uses. Riparian and aquatic environments have become increasing important in the arid southwest due to widespread destruction and/or significant alteration. They are highly productive ecosystems that have been greatly reduced in areal extent and complexity by ground water overdrafts, overgrazing, streambed channelization, surface water flow alterations, impoundments, mining, and developments. These uses often conflict with protection and preservation of natural and cultural resources.

The importance of groundwater in the area is significant. About half the flow of the Verde River leaving the valley is due to groundwater discharge into the river and its tributaries. Most occurs as non-point discharge into streams along their courses. Another portion results from springs, such as Montezuma Well, which discharges approximately 1000 gpm. Adjacent land uses pose a threat to groundwater in the monument. Rapid urbanization in the

Verde Valley has led to increased number of wells drilled for water supplies. The population of the locality is predicted to increase substantially.

Groundwater and spring discharges result in perennial flow in the river and some of its tributaries. However, human uses often interrupt the natural regime of surface waters. Part or all of the flow for Beaver Creek is diverted for irrigation during the summer. This upstream use affects the amount of creek water flowing through Montezuma Well and Montezuma Castle.

Water rights to surface water in the Verde River as well as groundwater are currently being adjudicated. The NPS claims for the monument include "all surface and ground water resources including creeks, springs, seeps and confined and unconfined aquifers within portions of the unit reserved or withdrawn from public domain and continuously administered by Federal agencies. This includes Beaver Creek and its unnamed tributaries." The claim for the reserved rights at Montezuma Castle includes consumptive and non-consumptive uses of all groundwater wells and surface waters. For Montezuma Well, two groundwater wells and the prehistoric/historic irrigation ditch are included in the claim. Half of the discharge from the Well is claimed. Water rights here are appropriative and reserved.

Cultural History

Montezuma Castle is one of the most publicized archeological sites in the southwest and concern for its preservation, starting a century ago, was a major factor in the nation's historic preservation movement. Although the Castle itself was closed to the public in 1951, it is one of the most-visited prehistoric southwestern ruins in the country, and is the best-known Sinagua site.

Montezuma Castle National Monument preserves archeological sites and features representing Hohokam and Sinagua settlement in the Middle Verde drainage from approximately AD 600 to AD 1450. During this span of time, a native hunting/gathering population developed a strong irrigation-based horticultural economy, drawing on technological advances adopted from the Hohokam to the south and the Sinagua to the north. By AD 1300, the Verde River supported a hierarchical system of villages and population centers, integrated by exchange and seasonal interaction. This exchange network extended from the Mogollon Rim to the Sonoran Desert and beyond. Montezuma Castle is part of an estimated 100-room community which was an important component of this system. Beaver Creek was a major population area and a trail corridor into the Northern Sinagua region. The year round oasis at the Well must have been a major factor in settlement. Numerous prehistoric irrigation canals, most of which have been buried by sediments, lie within the monument. Farmlands along the creeks were primary sustaining areas for the Sinagua from which they drew the important foods and other products for survival and trade. These parcels were broken into many small flats, isolated by cliffs and the meandering stream. One of the largest parcels of arable bottomland lies in and adjacent to the Well. It appears that the Sinagua intensively farmed crops such as corn, beans, squash, and cotton. The riparian and surrounding uplands provided wildlife and native plants for foods and other products.

Shortly after abandonment of the Verde Valley by the Sinagua, groups of foragers and hunters reappeared. Around 1500 A.D., the Yavapai occupied the valley and the Apache lived in the mountains to the east. They, too, were farmers, hunters, and foragers.

In 1582, an expedition led by Spanish explorer Antonia de Espejo left the Hopi mesas on the trail to the copper mines. When in the Verde Valley, they found a group of Yavapai mining and trading the green and blue pigments (near the present town of Jerome). In 1598, 1604, and 1776, other Spanish explorers and padres visited the valley and wrote about the inhabitants and their cultural and economic systems.

The earliest Anglo explorers and trappers used the Verde as a trail stop for many years, but not until the 1850s and 1860s did settlers begin to stay in the valley. The Yavapai were placed under military control in 1875 and moved to the San Carlos reservation. In 1900 they were returned to the valley at the Camp Verde reservation.

STATUS OF CURRENT RESOURCES DATABASE

Cultural Resources Baseline Information

Baseline information for the monument is lacking in a number of areas. A list of these deficiencies is as follows: 1) basic information on the ruins and artifacts prior to Service acquisition in 1906; 2) analysis of records and artifacts from the site; 3) cataloging of backlogged museum objects for basic federal property accountability; 4) Historic and Prehistoric Structures Preservation Guides; 5) administrative history for the area established in 1906; 6) entry of studies into the Cultural Resource Bibliography (CRBIB); 7) updating of the List of Classified Structures (LCS); 8) updating of museum records for objects into the computer program; 9) basic information on the prehistoric irrigation system at Montezuma Well; 10) research to determine the construction and occupation periods for Montezuma Castle; and 11) entry of sites into the Archeological Site Management Information System (ASMIS), once Servicewide standards have been established for such data entries.

The following sections of this plan provide more specific details on cultural resource needs for the monument: 1) program statements, which provide additional information on needed actions; 2) Cultural Resources Documentation Checklist, which provides a summary of completed cultural resources related studies in the monument; and 3) Bibliography, which contains a list of references of studies and projects conducted in the monument.

Cultural Resources

Sites

The majority of the sites at Montezuma Castle National Monument are nationally significant and prehistoric in origin. The monument has had a 100% survey to identify cultural resources. Sixty-five prehistoric archeological sites have been recorded within the monument, ranging from early pithouse villages to protohistoric Apache camps. The sites within the monument are the best documented cluster in the middle Verde. Monument resources are available to interpret the growth of pithouse villages, the transformation to

masonry pueblos, the growth of pueblo community systems, and abandonment of the valley. Irrigation systems and broad interregional trade and interaction are also important elements of interpretation here.

Structures

The majority of the structures in Montezuma Castle National Monument are prehistoric and are at the national level of significance. These structures are the primary resource for which the area was established. With the exception of the pithouse, which receives moderate impact as a result of unintentional vandalism, the prehistoric structures in the monument experience relatively low impact.

There are three remaining historic structures in the monument which have not been placed on the National Register and have as yet undetermined significance. Two of the structures, the adobe residences at Montezuma Castle, are in good condition, receiving low impact from occupants. The third historic structure is the 1874 log cabin (smokehouse), which is in poor condition due to severe impacts from animal/pest infestations and weathering. The structure remains standing, though there is little left of the supporting log walls. The documentation level for this structure is poor which has hindered progress toward National Register nomination.

Both Montezuma Castle and Montezuma Well have been completely surveyed for potential National Register structures. The monument's List of Classified Structures represents a complete inventory of all structures that are either on the National Register or which the Western Regional Office considers eligible for the National Register.

Objects

The Montezuma Castle National Monument collections are primarily comprised of archeological material recovered from excavating the ruins. These collections are either on exhibit in the park museum (about 140 items) or stored and curated at the Museum Collections Repository, Western Archeological and Conservation Center (MCR-WACC), Tucson, Arizona. There are a small number of other types of objects in the collection including ethnographic, historic, and biological specimens (for exact numbers, please refer to the summary chart for objects).

The MCR-WACC has recently completed cataloging all material, and basically, the collections are in good condition. The Montezuma Castle museum is in need of climate controls and further security systems in order to protect artifacts to NPS standards. The monument acquires curatorial items at a very slow rate; only three items have been acquired over the last three years. Therefore, no future cataloging backlog is expected.

Cultural Context/Theme

In the thematic analysis, History and Prehistory in the National Park System and the National Historic Landmarks Program (1987), Montezuma Castle represents:

I. CULTURAL DEVELOPMENTS: INDIGENOUS AMERICAN POPULATIONS

B. Post-Archaic and Pre-Contact Developments

8. Southwestern Farmers

C. Prehistoric Archeology: Topical Facets

1. Prehistoric Architecture
2. Prehistoric Technology
3. Prehistoric Social and Political Organization
5. Prehistoric Arts/Handicrafts
8. Prehistoric Economics/Trade
12. Prehistoric Settlements and Settlement Patterns
16. Prehistoric Horticulture
18. Prehistoric Demographics
19. Prehistoric Cultural Change

The USFS is currently updating their Archeological Context Study of the Verde Valley, and will include Montezuma Castle and new NPS data in their analysis.

In the period 1916-1942, there developed in western parks a style of architecture employing native materials to blend the structure into the environment which has been referred to as "rustic architecture," "Parkitecture," or "Architecture in the Parks." Rustic is a style which, through the use of native materials (in the particular park or area of the park) in proper scale, and through the avoidance of rigid straight lines and over-sophistication, gives the feeling of having been built by pioneer craftsmen with limited hand tools. It thus achieves sympathy with natural surroundings and with the past.

At Montezuma Castle, adobe residences 4 and 5, designed in the Pueblo style of rustic architecture are on the National Register of Historic Places. The structures are of local significance in the fields of architecture and landscape architecture as quality examples of environmental design. They were constructed in 1939 under a Public Works Program.

In the thematic analysis, History and Prehistory in the National Park System and the National Historic Landmarks Program (1987), Montezuma Castle represents:

VII. AMERICA AT WORK (Theme)

E. Architecture (Sub-theme)

6. Other Specialized-Rustic (Facet)

Natural Resources Baseline Information

Lack of data about the biological resources is a critical problem. The few studies and inventories done provide some information to manage resources, but much more is needed for comprehensive understanding of the environment and inter-relationships.

The National Park Service is currently developing Servicewide "Standards for Natural Resources Inventory and Monitoring" which, when available, will be helpful in more uniformly describing information in this section. In the meantime, the status of Montezuma Castle National Monument's resource information base is thoroughly inadequate for the job

at hand. The major focus of the natural resources section of this Resources Management Plan is the development of an adequate baseline data base for the monument.

Some baseline information does exist for Montezuma Castle, but the level of information in past and current studies is simply inadequate to gather complete knowledge of resources to guide proper management over the long run. Consequently, most of the natural resources program statements listed within this natural and cultural resources management plan are designed to provide baseline data for the monument. Currently, the natural resources data base is comprised of the following information:

An inventory of plants exists primarily resulting from a specific survey published in 1960. In addition, partial plant lists have been generated from surveys and scientific studies, such as mapping of trees and major shrubs in the riparian zone, aquatic vertebrate studies in the Well, water resources planning, and vegetation inventory, classification, and mapping.

For several years, studies have been done on aquatic plant and invertebrate species in Montezuma Well, resulting in the discovery of unique species and habitat. Associated coring and radiocarbon dating of the bottom sediment showed prehistoric vegetation and aquatic environment.

Geological studies have been conducted for Montezuma Well and cave.

An autecology of sycamore and preparation of a base map of the Castle riparian zone were done. This literature search was done to provide management with basic information about an important tree species in the monument that contributes significantly to the aesthetic environment around the Castle. The management question was what was needed to maintain the gallery forest of sycamores.

A 1931 inventory map was done of trees and major shrubs in the riparian zone along Wet Beaver Creek and Beaver Creek from Montezuma Well to Montezuma Castle. In 1988, a study was contracted for another inventory and mapping of the Castle vicinity. This will show changes over time in the vegetation and help managers identify problems and techniques to maintain the sycamore-dominated gallery forest.

Low level air photographs were taken of all units at a scale of 1" = 200'. These have proven invaluable for discussion, planning, and illustration of park concerns.

A vegetation study was contracted for the entire monument to do vegetation inventory, classification, and mapping in 1987. Permanent plots were established for long-term monitoring, and historic photos were retaken. The report included impacts and changes of vegetation communities due to human influences, such as grazing, fire, agriculture, and visitation.

In preparation for writing a water resources plan, a contract was let to gather information about water resources for the monument. It summarized historical data and research as well as identified water resources related issues. The final water resources management plan

(September 1992) consists of the report combined with program statements from earlier versions of the natural and cultural resources management plan.

Subsequent to the vegetation study for the entire monument, another one was contracted to more thoroughly examine the wall of Montezuma Well. This was started in 1988 and entailed vegetation inventory, classification, and mapping. Permanent plots will be established for long termed monitoring, and historic photos will be retaken. The report will also include impacts and changes of vegetation communities due to human influences.

RESOURCES MANAGEMENT AND RESEARCH PROGRAM

Overview of Current Program and Needs

Since the Castle and Well units have both had complete archeological inventories, and interpretation will continue to focus on the same sites and objects now on exhibit, the primary cultural resource program needs are to maintain these objects and sites. In addition, collection and assessment of existing records and data is needed to provide background for management and interpretation of the archeology and history of the monument.

A continuous need is the stabilization of sites on exhibit, including Montezuma Castle, surface pueblos along the trails, and an excavated pit house at Montezuma Well. Although the Castle is in excellent preservation, and has been closed to the public since 1951, its condition still requires periodic monitoring; any significant deterioration could result in its collapse from its perch in the cliff. An important source of data on the condition of the castle as it has appeared over the last century is historic photographs, many of which are in private collections or institutions; an inventory of these photographs is needed. Small pueblos with standing walls at the Castle and Well are stable, but are subject to impact from visitation. The Hohokam-type pit house at the Well unit, the only structure of its kind on display in the Service, needs special attention; its floor was coated with a polymer amended mud after excavation, over 30 years ago. This coating is cracking and deteriorating, detracting from the authenticity of appearance. It is important that a specialist in historic structure maintenance inspect the ruins at regular intervals, prepare historic preservation guides, and establish a regular schedule for stabilization and repair.

The monument has a significant and very valuable collection of artifacts on display, which interpret both prehistoric and historic Native American cultures of the area. These are presently in exhibit cases that cannot be continuously monitored, and which could be easily burglarized. New security measures are required for their protection. The fluctuation of temperature and humidity in the existing visitor center has real potential for harm to some unique artifacts made from organic material, and needs to be controlled by modification or replacement of the existing exhibit space. In addition to the approximately 140 items at the monument, the Western Archeological and Conservation Center stores over 5000 artifacts from the monument. Planning storage, treatment, and security of these objects requires a Collection Management Plan. Since Montezuma Castle was excavated by archeologists and amateurs prior to establishment of the monument, there are probably more objects in private and institutional collections than there are stored by the Service. The location and extent of

the collections have never been determined; a survey and inventory of them would provide valuable data for future research and interpretation.

Site records, reference bibliography and interpretive context for the prehistoric and ethnographic resources of the monument have been periodically revised, but need to be updated for ready use in interpretation, management and research. Archeological site records have yet to be entered in the national computerized Archeological Site Management Information System. An archeological overview and annotated bibliography were prepared in 1977; since then research on the Sinagua and Hohokam has been accomplished within the monument and in nearby areas, which can add to interpretation. These should be incorporated in a revised overview and bibliography.

Two research topics have the potential to contribute to interpretation of the prehistoric resources. While it is presumed that irrigation systems were essential to the prehistoric settlement in and around the monument, little is actually known about the extent and nature of the irrigation canal network at Montezuma Well. Mapping and excavation of the canal segments should provide valuable new information on these subjects. Another important question is the age of Montezuma Castle itself. It is assumed that the Castle belongs to the Tuzigoot Phase (AD 1200-1400), but there is no direct evidence for this. There is no collection of datable pottery from the cliff dwelling, and none of the well-preserved wooden beams in the structure are datable by tree-rings. A series of dates from small samples taken from the wooden beams, using C14 accelerator dating, should bracket the age of the structure.

Some historic research can contribute to management of the monument's cultural resources. The last administrative history was written in 1965. Documenting activities at the monument since then in an Administrative History would provide general historical data, as well as an assessment of the historic smokehouse at Montezuma Well. If it is determined that this structure qualifies for the National Register, an Historic Structure Preservation Guide for it and two historic buildings used as residences should be prepared, following which a systematic program of structures maintenance should be carried out.

Montezuma Castle National Monument has a small staff, with no single position having full-time responsibility for either cultural or natural resources planning or protection. Current staffing levels are sufficient to allow for the continuance of minimum levels of natural resource protection through such activities as pest management, tree hazard removal and other vegetation management activities, program administration, and the preparation of a management plan for prehistoric Sinaguan fields.

Cultural resources management being conducted with current staffing levels includes such activities as conserving museum objects, museum collection management, maintaining ANCS program, and program administration. These activities are routinely carried out on a recurring basis to protect cultural resources from depreciative activities.

Montezuma Castle receives cyclical preservation assistance from the Ruins Preservation Specialist of the Southern Arizona Group Office. The Western Archeological and Conservation Center provides assistance in curation of museum objects and assistance in

archeological site management. The National Biological Survey (previously the Cooperative Park Studies Unit) at the University of Arizona provides assistance with natural resources research issues. The Southern Arizona Group Office provides natural resources management and planning assistance. Almost all of this assistance, however, is predicated on project specific funding rather than on base funded activities.

None of the major threats to the monument's natural resources are currently being addressed, due to a lack of adequate staffing and associated project funds. Similar restrictions inhibit the cultural resource management efforts in the monument. The only activity currently underway which is beyond the scope of the basic ongoing program is the development of management options for the Sinaguan prehistoric fields. This effort is a pressing concern, due to the eminent expiration of a grazing lease and the need to determine the most appropriate use of these fields.

The breadth and complexity of the cultural and natural resource issues at Montezuma Castle and Tuzigoot National Monuments demand the attention of a professional resource manager. A full-time resources management specialist could be shared between the two monuments. In addition, at least $30,000 per year in project support funds is needed by Montezuma Castle National Monument to carry out the baseline research and management activities listed in this plan within a reasonable period of time. Even with funding of $30,000 per year, it would take Montezuma Castle ten years to complete their six highest priority natural resource projects (out of 26 unfunded natural projects identified to date) and five of their six highest cultural projects (out of 18 unfunded cultural projects identified to date). This excludes rebuilding the museum, which would require $350,000 in itself.

An indication of the resource funding shortage at the monument is provided by the fact that the total project funding for both cultural and natural resources programs in the last five years at Montezuma Castle has been only about $55,000. This funding has come entirely from cultural cyclic maintenance, natural resource regional rotating base funds, cultural resource preservation funds, and fee enhancement funds. Increased base funding is needed by the monument to adequately do the job at hand. Tables 1 and 2 show the levels of funding and personnel currently available for cultural and natural resources management activities in the monument.

Resources Management Assessment Program

The Resources Management Assessment Program (RMAP) is a process issued in 1993 to provide an objective assessment of the base staffing and funding needed to implement thorough natural resources management and research programs in a park. Base staffing and funding needs are objectively identified by the complexity and extent of the park's natural resources. This approach allows consistencies in program levels and staffing between parks of similar size and complexity.

The analysis has only been done for natural resources (RMAP-NR), and thus is the topic of this section. However, a cultural resources addition (RMAP-CR) has been developed, sent to parks to gather profile data, and now is being assessed. That analysis will be available in the near future and eventually will be included in this plan. The combination will provide a

comprehensive assessment for resources management staffing and funding needs in both disciplines. A similar process is being done for visitor services called VRAP, which will mesh with RMAP and be substituted for the natural resources protection data already collected and analyzed.

RMAP-NR allocates FTEs and support funding for four natural resources categories; i.e., management, protection, interpretation, and research. Each natural resources management category is subdivided into program areas comprised of groupings of resources activities. An example of a program area is vegetation management activities including exotic plant management, monitoring native plants, agricultural use management, etc.

Tables 1 and 2 show the current FTEs in Montezuma Castle and Tuzigoot going towards natural resources programs compared to the fully funded RMAP allocation of FTEs based on the park profiles that were analyzed November 1993. The FTEs are displayed by program area. The park profiles will be periodically updated, and the FTE allocations revised when there are changes.

The RMAP analysis will be consolidated when developing the resources management function since the monuments are jointly staffed and managed under one superintendency. The current natural resources program for both sites including all divisions and programs consists of 2.80 FTEs (Montezuma Castle 1.80 FTEs and Tuzigoot 1.00 FTEs) and 1.30 FTEs worth of research oversight at Montezuma Castle only furnished by the superintendent, rangers, maintenance, and administrative staff. As previously stated, there is not even one resources manager on staff. The fully funded RMAP allocations in Tables 1 and 2 show 12.17 FTEs (Montezuma Castle 6.37 FTEs and Tuzigoot 5.80 FTEs) for a comprehensive natural resources management program and 14.94 FTEs needed for the research component (Montezuma Castle 6.72 FTEs and Tuzigoot 8.22 FTEs). The break down for both parks are shown in Tables 1 and 2 for the resources management and research programs. The remaining FTEs are for protection, interpretation, administration, and maintenance for natural resources functions and support.

The FTE is used in RMAP as an expression of workload. Implementing RMAP allows either filling positions or using the monetary equivalent to fund projects rather than positions.

Corresponding project statements are in the resources management plans for each monument since the personnel will work in both parks. Only the immediate needs for resources management staff is addressed, which are, in priority, are a resources manager, a wildlife biologist, and two biological technicians. Further work will be done with the RMAP database and outputs to develop the staffing priority list for other natural resources management division positions. They will be presented in a phased approach to close the gap between the current program FTEs and fully funded program FTEs with the most critical positions first. A similar strategy will be done for cultural resources needs when the RMAP-CR is completed.

The FTEs allocated for research probably would be used to fund projects rather than fill scientist positions in the monuments. Research will be complete through agreements with

Table 1. Comparison of current and fully funded RMAP allocations (November 1993) for the natural resources program in Montezuma Castle National Memorial.

Program Area	*Current ONPS FTEs*	*Fully Funded RMAP Allocation*
Management		
Vegetation Management	0.20	1.10
Wildlife Management	0.20	0.80
Prescribed Fire Management	0.00	0.00
Water Resources Management	0.00	0.40
Air Quality Management	0.10	0.10
Geologic Resources Management	0.00	0.00
Grazing Management	0.00	0.00
Fence Maintenance	0.10	0.70
Disturbed Area Rehabilitation	0.00	0.10
Pest and Hazard Management	0.20	0.20
Environmental Planning and Compliance	0.30	0.70
Collections and Data Management	0.50	0.70
Science Consultation and Oversight	0.10	0.30
Clerical and Administrative Support	0.00	0.77
Management and Supervision	0.10	0.50
Total	**1.80**	**6.37**
Protection*		
Protection	0.60	1.00
Clerical and Administrative Support	0.00	0.15
Management and Supervision	0.00	0.50
Total	**0.60**	**1.65**
* will be revised with VRAP analysis.		
Interpretation		
Interpretation	0.50	1.00
Total	**0.50**	**1.00**
Research		
Research	1.20	5.40
Clerical and Administrative Support	0.00	0.82
Management and Supervision	0.10	0.50
Total	**1.30**	**6.72**
Administration		
Administrative Support	0.10	0.61
Total	**0.10**	**0.61**
Maintenance		
Maintenance Support	0.10	0.72
Total	**0.10**	**0.72**
GRAND TOTAL	**4.40**	**17.06**

Table 2. Comparison of current and fully funded RMAP allocations (November 1993) for the natural resources program in Tuzigoot National Memorial.

Program Area	*Current ONPS FTEs*	*Fully Funded RMAP Allocation*
Management		
Vegetation Management	0.00	1.60
Wildlife Management	0.00	1.10
Prescribed Fire Management	0.00	0.00
Water Resources Management	0.00	0.40
Air Quality Management	0.00	0.00
Geologic Resources Management	0.00	0.00
Grazing Management	0.00	0.00
Fence Maintenance	0.10	0.30
Disturbed Area Rehabilitation	0.00	0.00
Pest and Hazard Management	0.10	0.10
Environmental Planning and Compliance	0.30	0.50
Collections and Data Management	0.40	0.60
Science Consultation and Oversight	0.00	0.00
Clerical and Administrative Support	0.00	0.70
Management and Supervision	0.10	0.50
Total	**1.00**	**5.80**
Protection*		
Protection	0.30	0.60
Clerical and Administrative Support	0.00	0.10
Management and Supervision	0.00	0.00
Total	**0.30**	**0.70**
* will be revised with VRAP analysis.		
Interpretation		
Interpretation	0.30	1.00
Total	**0.30**	**1.00**
Research		
Research	0.00	6.70
Clerical and Administrative Support	0.00	1.02
Management and Supervision	0.00	0.50
Total	**0.00**	**8.22**
Administration		
Administrative Support	0.00	0.60
Total	**0.00**	**0.60**
Maintenance		
Maintenance Support	0.05	0.65
Total	**0.05**	**0.65**
GRAND TOTAL	**1.65**	**16.97**

National Biological Service, independent investigators, consulting firms or other academic entities.

Support staff for maintenance and administration would work in their respective divisions. They would help alleviate the workload resulting from increased natural resources staff and activities.

Tables 3 and 4 show the levels of 1996 funding and personnel currently available for cultural and natural resources management activities in the monument. These levels vary annually depending on the availability of funds and personnel.

The following subsection defines the major programs for natural and cultural resources in the Memorial. These are based on outlined RMAP programs.

Description of Major Programs

This section defines the major programs for natural and cultural resources in the Memorial. These are based on outlined RMAP programs.

The Montezuma Castle National Monument Resources Management Plan embodies several program statements under the categories of natural, cultural, and integrated projects. They have been arranged here into the major resources management programs for the park, which are:

- Program Administration and Management
- Resources Protection
- Information Management
- Archeology
- Historic Resources
- Collections Management
- Vegetation Management
- Wildlife Management
- Water Resources Management
- Geologic Resources Management

Following is a general overview of the major programs preceded by mention of the important legislation, regulation, and policy that influence these programs. The overview has a discussion of the topic, review of current status, and proposed actions for each major program. The following subsection is a summary in tabular form, which presents the synopsis of the problem and proposed action for each program statement grouped by the major programs. The last subsection contains the programming sheets.

Relevant Legislation, Policies, and Guidelines

Management of the national park system and its programs is guided by the constitution, public laws, proclamations, executive orders, rules, regulations, and directives of the

Table 3. National Park Service Resources Personnel for Current Year.

MONTEZUMA CASTLE NATIONAL MONUMENT

NPS RESOURCES PERSONNEL
(current year only)

FY: 1996
PARK: MOCA
FIELD AREA: IMFA

TYPE OF NPS EMPLOYEE		FTE's OF RESOURCES WORK Natural	Cultural	Total
RESEARCH SCIENTISTS (i.e., Research Grade Evaluation and Research Grant Administration Programs)				
RESOURCES SPECIALISTS (i.e., 170, 190, 193, 401, 404, 430, 808, 1015, 1016, 1215, etc.)				
025 PARK RANGERS - Resource Management		1.80	.7	2.50
025 PARK RANGERS - Resource Protection		.60		.60
025 PARK RANGERS - Resource Interpretation		.50		.50
MAINTENANCE PERSONNEL		.10	.2	.30
TOTALS OF ALL RESOURCES PERSONNEL		3.00	.90	3.90
TOTAL PARK FTE (All Personnel) 21.8	PERCENTAGE OF PARK FTE DEVOTED TO RESOURCES	13.7%	4.1%	17.9%

Table 4. Current Year Natural and Cultural Resources Funding.

MONTEZUMA CASTLE NATIONAL MONUMENT

FY: 1996

CURRENT YEAR NATURAL AND CULTURAL RESOURCES FUNDING PARK: MOCA

($ in thousands - funding by activity type) FIELD AREA: IMFA

FUNDING SOURCE	TOTAL	RESEARCH DOCUMENTATION	MITIGATION TREATMENT	MONITORING	PROTECTION	INTERPRETATION	PROGRAM ADMINISTRATION
CF2	15.0		5.9				9.1
NF2	15.8		5.0	1.0			9.8
NF3	3.0						3.0
NF8	2.0			2.0			
ALL SOURCES	35.8	0.0	10.9	3.0	0.0	0.0	21.9

Secretary of the Interior and the Assistant Secretary for Fish and Wildlife and Parks. The NPS policy must be consistent with higher authorities and with appropriate delegations of authority.

The section titled Legislation and Purpose in this plan recite the principal policy and planning documents and guidelines that frame management actions and the legislation that created the National Park Service and Montezuma Castle National Monument. Many other federal laws affect parks. Some of the more significant laws include the General Authorities (1970), Redwood National Park Act (1978), Historic Sites, Buildings and Antiquities Act (1935), National Historic Preservation Act (1966), National Environmental Policy Act (1969), Archeological Resources Protection Act (1979), Clean Air Act (1977), Clean Water Act (1977), Museum Properties Management Act (1955), Endangered Species Act (1973), Federal Insecticide, Fungicide, and Rodenticide Act (1972), Migratory Bird Treaty Act (1918), and Native American Graves Protection and Repatriation Act (1990). Important Executive Orders include Exotic Organisms (E.O. 11987), Floodplain Management of 1977 (E.O. 11988), and Protection and Enhancement of Environmental Quality (E.O. 11514, E.O. 11991). Notable Arizona legislation include Native Plant Act (1989), State Water Quality Standards (1989), Environmental Quality Act (1986), Groundwater Management Act (1980), and Wastewater Treatment Law. The Code of Federal Regulations also applies.

NPS Management Policies (1988) embodies relevant national legislation. Policy sets the framework and provides direction for management decisions. The NPS guideline series evolve from Management Policies and furnish more detailed procedures to implement policies. The guidelines generally allow for management discretion, unless specifically stated as mandatory.

Overview of Major Programs

There are ten major resources management programs for Montezuma Castle National Monument. They are described below.

- Program Administration and Management

  Administering and managing natural and cultural resources has become more complex due to the amount of information needed about resources to understand, protect, and preserve them. Servicewide resources programs have increased and compel superintendents to improve management and administration. A comprehensive program is needed to address the entire magnitude of cultural and natural resources issues facing Montezuma Castle National Monument. One program statement in this major program category states that basic resources administration and management is extremely difficult and inadequate due to lack of staff and support. Not changing the current situation will let resources continue to deteriorate and fail to comply with NPS mission and policies. The plan proposes to hire a resources management specialist with a cultural resources background as a dedicated position to construct and manage a comprehensive resources program.

- Resources Protection

Humans have lived in the Montezuma area for hundreds of years and their influences have varied from seemingly untouched to harsh impacts. Some resources have been permanently destroyed. Adjacent land uses included ranching, mining, camping, hiking, hunting, and off road driving. Vandalism does occur in the park. There are days when no parking spaces are available at the visitor center. Visitation has increased over the past decade. There are management questions about the threshold of human impacts and profile of visitor use patterns. Generation of social trials and erosion caused by visitors leaving the trails, as well as, inadequate fencing, also are also concerns for cultural and natural resources. This plan identifies programs to examine adjacent land uses, determine human impacts and use thresholds, conduct visitor use surveys, and improve boundary protection.

- Information Management

Research, projects, planning, documents, and activities on adjacent lands manufacture information which should be routinely collected. It should be stored and handled with methods that are accessible and functional. The ability to manipulate data makes it more valuable and applicable to all aspects of daily operations. Partial bibliographies have been done, but an extensive search for additional literature, reports, and other documents is needed to complete that database. This plan proposes developing an off site GIS operation, probably in the Southern Arizona Group Office, to identify existing and essential information. Material would be converted into a GIS database in order to create useable products for management awareness and decisions.

- Archeology

Prehistoric structures require regular monitoring and routine annual and cyclic preservation maintenance programs. These are necessary to prevent loss of historic fabric and structural failure principally caused by weathering as discussed in the program statements. An ethnographic overview and assessment including an ethnobotanical study will be conducted which will enhance management's ability to comply with the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act. Work will be done to maintain stabilized prehistoric ruins and to stabilize the Pithouse floor. The actual age of the Castle will be examined by running a series of small-sample carbon 14 accelerator dates. Finally, complete oral history interviews will yield information about the lesser known activities during the past century and provide a continuum of human use.

- Historic Resources

The prehistoric structures are the primary resources owing to the purpose for creating the park. Stabilization and preservation work has been done since the 1920s and has improved with better techniques and more skilled labor. Preservation has been done all these years without the essential documents. This plan calls for preparing historic

structure preservation guides required by NPS guidelines and essential to prescribe long term maintenance activities.

- Collections Management

Existing collections of natural specimens and cultural artifacts are valuable data to interpret and understand resources. Proper conservation of museum objects preserves them for future uses and lessens the urge to collect live natural specimens for impending studies. A few years ago, NPS seriously began to improve collections management nationwide as a result of congressional attention to the state of NPS collections. It has become a heightened responsibility of parks to take care of collections and rectify past problems. This plan addresses several needs for this subject. Improve management by specifically assigning this duty to a staff member trained to carry out the function. This duty is becoming more specialized, and several actions are required annually or more frequently to manage collections. Survey the park collections to assess condition and attend to those items needing conservation and preservation treatment. Write the collection management plan and update the scope of collection statement to guide preservation and future acquisitions. Expand and maintain the ANCS database. Comprehensive photographic documentation would be compiled from existing collections, and routine scientifically based pictures would be taken to record changes.

- Vegetation Management

This plan has several projects for vegetation management. Principal among them are the statements for development and implementation of a vegetation management plan and an inventory and assessment of vegetation communities. Partial surveys have been conducted, but complete inventories are needed for comprehensive understanding and protection. In some situations, vegetation will be manipulated to provide landscaping that represents the period of the prehistoric ruins, creates an aesthetic environment, provides a setting, and removes plants that may be harmful to the ruins. A statement identifies conducting an ethnographic overview and assessment including an ethnobotanical study.

- Wildlife Management

The diversity of aquatic and terrestrial habitats is also notable. Birds are the most commonly observed wildlife, and breeding densities in undisturbed riparian habitats are reported as being among the highest recorded from North America. Other fauna include the coyote, fox, bat, bobcat, mountain lion, ground squirrels, and other common rodents. Reptiles include several snakes and lizards. The Well is habitat for unique invertebrates known only from that location.

- Water Resources Management

Water is limited in this arid environment; a fact that elevates its value to humans, plants, and animals. Limited data has been kept regarding human consumption of

water in developments, and no complete survey of water resources has been conducted. The plan calls for a survey of subsurface water resources and water-related resource attributes. Monitoring protocols will be designed to document trends in quantity and quality for groundwater. Water rights would be thoroughly evaluated so management would be better prepared to protect them from outside requests for use of park water.

- Geologic Resources Management

  Baseline information about soils and geology is essential to understanding ecological components inherent to terrain features. There are broad scale maps for soils and geology for the park. The plan describes the need to continue the inventory and assessment of soils and geology to acquire in-depth, site-specific soils information for special purposes and to improve geological data.

Summary of Major Programs

The following summary sheets provide a quick glance at the topics in each program. The problems and recommended actions described in detail in the program statements are briefly summarized here.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

PROGRAM ADMINISTRATION AND MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-I-001.000	**Develop, Manage, and Administer Cultural and Natural Resources Program**	ISSUE: Lack of Resources Staff and Fiscal Support PROBLEM: Basic management of cultural and natural resources is extremely difficult due to lack of staff. Continuing with present staff level may allow park resources to deteriorate and fails to comply with NPS mission and policies.	Acquire resources management staff to expand and operate program. Use the RMAP database to identify the type of positions to acquire and develop a long term program. The RMAP analysis will be consolidated when developing the resources management function since the Montezuma Castle and Tuzigoot monuments are jointly staffed and administered by one superintendency. Sub-project statements address natural (MOCA-I-001.001) and cultural (MOCA-I-001.002; will be prepared after RMAP-CR analysis completed) staff.
MOCA-I-001.001	**Develop, Manage, and Administer Natural Resources Program**	ISSUE: Lack of Resources Staff and Fiscal Support PROBLEM: There are no dedicated resources management positions at Montezuma Castle and Tuzigoot so the limited amount of work accomplished in natural resources is done by the superintendent, ranger, maintenance, and administrative staff in conjunction with other duties. Research and some management projects have been contracted, and they absolutely depend on whether money is available.	Acquire natural resources management staff to expand and operate program. This is a sub-project statement of MOCA-I-001.000, and it is written so as not to duplicate staffing and funding requests in TUZI-I-001.000 and TUZI-I-001.001.

RESOURCE PROTECTION			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-I-100.000	**Design Monitoring Program and Train Staff in Monitoring Aircraft Overflights**	ISSUE: Lack of Basic Resource Data PROBLEM: Aircraft frequently fly over the visitor use area, headquarters, and residential areas, posing a safety hazard and creating noise intrusions which detract from visiting and working in the monument. Future study is needed to identify the magnitude of the impacts on park resources, and to develop ways to mitigate.	A monitoring program to document occurrence, type, ownership, etc., of overflights and assess impacts to prehistoric structures, people, and wildlife will be developed. Documented occurrence of flights, visitor and employee complaints, legal ramification of FAA rulings, and implementation of new regulations will attempt to stop illegal overflights.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

RESOURCE PROTECTION			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-I-100.001	**Monitor Aircraft Overflights**	ISSUE: Lack of Basic Resource Data PROBLEM: Aircraft frequently fly over the visitor use area, headquarters, and residential areas, posing a safety hazard and creating noise intrusions which detract from visiting and working in the monument. On-going monitoring is needed to identify the magnitude of the impacts on park resources, and to develop ways to mitigate.	Monitor effects on cultural and natural resources. Use wall monitoring systems to identify walls most likely to be negatively impacted by engine and rotor vibrations. Consult with historic architects and ruins stabilization archeologists to determine what mitigation is necessary to reinforce walls to desired stability. Monitor wildlife using the appropriate monitoring system resulting from project I-100.000. Document the occurrence of overflights.
MOCA-I-101.000	**Evaluate and Define Fencing and Patrol Needs**	ISSUE: Adjacent Land Use Visitor Use Impacts PROBLEM: The park's cultural and natural resources are more vulnerable to vandalism and other illegal uses due to increased development adjacent to the park. An assessment is needed to determine the types of fences, security systems, and/or management activities that would provide the most effective boundary protection.	A boundary protection program will be developed following an assessment of present security conditions. Suitable fences will be evaluated to combine effectiveness in prohibiting trespass, aesthetics, and protection of cultural and natural resources, including wildlife movement. Boundary patrols and other management activities will be examined.
MOCA-I-101.001	**Construct/Upgrade Fencing**	ISSUE: Adjacent Land Use Visitor Use Impacts PROBLEM: The park's cultural and natural resources are more vulnerable to vandalism and other illegal uses due to increased development adjacent to the park. Fences and security systems must be installed, and management activities must be implemented to provide the most effective boundary protection.	The effectiveness of boundary fences for protecting valuable cultural resources for which the monument was created and the effects of fencing itself on archeological cultural landscape values will be determined in project I-101.000. Replace fencing. NPS markers should be maintained.
MOCA-I-101.002	**Increase Boundary Patrols and Monitor Effectiveness**	ISSUE: Adjacent Land Use Visitor Use Impacts PROBLEM: The park's cultural and natural resources are more vulnerable to vandalism and other illegal uses due to increased development adjacent to the park. Management activities must be implemented to provide the most effective boundary protection.	Increase boundary patrols and monitor effectiveness of site steward program and boundary fences.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

RESOURCE PROTECTION			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-I-102.000	**Manage Pest Species and Conditions**	ISSUE: Pest Management PROBLEM: Unchecked insect, plant, and animal pest problems have the potential to escalate and may affect public health, cost of maintenance, and degrade cultural and natural resources.	Pest conditions will be managed with integrated pest management techniques. This involves preventative maintenance and regular, periodic monitoring of cultural and natural resources in the park.
MOCA-I-103.000	**Conduct Visitor Use Survey**	ISSUE: Visitor Use Impacts PROBLEM: Knowledge of visitor characteristics including demographics, perceptions, expectations, satisfactions, and behavior, enhances the managers' abilities to provide the user public with high quality recreational experiences, and preserve and protect the values which attract visitors and for which the monument was established. A comprehensive visitor survey must be designed and implemented.	Regular visitor surveys will be conducted which will document changing visitation, travel, and use patterns for the park. This will enable management to monitor visitation trends and respond to changes in a timely manner.
MOCA-C-104.000	**Improve Security Systems**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: The exhibit cases contain a number of monetarily and intrinsically valuable ethnographic and archeologic objects. The monument staff must implement modern equipment and strategies to be certain the artifacts are not vulnerable to theft or damage.	Install upgraded electronic security systems and implement other modern technology. This would offer the most effective protection for the artifacts.
MOCA-N-105.000	**Analysis of Adjacent Land Use and Status**	ISSUE: Adjacent Land Use PROBLEM: An analysis of adjacent land use is necessary to determine the degree of factors that influence management's ability to resolve potential resource utilization conflicts. Recent habitat conversions have already resulted in a loss of biological diversity and are impacting the adjacent riparian corridor. The historic and cultural scenes cannot be maintained adequately without the basic baseline information for assessing future changes in the area's hydrological regime and proximate land utilization factors.	A contract will be drawn to document and map existing land uses, evaluate historical patterns of land use, and identify external threats resulting from adjacent land use practices. Historical and present use patterns will be compared, and present utilization conflicts and resource concerns will be evaluated.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

RESOURCE PROTECTION			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-105.001	**Implement Long-Term Monitoring and Management Strategies to Protect from Potential Threats of Adjacent Land Uses**	ISSUE: Adjacent Land Use PROBLEM: Basic baseline information necessary for assessing future changes in the area's hydrological regime and proximate land utilization factors the historic and cultural scenes will be obtained in project 105.000. A long-term monitoring program must be implemented to alert management to changing conditions and allow for execution of management strategies to protect monument resources.	Implement research program to quantify and evaluate potential threats resulting from land use conflicts from project 105.000. Train monument staff to reevaluate external threats on a periodic basis. When necessary perform management actions to mitigate, or if possible eliminate, external threats stemming from external land uses.
MOCA-N-106.000	**Characterize the Hydrology of Groundwater System Supporting and Maintaining Montezuma Well and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data Groundwater Withdrawal PROBLEM: The height to which water rises in the Well is important to the archaeological and historical account. Subject to natural variation, the water surface elevation in the Well should be maintained as close to its prehistoric level as possible to convey to the visitor an appreciation of the locations of water and dwellings relative to one another, and the delivery of water to the ancient irrigation systems.	Characterize hydrology of groundwater system supporting and maintaining Montezuma Well and develop long-term monitoring protocols. This information will make it possible to evaluate potential effects of off-site land development on water flows in the Well through the use of mathematical models of existing and potential water withdrawals.
MOCA-N-106.001	**Implement Long-Term Monitoring and Management Strategies to Protect the Hydrologic Characteristics of the Archaeological and Historical Setting at Montezuma Well**	ISSUE: Lack of Basic Resource Data Groundwater Withdrawal PROBLEM: Baseline information will be collected in characterizing the hydrology of the groundwater system in 106.000. Monitoring most be on-going to alert management to imminent adverse, and possibly irreversible, effects to this resource attribute from external water use.	Implement long-term monitoring and management strategies to protect the hydrologic characteristics of the archaeological and historical setting at Montezuma Well. Monument staff will be trained in the implementation of long-term monitoring as prescribed in 106.000.
MOCA-N-107.000	**Identify Flood-Prone Areas for Protection of Lives and Property**	ISSUE: Flood Hazards PROBLEM: Visitor attractions are located in close proximity to active floodplains. Management is concerned that visitors and property may be at risk from flash flood hazards. A flood hazard assessment is not presently available, nor are there mitigation recommendations, specifically applicable to the monument.	A thorough hydrologic evaluation will be conducted to delineate and evaluate flood hazards. This prudent study will give the superintendent information necessary to ensure that resources, the public, and employees are being protected from unreasonable exposure to flood hazards

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

RESOURCE PROTECTION			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-108.000	**Determine Visitor Impacts and Use Limits and Develop Long-Term Monitoring Protocols**	ISSUE: Visitor Use Impacts PROBLEM: The portion of the monument containing the Castle totals nearly 600 acres, yet visitor use is concentrated into an area of approximately 20 acres. Visitor impacts on monument resources must be clearly identified and assessed, along with a determination of the maximum number of visitors that can be accommodated per day under the current limits of monument facilities and management.	Conduct a study of visitor impacts and use limits and develop long-term monitoring protocols. A combination study of visitor impacts on monument resources, both current and anticipated, and the determination of use limits for the monument, would provide staff with definitive tools with which to more effectively manage the heavy visitation they are experiencing.
MOCA-N-108.001	**Implement Long-Term Monitoring of Visitor Impacts and Use Limits**	ISSUE: Visitor Use Impacts PROBLEM: The portion of the monument containing the Castle totals nearly 600 acres, yet visitor use is concentrated into an area of approximately 20 acres. Visitor impacts on monument resources must be clearly identified and assessed, along with a determination of the maximum number of visitors that can be accommodated per day under the current limits of monument facilities and management.	Staff will be trained to implement long-term monitoring program that will be established in 108.000. Threats of increased visitation on visitor safety, logistics, impacts on facilities, and natural and cultural resources will be analyzed. Data will be collected to determine maximum visitation levels allowable before damage occurs to cultural and natural resources or to the visitor experience.

INFORMATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-I-200.000	**Conduct Ethnographic Overview and Assessment Including Ethnobotanical Study**	ISSUE: Lack of Basic Resource Data PROBLEM: The park does not have an ethnographic overview and assessment, which is a basic cultural resources document necessary to identify and establish traditional uses by Native American groups. Documenting prehistoric, historic, and current Native American use is essential to manage, interpret, and restore relationships with appropriate tribes.	An ethnographic overview and assessment, including an ethnobotanical study will be conducted. This will allow management to comply with the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

INFORMATION MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-I-201.000	**Conduct Literature Search, Compile & Annotate Reference List in Computerized Bibliographic Information Retrieval System**	ISSUE: Lack of Basic Resource Data PROBLEM: Currently, the monument does not have the ability to efficiently track the historic, technical, and ecological information that is available. Without the development of an adequate tracking system and information base, park management cannot efficiently manage the resource or respond to developing resource issues.	A computerized bibliographic system will be developed and an annotated bibliography produced. Adequate and effective access to informational resources can prevent duplication of effort and costly mistakes, and will increase management's ability to respond effectively to cultural and natural resource issues.
MOCA-I-201.001	**Update Bibliographic Information Retrieval System**	ISSUE: Lack of Basic Resource Data PROBLEM: Researchers and other professionals routinely depend upon and utilize the monument's information base as the first step in addressing management concerns. Annually updating the computerized bibliographic information retrieval system will place the monument in a better position to assess past actions, evaluate current programs, and identify potential resource management problems.	Update bibliographic database annually. Management will have the ability to respond effectively to cultural and natural resource issues using the most current data.
MOCA-I-202.000	**Prepare a Geographic Information Plan**	ISSUE: Lack of Basic Resource Data Lack of Information Management System PROBLEM: The park's resources are in a continual state of change which makes it difficult to predict future resource conditions and quantify effects from external threats. Montezuma Castle National Monument does not have access to a GIS system which would be instrumental in recording new information, detecting changes, analyzing trends, and projecting possible future conditions resulting from these external resource pressures.	The monument staff will write and implement the actions outlined in a GIS plan. A GIS Specialist will be detailed to implement the program. GIS will be fully integrated with other resources management and research programs, such as archeological site evaluation and ecological monitoring. The GIS will eventually be integrated with all monument functions, including maintenance and interpretation.
MOCA-I-202.001	**Implement a Geographic Information Plan**	ISSUE: Lack of Basic Resource Data Lack of Information Management System PROBLEM: Implementing a GIS plan, resulting from 202.000, is necessary to detect changes, analyze trends, and project possible future conditions resulting from these external resource pressures.	Implement GIS plan and apply GIS techniques to management operations. An NPS multidisciplinary GIS task force would be created to develop and standardize the GIS protocols that would be used by the monument staff.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

INFORMATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-203.000	**Update the Administrative History**	ISSUE: Lack of Information Management System PROBLEM: An administrative history, required by NPS policies, is a succinct source of briefings on past milestones, agreements, commitments, etc. that affect daily operations. The administrative history for Montezuma Castle National Monument must be updated yearly.	The administrative history will be updated to include comprehensive information on events from 1965 to present. This will help the superintendent understand the public and private interactions that have occurred since the earliest days of the park. Staff will update it annually with a summation of significant events to keep it current.
MOCA-C-204.000	**Compile and Maintain Comprehensive Photographic Documentation**	ISSUE: Lack of Information Management System PROBLEM: No comprehensive searches of historic photographs have been done for cultural or natural resources. Without baseline data, undesirable changes in resources and land development may remain undetected. Long-termed photos are invaluable as a tool for conducting inventories and mapping occurrences and distributions.	Scientifically based photographic documentation will be compiled and maintained. Photographs and airborne video will be taken, aerial photographs will be digitized and put into GIS format, photographs will be curated and cataloged, and a schedule defined for routine retaking of photographs.
MOCA-C-205.000	**Complete Oral Interviews of People With Historical Knowledge of the Monument**	ISSUE: Lack of Information Management System PROBLEM: Interviews with individuals knowledgeable about the history of the monument are incomplete. Many former employees and citizens of the area may provide valuable information regarding the history of the monument and early programs and operations.	Former employees, longtime local families, and others who have information about the historical and developmental periods of the monument will be identified. Oral interviews will be conducted and documented with appropriate media. A report of new information gathered by this project will be prepared and findings will be integrated with the administrative history.
MOCA-N-206.000	**Develop an Annotated Natural Resources Bibliographic Database**	ISSUE: Lack of Basic Resource Data PROBLEM: Natural resources of the monument have been addressed in various documents; however, the park does not have an exhaustive list of references. Therefore, duplication of research efforts may occur. An annotated natural resources bibliographic database would be useful for interpretive services, research, and management references.	Develop a natural resources bibliographic database by a search of NPS and other agency files, college, and university graduate theses and dissertations, electronic reference systems, and popular literature. Selected references will be acquired and others will be listed by source.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

INFORMATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-206.001	**Update Annotated Natural Resources Bibliographic Database Annually**	ISSUE: Lack of Basic Resource Data PROBLEM: Natural resources of the monument have been addressed in various documents; however, the park does not have an exhaustive list of references. Therefore, duplication of research efforts may occur. An annotated natural resources bibliographic database would be useful for interpretive services, research, and management references.	Update annotated natural resources bibliographic database annually. Park staff will be responsible for keeping the database current; nationwide searches may be required periodically.
MOCA-N-207.000	**Inventory the Basic Natural Resources of Montezuma Well and Adjacent Riparian and Terrestrial Habitat and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data Groundwater Withdrawal PROBLEM: The growing community south of the monument increases demand for and consumption of groundwater, which may have a negative impact on the Well. A survey of all resources associated with the Well is needed. Tens, if not hundreds, of taxa in Montezuma Well are found nowhere else on earth. The breadth of species diversity and the complexity of interactions among organisms in this one-of-a-kind ecosystem are only now beginning to be recognized.	A thorough resources basic inventory of the Well and adjacent riparian and terrestrial areas will be conducted. This will provide in-depth information on occurrence and status of rare species in the Well. This study will also indicate what species of native and non-native plants and animals are present and provide an understanding of the interrelationships among the aquatic, riparian, and terrestrial components of the ecosystem. Information about the Well and its biota will allow management to make appropriate decisions in protecting the resources associated with the Well.
MOCA-N-207.001	**Implement Long-Term Monitoring of the Basic Natural Resources of Montezuma Well and Adjacent Riparian and Terrestrial Habitat**	ISSUE: Lack of Basic Resource Data PROBLEM: The growing community south of the monument increases demand for and consumption of groundwater, which may have a negative impact on the Well. Current data is necessary to protect monument resources.	Implement long-term monitoring of the basic natural resources. This will provide the superintendent with in-depth current information on occurrence and status of rare species in the Well and some aspects of their life history. This information about the Well and its biota will allow the manager to make appropriate decisions in protecting the resources associated with the Well on both a short term and a long term basis. Long-term monitoring will follow protocols developed in the initial inventory, 207.000.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

INFORMATION MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-208.000	**Develop Program to Continually Integrate Long-Term Monitoring of Ecosystems**	ISSUE: Lack of Basic Resource Data PROBLEM: This resources management plan calls for conducting a wide variety of studies to delineate and quantify cultural and ecological values of Montezuma Castle National Monument. If individual long-term monitoring protocols are not integrated into a coherent and unified program for the park, the value of these studies will be greatly depreciated.	The monitoring protocols will be periodically evaluated with the oversight of an advisory group of scientists and managers. The best of the protocols will be integrated into an overall long-term monitoring program for the park to provide an empirical assessment of general ecosystem health and trends.

ARCHEOLOGY			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-C-300.000	**Stabilize Pithouse Floor**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: The surface of the pithouse excavation has begun to crack and come loose in a few areas, exposing the fragile earth beneath. Erosion is beginning to damage exposed areas, seriously endangering this resource. The surface has been patched in places, but patches have not blended well with the treated mud and have developed shrinkage cracks around the edges.	The amended mud surface will be removed and replaced. The fragile earth features will be protected from further erosion. A team of three trained ruins stabilization experts will remove the existing amended mud surface and install a new protective layer of amended mud over the earth features in the pithouse floor.
MOCA-C-301.000	**Complete Archeological Site Management Information System**	ISSUE: Lack of Information Management System PROBLEM: The Archeological Site Management Information System for Montezuma Castle has been completed through a total archeological inventory, with the exception of two acres on the northeast boundary, a plan map of Castle A, and a record and description of cave structures below Montezuma Castle.	The remaining areas will be surveyed, mapped, and recorded. A publishable report will be produced. Information will be entered into the Archeological Site Management Information System.
MOCA-C-302.000	**Date Montezuma Castle**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: Since Montezuma Castle was almost entirely cleared of artifacts by the late 1800's and none of the structural wood is datable by the tree-ring method, there are no direct dates for the ruin. The actual age of the Castle is not known.	A series of small-sample carbon 14 accelerator dates will be run to date carbon-containing objects from the outer surfaces of a sample of wooden beams from the Castle.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

ARCHEOLOGY			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-303.000	**Archeological Overview and Assessment**	ISSUE: Lack of Basic Resource Data PROBLEM: The general archeological overview of the Verde Valley done in 1977 provided a general context for Montezuma Castle, but did not address prehistoric settlement or landscape of which Montezuma Castle and nearby sites were a part. Further study should be done to produce a report on settlement and the probable prehistoric landscape of Montezuma Castle and Well.	An archeological overview and assessment will be conducted using previous data and reports from the Beaver Creek study and other climate and archeobotanical data for the park. This study will provide valuable scientific and interpretive data on the settlement of and probable prehistoric landscape at Montezuma Castle and Montezuma Well.
MOCA-C-304.000	**Maintain Stabilized Prehistoric Ruins**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: The ruins require regular monitoring and routine annual and cyclic preservation maintenance programs to prevent loss of historic fabric and structural failure. The structures are now in a maintainable condition and the impact is low, however to keep the structures in this condition they must be maintained on a cyclic basis.	Following instructions in the historic structure preservation guide, the maintenance staff will continue to maintain the structures. The Southern Arizona Group ruins stabilization specialist will provide assistance for training and difficult maintenance tasks.

HISTORIC RESOURCES			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-400.000	**Conduct Study of Montezuma Castle Irrigation System**	ISSUE: Lack of Information Management System PROBLEM: It is assumed that the prehistoric sites near Montezuma Well were small farming settlements that relied on irrigation ditches coming from the Well. However, the ditch system has not been systematically studied to determine its age, extent, flow capacity, or the results of mineral deposits in the canal.	A thorough study of the Montezuma Castle irrigation ditch system will be conducted to gather information on flow rates, length of use, aerial extent of the system, etc.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

HISTORIC RESOURCES			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-401.000	**Prepare Historic Structure Preservation Guide: Historic Structures**	ISSUE: Lack of Information Management System Deterioration of Cultural and Natural Resources PROBLEM: Historic structures No. 04 and No. 05 are now in a maintainable condition. However, it is imperative to provide maintenance personnel with a reference for programming, continued housekeeping, and routine and cyclic preservation maintenance. The historic structures preservation guide will provide the necessary information for orderly, timely, and proper inspection and maintenance.	A historic structures preservation guide will be prepared by park maintenance personnel, a historical architect, and engineers as required. A task directive, outlining the requirements and goals of the project, will be prepared by the Western Region Division of Park Historic Preservation. The completed document will contain three major sections: instructions, schedules, and reference materials.
MOCA-C-402.000	**Prepare Historic Structure Preservation Guide: Prehistoric Structures**	ISSUE: Lack of Information Management System Deterioration of Cultural and Natural Resources PROBLEM: The impact on the prehistoric structures is caused by visitation and erosion. Directing the maintenance activities on these structures is of the utmost importance to ensure that the present maintainable condition of the structures is retained without loss of historic fabric or details. These prehistoric resources are of national significance and are the prime resource for which the monument was established.	Maintenance and preservation activities on the structures will follow a prescribed schedule and be accomplished along parameters that will ensure the impact will remain low. A task directive, outlining the requirements and goals of the project, will be prepared by the Western Region Division of Park Historic Preservation. The HSPG will be a working document, produced in loose-leaf format with the pages dated to facilitate updating without reprinting the entire document.
MOCA-C-403.000	**Maintain Historic Structures**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: Cyclic maintenance must be performed on two residences to keep the impact from normal daily use by monument personnel at a low level. Maintenance inspections must be performed to ensure that water and other deteriorating elements are discovered before problems develop.	Following instructions in a historic structures preservation guide, the monument's maintenance staff will continue to maintain these buildings. The Southern Arizona Group ruins stabilization specialist will provide assistance for training and difficult maintenance tasks.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

HISTORIC RESOURCES			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-404.000	**Establish Program for Long-Term Monitoring of Cultural Setting**	ISSUE: Lack of Basic Resource Data Deterioration of Cultural and Natural Resources PROBLEM: This resources management plan calls for a wide variety of studies to delineate and quantify cultural and ecological values of Montezuma Castle National Monument. Studies recommend long-term monitoring protocols for each of the respective components. However, if these individual protocols are not integrated into a coherent and unified program for the monument the value of these studies will be greatly depreciated.	The results from inventory and assessment projects and cultural resources protection studies will be integrated into a carefully designed program for long-term monitoring of cultural resources. Such a monitoring program will put the monument in conformance with NPS policy and make it possible for staff to gather empirical data to ensure that ecosystems are functioning properly in the atmosphere of urban encroachment that surrounds the monument today.
MOCA-C-405.000	**Conduct Historic Resources Study**	ISSUE: Lack of Basic Resource Data Deterioration of Cultural and Natural Resources PROBLEM: The historic resources at Montezuma Castle and Well have not all been formally studied. Without further study age, complexity, and importance to the history of the ruins and surrounding area cannot be adequately known or fully interpreted. Future programs at Montezuma Castle and Well such as vegetation management could impact the integrity of the resources. A historic resource study of the Montezuma Well Smokehouse and Montezuma Castle National Monument staff residences, accompanied by requisite National Register forms and historic base maps must be conducted.	Conduct a historic resource study. This will study the historic resources associated with the historic site to provide data for accurate interpretation. Thorough background research and archeological testing of portions of the resources will be required to establish chronological age and pertinent data.

COLLECTIONS MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-500.000	**Conserve Museum Objects**	ISSUE: Lack of Information Management System PROBLEM: The museum collection at Montezuma Castle has been on exhibit for almost 30 continuous years. Many of the items are organic or repaired archeological items that may be particularly fragile. A collection condition survey, conducted in August of 1988, has identified objects that are in need of conservation treatment.	Artifacts in need of conservation would be prioritized by the collection condition survey and object treatment requests would be submitted by the park to the regional curator for approval. Conservators would treat objects following approval of the treatment proposal by the superintendent and the regional curator.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

COLLECTIONS MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-501.000	**Manage Park Museum Collections and Exhibits**	ISSUE: Lack of Information Management System PROBLEM: There are 140 objects are on display at the Mission 66 Visitor Center Museum. To maintain these objects, a number of actions need to be accomplished on an annual or more frequent basis: Collection Management Report, Annual Inventory for Museum Property, IPM monitoring, curatorial housekeeping, curatorial recordkeeping (accession and catalog records), Scope of Collection Statement review, and environmental recording of all spaces with museum objects.	The collection will be managed through a staff member specifically assigned collections management duties. An on-site, trained person will be available as-needed to perform any collections management duties, which will ensure continuity of work and records. Proper training in curatorial methods from the regional office or MCR-WACC will be provided for any staff member working with the collection.
MOCA-C-502.000	**Update and Maintain Automated National Catalog System**	ISSUE: Lack of Information Management System PROBLEM: The 140 items remaining at the monument have not yet been entered into the Automated National Catalog System. These items and future acquisitions must be added to the data base to allow park staff and management to manipulate the data and provide reports on a variety of subjects.	Park staff will input the data for the 140 items located in the park. The ANCS program can be used with minimal training and the input of records can be accomplished in a relatively short period of time. The purchase of a computer would be necessary for this project.
MOCA-C-503.000	**Rebuild Montezuma Castle Museum**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: The items on display in the museum are made up of a variety of materials with a great number of the artifacts particularly vulnerable to the changes in environment. The environment of the museum has high relative humidity coupled with rapid changes in both relative humidity and temperature. Such an environment is conducive to the presence of museum pests.	The visitor center will be rebuilt to include an expanded visitor contact area, sales outlet, and museum exhibits. More visitor contact space, an improved natural history association sales outlet area, a climate control system that regulates temperature and relative humidity, and an expanded the information desk will be provided.
MOCA-C-504.000	**Survey and Inventory Collections for Montezuma Castle Cultural Objects**	ISSUE: Lack of Information Management System PROBLEM: It is likely that archeological collections from Montezuma Castle, Montezuma Well, and other sites within the monument exist in institutions outside the National Park Service. Except for a few items located at the American Museum of Natural History, there is no information of the location of any artifacts from the prehistoric sites within the monument not currently in NPS possession.	An archeologist or a curator with archeological experience will conduct a survey of the most pertinent institutions and longtime local families to determine where artifacts and information related to the ruins and excavations might be located.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

COLLECTIONS MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-C-505.000	**Update/Correct Cultural Resources Bibliography**	ISSUE: Lack of Information Management System PROBLEM: The Cultural Resources Bibliography has not been systematically updated for the park as required by Guideline NPS 28. Without an up-to-date bibliography, it is cumbersome to locate scattered information and there is a potential for unnecessary duplication.	The Cultural Resources Bibliography will be updated with archeological reports and other types of cultural resource literature. Libraries of other parks, universities, museums, and private collections will be surveyed for relevant references and entered into CRBIB. Park staff will complete annual updates.
MOCA-C-506.000	**Write Collection Management Plan**	ISSUE: Lack of Information Management System PROBLEM: Management of the collection of archeological, ethnological, historical, and natural material is an ongoing concern. The park is lacking a collection management plan which is required by Guideline NPS 28: Cultural Resources Management.	The collection management plan will be written by a curator from a park, MCR-WACC, or the regional office. This is the most cost-effective, and provides the outside expertise the monument can benefit from. This plan will be in the form of expanded trip report.
MOCA-C-507.000	**Establish Exhibit Maintenance**	ISSUE: Deterioration of Cultural and Natural Resources PROBLEM: All exhibits need work from time to time to maintain them in good order. This includes installation of new photographs, cleaning of exhibit panels and cases, replacement of worn-out or damaged equipment, and, occasionally, the replacement of labels due to former inaccuracies or results of new research.	A program of exhibit maintenance will be established that includes replacement of damaged or worn material and cleaning of all exhibits as necessary. This will ensure that the exhibits meet all NPS standards and convey correct information to the public.
MOCA-N-508.000	**Survey and Inventory Collections for Natural History Specimens**	ISSUE: Lack of Basic Resource Data PROBLEM: Information regarding natural history collections is limited at the present time. To fully study and understand the environment of the area, all natural history collections need to be located, cataloged, studied, and compared.	A curator will conduct a survey of the most pertinent institutions to determine where natural history objects and related documentation might be located. A report will be written by the curator documenting description of the items, their locations, current ownership, condition, possible return to NPS, availability of cataloging data, and other relevant information.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

VEGETATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-I-600.000	**Prepare a Management Plan for Prehistoric Sinagua Fields**	ISSUE: Management of Prehistoric Fields PROBLEM: Without adequate research management is unable to determine the appropriate use of the pasture considering prehistoric and historic uses as well as water rights, grazing impacts, protection of cultural and natural resources, and visitor and employee safety.	An environmental assessment will be prepared to evaluate alternatives including; irrigated pasture with grazing, irrigated meadow for hay without grazing, irrigated hay meadow with some grazing, cultivated alfalfa, corn, or other crop, and restore native mesquite bosque community.
MOCA-I-601.000	**Manage Vegetation: Rehabilitation, Landscaping, and Hazard Tree Removal**	ISSUE: Lack of Basic Resource Data Lack of Comprehensive Vegetation Management PROBLEM: Vegetation must be managed to enhance the cultural setting, protect cultural resources, and preserve native vegetation. The monument has heavy visitation, past site excavation, past grazing, social trailing, work access, and facilities development that result in occasional impacted areas needing restoration. Landscaping is also needed to maintain native plant compositions that align with the prehistoric and historic land uses.	A vegetation management program will be developed and implemented. Areas that need revegetation and landscaping will be identified, botanical information about specific species gathered, seed stock for demonstration gardens obtained, and hazardous trees identified and removed. It will be designed for maintenance personnel without background in landscape management to be trained to properly care for the plantings.
MOCA-N-602.000	**Inventory Sensitive and Threatened/ Endangered Flora**	ISSUE: Lack of Basic Resource Data PROBLEM: There has not been a systematic survey to identify all rare plants at Montezuma Castle National Monument. It is probable that additional rare life forms occur in the monument and may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern.	A systematic survey for rare species will be conducted. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act.
MOCA-N-602.001	**Monitor Sensitive and Threatened/Endangered Flora**	ISSUE: Lack of Basic Resource Data PROBLEM: Sensitive, threatened and endangered species in the monument may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff must continually be aware of any rare plants potentially near the monument boundaries.	Monitor sensitive, threatened, and endangered flora. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act. A thorough search of monument habitats must be conducted periodically.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

VEGETATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-603.000	**Conduct Inventory and Assessment: Vegetation and Flora and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Vegetation is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Thus, vegetational analyses can be used as a tool for examining potential environmental problems. Existing vegetation and floral inventories are inadequate for full understanding of plant species and communities.	A vegetation and floral assessment will be conducted and a long-term monitoring program will be designed. Close monitoring of the vegetation and flora can serve as an early warning system for undesirable changes and increase management's ability to respond effectively.
MOCA-N-603.001	**Implement Long-Term Monitoring Protocols for Vegetation and Flora**	ISSUE: Lack of Basic Resource Data PROBLEM: Vegetation is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Thus, data must be current to provide management the ability to protect these resources.	Implement long-term monitoring protocols for vegetation and flora. A long-term monitoring program for these ecological factors as designed in 603.000 will be implemented. Monument staff will be trained to operate the monitoring program. This will increase management's ability to assess changes in the natural resources of the monument.
MOCA-N-604.000	**Inventory, Assess, and Evaluate Control of Non-Native Flora Species and Develop Long-Term Monitoring Protocols**	ISSUE: Pest Management PROBLEM: Little is known about the abundance, distribution, and population trends of non-native flora species in the monument. Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. NPS management policies require removal of non-native species where control is practicable.	An inventory and assessment of non-native flora species will be conducted and long-term monitoring protocols and management strategies will be developed. Management will have the ability to determine which species need to be controlled and which will be tolerated. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).
MOCA-N-604.001	**Implement Long-Term Monitoring Protocols for Non-Native Flora Species**	ISSUE: Pest Management PROBLEM: The National Park Service is aware of some non-native flora species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary.	A long-term monitoring program will be implemented for non-native flora following protocols designed in the initial inventory and assessment, 604.000. The monument staff will be trained in the implementation of these protocols.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

VEGETATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-605.000	**Examine Old Fields**	ISSUE: Management of Prehistoric Fields PROBLEM: Information is lacking about the old fields in the vegetation complex of riparian zone and adjacent mesquite benches. Questions exist regarding the location of the prehistoric fields and the irrigation channels, the type of farming and crops grown, and the successional trends from cropland and grazed pasture to eventual native vegetation. By having answers to these questions, park management can determine appropriate objectives and implement actions for these sites in context with park purposes.	A study of the prehistoric and historic uses of agricultural lands in the monument will be conducted. Current vegetation condition and any consumptive uses will be examined, and successional trends projected. Studying prehistoric and historic uses can be done as a historic resources study using information from ethnobotanists, archeologists, and historians and their records and writings.
MOCA-I-606.000	**Prepare Cultural Landscape Inventory**	ISSUE: Management of Prehistoric Fields PROBLEM: Management of cultural landscapes within park lands should take into account the need for preservation of the integrity of these areas. At the present time, only one definite cultural landscape has been identified in the monument, although it has never been formally documented.	The cultural landscape inventory (CLI) will inventory cultural landscape elements and relationships according to the Cultural Resources Guideline: NPS 28. It will identify character-defining landscape features and discuss their significance and integrity. The CLI will assist management in planning appropriate decisions.

WILDLIFE MANAGEMENT			
PROJECT #	TITLE	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-700.000	**Inventory, Assess, and Evaluate Control of Non-Native Species and Develop Long-Term Monitoring Protocols**	ISSUE: Pest Management PROBLEM: Little is known about the abundance, distribution, and population trends of non-native species in the monument. Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. NPS management policies require removal of non-native species where control is practicable.	An inventory and assessment of non-native species will be conducted. Management will have the ability to determine which species need to be controlled and which will be tolerated. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WILDLIFE MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-700.001	**Monitor Sensitive and Threatened/Endangered Fauna**	ISSUE: Pest Management PROBLEM: Rare life forms in the monument may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff must be continually aware of any rare animals potentially near the monument boundaries.	Monitor rare species. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act.
MOCA-N-701.000	**Assess Habitat Requirements of Aquatic Organisms at Montezuma Well**	ISSUE: Groundwater Withdrawal PROBLEM: Changes in water quantity and quality are anticipated at the Well due to increasing residential and commercial development in locations peripheral to the site. If a significant diminution in water delivery occurs, or if water quality substantially changes, then the aquatic organisms indigenous to Montezuma Well may be adversely affected. Once affected, there is presently no means whereby the consequences may be assessed.	An interdisciplinary approach to characterize the existing hydrologic and water quality regimes and the biotic needs of the indigenous organisms will be taken. A research program will be developed and implemented to assess aquatic organisms and their habitat requirements. The analysis of data collected will require the use of both computer models and expert opinion to assess current conditions and to predict probable conditions.
MOCA-N-702.000	**Conduct Inventory and Assessment: Invertebrates and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Invertebrates are critical to basic and widespread ecosystem functions such as pollination, decomposition, soil aeration and churning. They are extremely important and numerous, and to better understand and appreciate insects the park must expand the existing knowledge beyond the limited study and collection.	Inventory, assessment, and monitoring of invertebrates will be conducted. Information will be gathered about insects as individual species, family, or genera, their habitats, and ecological roles. Long-term monitoring protocols will be developed.
MOCA-N-702.001	**Implement Long-Term Monitoring of Invertebrates**	ISSUE: Lack of Basic Resource Data PROBLEM: Invertebrates are critical to basic and widespread ecosystem functions such as pollination, decomposition, soil aeration and churning. They are extremely important and numerous, and to better understand and appreciate insects the park must expand the existing knowledge beyond the limited study and collection.	Implement long-term monitoring of the native invertebrates at Montezuma Castle. A long-term monitoring program designed in the inventory and assessment of invertebrates, project 702.000, should be implemented. Monument staff will be trained in the implementation of these protocols.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WILDLIFE MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-703.000	**Conduct Inventory and Assessment of Reptiles and Amphibians and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Amphibians and reptiles are commonly the most poorly understood of the vertebrates, yet they are probably the most reliable vertebrate indicators of habitat change. Venomous reptiles, such as rattlesnakes, can constitute a safety hazard to visitors and staff. Thus, distribution and relative stability of these species are important biological elements for management and interpretation.	Conduct inventory and assessment of amphibians and reptiles and develop long-term monitoring protocols. This will provide additional information to aid management in maintaining biological diversity in the monument as well as providing information for interpretive exhibits and presentations. Species richness and relative densities for amphibians and reptiles in the monument will be determined.
MOCA-N-703.001	**Implement Long-Term Monitoring for Amphibians and Reptiles**	ISSUE: Lack of Basic Resource Data PROBLEM: Understanding distribution and relative stability of amphibian and reptile species is thus an important element of vertebrate biology in relation to resource management and interpretation. A long-term monitoring program for these components of the ecosystem is needed.	Implement long-term monitoring protocols for amphibians and reptiles. This will provide current information to aid management in maintaining biological diversity in the monument as well as providing information for interpretive exhibits and presentations.
MOCA-N-704.000	**Conduct Inventory and Assessment of Birds and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Changes in avian species diversity, population densities, and habitat have occurred and will continue with development, increased recreational activities, and changes in riparian and upland ecosystems. Therefore, there is a need for a comprehensive survey of birds.	Conduct inventory and assessment of birds and develop long-term monitoring protocols. This study will provide information that can serve as an additional management tool for examining the ecological health of the monument, especially riparian ecosystems. Species richness and relative densities for avian species will be examined.
MOCA-N-704.001	**Implement Long-Term Monitoring of Birds**	ISSUE: Lack of Basic Resource Data PROBLEM: This project is designed to keep the basic avifaunal information current by providing updated information about the interaction of key avian species (indicator species) with the rest of the monument environment. It is a long-term monitoring program for these components of the ecosystem.	Implement long-term monitoring of birds. This study will provide current information that can serve as an additional management tool for examining the ecological health of the monument, especially riparian ecosystems. The monument staff will be trained in the implementation of these protocols.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WILDLIFE MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-705.000	**Conduct Inventory and Assessment: Mammals and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Mammals are significant, integral ecosystem components and to better understand and appreciate them, the monument must continue research beyond the limited work done to date. Documented occurrence of native and non-native mammals and their relative abundance within desert upland and riparian habitats, will serve as an additional management tool for examining the ecosystem health.	A mammalian inventory and assessment will be conducted. This includes a literature search, consultation with museum collections, test study design, field study, and a written report with long-term monitoring protocols.
MOCA-N-705.001	**Implement Long-Term Monitoring Protocols for Mammals**	ISSUE: Lack of Basic Resource Data PROBLEM: This project is designed to keep baseline information on mammals within Montezuma Castle current and provide up-to-date information about the interaction of key mammalian species (indicator species) with the rest of the monument environment, and document the biological diversity of mammals. A long-term monitoring program for these components of the ecosystem will be implemented.	Implement long-term monitoring protocols for mammals. This will provide current information on native mammals which will serve as an additional management tool for examining the ecological health of the monument ecosystems. A long-term monitoring program will be implemented following the protocols developed in the initial inventory and assessment, 705.000. The monument staff will be trained in the implementation of these protocols.
MOCA-N-706.000	**Inventory, Assess, and Evaluate Control of Non-Native Fauna Species and Develop Long-Term Monitoring Protocols**	ISSUE: Pest Management PROBLEM: Little is known about the abundance, distribution, and population trends of non-native fauna species in the monument. Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. NPS management policies require removal of non-native species where control is practicable.	An inventory and assessment of non-native species will be conducted and long-term monitoring protocols and management strategies will be developed. Management will have the ability to determine which species need to be controlled and which will be tolerated. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).
MOCA-N-706.002	**Implement Long-Term Monitoring Protocols for Non-Native Fauna Species**	ISSUE: Pest Management PROBLEM: The National Park Service is aware of some non-native fauna species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary.	A long-term monitoring program will be implemented for non-native fauna following protocols designed in the initial inventory and assessment, 706.000. The monument staff will be trained in the implementation of these protocols.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WILDLIFE MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-707.000	**Manage Feral Honey Bees**	ISSUE: Lack of Basic Resource Data PROBLEM: Non-native honey bees compete and displace native pollinators. They pose a health and safety problem with stinging incidents occurring regularly in spring and summer. The problem is exacerbated by the approaching Africanized honey bees who will be attracted to the monument's available nest sites, water, nectar and pollen plants.	Management of honey bees located near the ruins and administrative area will be increased. The monument staff will continue to be proactive by dealing with honeybee problems and supporting research.
MOCA-N-708.000	**Conduct Inventory and Assessment of Fishes and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: The native fish fauna of Wet Beaver Creek and Beaver Creek has been modified by water management practices and introductions of non-native fishes. Native fishes have been a significant resource consideration for monument staff due to the relatively low diversity of natives, threats posed by non-native fishes, and water management practices.	An inventory of native fishes in Wet Beaver Creek and Beaver Creek will be conducted using electrofishing, seining and other non-destructive sampling techniques to characterize the composition of the fishery. Contract researchers will be retained to conduct the inventory. Long-term monitoring protocols for these components of the ecosystem will be developed.
MOCA-N-708.001	**Implement Long-Term Monitoring of Fishes**	ISSUE: Lack of Basic Resource Data PROBLEM: The native fish fauna of Wet Beaver Creek and Beaver Creek has been modified by water management practices and introductions of non-native fishes. Native fishes have been a significant resource consideration for monument staff due to the relatively low diversity of natives, threats posed by non-native fishes, and water management practices.	Implement long-term monitoring protocols of native fishes. The Principal Investigator in the inventory and assessment (708.000) will design long-term monitoring protocols for these components of the ecosystem. Monument staff will be trained in the implementation of these protocols to conduct a long-term monitoring program.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WATER RESOURCES MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-800.000	**Measure Outflow for Montezuma Well**	ISSUE: Lack of Basic Resource Data Groundwater Withdrawal Alteration of Flow Regimes PROBLEM: Natural spring flows from Montezuma Well are monitored through an agreement with the US Geological Survey, which maintains the flow records and reports the results to the NPS on a annual basis. The NPS takes daily readings according to a protocol developed by the USGS and sends these data to the Survey for compilation and summary.	The current monitoring agreement with USGS will be continued. NPS will continue to take daily readings and send data to the USGS for compilation and summary.
MOCA-N-801.000	**Identify and Inventory Water-Related Resources**	ISSUE: Lack of Basic Resource Data Groundwater Withdrawal Alteration of Flow Regimes PROBLEM: The water-related resources of the monument have not been fully identified. An inventory is needed to both identify the possibility of impact and to measure its magnitude, in the event impact does occur. This information will be required in water rights litigation or in any other similar arena in which the NPS seeks relief from such impact to protect the monument for the purposes for which it was created.	A thorough inventory of all water-related resources in the monument will be conducted. Such a broad survey will give the superintendent an adequate data base from which to make informed management decisions and to protect water rights. Results will also be of use to all other resource related inventories conducted at the monument.
MOCA-N-802.000	**Conduct Analysis of Existing Water Monitoring System**	ISSUE: Lack of Secure Water Rights PROBLEM: The water-related resources of the monument have not been fully identified. An inventory is needed to both identify the possibility of impact and to measure its magnitude, in the event impact does occur. This information will be required in water rights litigation or in any other similar arena in which the NPS seeks relief from such impact to protect the monument for the purposes for which it was created.	Conduct analysis of existing water monitoring system to ensure that the partitioned water rights are being fairly and correctly metered. The effects of population growth in the Verde Valley on spring flow also need to be evaluated.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

VEGETATION MANAGEMENT			
PROJECT #	**TITLE**	**ISSUE & PROBLEM STATEMENT**	**ACTION PLAN**
MOCA-N-603.000	**Conduct Inventory and Assessment: Vegetation and Flora and Develop Long-Term Monitoring Protocols**	ISSUE: Lack of Basic Resource Data PROBLEM: Vegetation is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Thus, vegetational analyses can be used as a tool for examining potential environmental problems. Existing vegetation and floral inventories are inadequate for full understanding of plant species and communities.	A vegetation and floral assessment will be conducted and a long-term monitoring program will be designed. Close monitoring of the vegetation and flora can serve as an early warning system for undesirable changes and increase management's ability to respond effectively.
MOCA-N-603.001	**Implement Long-Term Monitoring Protocols for Vegetation and Flora**	ISSUE: Lack of Basic Resource Data PROBLEM: Vegetation is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Thus, data must be current to provide management the ability to protect these resources.	Implement long-term monitoring protocols for vegetation and flora. A long-term monitoring program for these ecological factors as designed in 603.000 will be implemented. Monument staff will be trained to operate the monitoring program. This will increase management's ability to assess changes in the natural resources of the monument.
MOCA-N-604.000	**Inventory, Assess, and Evaluate Control of Non-Native Flora Species and Develop Long-Term Monitoring Protocols**	ISSUE: Pest Management PROBLEM: Little is known about the abundance, distribution, and population trends of non-native flora species in the monument. Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. NPS management policies require removal of non-native species where control is practicable.	An inventory and assessment of non-native flora species will be conducted and long-term monitoring protocols and management strategies will be developed. Management will have the ability to determine which species need to be controlled and which will be tolerated. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).
MOCA-N-604.001	**Implement Long-Term Monitoring Protocols for Non-Native Flora Species**	ISSUE: Pest Management PROBLEM: The National Park Service is aware of some non-native flora species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary.	A long-term monitoring program will be implemented for non-native flora following protocols designed in the initial inventory and assessment, 604.000. The monument staff will be trained in the implementation of these protocols.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

WATER RESOURCES MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-804.001	**Implement Long-Term Monitoring and Management Strategies for Wetlands Protection**	ISSUE: Groundwater Withdrawal Groundwater Withdrawal Alteration of Flow Regimes PROBLEM: External factors are impacting the quality and quantity of these water related resources, which directly affects management's ability to preserve and protect the resources. Current data must be available to continue protecting monument wetlands as external factors change.	Implement long-term monitoring and management strategies for wetlands protection. The research team assembled to conduct the initial delineation in 804.000 will develop strategies to protect these wetland resources. Management alternatives and options will have been identified to mitigate each threat. These recommendations will be implemented with the long-term monitoring. Monument staff will be trained in monitoring protocols.
MOCA-N-805.000	**Evaluate Effects of Hydrologic Characteristics on Morphological Properties of Flowing Streams**	ISSUE: Alteration of Flow Regimes PROBLEM: The channel features found in monument streams can be dramatically altered through human-induced changes in the hydrologic regime (amount, duration, and timing of discharges). Alterations of this kind may affect existing channel form may severely compromise site integrity and thereby diminish scientific values for scholars and the recreational and interpretive values for visitors.	The hydrologic effects on morphological characteristics of flowing streams in Montezuma Castle National Monument will be thoroughly evaluated. A mathematical model for such characteristics will be developed to assist the superintendent in protecting water rights, evaluating the potential effects of proposed upstream land developments, etc.
MOCA-N-806.000	**Evaluate Effects of Hydrologic Characteristics on Regeneration of Vegetation in Riparian Areas**	ISSUE: Alteration of Flow Regimes PROBLEM: Riparian vegetation is a specific concern to management. Many riparian plants have regeneration requirements which are related to the normal periodicity of over-bank discharges. Elimination of these discharges or a change in their periodicity may adversely affect vegetation replacement and the organisms dependent upon riparian vegetation.	An evaluation of hydrologic effects on regeneration of vegetation in riparian areas will be conducted. This will require the characterization of existing hydrology, channel features, sediment transport, and riparian vegetation, as well as mathematical modelling of existing and potential flow regimes. The collection of discharge and sediment data will be accompanied by the mapping of floodplain areas and their associated vegetation.
MOCA-N-807.000	**Determine Vulnerability of Unique Biota to Changes in Hydrologic Regimes**	ISSUE: Lack of Basic Resource Data PROBLEM: The growing population of the Verde Valley increases demand for and consumption of groundwater. This will alter the hydrologic regimes in the region and may have significant impacts on the Well and the organisms that live in it. A survey of all biotic resources associated with the Well and an assessment of their habitat requirements are essential to the proper management of the monument and the protection of these sensitive resources.	A study will be conducted to determine the vulnerability of unique biota to changes in hydrologic regimes. A bibliographic search and intensive resource inventories and assessments of Montezuma Well and the Beaver Creek riparian zone will be conducted. A complete taxonomic listing of aquatic and riparian plants and animals will be developed and their habitat requirements will be identified. A multidisciplinary group will be convened to develop management options, and the results of this research will be prepared for use in park interpretive programs.

PROGRAM STATEMENT SUMMARY
MONTEZUMA CASTLE NATIONAL MONUMENT, INTERMOUNTAIN FIELD AREA
FISCAL YEAR 1996

GEOLOGIC RESOURCES MANAGEMENT			
PROJECT #	TITLE	ISSUE & PROBLEM STATEMENT	ACTION PLAN
MOCA-N-900.000	**Conduct Survey and Assessment: Soils**	ISSUE: Lack of Basic Resource Data PROBLEM: The soils of Montezuma Castle National Monument have not been surveyed or mapped to detail. No site specific information exists that can be used by management to make informed decisions regarding management of the developed and landscaped areas, natural areas, siting of visitor use facilities, protection of cultural sites and critical habitats, or prevention of soil erosion.	The Soil Conservation Service, the U.S. Forest Service, a university researcher, or a private consultant will conduct a level III soil survey. Products of this survey will include a detailed soils map, soil series descriptions, and an assessment of the significant properties of these soils as related to cultural site preservation, prehistoric landscape scene preservation, ecological protection, and visitor services development.

Programming Sheets

The programming sheets show the funded and unfunded integrated, cultural, and natural projects and the priority ranking for unfunded projects. Other information is presented about issue codes and funding needs. The integrated and cultural projects are jointly prioritized. Likewise, the integrated and natural projects are jointly prioritized. In this manner, integrated projects can be considered for funding with either cultural or natural budget opportunities.

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE-WIDE ISSUE(s)	FUNDING SOURCE	ACT TYPE	CURRENT		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
							$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
I-601.000	MANAGE VEG: REHABILITATION, LANDSCAPING, HAZARD TRESS	--	COMB	N22, C11	PKBASE-CR	MIT	2.0	0.1	1.00	0.1	.00	0.1	1.00	0.1	5.00	0.40
N-800.000	MEASURE OUTFLOW FOR MONTEZUMA WELL	--		N12	SNWR	MON	2.50	0.10	2.50	0.10	2.50	0.10	2.50	0.10	10.00	0.40
N-807.000	DETERMINE VULNERABILITY OF UNIQUE BIOTA TO CHANGES IN HYDROLOGIC REGIMES	--		N02, N12		RES	79.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	79.00	1.50
TOTAL FOR ALL FUNDED NATURAL AND INTEGRATED RESOURCES ACTIVITIES							83.50	1.70	3.50	0.20	3.50	0.20	3.50	0.20	94.00	2.30

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
01	I-001.000	DEVELOP AND OPERATE CULTURAL & NATURAL RESOURCES PROGRAM	--	COMB	N24, C83	VARIABLE	ADM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	I-001.001	DEVELOP AND OPERATE NATURAL RESOURCES PROGRAM	--		N24	VARIABLE	ADM	72.00	1.00	72.00	0.00	120.00	1.00	120.00	0.00	384.00	2.00
02	N-206.000	DEVELOP A NATURAL RESOURCES BIBLIOGRAPHIC DATABASE	--		N20, N24	VARIABLE	RES	10.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
03	N-801.000	IDENTIFY & INVENTORY WATER RELATED RESOURCES	--		N13, N20	VARIABLE	RES	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
04	N-802.000	EVALUATE WATER DELIVERY MONITORING SYSTEM	--		N13	WATER-RES	RES	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
	N-802.001	CONSTRUCT NEW WATER DELIVERY SYSTEM/CORRELATE OLD AND NEW DATA	--		N13	WATER-RES	RES	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
05	N-207.000	INVENTORY BASIC NAT. RESOURCES OF WELL & RIPARIAN	--		N20	RG-NS-RES	RES	22.00	0.70	12.30	0.40	0.00	0.00	0.00	0.00	34.30	1.10
	N-207.001	IMPLEMENT MONITORING OF BASIC NATURAL RESOURCES	--		N20	VARIABLE	MON	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00

Programming Sheet
NATURAL AND INTEGRATED
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PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
06	I-200.000	CONDUCT ETHNOGRAPHIC OVERVIEW & ASSESSMENT W/ ETHNOBOTANICAL STUDY	--		N24, C21	VARIABLE	RES	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
07	N-701.000	INVENTORY HABITAT REQUIREMENT	--		N20	RE-NS-RES	RES	25.00	0.00	22.00	0.00	18.00	0.00	0.00	0.00	65.00	0.00
08	N-803.000	CONDUCT RIPARIAN ECOSYSTEM RESEARCH	--		N12	VARIABLE	RES	10.00	0.20	10.00	0.20	15.00	0.40	15.00	0.40	50.00	1.20
09	I-601.000	MANAGE VEG: REHABILITATION, LANDSCAPING, HAZARD TREES	--	COMB	N22, C11	VARIABLE	RES/MIT	6.00	0.0	6.00	0.00	6.0	0.00	6.00	0.00	24.00	0.00
10	N-106.000	PROTECT HYDROLOGICAL CHARACTERISTICS OF MONTEZUMA WELL SETTING	--		N12	VARIABLE	RES/MON/MIT	50.00 40.00 40.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
	N-106.001	IMPLEMENT MONITORING & MGMT STRATEGIES FOR HYDROLOGIC CHARACTERISTICS OF WELL	--		N12	VARIABLE	MON	1.00	0.20	1.00	0.20	1.00	0.20	1.00	0.20	4.00	0.80
11	I-102.000	MANAGE PEST SPECIES	--	COMB	N01, C49	VARIABLE	MON	5.00	0.00	5.00	0.00	5.00	0.00	5.00	0.00	20.00	0.00
12	I-201.000	DEVELOP COMPUTERIZED BIBLIOGRAPHIC RETRIEVAL SYSTEM	--	COMB	N20, C60	VARIABLE	RES	10.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50	0.00

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
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PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
	I-201.001	UPDATE BIBLIOGRAPHIC DATABASE ANNUALLY	--	COMB	N20, C60	VARIABLE	RES	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00
13	N-805.000	STUDY HYDROLOGICAL & MORPHOLOGICAL PROPERTIES OF STREAMS	--		N12	WATER-RES	RES	30.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
14	N-806.000	STUDY HYDROLOGICAL EFFECTS ON REGENERATION OF RIPARIAN VEGETATION	--		N12	WATER-RES	RES	35.00	0.00	20.00	0.00	20.00	0.00	0.00	0.00	75.00	0.00
15	N-800.000	OUTFLOW MEASUREMENTS FOR MONTEZUMA WELL	--		N12	VARIABLE	MON	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00
16	N-707.000	MANAGE FERAL HONEY BEES	--		N04, N17	PKBASE-OT VARIABLE	MON	0.20	0.00	0.20	0.00	0.20	0.00	0.20	0.00	0.80	0.00
17	I-600.000	PREPARE A MANAGEMENT PLAN FOR PREHISTORIC SINAGUAN FIELDS	--	COMB	N08, C11	VARIABLE	RES	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
18	N-602.000	INVENTORY SENSITIVE AND T&E FLORA	--		N02, N03	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	N-700.000	INVENTORY SENSITIVE AND T&E FAUNA	--		N02	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
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FY: 1996
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PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
19	N-807.000	STUDY UNIQUE BIOTA RE: CHANGES IN HYDROLOGIC REGIME	--		N01, N12	NRPP	RES	79.00	1.50	84.00	1.50	0.00	0.00	0.00	0.00	163.00	3.00
20	N-804.000	DELINEATE & EVALUATE STRATEGIES FOR WETLAND PROTECTION	--		N12	RG-NS-RES VARIABLE	RES	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	N-804.001	IMPLEMENT LT MONITORING & MGMT STRATEGIES FOR WETLANDS PROTECTION	--		N12	VARIABLE	RES	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
21	N-108.000	DETERMINE VISITOR IMPACTS AND USE LIMITS	--		N22	RG-NS-RES	RES	10.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.80	0.00
	N-108.001	IMPLEMENT MONITORING OF VISITOR IMPACTS & USE LIMITS	--		N22	VARIABLE	MON	1.00	0.20	1.00	0.20	1.00	0.20	1.00	0.20	4.00	0.80
22	I-100.000	DESIGN MONITORING PROGRAM FOR AIRCRAFT OVERFLIGHTS	--	STRC	N15, C70	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	I-100.001	MONITOR AIRCRAFT OVERFLIGHTS	--		N15, C70	VARIABLE	MON	1.50	0.00	1.50	0.00	1.50	0.00	1.50	0.00	6.00	0.00
23	N-603.000	CONDUCT INVENTORY & ASSESSMENT: VEGETATION AND FLORA	--		N20	RG-NS-RES	RES	7.50	0.10	7.50	0.10	8.10	0.20	0.00	0.00	23.10	0.40

Programming Sheet
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PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
	N-603.001	IMPLEMENT MONITORING OF VEGETATION AND FLORA	--		N20	VARIABLE	MON	1.00	0.10	1.00	0.10	1.00	0.10	1.00	0.10	4.00	0.40
24	N-704.000	CONDUCT INVENTORY AND ASSESSMENT: BIRDS	--		N20	RG-NS-RES	RES	9.00	0.10	9.00	0.10	8.50	0.10	0.00	0.00	26.50	0.30
	N-704.001	IMPLEMENT MONITORING OF BIRDS	--		N20	VARIABLE	MON	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.80	0.40
25	N-702.000	CONDUCT INVENTORY & ASSESSMENT: INVERTEBRATES	--		N20	RG-NS-RES	RES	11.50	0.20	11.50	0.20	12.30	0.20	0.00	0.00	35.30	0.60
	N-702.001	IMPLEMENT MONITORING OF INVERTEBRATES	--		N20	VARIABLE	MON	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.80	0.80
26	N-703.000	INVENTORY & ASSESS: AMPHIBIANS AND REPTILES	--		N20	RE-NS-RES	RES	8.80	0.10	8.80	0.10	8.80	0.10	0.00	0.00	26.40	0.30
	N-703.001	IMPLEMENT MONITORING OF AMPHIBIANS AND REPTILES	--		N20	VARIABLE	MON	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.80	0.40
27	N-705.000	CONDUCT INVENTORY AND ASSESSMENT: MAMMALS	--		N20	RG-NS-RES	RES	8.30	0.10	8.30	0.10	0.00	0.00	0.00	0.00	16.60	0.20

Programming Sheet
NATURAL AND INTEGRATED
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PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
	N-705.001	IMPLEMENT MONITORING OF MAMMALS	--		N20	VARIABLE	MON	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.80	0.40
28	N-900.000	CONDUCT A SURVEY AND ASSESSMENT: SOILS	--		N20	RG-NS-RES	RES	13.90	0.20	0.00	0.00	0.00	0.00	0.00	0.00	13.90	0.20
29	N-604.000	INVENTORY AND ASSESS CONTROL OF NON-NATIVE FLORA SPECIES	--		N05, N20	RG-RM-NAT	RES	14.00	0.30	14.80	0.30	0.00	0.00	0.00	0.00	28.80	0.60
	N-604.001	IMPLEMENT MONITORING OF NON-NATIVE FLORA SPECIES	--		N05, N20	VARIABLE	MON	1.00	0.30	1.00	0.30	1.00	0.30	1.00	0.30	4.00	1.20
	N-706.000	INVENTORY AND ASSESS CONTROL OF NON-NATIVE FAUNA SPECIES	--		N05, N20	RG-RM-NAT	RES	14.00	0.30	14.80	0.30	0.00	0.00	0.00	0.00	28.80	0.60
	N-706.002	IMPLEMENT MONITORING OF NON-NATIVE FAUNA SPECIES	--		N05, N20	VARIABLE	MON	1.00	0.30	1.00	0.3	1.00	0.30	1.00	0.30	4.00	1.20
30	N-708.000	CONDUCT INVENTORY AND ASSESSMENT: FISHES	--		N20	RG-NS-RES	RES	8.30	0.10	8.20	0.10	0.00	0.00	0.00	0.00	16.50	0.20
	N-708.001	IMPLEMENT MONITORING FOR FISHES	--		N20	VARIABLE	MON	1.00	0.10	1.00	0.10	1.00	0.10	1.00	0.10	4.00	0.40

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
31	N-208.000	DEVELOP PROGRAM FOR LONG-TERM MONITORING OF ECOSYSTEMS	--		N20	VARIABLE	RES	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00
32	N-107.000	IDENTIFY FLOOD-PRONE AREA FOR PROTECTION OF LIVES & PROPERTY	--		N20	WATER-RES	RES	35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00	0.00
33	I-508.000	SURVEY & INVENTORY COLLECTIONS FOR NATURAL HISTORY SPECIMENS	--		N20, N24	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
34	N-105.000	CONDUCT ANALYSIS OF ADJACENT LAND USE AND STATUS	--		N16, C73	VARIABLE	RES	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
35	I-103.000	CONDUCT VISITOR USE SURVEY	--	COMB	N22, C71	VARIABLE	RES	11.80	0.50	0.00	0.00	0.00	0.00	0.00	0.00	11.80	0.50
36	I-202.000	PREPARE A GEOGRAPHIC INFORMATION PLAN	--	COMB	N24, C62	VARIABLE	RES	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.00
	I-202.001	IMPLEMENT A GEOGRAPHIC INFORMATION PLAN	--	COMB	N24, C62	VARIABLE	RES	30.00	0.20	10.00	0.20	10.00	0.20	10.00	0.20	60.00	0.80
	I-606.000	PREPARE CULTURAL LANDSCAPE INVENTORY	--	COMB	N08, C10	VARIABLE	RES	0.50	0.01	1.00	0.02	15.00	0.00	0.00	0.00	16.50	0.03

Programming Sheet
NATURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
37	N-605.000	EXAMINE OLD FIELDS	--		N08, C10	RG-RM-NAT	RES	9.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	9.20	0.20
38	I-101.000	EVALUATE FENCING & PATROL NEEDS	--	COMB	N16, C72	VARIABLE	RES	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
	I-101.001	CONSTRUCT/UPGRADE FENCING	--	COMB	N16, C72	VARIABLE	PRO	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
	I-101.002	INCREASE BOUNDARY PATROLS & MONITOR EFFECTIVENESS	--	COMB	N16, C72	VARIABLE	PRO	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00
TOTAL FOR ALL UNFUNDED CULTURAL AND INTEGRATED RESOURCES ACTIVITIES								734.60	7.51	387.70	5.32	259.20	3.90	168.50	2.30	1,550.00	19.03

Programming Sheet
CULTURAL AND INTEGRATED
CURRENT YEAR FUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE-WIDE ISSUE(s)	FUNDING SOURCE	ACT TYPE	CURRENT		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
							$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
C-501.000	MANAGE PARK MUSEUM COLLECTION	--	OBJC	C49	PCR1	MIT	2.00	0.00	2.00	0.00	2.00	0.00	2.00	0.00	8.00	0.00
C-502.000	UPDATE AND MAINTAIN AUTOMATED NATIONAL CATALOG SYSTEM	--	OBJC	C46	PCR1	RES	1.00	0.10	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.10
I-601.000	MANAGE VEG: REHABILITATION, LANDSCAPING, HAZARD TRESS	--	COMB	N22, C11	PKBASE-CR	MIT	2.0	0.1	1.00	0.1	1.00	0.1	1.00	0.1	5.00	0.40
TOTAL FOR ALL FUNDED NATURAL AND INTEGRATED RESOURCES ACTIVITIES							5.00	0.20	4.00	0.10	4.00	0.10	4.00	0.10	17.00	0.50

Programming Sheet
CULTURAL AND INTEGRATED
UNFUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
01	I-001.000	DEVELOP AND OPERATE CULTURAL AND NATURAL RESOURCES PROGRAM	--	COMB	N24, C83	VARIABLE	ADM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
02	C-500.000	CONSERVE MUSEUM OBJECTS	--	OBJC	C48	VARIABLE	MIT	3.30	0.00	3.30	0.00	3.30	0.00	3.30	0.00	13.20	0.00
03	C-501.000	MANAGE PARK MUSEUM COLLECTION	--	OBJC	C49	VARIABLE	MIT	3.60	0.00	3.60	0.00	3.60	0.00	3.60	0.00	14.40	0.00
04	C-502.000	UPDATE AND MAINTAIN ANCS PROGRAM	--	OBJC	C46	VARIABLE	RES	1.40	0.00	1.40	0.00	1.40	0.00	1.40	0.00	5.60	0.00
05	I-200.000	CONDUCT ETHNOGRAPHIC AND ETHNOBOTANICAL STUDY	--	COMB	N24, C21	VARIABLE	RES	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
06	C-505.000	UPDATE/CORRECT CULTURAL RESOURCES BIBLIOGRAPHY	--	COMB	C60	RG-CR-MTN	RES	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
07	C-404.000	ESTABLISH MONITORING PROGRAM FOR CULTURAL SETTING	--	COMB	N20, C19	VARIABLE	RES	30.00	0.00	30.00	0.00	30.00	0.00	30.00	0.00	120.00	0.00
08	C-304.000	MAINTAIN STABILIZED PREHISTORIC RUINS	--	STRC	C05	PKBASE-CR VARIABLE	MIT	16.00	0.30	16.00	0.30	16.00	0.30	16.00	0.30	64.00	1.20

Programming Sheet
CULTURAL AND INTEGRATED
UNFUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
09	C-403.000	MAINTAIN HISTORIC STRUCTURES	--	STRC	C05	PKBASE-CR	MIT	8.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.10
10	C-402.000	PREPARE HSPG: PREHISTORIC STRUCTURES	--	STRC	C05	VARIABLE	RES	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00	0.00
11	C-401.000	PREPARE HSPG: HISTORIC STRUCTURES	--	STRC	C05	VARIABLE	RES	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
12	C-504.000	SURVEY AND INVENTORY COLLECTIONS FOR MONTEZUMA CASTLE CULTURAL OBJECTS	--	OBJC	C08, C46	VARIABLE	RES	36.00	0.00	18.00	0.00	0.00	0.00	0.00	0.00	54.00	0.00
13	I-201.000	DEVELOP COMPUTERIZED BIBLIOGRAPHIC RETRIEVAL SYSTEM	--	COMB	N20, C60	VARIABLE	RES	10.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50	0.00
	I-201.001	UPDATE BIBLIOGRAPHIC DATABASE ANNUALLY	--	COMB	N20, C60	VARIABLE	RES	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00
14	C-507.000	ESTABLISH EXHIBIT MAINTENANCE	--	OBJC	C45, C49	PKBASE-CR VARIABLE	MIT	6.00	0.10	6.00	0.10	6.00	0.10	6.00	0.10	24.00	0.40
15	I-102.000	MANAGE PEST SPECIES	--	COMB	N04, C49	VARIABLE	MIT	5.00	0.00	5.00	0.00	5.00	0.00	5.00	0.00	20.00	0.00

Programming Sheet
CULTURAL AND INTEGRATED
UNFUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
16	I-601.000	MANAGE VEG: REHABILITATION, LANDSCAPING, HAZARD TREES	--	COMB	N22, C11	VARIABLE	RES/MIT	6.00	0.00	6.00	0.00	6.00	0.00	6.00	0.00	24.00	0.00
17	I-600.000	PREPARE A MANAGEMENT PLAN FOR PREHISTORIC SINAGUAN FIELDS	--	COMB	N08, C11	VARIABLE	RES	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
	I-606.000	PREPARE CULTURAL LANDSCAPE INVENTORY	--	COMB	N08, C10	VARIABLE	RES	0.50	0.01	1.00	0.02	15.00	0.00	0.00	0.00	16.50	0.03
18	C-204.000	COMPILE AND MAINTAIN PHOTOGRAPHIC DOCUMENTATION	--	COMB	N20, C70	VARIABLE	RES	21.00	0.40	15.00	0.40	0.00	0.00	0.00	0.00	36.00	0.80
19	C-506.000	WRITE COLLECTION MANAGEMENT PLAN	--	OBJC	C41	VARIABLE	RES	2.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.10
20	I-100.000	MONITOR AIRCRAFT OVERFLIGHTS AND STUDY IMPACTS	--	STRC	N15, C70	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	I-100.001	MONITOR AIRCRAFT OVERFLIGHTS	--		N15, C70	VARIABLE	MON	1.50	0.00	1.50	0.00	1.50	0.00	1.50	0.00	6.00	0.00
21	C-300.000	STABILIZE PITHOUSE FLOOR	--	STRC	C05	VARIABLE	MIT	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00

Programming Sheet
CULTURAL AND INTEGRATED
UNFUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
22	C-203.000	UPDATE ADMINISTRATIVE HISTORY	--	COMB	C37	RE-CR-MTN	RES	25.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	25.00	0.00
23	C-503.000	REBUILD MONTEZUMA CASTLE MUSEUM	--	COMB	C49, C50	CONSTRUCT	INT	50.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	350.00	0.00
24	C-104.000	IMPROVE SECURITY SYSTEMS	--	OBJC	C72	REP-RE-HAB VARIABLE	PRO	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
25	C-400.000	CONDUCT STUDY OF MONTEZUMA CASTLE IRRIGATION	--	COMB	C35	RG-CR-MTN	RES	14.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.50	0.00
26	I-103.000	CONDUCT VISITOR USE SURVEY	--	COMB	N22, C71	VARIABLE	RES	11.80	0.50	0.00	0.00	0.00	0.00	0.00	0.00	11.80	0.50
27	C-302.000	DATE MONTEZUMA CASTLE	--	STRC	C02	RG-CR-MTN	RES	24.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.40	0.00
28	C-3034000	CONDUCT ARCHEOLOGICAL OVERVIEW AND ASSESSMENT	--	SITE	C01	RE-CR-MTN	RES	6.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.10
29	I-202.000	PREPARE A GEOGRAPHIC INFORMATION PLAN	--	COMB	N24, C64	RG-RM-NAT	RES	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.00

Programming Sheet
CULTURAL AND INTEGRATED
UNFUNDED ACTIVITIES
($ in thousands)

FY: 1996
Park: MOCA
Field Area: IMFA

PK PRI NUM	PROJ STMT NUM	PROJECT OR ACTIVITY TITLE	PKG NUM	CULT RES TYPE	SERVICE WIDE ISSUE(s)	FUNDING SOURCES	ACT TYPE	STARTING YEAR		OUTYEAR 1		OUTYEAR 2		OUTYEAR 3		TOTAL	
								$$	FTE	$$	FTE	$$	FTE	$$	FTE	$$	FTE
	I-202.001	IMPLEMENT A GEOGRAPHIC INFORMATION PLAN	--	COMB	N24, C64	VARIABLE	RES	30.00	0.20	10.00	0.20	10.00	0.20	10.00	0.20	60.00	0.80
30	I-101.000	EVALUATE/DEFINE FENCING & PATROL NEEDS	--	COMB	N16, C72	VARIABLE	RES	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
	I-101.001	CONSTRUCT/UPGRADE FENCING	--	COMB	N16, C72	VARIABLE	PRO	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
	I-101.002	INCREASE BOUNDARY PATROLS & MONITOR EFFECTIVENESS	--	COMB	N16, C07	VARIABLE	PRO	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	4.00	0.00
31	C-301.000	COMPLETE ARCHEOLOGICAL SITE MANAGEMENT INFORMATION SYSTEM	--	SITE	C03	RG-CR-MTN	RES	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
32	C-205.000	COMPLETE ORAL INTERVIEWS OF PEOPLE WITH HISTORIC KNOWLEDGE OF THE MONUMENT	--	ETHN	C27, C35	VARIABLE	RES	6.50	0.00	5.00	0.00	0.00	0.00	0.00	0.00	11.50	0.00
	I-508.000	SURVEY & INVENTORY COLLECTIONS FOR NATURAL HISTORY SPECIMENS	--	COMB	N20, N24	VARIABLE	RES	10.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	C-405.000	CONDUCT HISTORIC RESOURCES STUDY	--	COMB	C35	VARIABLE	RES	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00
TOTAL FOR ALL UNFUNDED NATURAL AND INTEGRATED ACTIVITIES								472.00	1.81	443.80	1.02	99.80	0.60	84.80	0.60	1,100.40	4.03

PART II PROGRAM STATEMENTS

MOCA-I-001.000 Develop, Manage, and Administer Cultural and Natural Resources Program

PROGRAM STATEMENT

PARK AND REGION: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-001.000 (see TUZI-I-001.000)

TITLE: Develop, Manage, and Administer Cultural and Natural Resources Program

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 0.0

SERVICEWIDE ISSUES:

N24 Other Issues
C83 Cultural Resources Management, General

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

There are no dedicated resources management positions at Montezuma Castle and Tuzigoot so the limited amount of work accomplished in natural and cultural resources is done by the superintendent, ranger, maintenance, and administrative staff in conjunction with other duties. Research and some management projects have been contracted, and they absolutely depend on whether money is available.

Analysis of the 1993 RMAP database shows there are 2.80 FTEs worth of natural resources management work being done by staff (Montezuma Castle 1.80 FTEs and Tuzigoot 1.00 FTE) and 1.30 FTEs worth of research oversight at Montezuma Castle only. The fully funded RMAP allocations show 12.17 FTEs (Montezuma Castle 6.37 FTEs and Tuzigoot 5.80 FTEs) needed for a comprehensive natural resources management program and 14.94 FTEs needed for the research component (Montezuma Castle 6.72 FTEs and Tuzigoot 8.22 FTEs). Additional FTEs are required for protection, interpretation, administration, and maintenance for natural resources functions and support, which are also in the RMAP analysis report. Tables showing this data are included in the resources management plan narrative. They will be revised periodically.

The RMAP analysis has been completed for natural resources Servicewide. The cultural resources addition has been developed, sent to parks to gather profile data, and now is being assessed. That analysis will be available in the near future and eventually will be included in this plan. The combination will provide a comprehensive assessment for resources management staffing and funding needs in both disciplines. A similar process is being done for visitor services called VRAP, which will mesh with RMAP for resources protection.

Much of the work done by Montezuma Castle and Tuzigoot staff entails administrative functions. Writing and updating plans, supervising projects, compliance, preparing funding justifications, purchasing supplies, etc. are examples.

Comprehensive management and research of natural and cultural resources is impossible to accomplish without dedicated positions to implement and oversee work. NPS Management Policies, Guideline NPS 28: Cultural Resource Management, Guideline NPS 77: Natural Resource Management, and other documents set certain resource stewardship standards for NPS that cannot be met without more attention. The staffing predicament threatens the resources elements the monuments were mandated to protect for future generations. There is a crucial need for dedicated staff to develop, manage, and administer a program that includes, but is not limited to the following types of activities in the park:

- Plan and coordinate ruins preservation monitoring, preservation projects, and compliance.
- Identify and conduct resources management projects.
- Conduct inventory and monitoring of cultural and natural resources.
- Assist in identification, oversight, and review of research activities.
- Submit requests for cyclic and other funding, and accomplish funded projects within fiscal and staffing constraints.
- Maintain basic information, as available (forms, records, studies, bibliographies, photographs, maps).
- Annually review/update museum scope of collection statement, museum housekeeping plan, cultural and natural resource priority lists, and budget requests.
- Conduct annual museum collection inventory, and assist in providing adequate storage, protection, environmental conditions, and emergency treatment to park collections.
- Prepare the biennial review/updating of natural and cultural resources management plans, with annual updating of priority forms/accomplishments. This includes action plans, such as fire and IPM.
- Interface resource needs in statement for management and outline of planning requirements.
- Review and comment on external documents and other agency activities.
- Prepare responses to special reports and status on special program efforts, and assist in ensuring compliance with NEPA and NHPA for all resources management activities.
- Complete superintendent's annual report on significant events and accomplishments.
- Coordination of Native American groups in planning/projects.
- Maintain GIS and resources information system.
- Maintain park special library and archives.
- Accomplish yearly (cyclic less than a year) maintenance of historic structures.

The problem is acquiring necessary staff to expand and operate the integrated cultural and natural resources management program. The RMAP database will be used to determine the

types of positions needed and to develop a strategy for acquiring them. The analysis will be consolidated when developing the resources management function.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Acquire resources management staff to expand and operate program. Use the RMAP database to identify the type of positions to acquire and develop a long term program. The RMAP analysis will be consolidated when developing the resources management function since the monuments are jointly staffed and administered by one superintendency. Sub-project statements address natural (MOCA-I-001.001) and cultural (MOCA-I-001.002; prepared after RMAP-CR analysis completed) staff. The statements are written so as not to duplicate staffing and funding requests.

A dedicated and professional resources management staff would afford enhanced management. Ultimately an integrated division would be developed to handle natural and cultural resources and work with other staff to integrate protection, preservation, maintenance, and research. Staff would work cooperatively with other parks and agencies, the Southern Arizona Group Office, Western Archeological and Conservation Center, Western field and system support offices, and others. The dedicated staff would ensure management in accordance with the requirement of the NPS Organic Act of 1916, Endangered Species Act, National Historic Preservation Legislation, National Environmental Policy Act, Guideline NPS 28, Guideline NPS 77, US Department of Interior Standards/Guidelines, administrative requirements, etc.

Year 1: Hire resources management staff and develop integrated program.

Year 2: Continue filling out RMAP allocations and developing integrated program.

Year 3: Continue filling out RMAP allocations and developing integrated program.

Year 4: Continue filling out RMAP allocations and developing integrated program.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:			0.0	0.0
Year 2:			0.0	0.0
Year 3:			0.0	0.0
Year 4:			0.0	0.0
		Total:	0.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Continuing at present staff level fails to provide the even minimum levels of resources management and protection. This would be in direct violation of legislative and policy mandates of the National Park Service.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.1, 1.2, 1.7, DM6 App. 7.4 E(2)

Proposal Date: 1990

MOCA-I-001.001 Develop, Manage, and Administer Natural Resources Program

PROGRAM STATEMENT

PARK AND REGION: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-001.001 (see TUZI-I-001.001)

TITLE: Develop, Manage, and Administer Natural Resources Program

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 384.0

SERVICEWIDE ISSUES:

N24 Other Issues

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

This is a sub-project statement for MOCA-I-001.000 Develop, Manage, and Administer Cultural and Natural Resources Program. It addresses acquiring staff for natural resources management using the RMAP analysis process and allocations.

There are no dedicated resources management positions at Montezuma Castle and Tuzigoot so the limited amount of work accomplished in natural resources is done by the superintendent, ranger, maintenance, and administrative staff in conjunction with other duties. Research and some management projects have been contracted, and they absolutely depend on whether money is available.

Analysis of the 1993 RMAP database shows there are 2.80 FTEs worth of natural resources management work being done by staff (Montezuma Castle 1.80 FTEs and Tuzigoot 1.00 FTE) and 1.30 FTEs worth of research oversight at Montezuma Castle only. The fully funded RMAP allocations show 12.17 FTEs (Montezuma Castle 6.37 FTEs and Tuzigoot 5.80 FTEs) needed for a comprehensive natural resources management program and 14.94 FTEs needed for the research component (Montezuma Castle 6.72 FTEs and Tuzigoot 8.22 FTEs). Additional FTEs are required for protection, interpretation, administration, and maintenance for natural resources functions and support, which are also in the RMAP analysis report. Tables showing this data are included in the resources management plan narrative. They will be revised periodically.

Much of the work done by Montezuma Castle and Tuzigoot staff entails administrative functions. Writing and updating plans, supervising projects, compliance, preparing funding justifications, purchasing supplies, etc. are examples.

Comprehensive management and research of natural and cultural resources is impossible to accomplish without dedicated positions to implement and oversee work. NPS Management Policies, Guideline NPS 28: Cultural Resource Management, Guideline NPS 77: Natural Resource Management, and other documents set certain resource stewardship standards for NPS that cannot be met without more attention. The staffing predicament threatens the resources elements the monuments were mandated to protect for future generations. There is a crucial need for dedicated staff to develop, manage, and administer a comprehensive program.

The problem is acquiring necessary staff to expand and operate the natural resources management program. The RMAP database will be used to determine the types of positions needed and to develop a strategy for acquiring them. The analysis will be consolidated when developing the resources management function.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Acquire natural resources management staff to expand and operate program. Use RMAP database to identify the type of positions to acquire and develop a long term program. The RMAP analysis will be consolidated when developing the resources management function since the monuments are jointly staffed and administered by one superintendency. This is a sub-project statement of MOCA-I-001.000, and it is written so as not to duplicate staffing and funding requests in TUZI-I-001.000 and TUZI-I-001.001.

There is a total of 12.17 FTEs identified for natural resources management work for both monuments. The four priority positions to acquire are resources manager (GS-11), wildlife biologist (GS-9/11), and two biological technicians (GS-9). The resources manager and a biological technician are requested with MOCA-I-001.001. This is done in conjunction with the request for the wildlife biologist and a biological technician in TUZI-I-001.001. The budget table shows cost of GS level and operating costs ($15,000).

In the response to "Stewardship Today for Parks Tomorrow, Natural Resources Management Initiative" (memorandum N16(470); September 16, 1994), there was one position each identified for Montezuma Castle and Tuzigoot that were submitted to the Washington Office. When positions are acquired, they will be the core of a dedicated resources staff and will prepare a resources organization in accordance with the RMAP allocations and intent.

Year 1: Hire resources manager (GS-11) (first priority) and develop integrated program.

Year 2: Continue striving to fill out RMAP allocations by hiring biological technician (GS-9) (third priority) and developing integrated program.

Year 3: Continue developing integrated program.

Year 4: Continue developing integrated program.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	ADM/MIT	Recurring	72.0	1.0
Year 2:	ADM/MIT	Recurring	72.0	0.0
Year 3:	ADM/MIT	Recurring	120.0	1.0
Year 4:	ADM/MIT	Recurring	120.0	0.0
		Total:	384.0	2.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Continuing at present staff level fails to provide the even minimum levels of resources management and protection. This would be in direct violation of legislative and policy mandates of the National Park Service.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.1, 1.2, 1.7, DM6 App. 7.4 E(2)

Proposal Date: 1996

MOCA-I-100.000 Design Monitoring Program and Train Staff in Monitoring Aircraft Overflights

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-100.000

TITLE: Design Monitoring Program and Train Staff in Monitoring Aircraft Overflights

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

C70 Environment Impact
N15 Noise, Visual, and Biological Impacts Related to Aircraft Overflights

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Low level aircraft overflights are increasing within and around Montezuma Castle National Monument. Aircraft intrusions into the airspace above the monument are particularly serious at above-ground-level elevations of 1000 feet or less. A Federal Aviation Advisory (FAA) dictates that aircraft shall maintain elevations above 5000 feet when making overflights of National Park System areas. Helicopters, however, are exempt from the FAA advisory.

Illegal overflights by private, agency, and military fixed wing aircraft and helicopter at elevations below 500 feet, occur weekly. These crafts frequently fly over the visitor use area, headquarters, and residential areas, posing a safety hazard and creating noise intrusions which detract from visiting and working in the monument.

Helicopters frequently hover in front of the ruins for a time period of several seconds up to a minute or more. The impacts of rotor vibrations on the ruins are unknown. Most ruin walls are of original composition with various degrees of stabilization. Negative impacts on wildlife populations are also likely.

Park employees attempt to document overflights. On occasions when identification numbers can be ascertained, the staff works with the FAA in contacting owners to seek compliance. This effort is only minimally successful.

Future study is needed to identify the magnitude of the impacts on park resources, and to develop ways to mitigate the number of overflights now experienced at the park. The new aircraft overflight interagency agreement (NPS, USFWS, BLM, FAA) is designed to help

mitigate impacts on resources caused by low flying aircraft. The Intermountain Field Areal Office Aircraft Overflight Coordinator and monument staff will work with the Washington Office to implement the interagency agreement. The agreement describes training, regulations, instructional materials, etc.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Design monitoring program and train staff in monitoring aircraft overflights. Monitor aircraft overflights and assess impacts to prehistoric structures, people, and wildlife. This involves several components. One is to develop a monitoring program to document occurrence, type, ownership, etc., of overflights plus management actions. Complaints from visitors and employees should be recorded as well. Contact with FAA is essential for official intervention. Legal ramifications of FAA rulings and implementation of new regulations are needed at Region and/or Servicewide levels. Establishment of better working relationships with the Intermountain Field Area Office, Washington Office, and local FAA officials is necessary to curtail on-going intrusions, and disseminate information on overflight regulations, including the use of flight club newsletters, military notification, and contacts with companies known to use or own helicopters.

To monitor effects on cultural sites, it is necessary to establish baseline data on wall integrity. Set up wall monitoring systems to identify walls most likely to be negatively impacted by engine and rotor vibrations. Visual impact of sensors should be not be excessive. Consult with historic architects and ruins stabilization archeologists to determine what mitigation is necessary to reinforce walls to desired stability.

Finally, investigate what type of wildlife monitoring would be suitable and initiate if appropriate.

Year 1: Work with Intermountain Field Area coordinator to design monitoring program for the monument. Initiate monitoring program and acquire literature references.

Year 2: Continue monitoring and analyze results. Define long-term program as appropriate to levels and types of impacts. Teach monument staff monitoring protocols.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
Year 2:	RES	One-Time	5.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not design aircraft overflight monitoring program. Overflights will continue unchecked. Without knowledge of impacts, primary cultural resources may be damaged or destroyed. Safety hazards from hovering aircraft will remain high. Visitor enjoyment may decrease due to noise and visual impacts of overflights. Employees will continue to be annoyed by overflights.

COMPLIANCE CODE(s): EXCL, NHPA

EXPLANATION: 516 DM6 App 7.4 B(4)

Proposal Date: 1994

MOCA-I-100.001 Monitor Aircraft Overflights

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-100.001

TITLE: Monitor Aircraft Overflights

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 6.0

SERVICEWIDE ISSUES:

C70 Environment Impact
N15 Noise, Visual, and Biological Impacts Related to Aircraft Overflights

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Low level aircraft overflights are increasing within and around Montezuma Castle National Monument. Aircraft intrusions into the airspace above the monument are particularly serious at above-ground-level elevations of 1000 feet or less. A Federal Aviation Advisory (FAA) dictates that aircraft shall maintain elevations above 5000 feet when making overflights of National Park System areas. Helicopters, however, are exempt from the FAA advisory.

Illegal overflights by private, agency, and military fixed wing aircraft and helicopter at elevations below 500 feet, occur weekly. These crafts frequently fly over the visitor use area, headquarters, and residential areas, posing a safety hazard and creating noise intrusions which detract from visiting and working in the monument.

Helicopters frequently hover in front of the ruins for a time period of several seconds up to a minute or more. The impacts of rotor vibrations on the ruins are unknown. Most ruin walls are of original composition with various degrees of stabilization. Negative impacts on wildlife populations are also likely.

Park employees attempt to document overflights. On occasions when identification numbers can be ascertained, the staff works with the FAA in contacting owners to seek compliance. This effort is only minimally successful.

Future study is needed to identify the magnitude of the impacts on park resources, and to develop ways to mitigate the number of overflights now experienced at the park. The new aircraft overflight interagency agreement (NPS, USFWS, BLM, FAA) is designed to help mitigate impacts on resources caused by low flying aircraft. The Intermountain Field Areal

Office Aircraft Overflight Coordinator and monument staff will work with the Washington Office to implement the interagency agreement. The agreement describes training, regulations, instructional materials, etc.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Monitor aircraft overflights. Document occurrence, type, ownership, etc., of overflights plus management actions. Complaints from visitors and employees should be recorded as well. Contact with FAA is essential for official intervention. Legal ramifications of FAA rulings and implementation of new regulations are needed Servicewide. Foster working relationships with the Intermountain Field Area Office, Washington Office, and local FAA officials to curtail on-going intrusions, and disseminate information on overflight regulations, including the use of flight club newsletters, military notification, and contacts with companies known to use or own helicopters.

Monitor effects on cultural sites. Use wall monitoring systems to identify walls most likely to be negatively impacted by engine and rotor vibrations. Consult with historic architects and ruins stabilization archeologists to determine what mitigation is necessary to reinforce walls to desired stability.

Monitor wildlife using the appropriate monitoring system resulting from project I-100.

Year 1: Monument staff will continue monitoring.

Year 2: Monument staff will continue monitoring.

Year 3: Monument staff will continue monitoring.

Year 4: Monument staff will continue monitoring.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.5	0.0
Year 2:	MON	Recurring	1.5	0.0
Year 3:	MON	Recurring	1.5	0.0
Year 4:	MON	Recurring	1.5	0.0
		Total:	6.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not monitor aircraft. Overflights will continue unchecked. Without knowledge of impacts, primary cultural resources may be damaged or destroyed. Safety hazards from hovering aircraft will remain high. Visitor enjoyment may decrease due to noise and visual impacts of overflights. Employees will continue to be annoyed by overflights.

COMPLIANCE CODE(s): EXCL, NHPA

EXPLANATION: 516 DM6 App 7.4 B(4)

Proposal Date: 1994

MOCA-I-101.000 Evaluate and Define Fencing and Patrol Needs

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-101.000

TITLE: Evaluate and Define Fencing and Patrol Needs

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 3.0

SERVICEWIDE ISSUES:

C72 Protection and Security
N16 Visual and Biological Impacts of Urbanization and Other Near-park Development on Park Resources

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle National Monument was established to protect, preserve, and care for the ruins of prehistoric structures and other objects. Boundaries are not patrolled often and are a considerable distance from the main park administrative facilities; therefore, not easily visible. Due to limited staff, patrols are done irregularly by interpreters, maintenance, or administrative personnel. Cultural and natural resources are vulnerable to vandalism and other illegal uses. This is a prevalent concern due to increased development adjacent to the park and the limited staff.

An assessment is needed to determine the various types of fences, security systems, and/or management activities that would provide boundary protection. This includes, but is not limited to, new or improved fences, boundary patrols, security systems, radios, and monitoring techniques.

Fencing for the entire boundary must be maintained to protect natural and cultural resources. Boundary markers should be kept current and replaced and restored when necessary. Fencing and marking are important to inform people of the monument boundary especially for unauthorized purposes, and to keep out trespass livestock. Regular patrols in known vulnerable areas must continue to monitor trespass and fence condition. This task should be accomplished on a priority basis following a survey and evaluation of the current condition of existing fence. Changes and improvements will more adequately protect the natural and cultural resources of the monument. Consideration must be given to using wildlife standards (smooth wire and spacing). On-site inspections must be done for the construction of additional fencing in regards to archeological clearance.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Evaluate and define fencing and patrol needs. Assess the present boundary protection needs and develop boundary protection program. Determine the effectiveness of boundary fences for protecting the valuable cultural resources for which the monument was created. Consider effects of the fencing itself on archeological cultural landscape values.

Due to the small-size staff, management may not be fully aware of illegal activities which may occur in the park. Additional pressures on resources and increased illegal activity seem almost inevitable with the rapidly developing area. Vandalism, graffiti, arson, archeological theft, and other illegal or incongruent activities pose threats to facilities, resources, and visitor safety. Information must be gathered especially in sensitive areas regarding the extent and type of illegal activities affecting cultural and natural resources in the monument. This would provide management with data to determine if there is a problem with illegal activity within the monument and develop protective strategies. This information is necessary to make effective decisions on the best monitoring techniques and methods of protecting the affected resources. This strategy would comply with the NPS responsibility of preserving and protection all park resources.

Evaluate the types of fence suitable for the park that provide better protection than the existing construction. Several styles will be examined for effectiveness and appearance. Consideration for wildlife movement must be given. For example, while an eight-foot chainlink fence might deter most illegal entry, it may not project the proper image. An alarm system might be appropriate in conjunction with the fence. Any fence design will be a compromise for appearance, effectiveness, wildlife movement, and potential effects on cultural resource values.

Year 1: Evaluate needs and develop boundary protection program. Determine most effective security system, patrolling schedule, and style of fence with consideration of effectiveness, appearance, and protection of cultural and natural resources, including wildlife movement.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	3.0	0.0
		Total:	3.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Staff will have little to no empirical data on the level and type trespass, vandalism, and other illegal activities within its boundaries. Managers would not be able to make informed decisions in protecting resources. Cultural and natural resources will remain vulnerable. Visitor safety may be jeopardized.

COMPLIANCE CODE(s): NHPA

EXPLANATION:

Proposal Date: 1994

MOCA-I-101.001 Construct/Upgrade Fencing

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-101.001

TITLE: Construct/Upgrade Fencing

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 3.0

SERVICEWIDE ISSUES:

C72 Protection and Security
N16 Visual and Biological Impacts of Urbanization and Other Near-park Development on Park Resources

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle National Monument was established to protect, preserve, and care for the ruins of prehistoric structures and other objects. Boundaries are not patrolled often and are a considerable distance from the main park administrative facilities; therefore, not easily visible. Due to limited staff, patrols are done irregularly by interpreters, maintenance, or administrative personnel. Cultural and natural resources are vulnerable to vandalism and other illegal uses. This is a prevalent concern due to increased development adjacent to the park and the limited staff.

An assessment is needed to determine the various types of fences, security systems, and/or management activities that would provide boundary protection. This includes, but is not limited to, new or improved fences, boundary patrols, security systems, radios, and monitoring techniques.

Fencing for the entire boundary must be maintained to protect natural and cultural resources. Boundary markers should be kept current and replaced and restored when necessary. Fencing and marking are important to inform people of the monument boundary especially for unauthorized purposes, and to keep out trespass livestock. Regular patrols in known vulnerable areas must continue to monitor trespass and fence condition. This task should be accomplished on a priority basis following a survey and evaluation of the current condition of existing fence. Changes and improvements will more adequately protect the natural and cultural resources of the monument. Consideration must be given to using wildlife standards (smooth wire and spacing). On-site inspections must be done for the construction of additional fencing in regards to archeological clearance.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Construct and upgrade fencing. The effectiveness of boundary fences for protecting valuable cultural resources for which the monument was created and the effects of fencing itself on archeological cultural landscape values will be determined in project I-101.000. Replace fencing. NPS markers should be maintained.

Year 1: Upgrade and construct fencing.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		PRO	One-Time	3.0	0.0
			Total:	3.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Cultural and natural resources of the monument will remain vulnerable to trespass, vandalism, and other illegal activities within its boundaries. Visitor safety may be jeopardized.

COMPLIANCE CODE(s): NHPA

EXPLANATION:

Proposal Date: 1994

MOCA-I-101.002 Increase Boundary Patrols and Monitor Effectiveness

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-101.002

TITLE: Increase Boundary Patrols and Monitor Effectiveness

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

C07 Site Protection (law enforcement)
C72 Protection and Security
N16 Visual and Biological Impacts of Urbanization and Other Near-park Development on Park Resources

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle National Monument was established to protect, preserve, and care for the ruins of prehistoric structures and other objects. Boundaries are not patrolled often and are a considerable distance from the main park administrative facilities; therefore, not easily visible. Due to limited staff, patrols are done irregularly by interpreters, maintenance, or administrative personnel. Cultural and natural resources are vulnerable to vandalism and other illegal uses. This is a prevalent concern due to increased development adjacent to the park and the limited staff.

An assessment is needed to determine the various types of fences, security systems, and/or management activities that would provide boundary protection. This includes, but is not limited to, new or improved fences, boundary patrols, security systems, radios, and monitoring techniques.

Fencing for the entire boundary must be maintained to protect natural and cultural resources. Boundary markers should be kept current and replaced and restored when necessary. Fencing and marking are important to inform people of the monument boundary especially for unauthorized purposes, and to keep out trespass livestock. Regular patrols in known vulnerable areas must continue to monitor trespass and fence condition. This task should be accomplished on a priority basis following a survey and evaluation of the current condition of existing fence. Changes and improvements will more adequately protect the natural and cultural resources of the monument. Consideration must be given to using wildlife standards

(smooth wire and spacing). On-site inspections must be done for the construction of additional fencing in regards to archeological clearance.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Increase boundary patrols and monitor effectiveness. The boundary fence will be patrolled routinely, especially the most vulnerable sections, to look for trespass.

Due to the small-size staff, management may not be fully aware of illegal activities which may occur in the park. Additional pressures on resources and increased illegal activity seem almost inevitable with the rapidly developing area. Vandalism, graffiti, arson, archeological theft, and other illegal or incongruent activities pose threats to facilities, resources, and visitor safety.

Year 1: Increase boundary patrols and monitor effectiveness of site steward program and boundary fences.

Year 2: Continue with boundary protection program of patrolling and monitoring effectiveness of site steward program and boundary fences.

Year 3: Continue with boundary protection program of patrolling and monitoring effectiveness of site steward program and boundary fences.

Year 4: Continue with boundary protection program of patrolling and monitoring effectiveness of site steward program and boundary fences.

Note: This is an ongoing, long-term program.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	PRO	Recurring	1.0	0.0
Year 2:	PRO	Recurring	1.0	0.0
Year 3:	PRO	Recurring	1.0	0.0
Year 4:	PRO	Recurring	1.0	0.0
		Total:	4.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Cultural and natural resources will remain vulnerable. Visitor safety may be jeopardized.

COMPLIANCE CODE(s): NHPA

EXPLANATION:

Proposal Date: 1994

MOCA-I-102.000 Manage Pest Species

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-102.000

TITLE: Manage Pest Species

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 20.0

SERVICEWIDE ISSUES:

N01 Degradation of Park Resources due to Native Animal Species Overpopulation
N04 Degradation of Park Resources Due to Non-Native Animals
N05 Degradation of Park Resources Due to Non-Native Plants
C49 Museum Environment (Monitor/control, including IPM, in storage and exhibits)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Pests are generally a low level problem at Montezuma Castle, but they are a persistent and continuous problem that needs constant attention. Certain insects, clams, mammals, and plants, many non-native, cause problems that require periodic control measures. In the past five years, Integrated Pest Management (IPM) techniques have been initiated and will continue to be used as treatment for household, structural, wildland, and museum pests and for non-native species. Currently known pest problems are cited below.

Honeybees nest in cracks of the alcoves of Montezuma Castle and pose a hazard when they sting visitors and staff. When problems occur, the normal remedy has been to get local beekeepers to capture bees when they swarm. Earlier this year, one hive was flushed with soapy water to kill bees located close to the trail that had been stinging people. Periodic treatment will be necessary because the alcove provides nesting sites for bees. A more serious threat is the approaching Africanized honey bee. This is an aggressive non-native bee that has migrated northward from South and Central America since its accidental escape in the 1950s. A specific workshop was held January 1989 for dealing with management and safety concerns of Africanized bees. Staff from Montezuma Castle attended the course.

Scorpions and conenose bugs occasionally are pests when they enter dwellings. Ants are occasionally in structures (in water damaged wood) or undermining sidewalks. Treatment for drywood and subterranean termites has been carried out in the past. A couple of years ago, girdling bark beetles occurred in the sycamores at Montezuma Well and killed some large branches. The sycamore lacebug and anthracnose fungus reportedly infested the

sycamores at Montezuma Castle in the past. Monitoring will be conducted for museum pests as well.

The Asiatic clam was found to inhabit the outflow ditch from Montezuma Well. These clams are aggressive predators of native aquatic fauna. In 1985, a control project was completed whereby a station was established that automatically dispenses a specified amount of chlorine, which is lethal to Asiatic clams. The chlorine application coupled with regular drying and cleaning of the ditch has been successful for eliminating the clams. Since the clams have been eliminated from the ditch, the mechanical treatment will continue indefinitely since the clams inhabit Wet Beaver Creek and can readily invade the ditch if treatment were discontinued.

Occasionally mammals become pests. Mice, ringtail cats, and rock squirrels burrow in the ruins and undermine structures. Raccoons knock over garbage cans in the picnic area. Alien turtles currently occur in the Well. Alien birds (i.e., pigeons) roost in nooks in the vicinity of the Castle. Bats roost in the attic of park housing. These are periodic problems inherent with the locality and available habitat.

Partial lists of non-native plants have been made for the monument, i.e., tree of heaven, tamarisk, russian thistle, cheat grass, and horehound are a few. Some of these species are aggressive invaders. Work has been done to remove some weeds, but the method has not been timed correctly to eradicate them. Renewed action will be taken to control some plants when it is practicable. Native and non-native vegetation will be removed when found growing next to or within the walls of structures whether prehistoric, historic or modern.

The monument is getting a handle on its pest management problems. While this is not a major task, it is one that is continuous and requires application of integrated pest management techniques to solve problems and comply with NPS policies. Because of the natural and cultural environment, non-native species, and structures construction, managing pests will always be an ongoing duty. The problem is devoting the staff time to investigate and implement proper IPM techniques. This duty now fits into normal duties without consistent and effective methodologies, although progress has been made in this area. Much of the pest problems can be corrected with intensive action for most followed by low maintenance, i.e., removal of weeds. Other pests can be treated easily, i.e., screening vent openings to exclude bats from attics.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Manage pests with integrated pest management. Integrated pest management (IPM) is the decision making process and action used by the National Park Service to deal with pest species. Therefore, NPS policy and guidelines will be followed to manage pest species. The IPM techniques will be used and an action plan written as necessary. A staff position will be added to handle resources management duties, including pest management, as described in a separate statement to increase cultural and natural resources management staffing. This person will be responsible for identifying pest species and using IPM techniques to manage them. An IPM action plan will be written as necessary. An example of such an activity is the control of bee populations, as required for health and safety. Asiatic clams will be

controlled with the existing routine treatment. Rodents will be trapped and removed from ruins. Non-native species will be assessed to determine the threat to resources and managed as practicable. Until a resource management specialist is hired, the monument will continue to operate its pest management program with current staff in order to keep the problem under reasonable control.

Year 1: Hire a resources management specialist and manage pest conditions with IPM techniques.

Year 2: Manage pest conditions with IPM techniques.

Year 3: Manage pest conditions with IPM techniques.

Year 3: Manage pest conditions with IPM techniques.

Note: This is an ongoing, long-term program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		MON	Recurring	5.0	0.0
Year 2:		MON	Recurring	5.0	0.0
Year 3:		MON	Recurring	5.0	0.0
Year 4:		MON	Recurring	5.0	0.0
			Total:	20.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue current level of effort. The monument will continue to deal with its pest management problems using current staff. Pest management will remain as a collateral duty and may not receive the full attention that it needs. However, this pragmatic approach is far better than doing nothing at all.

COMPLIANCE CODE (s): EXCL, Section 106

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-103.000 Conduct Visitor Use Survey

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-103.000

TITLE: Conduct Visitor Use Survey

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 11.8

SERVICEWIDE ISSUES:

N22 Overuse/Impacts to Recreation and/or Landscaped Zones
C71 Visitor Impact

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Other than the Public Area Recreation Visitor Survey (PARVS) jointly conducted in 1985 by the National Park Service, U.S. Forest Service, Army Corps of Engineers, Tennessee Valley Authority, and numerous state park systems, no formal visitor use data collection is known to have occurred at Montezuma Castle National Monument. A review of the *Summary Results of the Public Area Recreation Visitor Survey Open-ended Questions* memo distributed to participating areas by the Washington Office Recreation Resources Assistance Division in December, 1986 revealed only cursory information regarding visitor impressions of the Montezuma Castle recreational experience. Results from the balance of the PARVS survey are still being analyzed and therefore the overall quality and utility of this information are currently unknown. Available baseline visitor data is therefore at a premium. Without further knowledge of the PARVS data, the adequacy of it to perform its primary function of assisting monument personnel with visitor management is seriously in question. Visitor use information provides managers with highly valuable insight into a host of visitor characteristics including demographics, perceptions, expectations, satisfactions, and behavior. Knowledge of these aspects enhances the managers' abilities to: (1) provide the user public with high quality recreational experiences, and (2) preserve and protect the values which attract visitors and for which the monument was established. Visitor use information is helpful under any level of visitation, but its value increases greatly as visitation grows. Visitation at the monument (including Montezuma Well) has roughly doubled since 1970. In 1994, the Montezuma Castle section had 820,936 visitors while the Montezuma Well section received 205,497 visitors. Visitation at the Castle, the highest visitor use area, accounts for over three-fourths of the total and has risen more than 85 percent during the past six years. The trend for sharply increased visitation is expected to continue, thereby steadily increasing the already great need for essential baseline information. Although never satisfied, the need to

accumulate basic data through research on "visitor use patterns pertinent to the monument for its resource management and interpretive programs" is clearly stated as a resource management objective in the 1975 Final Master Plan.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a visitor use survey. A mail-back questionnaire design would be least expensive in terms of taxing monument personnel. This type of survey is widely used in public recreation areas nationally because of its flexibility, comprehensiveness, and relative ease of administration and interpretation of results. Such surveys can be tailored to provide managers with precisely what they need to know concerning their visitor population. Survey information can identify visitor related problems and form the basis for appropriate management actions. The completion of a visitor use survey would satisfy: 1) the need to accumulate basic visitor data through research on "visitor use patterns pertinent to the monument for its resource management and interpretive programs" specified in the Resource Management Objectives section of the 1975 Final Master Plan; and 2) the statement "visitor use statistics will be gathered, recorded, and analyzed on a continuing basis" within the Cultural and Natural Resources Research and Management Actions section of the Monument's 1976 Cultural and Natural Resources Management Plan and Assessment.

This questionnaire should be developed by CPSU/UA staff or a private contractor. The questionnaire would be distributed on-site by monument personnel according to specified random distribution guidelines. All questionnaire data would be computerized and results generated using appropriate software.

Year 1: Conduct surveys and analyze trends.

Note: This is a recurring project. Surveys must be repeated a minimum of once every five years.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Cyclic	11.8	0.5
		Total:	11.8	0.5

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. The historical lack of baseline visitor information will continue, further hindering personnel in their efforts to sensitively and effectively manage visitors while providing them with quality visits. Lack of survey implementation also fails to satisfy the visitor use information directive stated in the 1975 Final Master Plan.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), D(1), E(2)

Proposal Date: 1990

MOCA-C-104.000 Improve Security Systems

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-104.000

TITLE: Improve Security Systems

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

C72 Protection and Security

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The museum exhibit spaces at Montezuma Castle are in a Mission 66 building; the exhibits are of the same era. These cases exhibit a number of monetarily and intrinsically valuable ethnographic and archeologic objects that are extremely collectible. The artifacts are very vulnerable to theft or damage under current conditions. Details of the current security system are on file at the monument. Modern equipment and strategies must be implemented to be certain the artifacts are not vulnerable to theft or damage. The present electronic security system must be updated.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Upgrade Security. Install upgraded electronic systems and other modern technology. This would offer the most protection for the artifacts. The new security system should also be designed to fully integrate a 24-hour system for the exhibit cases and an intrusion detection system for hours when the museum is not open. A fire detection system that includes local alarms should also be included in the design. The security system should be integrated with the local police and fire departments or a security company.

Year 1: Install upgraded security systems and monitoring devices.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	PRO	One-Time	15.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The exhibited artifacts would not be covered by the most effective form of security, thus may potentially be vulnerable to theft or damage. The park would not be in compliance with Special Directive 80-1 (revised).

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-105.000 Analysis of Adjacent Land Use and Status

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-105.000

TITLE: Analysis of Adjacent Land Use and Status

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 30.0

SERVICEWIDE ISSUES:

C73 Adjacent Land Use
N16 Visual and Biological Impacts of Urbanization and Other Near-park Development on Park Resources

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The Verde Valley of Arizona has an enormous array of recreational opportunities. According to Marshall A. Worden in the publication Papers in Community and Rural Development, 1981, "the Verde valley may well contain the greatest density of different types of vacation or recreational experiences of any similarly sized area in Arizona". Tourism at the Castle alone last year exceeded 657,000 people. Concomitant local population growth has also increased dramatically as economic employment opportunities increased. Consequently, land use practices are changing and diversifying at an alarming rate. Accelerated growth increases the frequency and complexity of resource issues while simultaneously reducing the amount of time that management has to react to resource concerns. In addition, having two discontinuous management districts of less than 870 acres magnifies the degree of danger associated with each potential threat. The ingredients and characteristics that have created such an unusually rich and diverse environment for resource concerns are many.

A few examples of nearby land uses are: urbanization, aggregate mining, surface water diversions, agriculture, grazing, ranching, and recreational opportunities such as camping, golf, fishing, horseback riding, and swimming. These activities are impacting cultural, water and other natural resources at Montezuma Castle, Montezuma Well, and along Beaver Creek and its tributaries.

Beaver creek, a significant part of the historic scene and a major tributary of the Verde River, meanders southward approximately 10 miles from the Well before joining the Verde River from the North. Six river miles upstream from its mouth, Beaver Creek passes

Montezuma Castle. The Castle is the best preserved example of cliff dwellings remaining from an extinct Sinaguan culture.

Dry Beaver Creek flows adjacent to Montezuma Well and is located about six miles upstream of the confluence of Wet Beaver Creek and Beaver Creek. Continued expansion of nearby population centers prompts concern for protection of this valuable resource.

Without the basic baseline information necessary for assessing future changes in the area's hydrological regime and proximate land utilization factors the historic and cultural scenes cannot be maintained adequately. An analysis of adjacent land use is a prerequisite step in determining the degree and magnitude of factors that may influence management's ability to resolve or anticipate potential resource utilization conflicts. Preliminary indications suggest that recent habitat conversions have already resulted in a loss of biological diversity and are impacting the adjacent riparian corridor.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct analysis of adjacent land use and status. Let a contract to document and map existing land uses, evaluate historical patterns of land use, and identify external threats resulting from adjacent land use practices. This entails a three part research study as follows:

- Identify issues, concerns, and opportunities by a) developing land utilization maps that illustrate present uses, historical changes, and legal land status; and b) developing a research program to quantify and evaluate potential threats resulting from land use conflicts.

- Analyze the management situation and assess the risk level stemming from each external threat attributed to a land use pattern or concern.

- Develop a cost effective monitoring protocol system for monument staff to reevaluate external threats on a periodic basis. Recommend management actions to mitigate, or if possible eliminate, external threats stemming from external land uses. Make recommendations on how to develop community awareness programs through interpretive and outreach programs.

Year 1: Develop and implement program to quantify and evaluate potential threats. Conduct inventories and begin compiling information. Write report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	30.0	0.0
		Total:	30.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument will continue to operate without the ability to estimate or predict significant external threats resulting from changing land use patterns. This places management in a difficult position of trying preserve and protect a cultural landmark based on limited knowledge with possible unforeseen adverse consequences to resources.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-105.001 Implement Long-Term Monitoring and Management Strategies to Protect from Potential Threats of Adjacent Land Uses

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-105.001

TITLE: Implement Long-Term Monitoring and Management Strategies to Protect from Potential Threats of Adjacent Land Uses

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 8.0

SERVICEWIDE ISSUES:

C73 Adjacent Land Use
N16 Visual and Biological Impacts of Urbanization and Other Near-park Development on Park Resources

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The Verde Valley of Arizona has an enormous array of recreational opportunities. According to Marshall A. Worden in the publication Papers in Community and Rural Development, 1981, "the Verde valley may well contain the greatest density of different types of vacation or recreational experiences of any similarly sized area in Arizona". Tourism at the Castle alone last year exceeded 657,000 people. Concomitant local population growth has also increased dramatically as economic employment opportunities increased. Consequently, land use practices are changing and diversifying at an alarming rate. Accelerated growth increases the frequency and complexity of resource issues while simultaneously reducing the amount of time that management has to react to resource concerns. In addition, having two discontinuous management districts of less than 870 acres magnifies the degree of danger associated with each potential threat. The ingredients and characteristics that have created such an unusually rich and diverse environment for resource concerns are many.

A few examples of nearby land uses are: urbanization, aggregate mining, surface water diversions, agriculture, grazing, ranching, and recreational opportunities such as camping, golf, fishing, horseback riding, and swimming. These activities are impacting cultural, water and other natural resources at Montezuma Castle, Montezuma Well, and along Beaver Creek and its tributaries.

Beaver creek, a significant part of the historic scene and a major tributary of the Verde River, meanders southward approximately 10 miles from the Well before joining the Verde

River from the North. Six river miles upstream from its mouth, Beaver Creek passes Montezuma Castle. The Castle is the best preserved example of cliff dwellings remaining from an extinct Sinaguan culture.

Dry Beaver Creek flows adjacent to Montezuma Well and is located about six miles upstream of the confluence of Wet Beaver Creek and Beaver Creek. Continued expansion of nearby population centers prompts concern for protection of this valuable resource.

Basic baseline information necessary for assessing future changes in the area's hydrological regime and proximate land utilization factors the historic and cultural scenes will be obtained in project 105.000. This analysis of adjacent land use is a prerequisite step in determining the degree and magnitude of factors that influence management's ability to resolve or anticipate potential resource utilization conflicts. A long-term monitoring program must be implemented to alert management to changing conditions and allow for execution of management strategies to protect monument resources.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring and management strategies to protect from potential threats of adjacent land uses. Implement research program from project 105.000 to quantify and evaluate potential threats resulting from land use conflicts. Continue to analyze the management situation and assess the risk level stemming from each external threat attributed to a land use pattern or concern. Train monument staff to reevaluate external threats on a periodic basis. When necessary perform management actions to mitigate, or if possible eliminate, external threats stemming from external land uses. Work on community awareness programs through interpretive and outreach programs.

Year 1: Implement long-term monitoring and management strategies to protect from potential threats of adjacent land uses.

Year 2: Continue long-term monitoring and management strategies to protect from potential threats of adjacent land uses.

Year 3: Continue long-term monitoring and management strategies to protect from potential threats of adjacent land uses.

Year 4: Continue long-term monitoring and management strategies to protect from potential threats of adjacent land uses.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	2.0	0.0
Year 2:	RES	One-Time	2.0	0.0
Year 3:	RES	One-Time	2.0	0.0
Year 4:	RES	One-Time	2.0	0.0
		Total:	8.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument will continue to operate without the ability to estimate or predict significant external threats resulting from changing land use patterns. This places management in a difficult position of trying preserve and protect a cultural landmark based on limited knowledge with possible unforeseen adverse consequences to resources.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-106.000 Characterize Hydrology of Groundwater System Supporting and Maintaining Montezuma Well and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-106.000

TITLE: Characterize Hydrology of Groundwater System Supporting and Maintaining Montezuma Well and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 130.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The water surface level at Montezuma Well is, itself, a water-related resource of this site. The height to which water rises in the Well is important to the archaeological and historical account of this NPS unit. Specifically, the visitor is presented with a unique natural structure which had an obviously important relationship to the habitation of this desert area by ancient people. Subject to natural variation, the water surface elevation in the Well should be maintained as close to its prehistoric level as possible to convey to the visitor an appreciation of 1) the locations of water and dwellings, relative to one another, and 2) the delivery of water to the ancient irrigation systems.

Population increases have occurred in this area as in many others in the southwest. Consequently, residential and commercial development has been steadily increasing in locations peripheral to the Well unit. The nature and effect of increased water use and consumption associated with this development is presently unknown. However, it may be that water is being removed from the natural avenues of surface and subsurface water delivery that supply the Well. If a significant diminution in water delivery occurs, this water-related resource attribute may be adversely affected and, as a consequence, the purposes for which this unit was established may be jeopardized.

While outflow from the Well has been monitored in the past, no information has been collected which assesses either water surface elevation or inflow to the system. Furthermore, questions have been raised as to the efficacy of current outflow measurement efforts due to shortcomings in the measurement installation. More importantly, there currently exists no

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	35.0	0.0
		Total:	35.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument will be managed with inadequate data on the flood hazard of various locations and developments within its boundaries. This is an unacceptable option.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

means for alerting management to imminent adverse, and possibly irreversible, effects to this resource attribute from external water use.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Characterize hydrology of groundwater system supporting and maintaining Montezuma Well and develop long-term monitoring protocols. This information will make it possible to evaluate potential effects of off-site land development on water flows in the Well through the use of mathematical models of existing and potential water withdrawals.

The protection of the hydrologic characteristics of the archaeologic and historic setting at the Well requires monitoring the standing water surface elevation and identifying geographical areas where existing and future water withdrawals may be of concern. The areas around the Well which recharge the aquifer supplying the springs within its perimeter should be identified so that special attention may be directed toward monitoring off-site water development. If water development is found to affect this water-related resource attribute, then appropriate action may be taken, through state administration of water rights or through other means, to prevent both irreversible damage to the site and financial hardship to private development interests outside the unit.

However, to support allegations of impact from outside water development and use, the characteristics of the aquifer must be scientifically identified and potential impacts must be evaluated. This will require a thorough hydrologic characterization of the water system supporting the Well. This characterization will include assessments of piezometric water surface in the recharge area, aquifer characteristics and, possibly, ground water quality or age determination followed by mathematical modelling of existing and potential water withdrawal. Ancillary to these efforts would be an assessment of historical water levels using both computer simulation and historical research.

Year 1: Identify the hydrologic characterization of the groundwater system supporting and maintaining Montezuma Well. Evaluate potential effects of off-site land development on water flows in the Well. Assess historical water levels. Develop long-term monitoring protocols. Develop and implement strategies to prevent and mitigate damage from development outside the Well.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	50.0	0.0
	MON	One-Time	40.0	0.0
	MIT	One-Time	40.0	0.0
		Total:	130.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The Service will continue to manage Montezuma Well without a scientifically designed and tested monitoring system. Without factual data, management will be unable to plan adequate strategies for buffering or mitigating impacts from outside development.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-106.001 Implement Long-Term Monitoring and Management Strategies to Protect the Hydrologic Characteristics of the Archaeological and Historical Setting at Montezuma Well

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-106.001

TITLE: Implement Long-Term Monitoring and Management Strategies to Protect the Hydrologic Characteristics of the Archaeological and Historical Setting at Montezuma Well

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The water surface level at Montezuma Well is, itself, a water-related resource of this site. The height to which water rises in the Well is important to the archaeological and historical account of this NPS unit. Specifically, the visitor is presented with a unique natural structure which had an obviously important relationship to the habitation of this desert area by ancient people. Subject to natural variation, the water surface elevation in the Well should be maintained as close to its prehistoric level as possible to convey to the visitor an appreciation of 1) the locations of water and dwellings, relative to one another, and 2) the delivery of water to the ancient irrigation systems.

Population increases have occurred in this area as in many others in the southwest. Consequently, residential and commercial development has been steadily increasing in locations peripheral to the Well unit. The nature and effect of increased water use and consumption associated with this development is presently unknown. However, it may be that water is being removed from the natural avenues of surface and subsurface water delivery that supply the Well. If a significant diminution in water delivery occurs, this water-related resource attribute may be adversely affected and, as a consequence, the purposes for which this unit was established may be jeopardized.

Baseline information has been collected in characterizing the hydrology of the groundwater system in 106.000. Monitoring most be on-going to alert management to imminent adverse, and possibly irreversible, effects to this resource attribute from external water use.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring and management strategies to protect the hydrologic characteristics of the archaeological and historical setting at Montezuma Well. Monument staff will be trained in the implementation of long-term monitoring as prescribed in 106.000.

Year 1: Monument personnel will be trained to carry out long-term monitoring.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This is an ongoing, long-term monitoring program.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.2
Year 2:	MON	Recurring	1.0	0.2
Year 3:	MON	Recurring	1.0	0.2
Year 4:	MON	Recurring	1.0	0.2
		Total:	4.0	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The Service will continue to manage Montezuma Well without a scientifically designed and tested monitoring system. Without factual data, management will be unable to plan adequate strategies for buffering or mitigating impacts from outside development.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-107.000 Identify Flood-Prone Areas for Protection of Lives and Property

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-107.000

TITLE: Identify Flood-Prone Areas for Protection of Lives and Property

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 35.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Important visitor attractions are located in close proximity to active floodplains. Park management is concerned that visitors and property may be at risk from flash flood hazards. A flood hazard assessment is not presently available for management's use. Such an assessment would identify areas in the monument that lie within the limits of selected design floods including the 'Probable Maximum Flood'. In addition, there are no mitigation recommendations specifically applicable to the monument which management may employ where hazards might exist.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a thorough hydrologic evaluation to delineate and evaluate flood hazards. This prudent study would give the superintendent the information necessary to ensure that public and employee safety is being protected from unreasonable exposure to flood hazards. A hydrologic investigation, designed to assess flood hazards in the monument, will include stochastic analyses of available data and on-site measurements of the channel. Flood hazard maps will be constructed which define the probable limits of flooded areas for selected design floods including the 'Probable Maximum Flood'. In conjunction with this assessment will be an evaluation of potential means of mitigation including opportunities and constraints associated with each.

Year 1: Conduct hydrologic evaluation. Produce maps to define the probable limits of potential flooded areas. Evaluate possible means of mitigation.

MOCA-N-108.000 Determine Visitor Impacts and Use Limits and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-108.000

TITLE: Determine Visitor Impacts and Use Limits and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 10.8

SERVICEWIDE ISSUES:

N22 Overuse/Impacts to Recreation and/or Landscaped Zones

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

No known study of visitor impacts or use limits has yet been conducted at Montezuma Castle, even though such a study is called for in both the 1975 Final Master Plan and the 1976 Cultural and Natural Resources Management Plan and Assessment. Visitation to Montezuma Castle, the highest visitor use section of the monument, exceeded 657,000 in 1987 and has increased over 58 percent during the past five years. Although the portion of the monument containing the Castle totals nearly 600 acres, visitor use is concentrated into an area of approximately 20 acres. This area, handling as many as 4,500 people on peak days, is composed of the access road, visitor center and adjacent parking lot, sewage treatment facility, the grounds containing a picnic area and interpretive trail, and the ruin site. The current trend of rapidly increasing visitation shows no signs of slowing. Visitor overcrowding is already occurring on peak days, potentially resulting in greatly lessened quality of recreational experiences and a myriad number of resource degradation problems including those associated with visitor-oriented structures and facilities. In addition, the current on-site sewage facility (built in 1983 and brought on-line in 1984) to accommodate the anticipated continued visitation increase, is already operating at or above capacity. Severe overloading of that facility would result in the denial of monument access to visitors, stemming from the obvious threat to public health. Based on these and other related circumstances, particularly staff shortages, it is important that visitor impacts on monument resources be clearly identified and assessed, along with a determination of the maximum number of visitors that can be accommodated per day under the current limits of monument facilities and management.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a study of visitor impacts and use limits and develop long-term monitoring protocols. A combination study of visitor impacts on monument resources, both current and anticipated, and the determination of use limits for the monument, would provide staff with definitive tools with which to more effectively manage the heavy visitation they are experiencing. The monument, staff, and visitors would all benefit.

Data from the visitor use survey proposed in a separate statement in this resources management plan can be used to design and streamline the social conditions section of the visitor impacts/use limits study. This study would be designed to determine the physical, biological, environmental, and social conditions that define the monument's best recreational use. Once the ideal use conditions and use limits are established, they can be continuously updated via a long-term monitoring program.

Maximum allowable visitor use levels have not been determined for the various areas and visitor activities within the monument. In order to develop such use levels, based on quantifiable sociological and ecological data, a number of studies will be conducted. Impacted areas will be identified and information on deterioration rates, and the susceptibility of specific areas to visitor impact will be gathered. Visitor use statistics will be gathered, recorded, and analyzed on a continuing basis. Efforts will be made to identify those impacts resulting from specific visitor activities. Once impacts are identified, efforts will be made to mitigate and compensate for them in order to allow the monument's ecosystems to evolve, repair themselves, and survive in a relatively unimpeded natural state.

The information obtained from the above studies will be used to develop visitor use limit figures for the various areas and visitor activities in the monument. A use limit may also be developed for the monument as a whole. Once use limits have been established use will be held to this level. As additional information becomes available the use limit figures will be readjusted as necessary.

Year 1: Conduct visitor impacts and use limits survey.

Year 2: Complete study and write report. Develop long-term monitoring protocols.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Cyclic	10.8	0.0
		Total:	10.8	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Lack of movement on these issues will surely either initiate negative visitor impacts on resources or exacerbate existing ones, and risk failure of certain support facilities. Staff are frequently overwhelmed with visitors on peak days, and visitors will inevitably receive decreasingly inferior recreational experiences.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), D(1), E(2)

Proposal Date: 1990

MOCA-N-108.001 Implement Long-Term Monitoring of Visitor Impacts and Use Limits

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-108.001

TITLE: Implement Long-Term Monitoring of Visitor Impacts and Use Limits

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N22 Overuse/Impacts to Recreation and/or Landscaped Zones

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

No known study of visitor impacts or use limits has yet been conducted at Montezuma Castle, even though such a study is called for in both the 1975 Final Master Plan and the 1976 Cultural and Natural Resources Management Plan and Assessment. Visitation to Montezuma Castle, the highest visitor use section of the monument, exceeded 657,000 in 1987 and has increased over 58 percent during the past five years. Although the portion of the monument containing the Castle totals nearly 600 acres, visitor use is concentrated into an area of approximately 20 acres. This area, handling as many as 4,500 people on peak days, is composed of the access road, visitor center and adjacent parking lot, sewage treatment facility, the grounds containing a picnic area and interpretive trail, and the ruin site. The current trend of rapidly increasing visitation shows no signs of slowing. Visitor overcrowding is already occurring on peak days, potentially resulting in greatly lessened quality of recreational experiences and a myriad number of resource degradation problems including those associated with visitor-oriented structures and facilities. In addition, the current on-site sewage facility (built in 1983 and brought on-line in 1984) to accommodate the anticipated continued visitation increase, is already operating at or above capacity. Severe overloading of that facility would result in the denial of monument access to visitors, stemming from the obvious threat to public health. Based on these and other related circumstances, particularly staff shortages, it is important that visitor impacts on monument resources be clearly identified and assessed, along with a determination of the maximum number of visitors that can be accommodated per day under the current limits of monument facilities and management.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring of visitor impacts and use limits. A combination study of visitor impacts on monument resources, both current and anticipated, and the determination of use limits for the monument, would provide staff with definitive tools with which to more effectively manage the heavy visitation they are experiencing. The monument, staff, and visitors would all benefit. Staff will be trained to implement long-term monitoring program that will be established in 108.000.

Year 1: Monument personnel will be trained to carry out long-term monitoring.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This is an ongoing, long-term monitoring program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.2
Year 2:	MON	Recurring	1.0	0.2
Year 3:	MON	Recurring	1.0	0.2
Year 4:	MON	Recurring	1.0	0.2
		Total:	4.0	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Lack of movement on these issues will surely either initiate negative visitor impacts on resources or exacerbate existing ones, and risk failure of certain support facilities. Staff are frequently overwhelmed with visitors on peak days, and visitors will inevitably receive decreasingly inferior recreational experiences.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), D(1), E(2) **Proposal Date: 1990**

MOCA-I-200.000 Conduct Ethnographic Overview and Assessment Including an Ethnobotanical Study

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-200.000

TITLE: Conduct Ethnographic Overview and Assessment Including an Ethnobotanical Study

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 30.0

SERVICEWIDE ISSUES:

C21 Ethnographic Overview and Assessment
N24 Other Issues

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The monument does not have an ethnographic overview and assessment, which is a basic cultural resources document necessary to identify and establish traditional uses by Native American groups and early settlers. As a response to the Native American Graves Protection and Repatriation Act (NAGPRA), some tribes have stated ties to Montezuma Castle National Monument. An overview and assessment would help the park determine with whom to consult. Without this information, it is difficult for management to comply with NAGPRA and 1992 amendments to the National Historic Preservation Act, which requires consultation with Native American tribes.

An inventory is needed to establish if and where important ethnographic areas are located in the park that are presently unknown to the National Park Service. The inventory would provide information on known and previously unknown sites that would allow them to be managed in a sensitive and protective manner. Documenting prehistoric, historic, and current Native American use is essential to manage, interpret, and restore relationships with appropriate tribes. Ethnographic studies are vital to ensure that the park manages traditional cultural properties as required under federal and agency laws, policies, and guidelines.

The ethnographic information needed for this project will be collected during oral histories and interviews with Native Americans and local residents who have knowledge of plant harvesting, cultivation, and use, animal hunting, settlements, trade routes, and other native activities conducted in the area. Other sources of information are land claims, historical documents, and archeological surveys. An ethnobotanical study will examine the uses of plant resources and the effects on the plant species and communities. The findings of an

ethnobotanical study will contribute information on biogeographic changes in the location and abundance of plants and associated animal resources that may relate to changes in land use and climate in the area. Several archeological and cultural studies have been done for the park, but none focused on ethnographic research. They do, however, provide baseline data for the associated work.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct an ethnographic overview and assessment, including an ethnobotanical study. The overview will be produced according to NPS standards and guidelines, and will include assessment of pertinent land claims cases and current interests by various tribes, including taped oral interviews. The inventory would provide management with information on ethnographic resources. It entails comprehensive data collection on settlements, trade routes and exchange, gathering and hunting locations, plant use, etc. as they changed through time. Cultural links to present Native American tribes will be defined as related to their use of the park area.

An ethnobotanical study will yield details about the plants and their uses by historic native cultures, the relative size of historic occupations, human interaction with the environment, and environmental change. It would also address the position of Montezuma Castle National Monument along historic trade routes. New theories regarding usage of native plants and the significance of agriculture in the lifestyles of the Sinagua may result from research and help improve interpretation of the historic inhabitants of the park. The ethnobotanical study may consist of several concurrent or sequential stages including, but not limited to the following:

- Calculate the biomass of edible native plants potentially available as food supplements to the historic agriculture crops, on the basis of the carrying capacity of the park.

- Prepare an annotated list of all edible, medicinal, and other plants known to have been used by the Sinagua, and later historic native peoples, on the basis of literature searches and taped oral interviews.

- Map the individual distributions of native plants that appear to have been selectively encouraged by native groups to grow near occupation sites or in favorable habitats.

Information gathered from this project will be coupled with existing archeological data to enhance understanding about the historic cultures living in the area. This knowledge will enable NPS to better work with tribes having a link to the park. The staff can more fully comply with NAGPRA and NHPA.

Year 1: Conduct ethnographic inventory, gather oral history and ethnohistory, and study ethnobotany.

Year 2: Prepare transcripts of interviews and write report of combined study. Produce maps (atlas) of ethnographic use of park for use in interviews.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	20.0	0.0
Year 2:	RES	One-Time	10.0	0.0
		Total:	30.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not obtain ethnographic and ethnobotanical information. Management of ethnographic resources will not be founded on adequate information due to insufficient existing data. Compliance with NAGPRA and NHPA will be difficult. The possibility of conflict with Native American groups will continue, and the superintendent will be uncertain of the tribes with which to consult. If no additional data are obtained, there are a number of concerns and details regarding native cultures, routes, and resource use that will never be understood and incorporated into management. The park will not be able to properly protect traditional cultural properties (as required by law) or areas of traditional cultural use without knowledge of their location, ethnographic function, and value to native tribes. Ethnobotanical work will not be done, so the opportunity to provide new ideas regarding historic inhabitants' interactions with their environment could be lost, and public education will suffer.

COMPLIANCE CODE (s): EXCL, NHPA, NAGPRA

EXPLANATION: 516 DM6 App. 7.4 B(4), E(1), (7)

Proposal Date: 1993

MOCA-I-201.000 Conduct Literature Search, Compile and Annotate Reference List in Computerized Bibliographic Information Retrieval System

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-201.000

TITLE: Conduct Literature Search, Compile and Annotate Reference List in Computerized Bibliographic Information Retrieval System

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 10.5

SERVICEWIDE ISSUES:

C60 Cultural Resources Management Bibliography (CRBIB)
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Sociological, physical, and natural changes at Montezuma Castle National Monument are adversely impacting the monument. Historically, various studies have been conducted since the monument was established in 1906. Currently, the monument does not have the ability to efficiently track the wealth of historic, technical, and ecological information that is available. Without the development of an adequate tracking system and information base, park management cannot efficiently manage the resource or respond to developing resource issues. In addition, public interest and environmental groups frequently request bibliographic citations and or information upon which management actions were based. Researchers and other professionals routinely depend upon and utilize the monument's information base as the first step in addressing management concerns. The development of a computerized bibliographic system and the production of an annotated bibliography will place the monument in a better position to assess past actions, evaluate current programs, and identify potential resource management problems.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct literature search, compile & annotate reference list in computerized bibliographic information retrieval system. Develop a computerized bibliographic system and produce an annotated bibliography. This will increase management's ability to respond effectively to cultural and natural resource issues. An adequate information base can prevent duplication of effort and costly mistakes. Adequate and effective access to informational resources are a

mandatory prerequisite for efficient and cost effective management. The time frame for evaluating resource issues can be significantly reduced with an annotated bibliography and the creation of a computer information tracking system. In addition, the bibliographic assessment would identify strengths and weaknesses in the existing information base. This action would increase the effectiveness of all management programs. Information management is a critical first step in developing cost effective solutions. Also, this system will serve to maintain a comprehensive resource database.

Year 1: Begin literature search.

Year 2: Conclude literature search. Compile and annotate reference list.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.5	0.0
		Total:	10.5	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. With this alternative the monument will not have adequate access to current or past informational resources. This increases the time and reduces the cost effectiveness of management's ability to evaluate resource issues.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-201.001 Update Bibliographic Database Annually

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-201.001

TITLE: Update Bibliographic Database Annually

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

C60 Cultural Resources Management Bibliography (CRBIB)
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Sociological, physical, and natural changes at Montezuma Castle National Monument are adversely impacting the monument. Historically, various studies have been conducted since the monument was established in 1906. Without an updated adequate tracking system and information base, park management cannot efficiently manage the resource or respond to developing resource issues. In addition, public interest and environmental groups frequently request bibliographic citations and or information upon which management actions were based, thus the most current information must be readily available. Researchers and other professionals routinely depend upon and utilize the monument's information base as the first step in addressing management concerns. Annually updating the computerized bibliographic information retrieval system will place the monument in a better position to assess past actions, evaluate current programs, and identify potential resource management problems.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Update bibliographic database annually. Management will have the ability to respond effectively to cultural and natural resource issues using the most current data.

Year 1: Monument staff will update bibliographic database.

Year 2: Monument staff will update bibliographic database.

Year 3: Monument staff will update bibliographic database.

Year 4: Monument staff will update bibliographic database.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		RES	Recurring	1.0	0.0
Year 1:		RES	Recurring	1.0	0.0
Year 1:		RES	Recurring	1.0	0.0
Year 1:		RES	Recurring	1.0	0.0
			Total:	4.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. With this alternative the monument will not have adequate access to the most current informational resources. This increases the time and reduces the cost effectiveness of management's ability to evaluate resource issues.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-202.000 Prepare a Geographic Information Plan

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-202.000

TITLE: Prepare a Geographic Information Plan

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 8.0

SERVICEWIDE ISSUES:

C62 Geographical Information System
N24 Other Issues

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Numerous resource management projects, research activities, and programs, such as ecological inventorying and monitoring, air quality monitoring, and water resources evaluation require effective management of large quantities of data, so that data is organized, protected and meaningfully interpreted. This is of utmost importance in order to ensure research validity, aid with the implementation of monitoring protocols, enhance the quality of future research, and aid in decision making processes. Production of high quality graphics, including thematic maps, is essential to improve intra-agency, interagency, and international communications. A geographic information system is the most efficient and effective means for collecting, storing, analyzing and disseminating information about any georeferenced data.

External threats from urbanization, conflicting land use practices, demographic changes, and environmental pollution are increasing at an alarming rate. A GIS is instrumental in detecting changes, analyzing trends, and projecting possible future conditions resulting from these external resource pressures. Digitizing photographic and cartographic information increases the speed at which monument staff can collect, prepare, retrieve, and manipulate data from different thematic data composites. Cartographic and subsequent data analysis significantly increases management's ability to document, demonstrate, illustrate, and predict long term changes in the health of the monument's resources. In addition, the GIS produces support materials such as maps, tables, charts and graphs to illustrate resource concerns and to describe park resources to interested parties. It provides the medium to better interpret data, identify issues and threats, articulate concerns, and provide information for management decisions.

A Geographic Information Plan must be developed for the monument. The plan will outline the overall scope of GIS at the monument, including application development. Long-term goals of the GIS program should be described including; to work cooperatively with adjacent land managers and owners, and the University of Northern Arizona, and develop a regional database that will assist in planning, management, and resource protection.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Prepare a Geographic Information Plan. The monument staff will write and implement the actions outlined in a GIS plan. A GIS Specialist will be detailed or contracted to implement the program. GIS will be fully integrated with other resources management and research programs, such as archeological site evaluation and ecological monitoring. The GIS will eventually be integrated with all monument functions, including maintenance and interpretation.

Year 1: Prepare a Geographic Information Plan

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.00	0.00
			Total:	0.00	0.00

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	8.00	0.00
		Total:	8.00	0.00

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with Present Management. Monument staff will rely on traditional techniques and methods to define, locate and facilitate plotting of computerized mapped data. As a result of no action, the organization of the overall GIS database will be less user-friendly, thus inhibiting utilization of the technology by monument staff.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-I-202.001 Implement a Geographic Information Plan

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-202.001

TITLE: Implement a Geographic Information Plan

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 60.0

SERVICEWIDE ISSUES:

C62 Geographical Information System
N24 Other Issues (Lack of adequate data management system)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Currently there is no automated system for creating, managing, analyzing, and displaying mapped information about the monument's resources. The monument's resources are in a continual state of change which makes it difficult to predict future resource conditions and quantify the effects from external threats. A significant challenge is faced by management when traditional methods are utilized to integrate thematic data composites derived from natural and cultural resource information. Resource management plans are by their nature limited in illustrating long term inconspicuous and subtle changes in the health of natural and cultural resources. External threats, pressures from urbanization, conflicting land use practices, demographic changes, and environmental pollution are increasing at an alarming rate. Implementing a GIS plan, resulting from 202.000, is necessary to detect changes, analyze trends, and project possible future conditions resulting from these external resource pressures.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement GIS Plan and apply GIS techniques to management operations. An NPS multidisciplinary GIS task force would be created to develop and standardize the GIS protocols that would be used by the monument staff. The task force would develop a strategy to address the following GIS themes: boundaries, land use, landownership, vegetation communities, riparian community stability, roads, trails, archeological sites, historic structures, ethnographic resources, cultural landscapes, and demographic influences on cultural and natural resources, soils, wetlands delineation, and other external impacts from the surrounding area.

Digitizing photographic and cartographic information will increase the speed with which staff can collect, prepare, retrieve, and manipulate data from different thematic data composites. Cartographic and subsequent data analysis will significantly increase managements ability to document, demonstrate, illustrate, and predict long term changes in the health of the monument's resources. In addition, the automated GIS system produces support materials such as maps, tables, charts, and graphs to illustrate the resource concerns or simply describe park resources to interested parties.

At least two scales of resolution will be initially required to represent and generate the thematic data composites. Consideration should be given to the 1:1,200 and 1:24,000 scales for small and large scale resolution as appropriate. Physiographic and political boundaries should be adjusted to include selected natural or culture features that influence the monument's resources.

Year 1: Implement a Geographic Information Plan.

Year 2: Continue data entry and provide analyses.

Year 3: Continue data entry and provide analyses.

Year 4: Continue data entry and provide analyses.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	30.0	0.2
Year 2:	RES	Recurring	10.0	0.2
Year 3:	RES	Recurring	10.0	0.2
Year 4:	RES	Recurring	10.0	0.2
		Total:	60.0	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not use a GIS system. This entails maintenance of the status quo. Staff would be forced to rely on traditional techniques and methods that do not illustrate long term resource

changes as effectively as a GIS. Visual patterns and conditions of resources will not be generated.

Develop a stand-alone GIS system. This is certainly a viable option in terms of technology, etc., but it would not be cost effective for an area as small as Montezuma Castle.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-C-203.000 Update Administrative History

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-203.000

TITLE: Update Administrative History

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 25.0

SERVICEWIDE ISSUES:

C37 Administrative History

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle has a 1965 administrative history that needs to be updated. Such a document can be a valuable resource in explaining the historic reasons certain practices are in place in the monument. This document should properly record what verbal and written agreements were made with landowners, neighboring communities, etc. at the time of establishment of the monument. It should also record any significant subsequent matters that affect how and why Montezuma Castle National Monument operates in specific unique areas. A manager newly assigned to the monument should find that this document is a succinct source from which to get a briefing on past milestones, agreements, commitments, etc. that shape everyday decisions in the monument. It is NPS policy that every area have an up-to-date administrative history.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Update the Administrative History. A qualified historian from a university or private practice will be contracted to update the administrative history for Montezuma Castle National Monument. Servicewide guidelines for writing administrative histories will be followed, meeting the Washington Office directive and ensuring compliance with the National Historic Preservation Act. This will help the superintendent, particularly when new to the monument to understand the public and private interactions that have occurred since the earliest days of the monument. Many of these interactions have helped shape the way things are done and the reasons behind certain decisions and practices. This is valuable information for the superintendent to have. Such an update will also accomplish one aspect of NHPA compliance.

Year 1: Gather information.

Year 2: Complete gathering information. Update the administrative history.

Note: This is a long-term program; monument staff will update with annual reports.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		ADM	One-Time	25.0	0.0
			Total:	25.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with Present Management. The park will not be in compliance with NHPA nor the WASO directives on having a current administrative history for each park unit in the system, until this project is accomplished.

COMPLIANCE CODE (s): Section 106, NHPA

EXPLANATION:

Proposal Date: 1990

MOCA-C-204.000 Compile and Maintain Comprehensive Photographic Documentation

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-204.000

TITLE: Compile and Maintain Comprehensive Photographic Documentation

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 35.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park and Ecosystems and Threats to Them
C70 Environment Impact

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The known photographic collection for Montezuma Castle National Monument is a mixture of pictures taken for multiple reasons. Various land photos have been taken over the years for different purposes, but routine duplicates rarely followed. No comprehensive search of historic photographs has been done for cultural or natural resources. Some work has been done to establish long-term photodocumentation of resources. However, to be of value, a systematic photographic plan must be made and carried out.

A limited systematic search of libraries, historical societies, museums, university anthropology and archeology departments, or other relevant depositories should be conducted to obtain copies of early historic photos. Photographs will show changes in vegetation, major events (such as urbanization and ranching), portions of ruins now collapsed, missing, or vandalized, and structural details and conditions now lost. Without this information undesirable changes in resources and land development may go undetected resulting in failure to meet minimal standards in resources protection and preservation.

A scientifically based collection is lacking as well as a plan or protocol for future photographic needs. Low and high level air photographs, airborne video, and land-based photographs would document existing conditions such as ruins, fences, structures, roads, trails, facilities, vegetation, soils, adjacent land uses, wildland fires, etc. These photos are a valuable management tool as baseline information to document a condition at a point in time and assess changes that occur with management actions, natural events, vandalism, or adjacent land uses.

To make the results more useful, GIS should be employed as a data management system. The only GIS connection has been with the CPSU/UA, but it is under funded, has a minimal database, and lacks reliable data, which is based on USGS topographic maps. With transfer of CPSU/UA to NBS, there must be a GIS program developed in conjunction with the Southern Arizona Group (SOAR).

Long-termed photos are invaluable as a tool in conducting inventories and mapping occurrences and distributions. One set would be taken with sequential sets following at regular frequencies in the future. The value of the frequency will be apparent in following years when a comparison can be made. The closer the frequency, the more useful the information. Changes and trends can be monitored in conjunction with analysis (ground truthing) in the field. The condition of resources in and around the park are continually changing, which makes predictions of future resource conditions difficult. Also, it is difficult to quantify changes generated from external threats.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Compile and maintain scientifically based photographic documentation for the ruins. This action starts with designing a plan to survey for existing photographs and to photograph the park in its present condition. It directs compiling and conserving existing photographs that document resource conditions. A systematic process of replicating historic pictures, taking initial pictures, and retaking baseline photos is necessary to develop a useful database of aerial and land photos. The protocols describe systematic and scientific methods of taking and collecting air and land photographs, data processing techniques with GIS and conventional stereo-paired photographs, and data use and management. First will be an assessment of existing photographs in the park, Western Archeological and Conservation Center (WACC), and other known sources, such as libraries, historical societies, museums, university archeology and anthropology departments, and other relevant depositories for photographs made prior to monument establishment that are currently not in NPS collections. It will assess the possibility of collections in regional and national repositories, such as the Smithsonian Institute and Heard Museum. It will also survey other agencies. Appropriate repositories will be defined, whether in the park and/or WACC.

Data will provide useful information on structural conditions through time, landscaping, and historic scene changes. Acquire large format (4" x 5") copy negatives when possible and/or 8" x 10" prints of any views not already in park files or other NPS repositories. Supplement with brief memorandum of repositories and collections searched, and any known but not searched. Photographs should be preserved in permanent park collection or at the Western Archeological and Conservation Center.

Low and high level air photographs, airborne video, and land-based photographs would be collected on a regular schedule to ensure consistent data gathering and assessment. This effort will provide management with an effective means to analyze existing trends and predict future changes. Selected sites of cultural and natural settings will be photographed. Aerial photographs will be digitized and put into GIS format for ready access and use. Photographs will be curated and cataloged according to NPS requirements. A schedule of routine retaking of the different types of photographs will be defined.

Photographs would provide documentation to assess visual condition patterns, changes of resources and topography, and land development inside and outside the park. Digitizing photographic and cartographic information will increase the speed that the staff can collect, prepare, retrieve, and manipulate data from different GIS thematic data composites. It will significantly increase management's ability to document, demonstrate, and predict long-term changes in the health of the resources. Having long-term and current information enhances management's ability to make sound decisions for ecological, cultural, and political challenges that continually face the park.

Year 1: Conduct a search for historic photographs. Take a series of low and high level air photographs and airborne video of the park and immediate area at least within a mile radius.

Year 2: Complete work started in year 1.

Note: This is a recurring project at a minimum cycle of four years. Threats to park resources or major changes on adjacent lands may require more frequent photography.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	21.0	0.4
Year 2:	RES	One-Time	15.0	0.4
		Total:	36.0	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This is unsuitable because essential historic data will remain unknown and could be lost through careless handling of photographs in private hands. There is no systematic plan or method to acquire photographs, airborne video, or to extensively search repositories and archives for historic photos of the cultural resources, natural environment, and human uses. There is no schedule to retake photographs to make them valuable documentation of change. Similarly the detailed photos of cultural sites must be programmed and retaken. Developing a GIS database with this alternative is also uncertain because of inconsistent funding.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-C-205.000 Complete Oral Interviews of People With Historical Knowledge of the Monument

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-205.000

TITLE: Complete Oral Interviews of People With Historical Knowledge of the Monument

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 11.5

SERVICEWIDE ISSUES:

C27 Ethnographic Oral and Life Histories
C35 Historic Resource Study (HRS)

CULTURAL RESOURCE TYPE CODE: ETHN

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Documented interviews with individuals knowledgeable about the history of the monument are incomplete. Many former employees and former and/or current citizens of the area have information about historical activities that occurred in and around the monument. They may provide valuable information regarding the history of the monument and early programs and operations under the care of the US Forest Service and the National Park Service. This information must be acquired while those individuals are alive and willing to share their experiences.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct interviews and document historical events, activities, and landmarks. Identify former employees, longtime local families, and others who have information about the historical and developmental periods of the monument. Conduct oral interviews and document those meetings with appropriate media, tape, video, etc. Transcribe and copy tapes of all interviews so that information is available while preserving original, archival tapes. This information will highlight the history of Montezuma Castle National Monument. Complete a report on new information gathered by this project, and integrate findings with the administrative history.

Year 1: Contact people with historical knowledge of the monument and gather oral histories.

Year 2: Write report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	6.5	0.0
Year 2:	RES	One-Time	5.0	0.0
		Total:	11.5	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not collect oral histories. Information that could fill in gaps in the monument's history and provide background will be forever lost.

Recruit volunteer to conduct interviews. Monument volunteers will identify individuals who were former employees and others who have information about the historical, developmental periods of the monument.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1994

MOCA-N-206.000 Develop an Annotated Natural Resources Bibliographic Database

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-206.000

TITLE: Develop an Annotated Natural Resources Bibliographic Database

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 20.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them
N24 Other Issues

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Cultural resources literature is documented in a servicewide program called CRBIB (Cultural Resources Bibliography). At this time there is no companion servicewide program for natural resources literature, although the Washington Office is examining this deficit. The ProCite software program is being used for the CRBIB and natural resource literature base.

Cultural resources at Montezuma Castle National Monument are known to have been subject to a number of graduate and professional research studies, symposium papers, and journal articles. Natural resources have also been addressed in various documents, although to a lesser degree. The park has developed a list of references over the years, but it is not exhaustive. Based on a comprehensive list, the park can expand its library by acquiring the most pertinent references. This would be particularly useful for interpretive services, research, and management reference.

The CPSU/UA in 1990 funded a partial survey of natural resources of Southern Arizona Group areas by searching park files and libraries. An annotated bibliography was compiled of all relevant literature, whether natural or cultural, for each park. Funding limitation narrowed the scope of this search. An expanded search for literature regarding natural resources in and related to the monument is needed to develop a database for research and management.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Develop a natural resources bibliographic database. A search of bibliographic databases, NPS and other agency files, college and university graduate theses and dissertations, electronic reference systems, and popular literature is necessary in order to compile a complete list of annotated references. This would encompass all relevant books, reports, articles, monographs, graduate-level literature, symposium and conference proceedings, and manuscripts. Files of NPS and other agencies/organizations would be examined for historical information (including maps) about topics, such as grazing, farming, ranching, management, fires, water resources, etc. The park cannot house a complete natural and cultural library. Selected references would be acquired. Others would be listed by source. In addition, approval of all future research at the park would be contingent on the investigator providing a complete literature search record to the superintendent.

ProCite is the selected software, so updated copies would be acquired. A dedicated computer may be necessary. Eventually there may be electronic connections with NPS and other computer databases.

Year 1: Purchase updated copy of software and begin literature search.

Year 2: Conclude literature search. Compile and annotate reference list. Begin to acquire desired references.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
Year 2:	RES	One-Time	10.0	0.0
		Total:	20.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not conduct literature search. The park would not efficiently improve its bibliographic database. There would be a duplication of future research efforts (although the magnitude of redundancy is difficult to estimate), and management would not have the benefit of knowledge of past work in the park and related work elsewhere.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1994

MOCA-N-206.001 Update Annotated Natural Resources Bibliographic Database Annually

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-206.001

TITLE: Update Annotated Natural Resources Bibliographic Database Annually

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 0.4

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them
N24 Other Issues

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Cultural resources literature is documented in a servicewide program called CRBIB (Cultural Resources Bibliography). At this time there is no companion servicewide program for natural resources literature, although the Washington Office is examining this deficit. The ProCite software program is being used for the CRBIB and natural resource literature base.

Cultural resources at Montezuma Castle National Monument are known to have been subject to a number of graduate and professional research studies, symposium papers, and journal articles. Natural resources have also been addressed in various documents, although to a lesser degree. The park has developed a list of references over the years, but it is not exhaustive. Based on a comprehensive list, the park can expand its library by acquiring the most pertinent references. This would be particularly useful for interpretive services, research, and management reference.

The CPSU/UA in 1990 funded a partial survey of natural resources of Southern Arizona Group areas by searching park files and libraries. An annotated bibliography was compiled of all relevant literature, whether natural or cultural, for each park. Funding limitation narrowed the scope of this search. An expanded search for literature regarding natural resources in and related to the monument is needed to develop a database for research and management.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Update annotated natural resources bibliographic database annually. Park staff will be responsible for keeping the database current; nationwide searches may be required periodically. Eventually there may be electronic connections with NPS and other computer databases. Selected references would be acquired. Others would be listed by source. In addition, approval of all future research at the park would be contingent on the investigator providing a complete literature search record to the superintendent.

Year 1: Update annotated natural resources bibliographic database.

Year 2: Update annotated natural resources bibliographic database.

Year 3: Update annotated natural resources bibliographic database.

Year 4: Update annotated natural resources bibliographic database.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	On-Going	0.1	0.0
Year 2:	RES	On-Going	0.1	0.0
Year 3:	RES	On-Going	0.1	0.0
Year 4:	RES	On-Going	0.1	0.0
		Total:	0.4	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not conduct literature search. The park would not keep an up-to-date bibliographic database. There would be a duplication of future research efforts (although the magnitude of redundancy is difficult to estimate), and management would not have the benefit of knowledge of past work in the park and related work elsewhere.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1994

MOCA-N-207.000 Inventory the Basic Natural Resources of Montezuma Well and Adjacent Riparian and Terrestrial Habitat and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-207.000

TITLE: Inventory the Basic Natural Resources of Montezuma Well and Adjacent Riparian and Terrestrial Habitat and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 34.3

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Well is a unique, spring fed lake nearly circular in shape, with a diameter of about 360 ft. (112 meters). It was formed in a limestone sink approximately 10,000 years ago. No other ecological equivalent to Montezuma Well has yet been found worldwide (George Ruffner, Personal Communication). A sizeable human community has developed just south of the monument in the past 20 years and it is still growing. A growing population necessarily increases demand for and consumption of groundwater, which consumption may have a negative impact on the Well. A survey of all resources associated with the Well is badly needed. Tens, if not hundreds, of taxa in Montezuma Well are found nowhere else on earth. The breadth of species diversity and the complexity of interactions among organisms in this one-of-a-kind ecosystem are only now beginning to be recognized. Ecological knowledge of the Well is very limited. Increasing visitation, human population growth, and changes in land use patterns present a real threat to the long-term protection of this unique resource.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a thorough resources basic inventory of the Well and adjacent riparian and terrestrial areas and develop long-term monitoring protocols. This will provide the superintendent with in-depth information on occurrence and status of rare species in the Well and some aspects of their life history. This study will also indicate what species of native and alien plants and animals are present in the well and its adjacent areas. The study will

also provide an understanding of the interrelationships among the aquatic, riparian, and terrestrial components of the ecosystem. This information about the Well and its biota will allow the manager to make appropriate decisions in protecting the resources associated with the Well on both a short term and a long term basis.

This study will be conducted through a combination of research contracts and NPS scientists. It will consist of the following components:

- A thorough bibliographic search, review, and summary of information from literature. Over 50 scientific reports and papers have been published on a variety of scientific subjects regarding the Well. They describe its geology, provide some data on water quality and quantity, water turnover rate, sediments, etc. This search should include historic photos and aerial photographs of the area.

- A complete taxonomic listing of plants (including cryptogams) and animals that occur in the study site, including annotations on relative abundance, distribution, life history, phenology, etc., based on observations during this study as well as information from the literature. The species inventory within the Well and its associated outflow irrigation ditch will include phytoplankton and zooplankton.

- An evaluation of interrelationships among the aquatic, riparian, and terrestrial species and ecological communities. The study will evaluate, for example, the ecological role of water fowl and other water birds, riparian songbirds (passerines) along the Well and outflow ditch.

- A written evaluation of key species and critical food chains, also discussing observations of, or potential for, any native species being threatened by alien species or human activities. A discussion of known or potential threats to ecosystem components, along with considerations of manipulative management, habitat, or species protection or restoration, etc. will also be included here.

- The preparation of interpretive and educational programs for use in presenting a more complete and accurate story of this unique resource.

- Products from this study will be scientific report(s), species listings and annotations, taxonomically identified specimens to be curated in appropriate museums and herbaria, reference specimens of selected species for use in the monument by scientists, interpreters, etc. Specific suggestions will be made in writing and in an oral presentation to the monument staff on the implications of study findings to both management and interpretation. The researchers will also recommend any further studies that may be necessary to manage the resources of the Well, the outflow ditch, and adjacent riparian and terrestrial habitats.

Year 1: Conduct literature and historic photograph search and initiate field work.

Year 2: Conclude field work and write report with long-term monitoring protocols.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	22.0	0.7
Year 2:	RES	One-Time	12.3	0.4
		Total:	34.3	1.1

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not conduct research. This will result in continued management of the Well without knowledge of the unique species and communities existing there. It is likely that degradation of the Well, and loss of species or entire ecological communities may occur without NPS knowledge or management action to prevent it.

Continue the present program. The National Park Service has funded very little biological research in the Well. A vegetation study around the rim of the Well was funded in 1987 and one within the sink was funded in 1988. Outside researchers, however, are encouraged to use their own funding sources to conduct studies in the Well, provided their research proposal demonstrates that they will do no harm to the resources. This option may result in many of the same problems as the no action alternative due to the slow pace of research.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-207.001 Implement Long-Term Monitoring of the Basic Natural Resources

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-207.001

TITLE: Implement Long-Term Monitoring of the Basic Natural Resources

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Well is a unique, spring fed lake nearly circular in shape, with a diameter of about 360 ft. (112 meters). It was formed in a limestone sink approximately 10,000 years ago. No other ecological equivalent to Montezuma Well has yet been found worldwide (George Ruffner, Personal Communication). A sizeable human community has developed just south of the monument in the past 20 years and it is still growing. A growing population necessarily increases demand for and consumption of groundwater, which consumption may have a negative impact on the Well. A survey of all resources associated with the Well is badly needed. Tens, if not hundreds, of taxa in Montezuma Well are found nowhere else on earth. The breadth of species diversity and the complexity of interactions among organisms in this one-of-a-kind ecosystem are only now beginning to be recognized. Ecological knowledge of the Well is very limited. Increasing visitation, human population growth, and changes in land use patterns present a real threat to the long-term protection of this unique resource.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring of the basic natural resources. This will provide the superintendent with in-depth current information on occurrence and status of rare species in the Well and some aspects of their life history. This information about the Well and its biota will allow the manager to make appropriate decisions in protecting the resources associated with the Well on both a short term and a long term basis. Long-term monitoring will follow protocols developed in the initial inventory, 207.000.

Year 1: Implement long-term monitoring protocols.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This action will require long-term monitoring and recommend further studies.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.7
Year 2:	MON	Recurring	1.0	0.7
Year 3:	MON	Recurring	1.0	0.7
Year 4:	MON	Recurring	1.0	0.7
		Total:	4.0	2.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not conduct research. This will result in continued management of the Well without knowledge of the unique species and communities existing there. It is likely that degradation of the Well, and loss of species or entire ecological communities may occur without NPS knowledge or management action to prevent it.

Continue the present program. The National Park Service has funded very little biological research in the Well. A vegetation study around the rim of the Well was funded in 1987 and one within the sink was funded in 1988. Outside researchers, however, are encouraged to use their own funding sources to conduct studies in the Well, provided their research proposal demonstrates that they will do no harm to the resources. This option may result in many of the same problems as the no action alternative due to the slow pace of research.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-208.000 Develop Program to Continually Integrate Long-Term Monitoring of Ecosystems

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-208.000

TITLE: Develop Program to Continually Integrate Long-Term Monitoring of Ecosystems

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 6.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

This resources management plan calls for conducting a wide variety of studies to delineate and quantify ecological values of Montezuma Castle National Monument. These studies will involve long-term monitoring protocols for each of the respective components. However, if these individual protocols are not integrated into a coherent and unified program for the park, the value of these studies will be greatly depreciated.

Monitoring can provide the superintendent with a direct measure of the health and stability of the park's resources. Such an integrated monitoring program must be carefully designed and coordinated to minimize the costs while maximizing the returns. It must be adjustable to unpredicted future factors and additional studies. Continual evaluation of monitoring and results will yield the best resources data. This project is needed to focus the professional judgement and experience on integrated monitoring in a manner that can address the multidisciplinary needs of the program and provide the staff assistance needed to implement a long-term commitment.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Continually evaluate the protocols. The best of the protocols should be integrated into an overall long-term monitoring program for the park to provide an empirical assessment of general ecosystem health and trends. This will ensure that the superintendent and staff are able to manage the park's natural resources with informed decisions. The park is not likely to gain the staff necessary to conduct an intense and detailed monitoring system. Therefore, emphasis will be on simplicity by focusing on only the most useful components for reflecting

general ecological conditions. This program statement defines the need to periodically evaluate the monitoring protocols with the oversight of an advisory group of scientists and managers. They will recommend changes based on results and completion of new research to add to the monitoring workload. Finally, the funds necessary for training staff and implementing this monitoring program must be obtained in the park base budget.

Year 1: Review and evaluate the type of research that has been conducted and monitoring protocols used. Identify information gaps. Adjust the existing integrated monitoring program if necessary and design a strategy to gather missing information.

Note: This is a periodic evaluation and adjustment of the overall program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Cyclic	6.0	0.0
		Total:	6.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. This entails continuing to operate the park without any systematic or programmatic long-term monitoring program evaluation. This will leave management vulnerable and unable to detect changes in the flora and fauna and related trends. Additional information for interpretation of ecological parameters will not be forthcoming.

COMPLIANCE CODE(s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1994

MOCA-C-300.000 Stabilize Pithouse Floor

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-300.000

TITLE: Stabilize Pithouse Floor

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

C05 Site Stabilization/Preservation/Protection Treatments

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The pithouse exhibit is an exposed archeological excavation which has been covered with a protective roof structure. The surface of the excavation, which was coated with a thin layer of polymer amended mud shortly after the digging was completed, has held up remarkably well for over 30 years. In recent years however, the surface has begun to crack and come loose in a few areas, exposing the fragile earth beneath. Erosion is beginning to damage exposed areas, seriously endangering this important resource. The surface has been patched in places, but these patches have not blended well with the treated mud and have developed shrinkage cracks around the edges.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Remove and replace the amended mud surface. The requirements of the NPS Organic Act of 1916 and NPS-28 will be met. The fragile earth features will be protected from further erosion. A team of three (3) trained ruins stabilization experts should remove the existing amended mud surface and reinstall a new protective layer of amended mud over the earth features in the pithouse floor.

The existing surface should be carefully removed using small hand tools, exercising care to prevent damage to the pithouse features. The exposed features should be carefully examined for deterioration and evaluated for future research potential.

The ruins stabilization team should install this new amended mud surface using small hand tools and their hands to pat the material into place. The new protective surface should be formed using Duraweld-C polymer and local soils in order to better match the color of the surroundings. The new surface should be protected until curing is complete. The pithouse

should be recorded with photographs before, during, and after the work. The new surface should protect the fragile earth features from erosion due to rain, melting snow, and the abrasive action of footsteps.

Year 1: Remove amended mud surface and reinstall a new protective layer of amended mud over the earth features in the pithouse floor. Take photographs before, during, and after the work.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	One-Time	15.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Such management of this cultural resource would fail to meet the NPS Organic Act of 1916 and NPS-28 Cultural Resources Management Guidelines. The treated surface will continue to flake-off exposing fragile earth features to erosion.

Remove the amended mud surface only. Management would fail to meet the NPS Organic Act of 1916 and NPS-28 Cultural Resources Management Guidelines. The exposed fragile earth features will erode and the resource will be lost.

COMPLIANCE CODE (s): NHPA

EXPLANATION:

Proposal Date: 1990

MOCA-C-301.000 Complete Archeological Site Management Information System

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-301.000

TITLE: Complete Archeological Site Management Information System

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 10.0

SERVICEWIDE ISSUES:

C03 Site Documentation and Data Management (incl. CSI-A & ASMIS)

CULTURAL RESOURCE TYPE CODE: SITE

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The Archeological Site Management Information System (ASMIS) for Montezuma Castle has been completed through a total archeological inventory, with the exception of: 1) coverage of 2+ acres on the northeast boundary; 2) a plan map of Castle A; and 3) record and description of cave structures below Montezuma Castle. These are necessary to complete its Archeological Site Management Information System which has been conducted first in the 1950's by A. Schroeder and updated in 1988 by S. Wells.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct complete inventory. Conduct the needed survey and mapping of the structures to a level of documentation for necessary National Register assessment of these structures to complete the ASMIS. Survey, map and record these remaining areas at US Department of Interior and professional standard. Produce a publishable report.

Year 1: Enter data for Archeological Site Management Information System.

Note: This is an ongoing project; update as information becomes available.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
		Total:	10.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Use existing records to complete the ASMIS. This leaves incomplete inventory and incomplete data for the National Register documentation for this nationally significant resource.

COMPLIANCE CODE (s): Section 110, NHPA

EXPLANATION:

Proposal Date: 1990

MOCA-C-302.000 Date Montezuma Castle

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-302.000

TITLE: Date Montezuma Castle

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 24.4

SERVICEWIDE ISSUES:

C02 Identification and Evaluation Studies

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Since Montezuma Castle was almost entirely cleared of artifacts by the late 1800s and none of the structural wood is datable by the tree-ring method, there are no direct dates for the ruin. It is assumed that the cliff dwelling dates from the Tuzigoot Phase (A.D. 1200-1400) by analogy to pueblos of that period, and this is the basis for its interpretation. However, the actual age of the Castle is not known.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Run a series of small-sample C14 accelerator dates. It is now possible to run Carbon 14 dates on very small samples to date ancient carbon-containing objects. Thus a series of dates could be run from the outer surfaces (exterior rings at cutting time) of a sample of wooden beams from the Castle. By taking samples from different rooms and levels of the Castle it should be possible to obtain a suite of dates centering on the age of occupation of the Castle, with a margin of error of less than a century. It may also be possible to obtain relative dates for a building sequence which can be used to validate or invalidate the building sequence recently derived from wall superposition and corner joints.

This option will require that researchers obtain wood from 2 or 3 locations in levels 1-4 (level 5 has no wood) of the Castle, and submit duplicate samples to two different laboratories to control for errors. A final report will be produced that meets professional and Department of Interior standards.

Year 1: Conduct the testing and write a report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	24.4	0.0
		Total:	24.4	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Continue to ascribe Montezuma Castle's age to the 14th and 15th centuries by analogy to other Tuzigoot Phase pueblos. This is based on assumptions that cannot be substantiated, and is a deficiency in area interpretation.

Excavate Montezuma Castle. Conduct an archeological excavation within the rooms of the Castle. There are a few rooms with original deposits beneath the floors, and excavation in these deposits might recover a sample of decorated pottery which could give the age of the Castle to the closest 50 or 100 years. However, the logistics of this excavation, and the potential for structural disturbance make this an impractical approach, with no guarantee of obtaining the information desired.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(1)

Proposal Date: 1990

MOCA-C-303.000 Conduct Archeological Overview and Assessment

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-303.000

TITLE: Conduct Archeological Overview and Assessment

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 6.0

SERVICEWIDE ISSUES:

C01 Overview and Assessment

CULTURAL RESOURCE TYPE CODE: SITE

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

A general archeological overview of the Verde Valley was done under general contract by Paul and Suzanne Fish in 1977. This provided a general context for Tuzigoot and Montezuma Castle, but did not address prehistoric settlement or landscape of which Montezuma Castle and nearby sites were a part. Presently the U.S. Forest Service is preparing an archeological overview of the Verde Valley which may address these concerns. However, further study should be done to produce a report on settlement and the probable prehistoric landscape of Montezuma Castle and Well.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct archeological overview and assessment. Conduct an archeological overview and assessment using previous data and reports from the Beaver Creek study and other climate and archeobotanical data for the park. This study will provide valuable scientific and interpretive data on the settlement of and probable prehistoric landscape at Montezuma Castle and Montezuma Well.

A review of archeological data and reports for Beaver Creek will be helpful to reconstruct the prehistoric Tuzigoot Phase settlement system and landscape. Relate Montezuma Castle to contemporary sites that formed a system of land use in this drainage. Review existing archeobotanical and climatic data to reconstruct probable patterns of vegetation and land use.

Year 1: Conduct archeological overview and assessment.

Year 2: Reconstruct probable patterns of vegetation and land use.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	6.0	0.0
		Total:	6.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. There will be no professional basis for interpreting Montezuma Castle's cultural and natural surroundings, except limited data from existing sources. There will be no basis for appropriate systematic management of natural vegetation.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), (10), E(6)

Proposal Date: 1990

MOCA-C-304.000 Maintain Stabilized Prehistoric Ruins

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-304.000

TITLE: Maintain Stabilized Prehistoric Ruins

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 64.0

SERVICEWIDE ISSUES:

C05 Site Stabilization/Preservation/Protection Treatments

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

From 1925 to 1928, Frank Pinkley and Martin Jackson conducted extensive repairs on Montezuma Castle. However, in 1951, the Castle was closed to the public due to structural weaknesses. From 1951 through the 1970s stabilization was confined largely to water proofing roofs in the exposed outer tier of rooms, correcting points of internal stress, and resurfacing eroded facings. Routine minor stabilization was done by maintenance staff.

From the late 1970s until now the stabilization of the prehistoric structures was accomplished by a Ruins Stabilization Specialist. The structures are now in a maintainable condition and the impact is low, however to keep the following structures in this condition they must be maintained on a cyclic basis.

Structure No. NA 1272
Structure No. NA 1271
Structure No. NA 1273
Structure No. NA 1273A
Structure No. NA 1278 (Castle B)
Structure No. NA 4616
Structure No. NA 4630
Structure No. NA 5553
Structure No. NA 6373 (Castle A)

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Maintain stabilized prehistoric ruins. Maintain the structures, thus meeting the requirements of the NPS Organic Act of 1916 and Guideline NPS 28: Cultural Resources Management. Impacts to the structures will remain low.

The work is to be accomplished by the monument's maintenance staff. Following instructions in the historic structure preservation guide, the maintenance staff will continue to maintain the structures. The Ruins Stabilization Specialist will provide assistance for training and difficult maintenance tasks. The specialist will provide closeout of all work undertaken.

Year 1: Maintain and stabilize prehistoric ruins; continue to improve and document techniques and actions.

Year 2: Maintain and stabilize prehistoric ruins; continue to improve and document techniques and actions.

Year 3: Maintain and stabilize prehistoric ruins; continue to improve and document techniques and actions.

Year 4: Maintain and stabilize prehistoric ruins; continue to improve and document techniques and actions.

Note: This is a long-term ongoing program.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Recurring	16.0	0.3
Year 2:	MIT	Recurring	16.0	0.3
Year 3:	MIT	Recurring	16.0	0.3
Year 4:	MIT	Recurring	16.0	0.3
		Total:	64.0	1.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Management of the cultural resources will fail to meet the NPS Organic Act of 1916 and NPS 28 Cultural Resources Management Guidelines. The level of impact on the structures will increase from low to moderate within two years.

COMPLIANCE CODE (s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 B(2), C(4)

Proposal Date: 1990

MOCA-C-400.000 Conduct Study of Montezuma Castle Irrigation System

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-400.000

TITLE: Conduct Study of Montezuma Castle Irrigation System

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 14.5

SERVICEWIDE ISSUES:

C35 Historic Resource Study (HRS)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

It is assumed that the prehistoric sites near Montezuma Well were small farming settlements that relied on irrigation ditches coming from the Well. However, the ditch system has not been systematically studied to determine its age, extent, flow capacity, or the results of mineral deposits in the canal.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Study irrigation system. Conduct a thorough study of the Montezuma Castle irrigation ditch system to gather as much information as possible on flow rates, length of use, aerial extent of the system, etc. Past records of canal systems will be gathered, existing aerial photographs will be examined and new low-altitude low angle aerial photographs will be taken. Visible canal systems will be mapped and digitized. Exposed canals will be examined, and additional segments will be exposed and sectioned to examine mineral deposits and estimate flow rates. Feasibility of dating canals will be assessed. Canal system's age, extent and capacity will be compared to other prehistoric canal systems. Potential for further research will be assessed, and proposals for further work will be prepared.

Year 1: Conduct study of irrigation system.

Year 2: Write report and digitize maps.

Note: Additional studies may be proposed as a result of this initial research.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	14.5	0.0
		Total:	14.5	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. The interpretive story at the Well will rely on traditional lore and analogy with modern irrigation systems.

Review documentation of prehistoric systems in the Southwest. This will add some background for interpretation but will not increase knowledge of the system at Montezuma Well.

COMPLIANCE CODE (s): Section 106, NHPA

EXPLANATION:

Proposal Date: 1990

MOCA-C-401.000 Prepare Historic Structure Preservation Guide: Historic Structures

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-401.000

TITLE: Prepare Historic Structure Preservation Guide: Historic Structures

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 30.0

SERVICEWIDE ISSUES:

C05 Site Stabilization/Preservation/Protection Treatments

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

There is a great need to provide direction for the preservation maintenance activities on these structures. The structures are now in a maintainable condition. However, it is imperative to provide maintenance personnel with a reference for programming, continued housekeeping, and routine and cyclic preservation maintenance. The historic structures preservation guide (HSPG) will provide the necessary information for orderly, timely, and proper inspection and maintenance.

Specific key points that must be monitored in an annual inspection will be; impacting vegetation around the building base, water drainage, and adobe wall construction. These are not the only points to be monitored, however, they are the elements that present the greatest areas of deterioration.

The impact on these structures is due to normal daily use by park personnel. The level of impact is low, therefore, its effects are not a direct threat to visitor or staff safety. However, directing the maintenance activities on these structures is considered to be of the utmost importance to ensure that the present maintainable condition of the structures is retained without loss of historic fabric or details.

The resources to be included in this HSPG are as follows:

Structure No. 04 - Residence
Structure No. 05 - Residence

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Establish a historic structure preservation guide for structures. The requirements of the Act of 1916 and NPS-28 will be met. Maintenance and preservation activities on the structures will follow a prescribed schedule and be accomplished along parameters that will ensure the impact will remain low.

A task directive, outlining the requirements and goals of the project, will be prepared by the Western Region Division of Park Historic Preservation. The HSPG will be a working document, produced in loose-leaf format with the pages dated to facilitate updating without reprinting the entire document. The completed document will contain three major sections: instructions, schedules, and reference materials.

Personnel required for the compilation of the HSPG will be park maintenance personnel, a historical architect, and a historian. The following procedures for developing an HSPG will be used:

- A historical architect, and a historian will assemble basic inspection and preservation instructions, as well as specifications, and prepare or modify as-built drawings and other initial pertinent reference material.

- Copies of an initial draft of the above documents will be forwarded to the monument, Southern Arizona Group office, and the regional office for review. Shortly thereafter the specialists and area and regional office staff will meet at the site to suggest additions, changes, or deletions.

- Based on the initial draft, the monument and SOAR staff will draft a cyclic preservation maintenance schedule to be reviewed by the specialists during the above site visit.

- Based on the revised draft of the guide resulting from the above meeting, the document will be completed and submitted for area concurrence and regional approval.

Year 1: Gather site information and begin writing HSPG.

Year 2: Complete HSPG.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	30.0	0.0
		Total:	30.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Management of the cultural resources will fail to meet the Act of 1916 and NPS 28 Cultural Resources Management Guidelines. The level of impact on the structures will increase from low to moderate within two years.

COMPLIANCE CODE (s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 B(2), (5), C(4)

Proposal Date: 1990

MOCA-C-402.000 Prepare Historic Structure Preservation Guide: Prehistoric Structures

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-402.000

TITLE: Prepare Historic Structure Preservation Guide: Prehistoric Structures

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 13.0

SERVICEWIDE ISSUES:

C05 Site Stabilization/Preservation/Protection Treatments

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Until late in 1987 the prehistoric structures of Montezuma Castle were maintained by a Ruins Stabilization Specialist operating out of the Western Archeology and Conservation Center. The Specialist provided preservation and stabilization of prehistoric ruins throughout National Parks in both the Western and Southwest Regions. His knowledge of preservation and stabilization, gathered through years of experience, served as the preservation guide for work on these structures. In 1987 the Ruins Stabilization Specialist retired, taking with him the entire history and technology of ruins preservation that he had developed over the years.

There is a great need to provide direction for the preservation maintenance activities on the prehistoric structures of the monument. The structures are now in a maintainable condition. However, it is imperative to provide maintenance personnel and stabilization teams with a reference for programming, continued housekeeping, and routine and cyclic preservation maintenance. The HSPG will provide, as well, the necessary information for orderly, timely, and proper inspection and maintenance.

The impact on these structures is from visitation and erosion. The level of impact is low for its effects are not a direct threat to visitor or staff safety. However, directing the maintenance activities on these structures is considered to be of the utmost importance to ensure that the present maintainable condition of the structures is retained without loss of historic fabric or details. These prehistoric resources are of national significance and are the prime resource for which the monument was established.

The resources to be included in this HSPG are as follows:

Structure No. NA 1272
Structure No. NA 1271
Structure No. NA 1273
Structure No. NA 1273A
Structure No. NA 1278 (Castle B)
Structure No. NA 4616
Structure No. NA 4630
Structure No. NA 5553
Structure No. NA 6373 (Castle A)

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Establish a historic structures preservation guide for the structures. The requirements of the Act of 1916 and Guideline NPS 28 will be met. Maintenance and preservation activities on the structures will follow a prescribed schedule and be accomplished along parameters that will ensure the impact will remain low.

A task directive, outlining the requirements and goals of the project, will be prepared by the Western Region Division of Park Historic Preservation. The HSPG will be a working document, produced in loose-leaf format with the pages dated to facilitate updating without reprinting the entire document. The completed document will contain three major sections: instructions, schedules, and reference materials.

Personnel required for the compilation of the HSPG will be park maintenance personnel, a ruins stabilization specialist, a historical architect, an anthropologist, and a historian. The following procedures for developing an HSPG will be used:

- A ruins stabilization specialist, a historical architect, and an anthropologist, will assemble basic inspection and preservation instructions, as well as specifications, and prepare or modify as-built drawings and other initial pertinent reference material;

- Copies of an initial draft of the above documents will be forwarded to the monument, Southern Arizona Group office, and the regional office for review. Shortly thereafter the specialists and area and regional office staff will meet at the site to suggest additions, changes, or deletions.

- Based on the initial draft, the ruins stabilization specialist will draft a cyclic preservation maintenance schedule to be reviewed by the area and region during the above site visit.

- Based on the revised draft of the guide resulting from the above meeting, the document will be completed and submitted for area concurrence and regional approval.

Year 1: Gather site information and begin writing the HSPG.

Year 2: Complete the HSPG.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		RES	One-Time	13.0	0.0
			Total:	13.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Management of the cultural resources will fail to meet the Act of 1916 and NPS 28 Cultural Resources Management Guidelines. The level of impact on the structures will increase from low to moderate within two years.

COMPLIANCE CODE (s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 B(2), (5), C(4)

Proposal Date: 1990

MOCA-C-403.000 Maintain Historic Structures

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-403.000

TITLE: Maintain Historic Structures

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 8.0

SERVICEWIDE ISSUES:

C05 Site Stabilization/Preservation/Protection Treatments

CULTURAL RESOURCE TYPE CODE: STRC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The existing management program for these structures has resulted in buildings that are now maintainable. However, cyclic maintenance must be performed on these structures to keep the impact at a low level from normal daily use by monument personnel.

The cyclic maintenance of these adobe structures requires more attentive and specialized work than does that of the other park structures. Maintenance inspections must be performed to ensure that water and other deteriorating elements are discovered before problems develop. After inspection the maintenance must be performed according to a historic structures preservation guide. The structures to be included in this work are as follows:

Structure No. 04 - Residence
Structure No. 05 - Residence

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Maintain historic structures. Maintain the structures, thus meeting the requirements of the NPS Organic Act of 1916 and Guideline NPS 28: Cultural Resources Management. Impacts to the structures will remain low. Following instructions in an historic structures preservation guide, the monument's maintenance staff will continue to maintain these buildings. The Southern Arizona Group ruins stabilization specialist will provide assistance for training and difficult maintenance tasks. The specialist will provide closeout of all work undertaken.

Year 1: Conduct routine and cyclic maintenance program.

Year 2: Conduct routine and cyclic maintenance program.

Year 3: Conduct routine and cyclic maintenance program.

Year 4: Conduct routine and cyclic maintenance program.

Note: This is an ongoing, long-term program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Cyclic	8.0	0.1
		Total:	8.0	0.1

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not maintain the structures. Management of the cultural resources will fail to meet the NPS Organic Act of 1916 and Guideline NPS 28: Cultural Resources Management. The level of impact on the structures will increase from low to moderate within two years.

COMPLIANCE CODE (s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 B(2), C(4), E(2)

Proposal Date: 1990

MOCA-C-404.000 Establish Program for Long-Term Monitoring of Cultural Setting

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-404.000

TITLE: Establish Program for Long-Term Monitoring of Cultural Setting

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 120.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them
C19 Special Studies

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

This resources management plan calls for a wide variety of studies to delineate and quantify cultural and ecological values of Montezuma Castle National Monument. These studies will also recommend long-term monitoring protocols for each of the respective components. However, if these individual protocols are not integrated into a coherent and unified program for the monument the value of these studies will be greatly depreciated. Monitoring can provide the superintendent with a direct measure of the health and stability of the monument's resources. Such an integrated monitoring program must be carefully designed and coordinated in order to minimize the costs while maximizing the returns. This project is needed in order to focus the necessary professional judgement and experience on this specific resources management problem in a manner that can address the multidisciplinary needs of the program and provide for the staff needed to implement an integrated monitoring effort.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Design and implement a long-term monitoring program. This involves taking the results from the series of inventory and assessment projects and cultural resources protection studies and integrating them into a carefully designed program for long-term monitoring of Montezuma Castle resources. Such a monitoring program will put the monument in conformance with NPS policy and make it possible for staff to gather empirical data to ensure that ecosystems are functioning properly in the atmosphere of urban encroachment that surrounds the monument today. It would also ensure that cultural resources are being protected to NPS standards.

In an area as small as Montezuma Castle and its associated Montezuma Well unit this monitoring system should be designed to be relatively simple but effective. The monument is not likely to gain the staff necessary to conduct an intense and detailed monitoring system. Therefore, emphasis will be on simplicity by focusing on only the most useful components for reflecting general ecological condition.

Year 1: Let research contract to design monitoring program.

Year 2: Initiate long-term monitoring program.

Year 3: Continue long-term monitoring program.

Year 4: Continue long-term monitoring program.

Note: This is an ongoing, long-term monitoring program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	30.0	0.0
Year 2:	RES	Recurring	30.0	0.0
Year 3:	RES	Recurring	30.0	0.0
Year 4:	RES	Recurring	30.0	0.0
		Total:	120.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This would require that the monument be managed without any formal system of monitoring the health of its ecosystems or the condition of its cultural resources. This will fail to meet NPS standards and is therefore an unacceptable option.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-C-405.000 Conduct Historic Resource Study

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-405.000

TITLE: Conduct Historic Resources Study

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 7.0

SERVICEWIDE ISSUES:

C35 Historic Resource Study (HRS)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The historic resources at Montezuma Castle and Well have not all been formally studied. Without further study age, complexity, and importance to the history of the ruins and surrounding area cannot be adequately known or fully interpreted. Future programs at Montezuma Castle and Well such as vegetation management could impact the integrity of the resources. A historic resource study of the Montezuma Well Smokehouse and Montezuma Castle National Monument staff residences, accompanied by requisite National Register forms and historic base maps must be conducted. The Smokehouse is a potentially historically significant log building about which there is conflicting and insufficient data. If significant, it will need a National Register form. The extent of the resources and the related resources beyond site boundaries are unknown. With the continuing loss of historic resources in the southwest the importance of studying, preserving, and interpreting what remains at Montezuma Castle and Well is significant.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a Historic Resource Study. This will study the historic resources associated with the historic site to provide data for accurate interpretation. Thorough background research and archeological testing of portions of the resources will be required to establish chronological age and pertinent data.

Complete a thorough literature search of available documentation relating to Montezuma Castle and Well; this would be followed by archeological testing of the resources within the site to determine cultural affiliation, chronological age, and acquire construction data. Aerial photographs may be available to help delineate old resources both on and off Montezuma Castle and Well property. The literature search and completion report will be completed by

an NPS archeologist that supervises the fieldwork with one other crew member. Recommendations will be provided for future management, protection and interpretive considerations.

Year 1: Conduct historic resource study and write a report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		RES	One-Time	7.0	0.0
			Total:	7.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Use Existing Information for Interpretation and Historic Documentation. Baseline data necessary for historical background required for accurate interpretation and sound management decisions will be lacking.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1995

MOCA-C-500.000 Conserve Museum Objects

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-500.000

TITLE: Conserve Museum Objects

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 13.2

SERVICEWIDE ISSUES:

C48 Conservation Treatment

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The museum collection still at Montezuma Castle, about 140 items, has been on exhibit for almost 30 continuous years. Many of the items are organic or repaired archeological items that may be particularly fragile. A collection condition survey, conducted in August of 1988, has identified objects that are in need of conservation treatment.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a collection condition survey and do preservation and conservation work. Artifacts in need of conservation would be prioritized by the collection condition survey and object treatment requests would be submitted by the park to the regional curator for approval. Conservators would treat objects following approval of the treatment proposal by the superintendent and the regional curator. A treatment report, including before and after photographs, will be submitted when treated objects are returned to the park. The conservators at Museum Collections Repository - Western Archeological and Conservation Center (MCR-WACC) have the expertise and accommodations to do professional conservation and preservation work for any park in their service area. Transportation to the center would be under optimal conditions. Environment at the center is similar to that of the monument.

Year 1: Conduct the collection condition survey then have preservation and conservation work done.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	One-Time	3.3	0.0
Year 2:	MIT	One-Time	3.3	0.0
Year 3:	MIT	One-Time	3.3	0.0
Year 4:	MIT	One-Time	3.3	0.0
		Total:	13.2	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. Without conservation treatment these items will continue to deteriorate leading to irretrievable loss of primary resources. The park would fail to meet NPS standards.

Engage the Division of Conservation, Harper's Ferry Center (HFC). HFC conservators have the expertise and accommodations to do professional conservation and preservation work for any park in the system. Because all parks compete Servicewide for time and funds for these projects, objects may wait years before receiving attention now needed. In addition fragile objects would travel a considerable distance placing them in jeopardy and would be in an environment that is different and unfavorable to their preservation.

Contract preservation and conservation work by professional conservators. There are a few professional conservators in the southwestern area who have experience in working with the materials in the collection. The travel distance would be minimal and the environment would be relatively the same as at the park.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(2), E(2)

Proposal Date: 1990

MOCA-C-501.000 Manage Park Museum Collection

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-

TITLE:

FUNDING STATUS: FUNDED: 8.0 **UNFUNDED:** 14.4

SERVICEWIDE ISSUES:

C49 Museum Environment (Monitor/control, including IPM, in storage and exhibits)

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle has a museum collection on-site of approximately 140 items; the remainder of the collection is located at the Museum Collections Repository, Western Archeological and Conservation Center (MCR-WACC). Several objects are on display at the Mission 66 Visitor Center Museum. Primarily archeological, there are a number of ethnographic objects - pottery, basketry, and jewelry - on display. The park is also responsible for the exhibits in the Yavapai-Apache Visitor Center, a tribal building in which the park leases space. There are approximately 50 items, historic, archeologic, and ethnographic, on permanent exhibit. These items are on loan from various agencies.

To maintain these objects, there are a number of actions that need to be accomplished on an annual or more frequent basis: Collection Management Report (form 10-94), Annual Inventory for Museum Property, IPM monitoring, curatorial housekeeping, curatorial recordkeeping (accession and catalog records), Scope of Collection Statement review, and environmental recording of all spaces with museum objects.

The park has identified a museum collection manager for the museum; however, the permanent GS-5 Interpreter position located at the Yavapai-Apache Visitor Center, who would be responsible for the exhibits, has not been filled in two years. Currently the Chief, Visitor Services and Resource Management (MOCA/TUZI) has undertaken these duties as time permits.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Manage collection through staff member specifically assigned collections management duties. This action would ensure an on-site, trained person who would be available as needed to

perform any collections management duties. This alternative would also ensure continuity of work and records. A park staff member, identified as a museum collections manager, would have these duties identified in his/her position description and performance standards (critical elements). Yavapai-Apache Visitor Center permanent interpreter position should be filled with these duties clearly stated in position description and performance standards. Proper training in curatorial methods must be provided for any staff member working with the collection. This training should come from regional or MCR-WACC professionals.

Year 1: Manage park collections with properly trained staff, completed documents, and actions.

Year 2: Manage park collections with properly trained staff, completed documents, and actions.

Year 3: Manage park collections with properly trained staff, completed documents, and actions.

Year 4: Manage park collections with properly trained staff, completed documents, and actions.

Note: This is an ongoing duty.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
1	PCR1	MIT	Recurring	2.0	0.1
2	PCR1	MIT	Recurring	2.0	0.1
3	PCR1	MIT	Recurring	2.0	0.1
4	PCR1	MIT	Recurring	2.0	0.1
			Total:	8.0	0.4

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Recurring	3.6	0.0
Year 2:	MIT	Recurring	3.6	0.0
Year 3:	MIT	Recurring	3.6	0.0
Year 4:	MIT	Recurring	3.6	0.0
		Total:	14.4	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. This would result in non-compliance with NPS 28: Cultural Resources Management, Manual for Museums, Museum Handbook: Part II, and Special Directive 80-1 (revised) and Guideline NPS 77: Natural Resources Management.

Manage park collection through contract with a non-NPS curator. This action would not be cost-effective. A non-NPS curator may not have the background in NPS standards and regulations. This person could change on a yearly basis leading to a lack of continuity and recordkeeping.

Management of park collection through use of MCR-WACC curator. This action would not be cost- or time-effective. The MCR-WACC curator would only be able to come to the park on a specifically schedule basis. Any emergency or other unscheduled (accessions) actions would require special trips and additional funding. MCR-WACC might not always send the same staff member leading to a lack of continuity.

COMPLIANCE CODE (s): EXCL, NAGPRA

EXPLANATION: 516 DM6 App. 7.4 B(2), (3), E(2)

Proposal Date: 1990

MOCA-C-502.000 Update and Maintain Automated National Catalog System

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-

TITLE:

FUNDING STATUS: FUNDED: 4.0 **UNFUNDED:** 5.6

SERVICEWIDE ISSUES:

C46 Museum Accountability/Documentation (Cataloging, surveying, processing, inventorying, appraising, and ANCS)

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

In fall 1987, the Automated National Catalog System (ANCS) was issued to the field from the Curatorial Service Division, WASO. At MCR-WACC, during the inventory project, all previously cataloged items were entered into an ANCS test version. The items remaining at the monument, about 140 in number, have not yet been entered into any data base. Once the MCR-WACC data bases are transferred to the current ANCS program, the park will receive the data for installation in their data base. As the backlog is cataloged, it will be entered directly into the current data base. As this is completed and reviewed, copies of the data base will be provided to the park. This leaves the items located at the park as well as any future acquisitions to be added to the data base so that all the park museum collection will be on the computer and allow park staff and management to manipulate the data and provide reports on a variety of subjects.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Park staff will input the data for the 140 items located in the park. The ANCS program can be used with minimal training and the input of 140 records can be accomplished in a relatively short period of time. The park museum collections manager should be responsible for the input of these records. The purchase of a computer would be necessary due to the fact that all park computers are located at the Yavapai-Apache Visitor Center and are heavily overused. The ANCS program requires a great deal of space for the data base as well as space for any indexes that are required to access data.

Year 1: Accession and catalog objects and specimens into ANCS. Purchase a computer dedicated to ANCS.

Year 2: Monument staff will maintain ANCS records.

Year 3: Monument staff will maintain ANCS records.

Year 4: Monument staff will maintain ANCS records.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
1	PCR1	RES	Recurring	1.0	0.1
2	PCR1	RES	Recurring	1.0	0.1
3	PCR1	RES	Recurring	1.0	0.1
4	PCR1	RES	Recurring	1.0	0.1
			Total:	4.0	0.4

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Recurring	1.4	0.0
Year 2:	RES	Recurring	1.4	0.0
Year 3:	RES	Recurring	1.4	0.0
Year 4:	RES	Recurring	1.4	0.0
		Total:	5.6	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. An incomplete data base will not allow full use of the ANCS program for completion of reports such as the Collection Management Report (form 10-94).

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(2), E(2)

Proposal Date: 1990

MOCA-C-503.000 Rebuild Montezuma Castle Museum

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-503.000

TITLE: Rebuild Montezuma Castle Museum

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 350.0

SERVICEWIDE ISSUES:

C49 Museum Environment (Monitor/control, including IPM, in storage and exhibits)
C50 Security and Fire Protection (Surveys, detection and suppression systems, and prevention)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The Montezuma Castle museum is located in a visitor center constructed in 1960, a small and fairly typical Mission 66 structure. During the summer months the doors of the building stand open to allow the evaporative cooler to work properly. The visitation at the site is currently in excess of 650,000 per year. All of these factors lead to an unsatisfactory environment for the preservation of museum objects. The recording hygrothermograph located in the museum has recorded excessive changes in temperature and especially relative humidity in a 24-hour period.

The standards for museum environment are fairly rigid and must be maintained for the preservation of the collection. The environment of the museum at the present time is placing a great deal of stress on the artifacts. High relative humidity coupled with rapid changes in both relative humidity and temperature are stressful to objects, particularly organic material. In addition, such an environment is conducive to the presence of museum pests. The items on display in the museum are made up of a variety of materials with a great number of the artifacts particularly vulnerable to the changes in environment.

There is not adequate space to deal with visitors, cooperating association outlet, as well as the museum. In addition, the current design of the visitor information desk does not allow adequate viewing of the museum exhibit space by the staff to provide security for them.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Rebuild the visitor center to include an expanded visitor contact area, sales outlet, and museum exhibits. This alternative would provide more visitor contact space, an improved natural history association sales outlet area, provide a climate control system that regulates temperature and relative humidity, and expand the information desk. The information desk would be redesigned to provide better security for the exhibit area and visitor use areas would be better used. There would be more control over visitor access to the site. The museum environment would be maintained by the installation of a climate control system that would regulate both temperature and relative humidity.

Year 1: Design plans for the reconstruction.

Year 2: Rebuild the visitor center.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	INT	One-Time	50.0	0.0
Year 2:	INT	One-Time	300.0	0.0
		Total:	350.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This would lead to non-compliance with NPS standards including Special Directive 80-1 (revised). The museum objects would deteriorate due to undue stress and pest infestation.

Revamp the current environmental control system and redesign the information desk. This would provide an environment better able to preserve the collection. It would also increase the security to the exhibit area by providing oversight of all areas in the museum.

COMPLIANCE CODE (s): EXCL, NHPA **is the structure Register eligible? What ground disturbance might be involved?**

EXPLANATION: 516 DM6 App. 7.4 C(4), C(18)

Proposal Date: 1990

MOCA-C-504.000 Survey and Inventory Collections for Montezuma Castle Cultural Objects

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-504.000

TITLE: Survey and Inventory Collections for Montezuma Castle Cultural Objects

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 54.0

SERVICEWIDE ISSUES:

C08 Special Studies
C46 Museum Accountability/Documentation (Cataloging, surveying, processing, inventorying, appraising, and ANCS)

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle and Montezuma Well had become quite well known by the people of the Verde Valley and the Prescott, Arizona, areas by the 1880's. However, there was no attempt to provide a written record of the area or do a study of the features involved. Dr. Edgar A. Mearns, an Army surgeon stationed at Fort Verde from 1884 to 1888, was apparently the first Anglo to do any serious study of the ruins. Mearns had a keen scientific mind and, although he was not an archeologist, his broad interest in the prehistory of humans in the Valley as well as the natural history of the area enabled him to delve further into the area than anyone had done previously. The Castle was described in detail by Mearns in an 1890 article in Popular Science ("Ancient Dwellings of the Rio Verde," May 1890, p 747). Apparently Mearns collected artifacts in the ruins and, according to communication between the park Custodian Homer F. Hastings and Mrs. H. W. Schroeder, some objects were placed in the collection of the American Museum of Natural History in New York. It may be that all human remains were taken to the Army Medical Museum. In further correspondence with the Field Museum of Natural History of Chicago, Albert H. Schroeder was unable to determine the location of objects referred to by a Dr. Cole in notes at the park.

A Dr. Miller of the Arizona Antiquarian Society supervised basic stabilization and repairs to the Castle about 1898. Dr. Harold S. Colton, later founder and director of the Museum of Northern Arizona, was also interested in the area. In the early years of the twentieth century there were several men who made careful studies of the Castle. The early NPS restoration work and excavation yielded collections that are included in the park collection and stored at MCR - WACC.

Because of the general interest in southwestern archeology and the fact that these ruins were well-known long before establishment as a monument (1906), it is quite likely that there exist archeological collections from Montezuma Castle, Montezuma Well, and other sites within the monument in institutions outside the National Park Service. Except for a few items located at the American Museum of Natural History, there is no information of the location of any artifacts from the prehistoric sites with the monument.

In order to fully study and understand the people who built and lived in Montezuma Castle and the other ruins within the monument, all artifacts and collections from these sites need to be studied and compared. Those items collected within the monument following its establishment need to be cataloged into the NPS system and possibly returned.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Hire a professional archeologist or curator for inventory. Hire an archeologist, or a curator with archeological experience, to conduct a survey of the most pertinent institutions and longtime local families to determine where artifacts and information related to the ruins and excavations might be located.

A survey of appropriate institutions should be undertaken to determine where collections from the monument lands are located. These should include those items collected prior to establishment as well as any that have been removed since. Initial work should begin with a letter to all institutions who were active in southwestern archeology prior to 1934. There should be no request for return of any material during this mail inquiry. Following initial contact, those institutions which have or may have material should be contacted and the items should be inspected.

At the same time, longtime local families should be contacted in a non-threatening manner to learn as much about the early explorations and information as possible; this might include family photographs, letters, etc. Every effort should be made to learn if anyone has any artifacts from the ruins. However, every effort should also be made to ensure that there is no feelings of threat from these contacts. The goal should be the gathering of information only.

Year 1: Conduct survey of institutions and longtime local families.

Year 2: Complete survey and write report.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	36.0	0.0
Year 2:	RES	One-Time	18.0	0.0
		Total:	54.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative would lead to continued lack of understanding of the sites within Montezuma Castle National Monument. Any items that have been obtained following the establishment of the monument could possibly be out of compliance with NPS standards regarding the cataloging and preservation of NPS museum collections.

Have volunteers track objects. Enlist a volunteer, perhaps a graduate student of archeology and museum management, to undertake a survey of the most pertinent institutions and longtime local families to determine where artifacts and information related to the ruins and excavations might be located. This would require an individual with diplomatic skills in order to deal with people who may be hostile to the federal government.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-C-505.000 Update/Correct the Cultural Resources Bibliography

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-505.000

TITLE: Update/Correct the Cultural Resources Bibliography

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 2.0

SERVICEWIDE ISSUES:

C60 Cultural Resources Management Bibliography (CRBIB)

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The cultural resources bibliography (CRBIB) lists five entries for Montezuma Castle and Montezuma Well. A quick search of the monument library identified at least 24 additional items not in the CRBIB, and there may be more. Searches of regional office library and Western Archeological and Conservation Center Library also are needed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Complete the cultural resources bibliography. An updated bibliographic data base will be helpful to park interpreters, researchers, and managers for years to come. Update the five existing entries and prepare new CRBIB bibliography entries for Montezuma Castle and Montezuma Well, encompassing all relevant books, reports, articles, monographs and manuscripts on the subject found in the monument, regional office, and Western Archeological and Conservation Center Libraries.

Year 1: Survey literature in libraries of other parks, universities, museums, and private collections for relevant references and enter into CRBIB. Once this major effort is completed, annual updates can be handled by park staff.

Year 2: Park staff will maintain CRBIB.

Year 3: Park staff will maintain CRBIB.

Year 4: Park staff will maintain CRBIB.

Note: This is an ongoing duty.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	2.0	0.0
		Total:	2.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The impact of this option would be that CRBIB will remain incomplete, potential to duplicate research already done.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-C-506.000 Write Collection Management Plan

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-506.000

TITLE: Write Collection Management Plan

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 2.0

SERVICEWIDE ISSUES:

C41 Collection Management Plan

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Management of the collection of archeological, ethnological, and historical material is an on-going concern. The museum collection currently located at the monument numbers approximately 140 items; the remaining items are located at the Museum MCR-WACC. The park staff is responsible for the preservation of the collection in perpetuity. To assist in this work, a collection management plan, required by Guideline NPS 28: Cultural Resources Management, needs to be written. This document would include a brief history of the collection and an overview of the present collection; a current scope of collections statement with recommended changes to the statement; current status and recommendations regarding museum records; current status (environment and maintenance) of museum exhibits with recommendations for improvement; current status with recommendations for museum security and fire detection/protection; current status with recommendations for museum staffing; and future planning/sources of funding. With this plan, the park will be in compliance with the standards.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Write the collection management plan. This should be written by a curator from a park, MCR-WACC, or the regional office. This alternative is the most cost-effective, and provides the outside expertise the monument can benefit from. This plan will be in the form of an expanded trip report and will include the sections listed above. Since the park has no collections in storage, it will not need to have a storage section but will include an overview of the collections stored at MCR-WACC and any other repositories, if appropriate.

Year 1: Write the collection management plan.

Note: This project is to be updated every fourth year.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	2.0	0.1
		Total:	2.0	0.1

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The park would not be in compliance with Guideline NPS 28. The staff has managed the collection in accordance with NPS standards to the best of their ability. This has been accomplished by sending much of the collection to MCR-WACC and by properly cataloging and curating the items on display in the museum.

Assign park staff to write the collection management plan. An outside team of curatorial experts is recommended for writing such plans. This allows fresh eyes to view the park, collection, and its problems and make recommendations.

Enlist a curatorial team to write the collection management plan. This team would be from the Curatorial Services Division, Washington Office, who are mainly responsible for the production of such plans. This alternative is not cost-effective do to the fact that the size of the collection and the amount of activity related to them do not, at this time, require the full-scale plan as outlined in Guideline NPS 28.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(2), E(2)

Proposal Date: 1990

MOCA-C-507.000 Establish Exhibit Maintenance

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-C-507.000

TITLE: Establish Exhibit Maintenance

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 24.0

SERVICEWIDE ISSUES:

C45 Housekeeping Plan (preventive conservation)
C49 Museum Environment (Monitor/control, including IPM, in storage and exhibits)

CULTURAL RESOURCE TYPE CODE: OBJC

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The exhibits at the Montezuma Castle museum were designed and installed as part of the Mission 66 program that built the visitor center. These exhibits are now almost 30 years old. All exhibits need work from time to time to maintain them in good order. This includes installation of new photographs, cleaning of exhibit panels and cases, replacement of worn-out or damaged equipment, and, occasionally, the replacement of labels due to former inaccuracies or results of new research.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Establish exhibit maintenance. Establish program of exhibit maintenance that includes replacement of damaged or worn material and cleaning of all exhibits as necessary. This would ensure that the exhibits would meet all NPS standards and would convey correct information to the public.

This program would annually inspect all exhibits and maintain a prioritized list of needed work. Work would be accomplished as needed to clean, upgrade, and/or replace any exhibit or part of an exhibit that is need of such due to fading, damage, or inaccurate information.

Year 1: Inspect all exhibits and prepare a list of necessary work. Conduct repair work.

Year 2: Inspect all exhibits and prepare a list of necessary work. Conduct repair work.

Year 3: Inspect all exhibits and prepare a list of necessary work. Conduct repair work.

Year 4: Inspect all exhibits and prepare a list of necessary work. Conduct repair work.

Note: This is an ongoing, long-term program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Recurring	6.0	0.1
Year 2:	MIT	Recurring	6.0	0.1
Year 3:	MIT	Recurring	6.0	0.1
Year 4:	MIT	Recurring	6.0	0.1
		Total:	24.0	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present exhibits. The current fading and damaged photographs and other exhibit media would continue to deteriorate and distract from the exhibits. This would not meet NPS standards for exhibits.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(3)

Proposal Date: 1990

MOCA-I-508.000 Survey and Inventory Collections for Natural History Specimens

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-508.000

TITLE: Survey and Inventory Collections for Natural History Specimens

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

C46 Museum Accountability/Documentation (Cataloging, surveying, processing, inventorying, appraising, and ANCS)
N24 Other Issues

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Natural history collections have historically been made within the monument. However, information regarding those collections is limited at the present time. The problem is finding out who has taken specimens, where they were taken from, and where they are kept. Known collections are held at Northern Arizona University and others possibly exist at Arizona State University, University of Arizona, and San Diego State University. There are other situations where research and specimen collection occurred, but the repository is unknown.

To fully study and understand the environment of the area, all natural history collections need to be located, cataloged, studied, and compared. Those items collected systematically within the monument following its establishment in 1907 need to be cataloged into the NPS system and possibly returned.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Determine location of monument collections. Survey appropriate institutions to determine where collections from monument lands are located. These should include items collected prior to establishment in 1906 as well as any that have been removed since. Initial work should begin with a letter to all institutions who were active in southwestern explorations and research. This would include specimens of plants, animals, insects, etc. Every effort would be made to learn the locations of natural history specimens from monument lands.

The purpose of the contact would be to gather information. This would be done by a curator to conduct a survey of the most pertinent institutions to determine where natural history objects and related documentation might be located. A report would be written by the curator documenting description of the items, their locations, current ownership, condition, possible return to NPS, availability of cataloging data, and other relevant information. The curator would make a computerized listing of the survey and inventory with recommendations to NPS about future actions based on findings.

Year 1: Conduct survey of institutions.

Year 2: Finish survey and write report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
Year 2:	RES	One-Time	5.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. This would lead to continued lack of understanding and knowledge of the environment within Montezuma Castle National Monument. Any natural history items that have been obtained from what is now the monument could possibly lack compliance with NPS standards regarding the cataloging and preservation of NPS museum collections.

Enlist a volunteer. Perhaps a graduate student of curation or museum management may undertake a survey of the most pertinent institutions to determine where natural history items and related information might be located.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1994

MOCA-I-600.000 Prepare a Management Plan for Prehistoric Sinagua Fields

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-600.000

TITLE: Prepare a Management Plan for Prehistoric Sinagua Fields

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 5.0

SERVICEWIDE ISSUES:

C11 Cultural Landscape Report (CLR)
N08 Loss of Cultural Landscapes

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

In prehistoric times, Sinagua people farmed the bench adjacent to the now Wet Beaver Creek in the Montezuma Well unit of Montezuma Castle National Monument. This bench supports a natural mesquite bosque community and is the upland area of the riparian zone, which is characterized by sycamore, velvet ash, walnut, and hackberry trees. During prehistoric times, the bench was extensively farmed with agricultural crops essential to the existence of the Sinaguas. A sophisticated system of irrigation ditches provided water; some portions of which are above ground and traceable. Another program statement in this resources management plan pertains to studying this integrated irrigation system.

In historic times during the 1870s, this prehistoric field was the site of farm houses, barn, and outbuildings and of cultivated crops and occasional pasturing. Noted crops were hay, alfalfa, watermelon, cantaloupes, and personal gardens. In the 1939 National Park Service appraisal for Montezuma Well, the total land was listed as 179.43 acres with 41.22 acres irrigated (agricultural), 92.21 acres as grazing, and 46.00 as other uses. A ditch irrigation system distributed water, and some of it followed the prehistoric alignment.

When Montezuma Well was established, haying and pasturing on part of the land was continued. In the late 1940s it was noted that hay from Montezuma Well was baled and transported to Saguaro National Monument for use by government livestock.

The monument has rights to half the flow from the Well, which is expressed as using the water for alternate eight-day periods. Generally, rights were obtained for the State of Arizona on the basis of "beneficial uses", usually interpreted as agricultural, commercial or other economic uses. The monument diverts water for eight days then it flows through to

downstream users for the following eight days. This pattern repeats. During winter the water primarily is diverted into Wet Beaver Creek. During summer, it irrigates the pasture and picnic area. The Water Resources Division, Washington Office is involved in the adjudication process for these water rights. They have been claimed for "ethnological interests" and "historical integrity."

Currently, there is a 27 acre parcel leased for cattle pasturing, a use that has supported the appropriated water rights of the Well for several decades. Sections of the historic irrigation system are still used. The current lessee operates with a special use permit and has used the pasture for several years. He is permitted to run 22 head of cattle from April 1 through November 30 and five cattle from December 1 through March 31. Pasture species are exotic grasses and forbs. The lessee also maintains the fences and the ditch (with a minimum of two hand clearings yearly). Upon termination of the lease, any improvements become property of the National Park Service. To date, there has been no assessment of cattle use levels, carrying capacity, or production of the pasture. The monument has not monitored to evaluate impacts of grazing or use levels of the pasture.

The authority to use the irrigated pasture for cattle is not provided for in any of the monument's legislation. The practice apparently comes from an assumption of nexus between farming and maintaining an irrigated pasture grazed by cattle. The earliest record is an August 17, 1954, memorandum from the Acting Assistant Director. It indicated that for a number of years prior to that date, special use permits were issued that allowed pasturing of cattle and horses. The assumption can be made that the practice has been followed from the time the National Park Service bought Montezuma Well property in 1947. The practice has continued to the present.

The problem is determining the appropriate use of the pasture considering prehistoric and historic uses as well as water rights, grazing impacts, protection of cultural and natural resources, and visitor and employee safety.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Assess alternative land uses. This project involves considering other land uses and preparing a formal environmental assessment for NEPA purposes to evaluate those alternatives and select one. The alternatives will include, but not be limited to, 1) irrigated pasture with grazing, 2) irrigated meadow for hay without grazing, 3) irrigated hay meadow with some grazing, 4) cultivated alfalfa, corn, or other crop, and 5) restore native mesquite bosque community. For the alternative selected, a management plan will be written to direct actions.

Monument and staff from the Southern Arizona Group office have begun the process of gathering information for an environmental assessment. To date, old records have been gathered, review assistance has been obtained from an NPS range conservationist, and Soil Conservation Service range conservationists been on site twice to discuss agricultural land uses and professional practices with monument and group office staff. An assessment will be written and distributed for public, SHPO/ACHP, and agency review and comment. After

evaluating public and agency input, the superintendent will select a land use. Following that, a management plan will be written as appropriate.

Year 1: Select a land use option.

Year 2: Write an implement a management plan.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		RES	One-Time	5.0	0.0
			Total:	5.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative entails maintaining the existing use levels of the pasture and current arrangements with the lessee. There would be no assessment of pasture value or grazing impacts. However, this alternative is precluded by Federal requirements for competitive leasing for special park uses, including agriculture and grazing. An environmental assessment is also needed for this consumptive use.

COMPLIANCE CODE (s): NEPA, Section 106

EXPLANATION: 516 DM6 App. 7.4 B(4), (10)

Proposal Date: 1990

MOCA-I-601.000 Manage Vegetation: Rehabilitation, Landscaping, and Hazard Tree Removal

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-601.000

TITLE: Manage Vegetation: Rehabilitation, Landscaping, and Hazard Tree Removal

FUNDING STATUS: FUNDED: 5.0 **UNFUNDED:** 24.0

SERVICEWIDE ISSUES:

C11 Cultural Landscape Report (CLR)
N22 Overuse/Impacts to Recreation and/or Landscaped Zones

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The monument has heavy visitation, past site excavation, past grazing, social trailing, work access, and facilities development that result in occasional impacted areas needing restoration. While the total area is not large, staff is unable to keep up with organizing or completing the rehabilitation work due to the normal work load. They have been careful to rehabilitate these sites with various techniques such as planting native species, removing non-native plants, scarifying the soil to allow natural restoration, and closing work access to vehicles. On one occasion, non-native species were used as roadside plantings when the entrance road was improved.

Landscaping is also needed to maintain native plant compositions that align with the prehistoric and historic land uses. A major focus of this project would be to perpetuate the sycamore trees growing at Montezuma Castle. They are essential to the integrity of the monument and grow in areas that are heavily impacted, i.e., the visitor center, picnic grounds, and Well. Thirty years ago pathologists and entomologists inspected the sycamore stands, and found the fungus known as anthracnose and the insect sycamore lacebug (*Corythucha confraterna*). For twenty-five years, the stand was treated with fertilization, litter removal, and spraying with malathion and zineb. This treatment was stopped in 1978. In the early 1980's, several large branches in the trees were killed by a bark beetle species which girdled the branches. To better understand the sycamore stand, a study of the autecology of the species was done in 1987. In 1988, a study began of the existing stand compared to an inventory done in 1931, which will show changes of four decades.

Landscaping with native plants is done to create a setting of native plants (some with cultural uses), to screen structures, and to provide shade. Landscape plans will be required in selected sites, especially those with heavy visitor use.

At the Well, the picnic area is heavily used. Cottonwood, hackberry, and ash trees have been planted to replace removed old hazard trees, in an effort to perpetuate the aesthetic scene and to maintain a healthy stand of younger trees. Hazardous trees (cottonwoods) have been identified and removed primarily in the picnic area by the Well. A thorough survey will be done to document and remove hazardous trees.

Forthcoming construction of an additional sewage lagoon requires revegetation. Work has begun with Denver Service Center and Soil Conservation Service (SCS) to use onsite plant materials to restore vegetation cover. A goal of the National Park Service is to use onsite plant material to preserve genetic integrity of the vegetation component. Recently, SCS and NPS signed a Memorandum of Understanding to work together on revegetation projects. This is the first occasion for both agencies to use this agreement in Arizona.

Managing vegetation at Montezuma Castle and Montezuma Well is not a major task; however, it is one that takes dedication and well timed work to complete throughout. The problem is devoting staff time to work consistently on vegetation projects. Normal staff work load only permits partial attention to this duty.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Develop a comprehensive approach to manage vegetation. This will be done in a proactive manner by identifying areas that need revegetation and landscaping, gathering botanical information about specific species, obtaining seed stock for demonstration gardens, and identifying and removing hazardous trees.

A natural and cultural resources management specialist will be hired to handle resources management duties, including vegetation management, as described in a separate statement in this resources management plan. The person will develop a vegetation management plan that is comprehensive in providing information as well as guidelines for managing the plant systems. A landscape plan will be prepared for selected sites such as the visitor center and picnic area. The follow up step will be to implement the program which will entail site restoration, propagation of selected native species, garden preparation, and landscaping for screening and perpetuation of natural setting. Identification of hazardous trees will be done by park staff and removal will be accomplished by staff or through a contract.

Until a resource management specialist is hired, the monument will continue to operate its vegetation management program with current staff in order to keep the problem under reasonable control.

Year 1: Hire a resource management specialist and manage vegetation.

Year 2: Manage vegetation.

Year 3: Manage vegetation.

Year 4: Manage vegetation.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
1	PCR1	MIT	Recurring	2.0	0.1
2	PCR1	MIT	Recurring	1.0	0.1
3	PCR1	MIT	Recurring	1.0	0.1
4	PCR1	MIT	Recurring	1.0	0.1
			Total:	5.0	0.4

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Recurring	6.0	0.0
Year 2:	MIT	Recurring	6.0	0.0
Year 3:	MIT	Recurring	6.0	0.0
Year 4:	MIT	Recurring	6.0	0.0
		Total:	24.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument will continue to deal with vegetation management issues using current staff. This function will remain as a collateral duty and may not receive the full attention that it needs.

COMPLIANCE CODE (s): NHPA

EXPLANATION:

Proposal Date: 1992

MOCA-N-602.000 Inventory Sensitive and Threatened/Endangered Flora and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-602.000

TITLE: Inventory Sensitive and Threatened/Endangered Flora and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

N03 Impacts on Threatened, Endangered, and Other Sensitive Plants

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

A few sensitive species are found in the monument or have potential habitat. The Arizona cliffrose (endangered) is one for which habitat exists. However, there has not been a systematic survey and search to identify all rare plants at Montezuma Castle National Monument. It is probable that additional rare life forms occur in the monument and may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff need to be aware of any rare plants potentially near the monument boundaries. Adjacent land uses can have positive or negative impacts on limited populations.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a systematic survey for rare species and develop long-term monitoring protocols. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act. Published and unpublished literature and museum specimens will be searched, reviewed, and annotated. An annotated bibliographic report will be prepared of all reported rare or otherwise sensitive plant species. Annotators will scrutinize existing ecologic, life historical, taxonomic, and distributional information for each species. A thorough search of monument habitats will be conducted of all terrestrial and aquatic plants considered to be rare. Through consultation with other specialists, the principal investigator will prioritize the list of rare life forms. For species not requiring complex management strategies, action plans will be prepared. Where additional species-

specific studies may be required, the principal investigator will propose in writing draft program statements for inclusion in the monument's resources management plan. A final report will be prepared summarizing findings from this investigation. It will include, but not be limited to lists of species with annotated summaries of life history and ecologic information, range/distribution data, and maps of species occurrences in and around the monument. Written recommendations will be provided to the superintendent of the study findings, for use in the monument's interpretive plan. Long-term monitoring protocols will be designed.

Year 1: Conduct systematic survey for rare plants in the monument and through the literature and museum collections.

Year 2: Write report of findings with long-term monitoring protocols.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
Year 2:	RES	One-Time	5.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue current activities. Rare species will be identified and mapped intermittently over the years on a hit or miss basis. Lack of knowledge regarding endemic species limits the superintendent in making proper judgments about managing the monument's resources. It will be unclear whether a species is naturally rare or rare due to human activities.

Do not assess species. The monument will not be in compliance with the Federal Endangered Species Act and state laws.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1994

MOCA-N-602.001 Monitor Sensitive and Threatened/Endangered Flora

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-602.001

TITLE: Monitor Sensitive and Threatened/Endangered Flora

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 0.4

SERVICEWIDE ISSUES:

N03 Impacts on Threatened, Endangered, and Other Sensitive Plants

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Sensitive, threatened and endangered species in the monument or having potential habitat in the monument will be identified in project 602.000. These rare life forms occurring in the monument may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff must continually be aware of any rare plants potentially near the monument boundaries. Adjacent land uses can have positive or negative impacts on limited populations. An on-going monitoring program is necessary to best protect monument resources.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Monitor sensitive, threatened, and endangered flora. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act. A thorough search of monument habitats must be conducted periodically. For species not requiring complex management strategies, action plans prepared in 602.000 will be followed. Where additional species-specific studies may be required, the principal investigator in 602.000 will propose in writing draft program statements for inclusion in the monument's resources management plan.

Year 1: Monitor sensitive, threatened, and endangered flora.

Year 2: Monitor sensitive, threatened, and endangered flora.

Year 3: Monitor sensitive, threatened, and endangered flora.

Year 4: Monitor sensitive, threatened, and endangered flora.

Note: This is an ongoing project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	On-Going	0.1	0.0
Year 2:	MON	On-Going	0.1	0.0
Year 3:	MON	On-Going	0.1	0.0
Year 4:	MON	On-Going	0.1	0.0
		Total:	0.4	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue current activities. Rare species will be identified and mapped intermittently over the years on a hit or miss basis. Lack of knowledge regarding endemic species limits the superintendent in making proper judgments about managing the monument's resources. It will be unclear whether a species is naturally rare or rare due to human activities.

Do not assess species. The monument will not be in compliance with the Federal Endangered Species Act and state laws.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1994

MOCA-N-603.000 Conduct Inventory and Assessment of Vegetation and Flora and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-603.000

TITLE: Conduct Inventory and Assessment of Vegetation and Flora and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 23.1

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

This project will consist of a botanical RBI of the Castle and Well units to provide new information for management and interpretation. It will also involve the design of long-term monitoring protocols for selected components of this ecosystem.

Vegetation is composed of plant communities, e.g. desertscrub or mixed riparian woodland, and is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Vegetation, in turn, is made up of the collective plant species of the monument, or flora. Thus, vegetational analyses can be used as a tool for examining potential environmental problems. Close monitoring of the vegetation and flora can serve as an early warning system for undesirable changes and increase management's ability to respond effectively to these changes in a timely manner. The baseline monitoring established by such a study will allow managers to assess such factors as changes in non-native plant species and communities, changes in surface and groundwater regimes, and stability or lack of stability in plant communities, e.g. sycamores in the Castle section, a problem discussed in the 1975 Cultural and Natural Resources Management Plan and Environmental Assessment.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct inventory and assessment of vegetation and flora and develop long-term monitoring protocols. Data will be collected concerning the distribution, composition, structure,

evolution, and aerial extent of vegetation. This will increase management's ability to assess changes in the natural resources of the monument. The monument currently has an extensive herbarium which contains specimens of 646 species and subspecies. A basic botanical survey, description, and synthesis of existing and new information will be completed, adding new information from the project to the information now contained in the herbarium and monument files. Additional botanical information will be provided to upgrade interpretation of the monument's flora and vegetation. A long-term monitoring program for these ecological factors will be designed.

Year 1: Begin collection and identification of flora of Castle and Well units during all four seasons.

Year 2: Continue collection and identification of flora during all four seasons. Start classification of vegetational communities.

Year 3: Finish collection and identification of flora. Design monitoring protocols. Prepare reports for resources management and interpretive programs. Provide management alternatives and projected results of management actions.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	7.5	0.1
Year 2:	RES	One-Time	7.5	0.1
Year 3:	RES	One-Time	8.1	0.2
		Total:	23.1	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Conduct vegetation inventory and assessment only. This will assist management in monitoring long time environmental changes in the monument environment but will not allow early detection of such problems as invasion of non-native species.

Conduct flora inventory and assessment only. This will assist management in detecting undesirable changes, e.g. invasion of non-native plant species, but will not provide adequate vegetational information to serve as an effective early warning system for undesirable changes in the monument's environment.

Continue with present management. Management will remain vulnerable without the ability to detect changes in the vegetation and flora, thus also related changes, e.g. in flow levels of surface or groundwater. Additional information for interpretation of botanical parameters will not be forthcoming.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-603.001 Implement Long-Term Monitoring Protocols for Vegetation and Flora

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-603.001

TITLE: Implement Long-Term Monitoring Protocols for Vegetation and Flora

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Vegetation is composed of plant communities, e.g. desertscrub or mixed riparian woodland, and is the keystone of natural ecosystems, serving as a basis for animal life and as a synthesizer of environmental factors, including geology, soils, slope, exposure, and climate. Vegetation, in turn, is made up of the collective plant species of the monument, or flora. Thus, vegetational analyses can be used as a tool for examining potential environmental problems. Close monitoring of the vegetation and flora can serve as an early warning system for undesirable changes and increase management's ability to respond effectively to these changes in a timely manner. Keeping baseline monitoring established by the inventory and assessment in 603.000 current will allow managers to assess such factors as changes in non-native plant species and communities, changes in surface and groundwater regimes, and stability or lack of stability in plant communities, e.g. sycamores in the Castle section, a problem discussed in the 1975 Cultural and Natural Resources Management Plan and Environmental Assessment. Long-term monitoring will be implemented for selected components of this ecosystem.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols for vegetation and flora. A long-term monitoring program for these ecological factors as designed in 603.000 will be implemented. Monument staff will be trained to operate the monitoring program. This will increase management's ability to assess changes in the natural resources of the monument. Additional botanical information will be provided to upgrade interpretation of the monument's flora and vegetation. Close monitoring of the vegetation and flora can serve as an early warning

system for undesirable changes and increase management's ability to respond effectively to these changes in a timely manner. Additional botanical information will be provided for interpretive programs.

Year 1: Train monument staff on implementation of monitoring protocols and begin long-term monitoring.

Year 2: Conduct long-term monitoring.

Year 3: Conduct long-term monitoring.

Year 4: Conduct long-term monitoring.

Note: This is an ongoing, long-term monitoring program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		MON	Recurring	1.0	0.1
Year 2:		MON	Recurring	1.0	0.1
Year 3:		MON	Recurring	1.0	0.1
Year 4:		MON	Recurring	1.0	0.1
			Total:	4.0	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Conduct vegetation inventory and assessment only. This will assist management in monitoring long time environmental changes in the monument environment but will not allow early detection of such problems as invasion of non-native species.

Conduct flora inventory and assessment only. This will assist management in detecting undesirable changes, e.g. invasion of non-native plant species, but will not provide adequate vegetational information to serve as an effective early warning system for undesirable changes in the monument's environment.

Continue with present management. Management will remain vulnerable without the ability to detect changes in the vegetation and flora, thus also related changes, e.g. in flow levels of

surface or groundwater. Additional information for interpretation of botanical parameters will not be forthcoming.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-604.000 Inventory, Assess, and Evaluate Control of Non-Native Flora and Develop Long-Term Management Strategies and Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-604.000

TITLE: Inventory, Assess, and Evaluate Control of Non-Native Flora and Develop Long-Term Management Strategies and Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 28.8

SERVICEWIDE ISSUES:

N05 Degradation of Park Resources due to Non Native Plants
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The National Park Service is aware of some non-native species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary. Lacking an inventory, it is likely that additional introduced species occur in the monument but have not yet been detected. Some problems perhaps have not yet been identified because of their subtlety. For example, a non-native insect(s) might compete with and replace a native insect which is essential (a symbiotic partner) in pollinating a native plant. An example is the European honey bee now colonizing niches in the cliffs. The Africanized bee is expected within three to five years.

However, some non-native species problems have been identified. Salt cedar, a shrub or small tree, is invading the Verde Valley and is spreading into riparian habitats at Montezuma Castle. Other introduced plants displaying differing aggressiveness on a case by case basis include Russian thistle, Russian olive, horehound, wooly mullein, puncturevine, filaree, red brome and bermuda grass. Several plants have been introduced to Montezuma Castle and Montezuma Well as a result of past settlement, grazing, farming, excavation and construction in and around these areas. Cheatgrass, wild barley and foxtail keenly invade from grazed to ungrazed lands. Arizona Department of Transportation commonly sows Lehmann lovegrass along highways. This species was used in the monument by NPS when the entrance road was improved.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Inventory, assess, and evaluate control of non-native flora and develop long-term management strategies and monitoring protocols. Inventorying introduced species, their distribution, abundance, and seasonal occurrence, is necessary to understand the extent of the problems. With this information, management can determine which species need to be controlled and which will be tolerated. Some species may be very abundant and widespread, characteristics that make removal infeasible. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).

Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. The NPS management policies require removal of non-native species where control is practicable. Recommendations are needed regarding feasibility of eliminating these species and, where appropriate, establishing natives. A long-term monitoring program will be designed for these components of the ecosystem.

Three phases will be involved with the project execution. These phases are as follows:

- Complete an inventory of non-native plants. Describe their distribution, abundance, population trends, and relative threat. Categorize these into species that are not aggressive and aggressive, which actually or potentially cause the greatest ecosystem change or loss of native biotic diversity.

- Develop management guidelines with control feasibility and cost evaluations for the highest priority and most threatening introduced species. Include basic information on distribution, rate of spread, etc. Historic aerial and ground photographs may be useful for these determinations. The literature should be thoroughly reviewed to determine what is known about the ecology of these species. Available management, i.e., control, using Integrated Pest Management techniques should be recommended, or if unavailable, control strategies associated with re-establishment of native species should be recommended, where appropriate. Such strategies might include physical removal or barrier experiments, use of herbicides or insecticides, biological control or some combination thereof. Consultations should be held with other specialists, as required, to develop sound strategies. Experimental treatment plots should be established, where appropriate, and records kept of activities. Success/failure of the treatment methodologies should be monitored during the course of the study.

- A scientific report would be prepared that provides the superintendent with results from the inventory and evaluations with a management plan or manual for removing the most crucial non-native plant and animal species. Finally, provide written material and recommendations for applicability of findings to the interpretive program of the monument. Proper explanation to the public of the problem and solution can develop public support and perhaps even participation in the removal program.

Year 1: Conduct survey to inventory and map non-native species. Begin developing management actions and monitoring protocols.

Year 2: Complete report.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	14.0	0.3
Year 2:	RES	One-Time	14.8	0.3
		Total:	28.8	0.6

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Maintain current non-native species control program. Current and past treatment of non-native species has been sporadic and infrequent, and usually not timed correctly to remove species. An ongoing contracted plant survey at Montezuma Castle and Montezuma Well will provide some preliminary information on non-native plants but it is not an extensive survey. Lacking a thorough species inventory with recommendations for control strategies, little can be done to control or eliminate those introduced species most practicable to remove. Ecosystem alteration occurs with non-native species present. Some of the ecosystem changes probably are not irreversible but without baseline information about non-native species, resource managers can only use intuition and speculate on outcomes.

Do not take action to manage non-native species. This is unacceptable because it abrogates NPS responsibility to protect naturally functioning ecosystems from non-native influences.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 E(7)

Proposal Date: 1990

MOCA-N-604.001 Implement Long-Term Monitoring Protocols of Non-Native Flora

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-604.001

TITLE: Implement Long-Term Monitoring Protocols of Non-Native Flora

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N05 Degradation of Park Resources due to Non Native Plants
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The National Park Service is aware of some non-native species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary. Lacking an inventory, it is likely that additional introduced species occur in the monument but have not yet been detected. Some problems perhaps have not yet been identified because of their subtlety. For example, a non-native insect(s) might compete with and replace a native insect which is essential (a symbiotic partner) in pollinating a native plant. An example is the European honey bee now colonizing niches in the cliffs. The Africanized bee is expected within three to five years.

However, some non-native species problems have been identified. Salt cedar, a shrub or small tree, is invading the Verde Valley and is spreading into riparian habitats at Montezuma Castle. Other introduced plants displaying differing aggressiveness on a case by case basis include Russian thistle, Russian olive, horehound, wooly mullein, puncturevine, filaree, red brome and bermuda grass. Several plants have been introduced to Montezuma Castle and Montezuma Well as a result of past settlement, grazing, farming, excavation and construction in and around these areas. Cheatgrass, wild barley and foxtail keenly invade from grazed to ungrazed lands. Arizona Department of Transportation commonly sows Lehmann lovegrass along highways. This species was used in the monument by NPS when the entrance road was improved.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols of non-native flora. The NPS management policies require removal of non-native species where control is practicable. Recommendations are needed regarding feasibility of eliminating these species and, where appropriate, establishing natives. A long-term monitoring program will be implemented following protocols designed in the initial inventory and assessment, 604.000. The monument staff will be trained in the implementation of these protocols.

A management plan or manual developed in 604.000 for removing the most crucial non-native plant species will be followed. Written material and recommendations for applicability of findings to the interpretive program of the monument will be implemented.

Year 1: Monument personnel will be trained to carry out long-term monitoring. Management guidelines will be followed to control non-native species and monitor success.

Year 2: Follow management guidelines to control non-native species and monitor success.

Year 3: Follow management guidelines to control non-native species and monitor success.

Year 4: Follow management guidelines to control non-native species and monitor success.

Note: This is an on-going, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Recurring	1.0	0.3
Year 2:	MIT	Recurring	1.0	0.3
Year 3:	MIT	Recurring	1.0	0.3
Year 4:	MIT	Recurring	1.0	0.3
		Total:	4.0	1.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Maintain current non-native species control program. Current and past treatment of non-native species has been sporadic and infrequent, and usually not timed correctly to remove

species. An ongoing contracted plant survey at Montezuma Castle and Montezuma Well will provide some preliminary information on non-native plants but it is not an extensive survey. Lacking a thorough species inventory with recommendations for control strategies, little can be done to control or eliminate those introduced species most practicable to remove. Ecosystem alteration occurs with non-native species present. Some of the ecosystem changes probably are not irreversible but without baseline information about non-native species, resource managers can only use intuition and speculate on outcomes.

Do not take action to manage non-native species. This is unacceptable because it abrogates NPS responsibility to protect naturally functioning ecosystems from non-native influences.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 E(7)

Proposal Date: 1990

MOCA-N-605.000 Examine Old Fields

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-605.000

TITLE: Examine Old Fields

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 9.2

SERVICEWIDE ISSUES:

C10 Cultural Landscape Inventory (CLI)
N08 Loss of Cultural Landscapes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Several sites within Montezuma Castle and Montezuma Well were farmed both prehistorically and historically. Currently in the monument, one pasture is lightly grazed for the purpose of maintaining water rights and to interpret prehistoric agricultural fields. Information is lacking about the old fields in this vegetation complex of riparian zone and adjacent mesquite benches. Park management's interest is for both cultural and natural reasons. In the cultural sense, questions arise about the location of the prehistoric fields and the irrigation channels, and the type of farming and crops grown. In the natural sense, questions pertain to the successional trends from cropland and grazed pasture to eventual native vegetation. For example, what weed species accompanied the agricultural use and which still are present, what are the stages of succession, i.e., what vegetation transitions occur, and will they, if left undisturbed, return to the natural vegetation community given factors such as soil and contour manipulation?

By having answers to these questions, park management can determine appropriate objectives and implement actions for these sites in context with park purposes. For example, discussions have been held whether to develop a demonstration prehistoric garden. Also, if water rights are secure, should grazing be maintained to keep an open scene or use other techniques of mowing or burning? The assessment of management options can be best made with understanding the past uses, the current conditions, the vegetative trends that have occurred, and the ultimate vegetation community if left undisturbed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Examine old fields. Conduct a study of the prehistoric and historic uses of agricultural lands in the monument, studying the current vegetation condition and any consumptive uses, and project successional trends. Studying prehistoric and historic uses can be done as a historic resources study using information from ethnobotanists, archeologists, and historians and their records and writings. More historical information can be gathered from local people. This report will describe what is known about current and past uses and will provide the ground work for examining vegetation trends.

There is one pasture currently being lightly grazed by cattle in the Montezuma Well unit. Additionally, there are other abandoned fields that now contain weeds and an open woodland formation of mesquite. Cottonwood trees have been planted in one abandoned field to provide shade for a possible extension of the picnic area.

At the Castle, the alluvial flats along the creek, which are believed to be prehistoric farm land, are now mesquite thickets. Vegetation plots in these sites coupled with soils data and available information about past uses will determine successional trends.

The goal is to describe the vegetative trends to give management more options in maintaining or recreating natural and cultural settings.

Year 1: Examine the old field vegetative trends. Write a report with management options.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	9.2	0.2
		Total:	9.2	0.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative means not examining old fields to determine the vegetative trends and not studying the prehistoric and historic agricultural uses. Park management would continue operating with a lack of knowledge about the natural and cultural aspects of old fields, resulting in limited options.

COMPLIANCE CODE (s): NHPA

EXPLANATION:

Proposal Date: 1990

MOCA-N-606.000 Prepare Cultural Landscape Inventory

PROGRAM STATEMENT

PARK AND REGION: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-I-606.000

TITLE: Prepare Cultural Landscape Inventory

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 16.50

SERVICEWIDE ISSUES:

C10 Cultural Landscape Inventory (CLI)
N08 Loss of Cultural Landscapes

CULTURAL RESOURCE TYPE CODE: COMB

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The landscape in and around Montezuma Castle National Monument is quite different from that during Sinaguan and Hohokam times. Portions of the monument have been altered by paved trails, a picnic area, and landscaping with lawns and trees. Other areas with a more natural growth have been affected by irrigation, service roads, structures, and work areas.

Because the landscape has changed repeatedly over the years, a study is needed to determine significant landscape elements. A number of management proposals such as revegetation of certain areas and removal of buildings and irrigation ditches affect both the natural and cultural landscapes. Options for managing these landscapes need to be documented and explored before these proposals are implemented.

In addition, the National Register nomination forms have not been completed for the monument. Evaluation of landscape elements is necessary to complete the nomination forms.

Cultural landscapes are geographic areas and the resources contained therein which have been influenced by or which reflect human activity, or which have been the background for a person or event significant in human history. Management of cultural landscapes within park lands should take into account the need for preservation of the integrity of these areas. At the present time, only one definite cultural landscape has been identified in the monument, although it has never been formally documented. Many management and maintenance take place inside this landscape which could potentially impact its integrity.

A cultural/ethnographic landscape inventory should be developed in conjunction with a Cultural Landscape Report and Plan. Develop an inventory, analysis, and synthesis of the

cultural landscapes within the front country and back country of the park. The inventories should be compiled in such a way that they can be easily incorporated into the park GIS in order to be used and referenced for cultural resources management and compliance actions. This study will add to the interpretive program at the park, and can be used to manage proposed development and establish carrying capacities.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Prepare a cultural landscape inventory. The cultural landscape inventory (CLI) will inventory cultural landscape elements and relationships according to the Cultural Resources Guideline: NPS 28. Preliminary management guidance will be a part of this document. It will identify character-defining landscape features and discuss their significance and integrity. The CLI will assist management in planning appropriate decisions.

Inventory and map all of the cultural landscape sites in the monument and include a narrative history of each site with the inventory. The sites should be described as one of the monument's GIS resource overlays so that it can be used for management purposes. The inventory would include a listing and location of each unique plant or group of plants in the landscape.

Year 1: Review existing literature pertaining to historic, prehistoric, socio-cultural and ethnographic resources in the park to identify potential landscape locations.

Utilizing this information, conduct field evaluation to determine the possible location of the following types of cultural landscapes: historic scenes, historic sites, historic designated landscapes, historic vernacular landscapes, and ethnographic landscapes.

Prepare a Cultural Landscape Report for all identified landscapes. Include four main sections: administrative data, documentary data, field survey data, and analysis and management recommendations.

This project should be completed under contract utilizing expertise in history and ethnography.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.00	0.00
			Total:	0.00	0.00

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-time	0.50	0.01
Year 2:	RES	One-time	1.00	0.02
Year 3:	RES	One-time	15.00	0.00
		Total:	16.50	0.03

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Without an inventory and evaluation of cultural landscapes, it is difficult to incorporate their significance in project planning. As a result, there could be significant impact to cultural integrity from other monument or visitor activities.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 APP. 7.4 B(10)

Proposal Date: 1996

MOCA-N-700.000 Inventory Sensitive and Threatened/Endangered Fauna and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-700.000

TITLE: Inventory Sensitive and Threatened/Endangered Fauna and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

N02 Impacts on Threatened, Endangered, and Other Sensitive Animals

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

A few sensitive species are found in the monument or have potential habitat. They include an amphipod in the Well (category 2), and the southern bald eagle (endangered) nests in the area. Some endangered fish species, the razorback sucker and Colorado squawfish have been reintroduced into the Verde River. The endangered spikedace occurs in part of the Verde River.

However, there has not been a systematic survey and search to identify all rare animals at Montezuma Castle National Monument. It is probable that additional rare life forms occur in the monument and may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff need to be aware of any rare animals potentially near the monument boundaries. Adjacent land uses can have positive or negative impacts on limited populations.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a systematic survey for rare species and develop long-term monitoring protocols. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act. Published and unpublished literature and museum specimens will be searched, reviewed, and annotated. An annotated bibliographic report will be prepared of all reported rare or otherwise sensitive animal species. Annotators will scrutinize existing ecologic, life historical, taxonomic, and distributional information for

each species. A thorough search of monument habitats will be conducted of all terrestrial and aquatic animals considered to be rare. Through consultation with other specialists, the principal investigator will prioritize the list of rare life forms. For species not requiring complex management strategies, action plans will be prepared. Where additional species-specific studies may be required, the principal investigator will propose in writing draft program statements for inclusion in the monument's resources management plan. A final report will be prepared summarizing findings from this investigation. It will include, but not be limited to lists of species with annotated summaries of life history and ecologic information, range/distribution data, and maps of species occurrences in and around the monument. Written recommendations will be provided to the superintendent of the study findings, for use in the monument's interpretive plan. Long-term monitoring protocols will be developed.

Year 1: Conduct systematic survey for rare animals in the monument and through the literature and museum collections.

Year 2: Write report of findings with long-term monitoring protocols.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
Year 2:	RES	One-Time	5.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue current activities. Rare species will be identified and mapped intermittently over the years on a hit or miss basis. Lack of knowledge regarding endemic species limits the superintendent in making proper judgments about managing the monument's resources. It will be unclear whether a species is naturally rare or rare due to human activities.

Do not assess species. The monument will not be in compliance with the Federal Endangered Species Act and state laws.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2) **Proposal Date: 1994**

MOCA-N-700.001 Monitor Sensitive and Threatened/Endangered Fauna

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-700.001

TITLE: Monitor Sensitive and Threatened/Endangered Fauna

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.4

SERVICEWIDE ISSUES:

N02 Impacts on Threatened, Endangered, and Other Sensitive Animals

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

A systematic survey and search to identify all rare animals at Montezuma Castle National Monument will be conducted in 700.000. Rare life forms in the monument may require protective management. Of special concern are federally listed threatened, endangered or candidate species which require protection under the Endangered Species Act and its amendments. State protected species are also of concern. Monument staff must be continually aware of any rare animals potentially near the monument boundaries. Adjacent land uses can have positive or negative impacts on limited populations.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Monitor rare species. By assessing occurrence and distribution of rare species, the superintendent can properly manage these species in accordance with NPS management policies, monument enabling legislation, and the Endangered Species Act.

For species not requiring complex management strategies, action plans prepared in 700.000 will be followed. Where additional species-specific studies may be required, the principal investigator will propose in writing draft program statements for inclusion in the monument's resources management plan.

Year 1: Monitor sensitive, threatened, and endangered flora.

Year 2: Monitor sensitive, threatened, and endangered flora.

Year 3: Monitor sensitive, threatened, and endangered flora.

Year 4: Monitor sensitive, threatened, and endangered flora.

Note: This is an ongoing project.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	On-Going	0.1	0.0
Year 2:	MON	On-Going	0.1	0.0
Year 3:	MON	On-Going	0.1	0.0
Year 4:	MON	On-Going	0.1	0.0
		Total:	0.4	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue current activities. Rare species will be identified and mapped intermittently over the years on a hit or miss basis. Lack of knowledge regarding endemic species limits the superintendent in making proper judgments about managing the monument's resources. It will be unclear whether a species is naturally rare or rare due to human activities.

Do not assess species. The monument will not be in compliance with the Federal Endangered Species Act and state laws.

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1994

MOCA-N-701.000 Assess Habitat Requirements of Aquatic Organisms at Montezuma Well and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-701.000

TITLE: Assess Habitat Requirements of Aquatic Organisms at Montezuma Well and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 65.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The aquatic organisms indigenous to Montezuma Well are water-related resource attributes of importance to this site. Their importance to the archaeological/historical story of this NPS unit is unknown but the organisms have importance in their own right due to their uniqueness. Their habitat requirements have been met historically through the particular combination of water quality and quantity in the Well. However, it is not known whether these characteristics have been stable over time or have been changing progressively. If changes have occurred, the present state-of-knowledge does not allow for an assessment of the nature, magnitude, or cause for such change or of the possible consequences.

It is not unreasonable to anticipate that changes in water quantity and quality will be manifest at the Well due to increasing residential and commercial development in locations peripheral to the site. If a significant diminution in water delivery occurs, or if water quality substantially changes, then this water-related resource attribute may be adversely affected. Once affected, there is presently no means whereby the consequences may be assessed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Assess habitat requirements of aquatic organisms at Montezuma Well and develop long-term monitoring protocols. The few studies that have been conducted thus far have found many unique endemic life forms in the Well. This resource is obviously unusual and has led to the development of life forms found nowhere else on earth. It is imperative that the Well be

systematically studied before unforeseen events degrade the Well and destroy unknown organisms.

The assessment of aquatic organisms and their habitat requirements requires monitoring water replacement rate and standing water surface elevation, characterizing existing water quality, characterizing organism habitat requirements, modelling and/or estimating potential changes in water quantity and quality and identifying activities or geographical areas that could impact water quantity or quality. This information would be necessary to ensure protection of this water-related resource attribute from off-site water development and use.

Accomplishing the above requires an interdisciplinary approach to characterize the existing hydrologic and water quality regimes as well as the biotic needs of the indigenous organisms. The analysis of data collected will require the use of both computer models and expert opinion to assess current conditions and to predict probable conditions.

Year 1: Develop and implement a research program to assess aquatic organisms and their habitat requirements. Initiate field work and begin compiling information.

Year 2: Continue field work and compiling information.

Year 3: Continue field work and compiling information. Analyze data. Write report. Design Long-Term Monitoring Program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	25.0	0.0
Year 2:	RES	One-Time	22.0	0.0
Year 3:	RES	One-Time	18.0	0.0
		Total:	65.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument would continue to manage the Well without any empirical knowledge of the resources of the Well. The Well is a unique natural wonder that contains many rare and endemic species. It is only through the acquisition of scientific data that this habitat can be properly protected and interpreted.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-701.001 Implement Long-Term Monitoring and Management Strategy for Habitat Requirements of Aquatic Organisms at Montezuma Well

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-701.001

TITLE: Implement Long-Term Monitoring and Management Strategy for Habitat Requirements of Aquatic Organisms at Montezuma Well

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The aquatic organisms indigenous to Montezuma Well are water-related resource attributes of importance to this site. Their importance to the archaeological/historical story of this NPS unit is unknown but the organisms have importance in their own right due to their uniqueness. Their habitat requirements have been met historically through the particular combination of water quality and quantity in the Well. However, it is not known whether these characteristics have been stable over time or have been changing progressively. If changes have occurred, the present state-of-knowledge does not allow for an assessment of the nature, magnitude, or cause for such change or of the possible consequences.

It is not unreasonable to anticipate that changes in water quantity and quality will be manifest at the Well due to increasing residential and commercial development in locations peripheral to the site. If a significant diminution in water delivery occurs, or if water quality substantially changes, then this water-related resource attribute may be adversely affected. Once affected, there is presently no means whereby the consequences may be assessed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring of aquatic organisms and their habitat requirements. The few studies that have been conducted thus far have found many unique endemic life forms in the Well. This resource is obviously unusual and has led to the development of life forms found nowhere else on earth. To avoid degradation of the Well and destruction of unknown

organisms, it is imperative that studies be kept current. A monitoring program as established in 701.000 will be implemented. Monument staff will be trained in the protocols.

Year 1: Monument personnel will be trained to carry out long-term monitoring.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.0
Year 2:	MON	Recurring	1.0	0.0
Year 3:	MON	Recurring	1.0	0.0
Year 4:	MON	Recurring	1.0	0.0
		Total:	4.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument would continue to manage the Well without knowledge of the current status of resources of the Well. The Well is a unique natural wonder that contains many rare and endemic species. It is only through the acquisition of scientific data that this habitat can be properly protected and interpreted.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-702.000 Conduct Inventory and Assessment of Invertebrates and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-702.000

TITLE: Conduct Inventory and Assessment of Invertebrates and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 35.3

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The invertebrates are a large and diverse group of animals occupying terrestrial and aquatic environments at Montezuma Castle and Montezuma Well. The vast number of species and difficulties of identifying specimens make invertebrates relatively difficult to study. Nonetheless, they are responsible for a number of vital ecosystem functions. The best known groups of invertebrates are members of the Classes Insecta, Crustacea and Mollusca. Many members of these groups are known because they are economically and medically important as pests. However, the description of species new to science is not atypical among workers specializing in a particular Family or Genus of insect, crustacean or mollusk. It is highly probably that tens of taxa in these three groups remain undescribed in the Well and Castle.

There are no known impacts on health and public safety; however, a number of insects, ticks, and other invertebrates are known to cause debilitating and life-threatening diseases. Biting insects such as bees and wasps may also threaten hyper-allergic people.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct an inventory and assessment of the native invertebrates at Montezuma Castle. The project should be phased to concentrate on Families or Orders of invertebrates. Specific taxonomic groups to be inventoried should include those that are preserved and studied easily. Protozoans, although of interest and importance in the monument could only be studied cost-effectively on a very limited scale. This is true of other groups such as the

Platyhelminthes and nematode worms as well. A few specialists would be available worldwide to study some groups of invertebrates. This effort should initially concentrate on biotic diversity of insects, crustaceans, mollusks and other relatively well known groups of invertebrates. Organisms occupying different environments (i.e., aquatic or terrestrial) will probably be studied most effectively by different specialists. Inventories should also be defined by habitats. A variety of collecting techniques should be used to effectively sample the diversity of invertebrates and their habitats. A seasonal sampling regime would allow the researcher to make initial determinations of relative abundance, reproductive strategies, and other natural history attributes. The inventories should be implemented with a comprehensive review of pertinent literature. Data should be analyzed using simple descriptive statistics (e.g., mean, standard deviation, etc.) and the entire set should be presented to NPS. Recommendations should be developed for subsequent studies which may provide information having management significance. Studies during the last two years of the project should concentrate on taxa of management concern or exceptional scientific interest.

Year 1: Initiate field aspects of project and conduct literature review.

Year 2: Continue project with emphasis on rare and poorly known species identified in the first year.

Year 3: Finish field work and prepare final report and collections. Produce field checklist.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	11.5	0.2
Year 2:	RES	One-Time	11.5	0.2
Year 3:	RES	One-Time	12.3	0.2
		Total:	35.3	0.6

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. This entails maintenance of the status quo. No research on native invertebrates would be undertaken.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4) **Proposal Date: 1990**

MOCA-N-702.001 Implement Long-Term Monitoring of Invertebrates

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-702.001

TITLE: Implement Long-Term Monitoring of Invertebrates

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.8

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The invertebrates are a large and diverse group of animals occupying terrestrial and aquatic environments at Montezuma Castle and Montezuma Well. The vast number of species and difficulties of identifying specimens make invertebrates relatively difficult to study. Nonetheless, they are responsible for a number of vital ecosystem functions. The best known groups of invertebrates are members of the Classes Insecta, Crustacea and Mollusca. Many members of these groups are known because they are economically and medically important as pests. However, the description of species new to science is not atypical among workers specializing in a particular Family or Genus of insect, crustacean or mollusk. There are no known impacts on health and public safety; however, a number of insects, ticks, and other invertebrates are known to cause debilitating and life-threatening diseases. Biting insects such as bees and wasps may also threaten hyper-allergic people. It is important to implement long-term monitoring within the monument.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring of the native invertebrates at Montezuma Castle. A long-term monitoring program designed in the inventory and assessment of invertebrates, project 702.000, should be implemented. Monument staff will be trained in the implementation of these protocols.

Year 1: Conduct long-term monitoring program and train monument staff on implementing protocols.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: Long-term monitoring is ongoing; additional work on specific species or genera will result from the research.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	0.2	0.2
Year 2:	MON	Recurring	0.2	0.2
Year 3:	MON	Recurring	0.2	0.2
Year 4:	MON	Recurring	0.2	0.2
		Total:	0.8	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with current management. This entails maintenance of the status quo. No research on native invertebrates would be undertaken.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-703.000 Conduct Inventory and Assessment of Amphibians and Reptiles and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-703.000

TITLE: Conduct Inventory and Assessment of Amphibians and Reptiles and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 26.4

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Upland and riparian amphibians and reptiles are commonly the most poorly understood of the vertebrate species in an area. Since they are poikilothermous ("cold-blooded") they are easily affected by slight changes in temperature, as between shady and sunny microhabitats, thus are probably the most reliable vertebrate indicators of habitat change. In addition, many species require moist habitats, during parts or all of their life cycles, especially amphibians such as frogs and toads. Although changes in riparian ecosystems have resulted in severe reductions in species diversity and population densities for many plant and animal species, the impacts of these riparian habitat losses on amphibians and reptiles have not been as well documented as for birds. Venomous reptiles such as rattlesnakes constitute a safety hazard for visitors and their distribution must be better understood. Understanding distribution and relative stability of amphibian and reptile species is thus an important element of vertebrate biology in relation to resource management and interpretation. A long-term monitoring program for these components of the ecosystem is also needed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct inventory and assessment of amphibians and reptiles and develop long-term monitoring protocols. This will provide additional information to aid management in maintaining biological diversity in the monument as well as providing information for interpretive exhibits and presentations. Species richness and relative densities for amphibians and reptiles in the monument will be determined. Species that have specialized requirements that are of interest to interpretive programs or resource management problems will be studied

in relationship to those requirements. A field checklist will be produced. A long-term monitoring program will be designed.

Year 1: Initiate field aspects of project.

Year 2: Continue project with emphasis on rare and poorly known species identified in the first year.

Year 3: Finish field work and prepare final report. Produce field checklist. Design long-term monitoring program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	8.8	0.1
Year 2:	RES	One-Time	8.8	0.1
Year 3:	RES	One-Time	8.8	0.1
		Total:	26.4	0.3

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Information that would assist in monitoring of environmental changes and changes in biological diversity will not be available for resource managers or for interpretation to the visiting public.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-703.001 Implement Long-Term Monitoring Protocols for Amphibians and Reptiles

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-703.001

TITLE: Implement Long-Term Monitoring Protocols for Amphibians and Reptiles

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.8

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Upland and riparian amphibians and reptiles are commonly the most poorly understood of the vertebrate species in an area. Since they are poikilothermous ("cold-blooded") they are easily affected by slight changes in temperature, as between shady and sunny microhabitats, thus are probably the most reliable vertebrate indicators of habitat change. In addition, many species require moist habitats, during parts or all of their life cycles, especially amphibians such as frogs and toads. Although changes in riparian ecosystems have resulted in severe reductions in species diversity and population densities for many plant and animal species, the impacts of these riparian habitat losses on amphibians and reptiles have not been as well documented as for birds. Venomous reptiles such as rattlesnakes constitute a safety hazard for visitors and their distribution needs to be better understood. Understanding distribution and relative stability of amphibian and reptile species is thus an important element of vertebrate biology in relation to resource management and interpretation. A long-term monitoring program for these components of the ecosystem is needed.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols for amphibians and reptiles. This will provide current information to aid management in maintaining biological diversity in the monument as well as providing information for interpretive exhibits and presentations. The monument staff will be trained in the implementation of these protocols following completion of the initial inventory and assessment, 703.000.

Year 1: Train monument staff on implementing protocols.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This in an ongoing, long-term monitoring program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	0.2	0.1
Year 2:	MON	Recurring	0.2	0.1
Year 3:	MON	Recurring	0.2	0.1
Year 4:	MON	Recurring	0.2	0.1
		Total:	0.8	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Information that would assist in monitoring of environmental changes and changes in biological diversity will not be available for resource managers or for interpretation to the visiting public.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-704.000 Conduct Inventory and Assessment of Birds and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-704.000

TITLE: Conduct Inventory and Assessment of Birds and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 26.5

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Changes in riparian and adjacent upland ecosystems, such as those at Montezuma Castle, have resulted in severe reductions in avian species diversity and population densities through most of the Southwest. Important attributes of birds include diurnal activity, songs and prominent displays, and the interest of a large number of people in birdwatching. These factors have provided an information base generally making the avifauna one of the best tools for evaluating the biological health of an ecosystem. Montezuma Castle and Well have been maintained in relatively pristine conditions since establishment of the monument in 1906 and addition of the Well in 1943. Still, reconstruction of the earlier biological landscapes of the area from journals of earlier explorers and residents and through comparison of modern photos with old photos indicate that even these areas were heavily impacted by the end of the 20th century. Activities that reduced and modified the extensive riparian and adjacent upland vegetative communities, and presumably the dependent avifauna, included trapping of beavers and destruction of their dams, overgrazing, and surface water withdrawal. This project is designed to supplement the basic avifaunal information contained in the monument files by providing more information about the interaction of key avian species (indicator species) with the rest of the monument environment. It will also design a long-term monitoring program for these components of the ecosystem.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct inventory and assessment of birds and develop long-term monitoring protocols. This study will provide information that can serve as an additional management tool for

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-704.001 Implement Long-Term Monitoring of Birds

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-704.001

TITLE: Implement Long-Term Monitoring of Birds

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.8

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Changes in riparian and adjacent upland ecosystems, such as those at Montezuma Castle, have resulted in severe reductions in avian species diversity and population densities through most of the Southwest. Important attributes of birds include diurnal activity, songs and prominent displays, and the interest of a large number of people in birdwatching. These factors have provided an information base generally making the avifauna one of the best tools for evaluating the biological health of an ecosystem. Montezuma Castle and Well have been maintained in relatively pristine conditions since establishment of the monument in 1906 and addition of the Well in 1943. Still, reconstruction of the earlier biological landscapes of the area from journals of earlier explorers and residents and through comparison of modern photos with old photos indicate that even these areas were heavily impacted by the end of the 20th century. Activities that reduced and modified the extensive riparian and adjacent upland vegetative communities, and presumably the dependent avifauna, included trapping of beavers and destruction of their dams, overgrazing, and surface water withdrawal. This project is designed to keep the basic avifaunal information current by providing updated information about the interaction of key avian species (indicator species) with the rest of the monument environment. It is a long-term monitoring program for these components of the ecosystem.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring of birds. This study will provide current information that can serve as an additional management tool for examining the ecological health of the monument, especially riparian ecosystems, including the examination of the problem of decreasing tree vigor in the sycamore forest (which was discussed in both the 1975 Cultural

and Natural Resources Management Plan and Environmental Assessment). The Principal Investigator in the initial inventory and assessment, 704.000 will design long-term monitoring protocols for the avian components of the ecosystem. The monument staff will be trained in the implementation of these protocols.

Year 1: Train monument staff in implementation of long-term monitoring protocols.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This in an ongoing, long-term monitoring program.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	0.2	0.1
Year 2:	MON	Recurring	0.2	0.1
Year 3:	MON	Recurring	0.2	0.1
Year 4:	MON	Recurring	0.2	0.1
		Total:	0.8	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. Problems to be addressed, such as those in the mixed riparian deciduous forest, will continue to exist without the necessary information from these avian studies. Additional information about birds for interpretive programs will not be forthcoming.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-705.000 Conduct Inventory and Assessment of Mammals and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-705.000

TITLE: Conduct Inventory and Assessment of Mammals and Develop Long-Term Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 16.6

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Changes in riparian and upland ecosystems have resulted in species composition and population densities through most of mammals in the Southwest. Some mammalian species are of interest because of recreational pursuits (i.e., hunting), others because they are disease vectors, and still others because they cause economic losses. The majority of mammalian species are poorly known by land managers, wildlife managers and the general public. Montezuma Castle and Well have been maintained in relatively pristine conditions since establishment of the monument in 1906 and addition of the Well in 1943. Still, reconstruction of the earlier biological landscapes of the area from journals of earlier explorers and residents and through comparison of modern photos with old photos indicate that even these areas were heavily impacted by the end of the 20th century. Activities that reduced and modified the extensive riparian vegetative communities, and presumably many mammals included, trapping and predator control, grazing, conversion of plant communities and surface water withdrawal. This project is designed to supplement and develop baseline information on mammals within Montezuma Castle, providing more information about the interaction of key mammalian species (indicator species) with the rest of the monument environment, and document the biological diversity of mammals. The study will also design a long-term monitoring program for these components of the ecosystem.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct inventory and assessment of mammals and develop long-term monitoring protocols. This will provide information on native mammals which will serve as an additional manage-

ment tool for examining the ecological health of the monument ecosystems. This program will document the occurrence of native mammals, natural history characteristics of species, and their relative abundance within riparian, wetland and upland habitats. Species that have habitat requirements that are related to interpretive programs or resource management problems will be studied in relationship to those requirements. An annotated checklist suitable for sale at the visitor center will be produced. A long-term monitoring program will be designed for these components of the ecosystem. The inventory will be conducted using non-destructive sampling techniques such as live trapping, mist netting, and observation. The contractor will be required to obtain a scientific collecting permit from the superintendent and from the State of Arizona.

Year 1: Conduct study in field.

Year 2: Finish field work and write report with long-term monitoring protocols.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	8.3	0.1
Year 2:	RES	One-Time	8.3	0.1
		Total:	16.6	0.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This entails maintenance of the status quo. Monument staff will rely on the existing scant database to make management decisions affecting native mammals. No research on native mammals will be conducted.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-705.001 Implement Long-Term Monitoring Protocols for Mammals

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-705.001

TITLE: Implement Long-Term Monitoring Protocols for Mammals

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.8

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Changes in riparian and upland ecosystems have resulted in species composition and population densities through most of mammals in the Southwest. Some mammalian species are of interest because of recreational pursuits (i.e., hunting), others because they are disease vectors, and still others because they cause economic losses. The majority of mammalian species are poorly known by land managers, wildlife managers and the general public. Montezuma Castle and Well have been maintained in relatively pristine conditions since establishment of the monument in 1906 and addition of the Well in 1943. Still, reconstruction of the earlier biological landscapes of the area from journals of earlier explorers and residents and through comparison of modern photos with old photos indicate that even these areas were heavily impacted by the end of the 20th century. Activities that reduced and modified the extensive riparian vegetative communities, and presumably many mammals included, trapping and predator control, grazing, conversion of plant communities and surface water withdrawal. This project is designed to keep baseline information on mammals within Montezuma Castle current and provide up-to-date information about the interaction of key mammalian species (indicator species) with the rest of the monument environment, and document the biological diversity of mammals. A long-term monitoring program for these components of the ecosystem will be implemented.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols for mammals. This will provide current information on native mammals which will serve as an additional management tool for examining the ecological health of the monument ecosystems. A long-term monitoring program will be implemented following the protocols developed in the initial inventory and

assessment, 705.000. The monument staff will be trained in the implementation of these protocols.

Year 1: Train monument staff in implementation of long-term monitoring protocols.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: Long-term monitoring is ongoing; additional work on specific species or genera will result from the research.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	0.2	0.1
Year 2:	MON	Recurring	0.2	0.1
Year 3:	MON	Recurring	0.2	0.1
Year 4:	MON	Recurring	0.2	0.1
		Total:	0.8	0.4

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This entails maintenance of the status quo. Monument staff will rely on the existing scant database to make management decisions affecting native mammals. No research on native mammals will be conducted.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-706.000 Inventory, Assess, and Evaluate Control of Non-Native Fauna and Develop Long-Term Management Strategies and Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-706.000

TITLE: Inventory, Assess, and Evaluate Control of Non-Native Fauna and Develop Long-Term Management Strategies and Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 28.8

SERVICEWIDE ISSUES:

N04 Degradation of Park Resources Due to Non Native Animals
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The National Park Service is aware of some non-native species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary. Lacking an inventory, it is likely that additional introduced species occur in the monument but have not yet been detected. Some problems perhaps have not yet been identified because of their subtlety. For example, a non-native insect(s) might compete with and replace a native insect which is essential (a symbiotic partner) in pollinating a native plant. An example is the European honey bee now colonizing niches in the cliffs. The Africanized bee is expected within three to five years.

Known introduced animals at Montezuma Castle include house sparrow, rock dove and starlings. Starlings are known to aggressively replace native primary and secondary cavity nesting bird species. Others include feral cats and dogs. In aquatic habitats, non-natives represented include bullfrog, eastern box turtle, and fishes, i.e., rainbow trout, brown trout, smallmouth bass, mosquitofish, green sunfish, carp and black bullhead. The Asiatic clam once infested the irrigation ditch at the Well unit. Control treatments were used and now it seems to be completely removed. However, its larvae are aggressive colonizers and the species is still abundant throughout the Verde Valley. Consequently, the ditch is cleaned twice a year to monitor for clams as well as maintain the flow.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Inventory, assess, and evaluate control of non-native fauna and develop long-term management strategies and monitoring protocols. Inventorying introduced species, their distribution, abundance, and seasonal occurrence, is necessary to understand the extent of the problems. With this information, management can determine which species need to be controlled and which will be tolerated. Some species may be very abundant and widespread, characteristics that make removal infeasible. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).

Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. The NPS management policies require removal of non-native species where control is practicable. Recommendations are needed regarding feasibility of eliminating these species and, where appropriate, establishing natives. A long-term monitoring program will be designed for these components of the ecosystem.

Three phases will be involved with the project execution. These phases are as follows:

- Complete an inventory of non-native animals. Describe their distribution, abundance, population trends, and relative threat. Categorize these into species that are not aggressive and aggressive, which actually or potentially cause the greatest ecosystem change or loss of native biotic diversity.

- Develop management guidelines with control feasibility and cost evaluations for the highest priority and most threatening introduced species. Include basic information on distribution, rate of spread, etc. Historic aerial and ground photographs may be useful for these determinations. The literature should be thoroughly reviewed to determine what is known about the ecology of these species. Available management, i.e., control, using Integrated Pest Management techniques should be recommended, or if unavailable, control strategies associated with re-establishment of native species should be recommended, where appropriate. Such strategies might include physical removal or barrier experiments, use of insecticides, biological control or some combination thereof. Consultations should be held with other specialists, as required, to develop sound strategies. Experimental treatment plots should be established, where appropriate, and records kept of activities. Success/failure of the treatment methodologies should be monitored during the course of the study.

- A scientific report would be prepared that provides the superintendent with results from the inventory and evaluations with a management plan or manual for removing the most crucial non-native plant and animal species. Finally, provide written material and recommendations for applicability of findings to the interpretive program of the monument. Proper explanation to the public of the problem and solution can develop public support and perhaps even participation in the removal program.

Year 1: Conduct survey to inventory and map non-native species. Begin developing management actions and monitoring protocols.

Year 2: Complete report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	14.0	0.3
Year 2:	RES	One-Time	14.8	0.3
		Total:	28.8	0.6

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Maintain current non-native species control program. Current and past treatment of non-native species has been sporadic and infrequent, and usually not timed correctly to remove species. However, one success has been the apparent removal of Asiatic clams previously mentioned. Monument staff has used bee keepers to remove European honey bees in close proximity to visitors at the Castle. Lacking a thorough species inventory with recommendations for control strategies, little can be done to control or eliminate those introduced species most practicable to remove. Ecosystem alteration occurs with non-native species present. Some of the ecosystem changes probably are not irreversible but without baseline information about non-native species, resource managers can only use intuition and speculate on outcomes.

Do not take action to manage non-native species. This abrogates the NPS responsibility to protect naturally functioning ecosystems from non-native influences. It is therefore unacceptable.

COMPLIANCE CODE (s): EXCL,

EXPLANATION: 516 DM6 App. 7.4 E(7)

Proposal Date: 1990

MOCA-N-706.002 Implement Long-Term Monitoring Protocols for Non-Native Fauna

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-706.002

TITLE: Implement Long-Term Monitoring Protocols for Non-Native Fauna

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N04 Degradation of Park Resources Due to Non Native Animals
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The National Park Service is aware of some non-native species that occur at Montezuma Castle National Monument. Less is known, however, about their abundance, distribution, and population trends. A long-term monitoring program for these components of the ecosystem is necessary. Lacking an inventory, it is likely that additional introduced species occur in the monument but have not yet been detected. Some problems perhaps have not yet been identified because of their subtlety. For example, a non-native insect(s) might compete with and replace a native insect which is essential (a symbiotic partner) in pollinating a native plant. An example is the European honey bee now colonizing niches in the cliffs. The Africanized bee is expected within three to five years.

Known introduced animals at Montezuma Castle include house sparrow, rock dove and starlings. Starlings are known to aggressively replace native primary and secondary cavity nesting bird species. Others include feral cats and dogs. In aquatic habitats, non-natives represented include bullfrog, eastern box turtle, and fishes, i.e., rainbow trout, brown trout, smallmouth bass, mosquitofish, green sunfish, carp and black bullhead. The Asiatic clam once infested the irrigation ditch at the Well unit. Control treatments were used and now it seems to be completely removed. However, its larvae are aggressive colonizers and the species is still abundant throughout the Verde Valley. Consequently, the ditch is cleaned twice a year to monitor for clams as well as maintain the flow.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols. Inventorying introduced species, their distribution, abundance, and seasonal occurrence, is necessary to understand the extent of the problems. With this information, management can determine which species need to be controlled and which will be tolerated. Some species may be very abundant and widespread, characteristics that make removal infeasible. Staff will also become aware of situations outside the monument which could affect lands under their jurisdiction (e.g., roadside seeding, farming, grazing, development).

Without the inventory, gradual or rapid expansion of non-native species and damage will remain unknown. Natural communities will be altered in some cases. The NPS management policies require removal of non-native species where control is practicable. Recommendations are needed regarding feasibility of eliminating these species and, where appropriate, establishing natives. A long-term monitoring program will be designed for these components of the ecosystem. The monument staff will be trained in the implementation of these protocols.

Management and long-term monitoring strategies will involve these phases:

- Management guidelines with control feasibility and cost evaluations for the highest priority and most threatening introduced species be developed in 706.000 will be followed. Available management, i.e., control, using Integrated Pest Management techniques or if unavailable, control strategies associated with re-establishment of native species will be used as recommended in 706.000. Monument personnel will be trained to carry out long-term monitoring of test plots, if appropriate.

- A management plan or manual for removing the most crucial non-native plant species from 706.000 will be followed. Written material and recommendations for applicability of findings to the interpretive program of the monument will be implemented.

Year 1: Follow management guidelines to control non-native species and monitor success.

Year 2: Follow management guidelines to control non-native species and monitor success.

Year 3: Follow management guidelines to control non-native species and monitor success.

Year 4: Follow management guidelines to control non-native species and monitor success.

Note: This is an on-going, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MIT	Recurring	1.0	0.3
Year 2:	MIT	Recurring	1.0	0.3
Year 3:	MIT	Recurring	1.0	0.3
Year 4:	MIT	Recurring	1.0	0.3
		Total:	4.0	1.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Maintain current non-native species control program. Current and past treatment of non-native species has been sporadic and infrequent, and usually not timed correctly to remove species. However, one success has been the apparent removal of Asiatic clams previously mentioned. Monument staff has used bee keepers to remove European honey bees in close proximity to visitors at the Castle. Lacking a thorough species inventory with recommendations for control strategies, little can be done to control or eliminate those introduced species most practicable to remove. Ecosystem alteration occurs with non-native species present. Some of the ecosystem changes probably are not irreversible but without baseline information about non-native species, resource managers can only use intuition and speculate on outcomes.

Do not take action to manage non-native species. This abrogates the NPS responsibility to protect naturally functioning ecosystems from non-native influences. It is therefore unacceptable.

COMPLIANCE CODE (s): EXCL,

EXPLANATION: 516 DM6 App. 7.4 E(7)

Proposal Date: 1990

MOCA-N-707.000 Manage Feral Honey Bees

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-707.000

TITLE: Manage Feral Honey Bees

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 0.8

SERVICEWIDE ISSUES:

N04 Degradation of Park Resources Due to Non-Native Animals
N17 Loss of Biological Diversity
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Feral honey bee colonies are both a potential ecological resource and an ecological problem. While they are general pollinators, they are also non-native species that have out competed and displaced native pollinators. They also pose a health and safety problem. Bee hives are found above and around the ruins, usually in cracks and holes in the cliff rock. They build hives in trees near the administrative area and residences and when swarming in the spring, often try to establish hives in buildings. These bees may cause damage to the cultural structures, and affect visitors and park employees. Stinging incidents occur regularly in spring and summer, which threaten hyper-allergic people.

The potential problem is exacerbated by the approaching populations of Africanized honey bees, which are descendants of bees that escaped from colonies in Brazil in 1956. The Africanized bee has been migrating northward since then and arrived in Brownsville, Texas in 1991. Their movements have received national attention and efforts to immediately eliminate them. Literature and experiences portray this strain as being unpredictable and fiercely defensive. Records show there have been stinging deaths of humans and large animals by swarms of these bees. Most recently, a dog died in Tucson in June 1993. The colony was captured and killed. Authorities said the colony "hitchhiked" via a truck from Mexico and did not migrate. The front of the Africanized honey bee movement still appears to be in south Texas along the Rio Grande.

There is serious concern for visitors and the natural environment when the expected Africanized honey bee becomes established. The monument offers many nest sites, water,

and available nectar and pollen plants that will be crucial for this bee. Most colonies are expected to chose nest sites near water sources and will have potentially severe impacts on humans and animals.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Increase management of honey bees located near the ruins and administrative area. In January 1989, the Southern Arizona Group Office convened a workshop about bees and wasps that focused on the European and Africanized honey bees and IPM treatments. Scientists from the Carl Hayden Bee Research Center (CHBRC), Agriculture Research Service, instructed at the workshop. An IPM action plan was prepared for parks to adopt locally. Monument staff participated.

Staff continues to immediately eliminate swarms that colonize in and on buildings. They monitor stinging incidents and alert visitors to the potential danger.

A scientist from CHBRC started a baseline inventory of honey bees in Montezuma Castle National Monument and other parks in southern Arizona in 1993. The purpose was to conduct a location, phenotypic, and genotypic survey. This is invaluable, long-term research because the scientist will provide basic information from which to evaluate trends. The methods will detect the presence of Africanized honey bee, then treatments can be recommended and evaluated.

Staff can never expect to eradicate European or Africanized honey bees from the monument or other parks where habitat is so available. The recommended approach is to deal with problem colonies regardless of the species. Problem colonies are those with which people frequently interact. This involves destroying hives and making the niche unavailable when possible or re-queening colonies. The same consideration should be given to colonies that repeatedly attack or kill wildlife around water holes, for instance.

The monument will continue to be proactive by dealing with honeybee problems and supporting research. Staff are re-evaluating established colonies around ruins with consideration for removal. This program statement addresses routine activities that are covered with park funds. If additional money is required for special or more-costly actions, it will be amended. Further research will be identified and funding sought, as appropriate.

Year 1: Monitor honey bee activities in selected areas and take IPM action as required. Support research.

Year 2: Monitor honey bee activities in selected areas and take IPM action as required. Support research.

Year 3: Monitor honey bee activities in selected areas and take IPM action as required. Support research.

Year 4: Monitor honey bee activities in selected areas and take IPM action as required. Support research.

Note: This is an ongoing program.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	0.2	0.0
Year 2:	MON	Recurring	0.2	0.0
Year 3:	MON	Recurring	0.2	0.0
Year 4:	MON	Recurring	0.2	0.0
		Total:	0.8	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not manage bees. This may be dangerous to the visitors and park employees, as well as the cultural structures and wildlife.

COMPLIANCE CODE(s): EXCL, NHPA

EXPLANATION: 516 DM6 App. 7.4 E(7)

Proposal Date: 1994

MOCA-N-708.000 Conduct Inventory and Assessment of Fishes and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-708.000

TITLE: Conduct Inventory and Assessment of Fishes and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 16.5

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The native fish fauna of Wet Beaver Creek and Beaver Creek has been modified by water management practices and introductions of non-native fishes. Five species of native fishes (Gila Mountain Sucker, Gila Sucker, Roundtail Chub, Speckled Dace and Longfin Dace) are known from these waters. Several species have been extirpated from Wet Beaver Creek and Beaver Creek. These were reviewed by Minckley (1973).

Native fishes have been a significant resource consideration for monument staff due to the relatively low diversity of natives, threats posed by non-native fishes, and water management practices. Arizona Game and Fish Department and U.S. Fish and Wildlife Service have conducted periodic inventories of the Wet Beaver Creek and Beaver Creek drainages. However, these efforts are generally targeting non-native gamefishes. There are no known impacts on current park activities or health and safety of park employees and visitors resulting from the existing native fishery.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Inventory and assess native fish and develop long-term monitoring protocols. The inventory would be conducted using electrofishing, seining and other non-destructive sampling techniques to characterize the composition of the fishery. This research project will document the occurrence of native fish species at Montezuma Castle. Contract researchers would be retained to conduct the inventory. The contractor would be required to obtain necessary permits from the State of Arizona, U.S. Fish and Wildlife Service and NPS. The

Principal Investigator will also design long-term monitoring protocols for these components of the ecosystem. Monument staff will be trained in the implementation of these protocols to conduct a long-term monitoring program.

A variety of collecting techniques should be used to effectively sample the diversity of aquatic habitats found (i.e. pools, runs, riffles and backwaters). A seasonal sampling regime will allow the researcher to make initial determinations of relative abundance, reproductive activity, length-frequency relationships within species, habitat preferences and other natural history attributes, and potential threats. The study effort should be initiated with a comprehensive review of the native fishery literature regarding the Beaver Creek drainage and introduction of non-native fishes. These data should be analyzed using descriptive statistics (e.g., mean, standard deviation, etc). The researcher should also develop recommendations for subsequent studies which may provide assessment level information on individual fish species having management significance. The drainages should be evaluated for opportunities to re-introduce extirpated species.

Year 1: Conduct field work.

Year 2: Finish field work and write report and long-term monitoring protocols.

Note: Additional work on specific species may result from the research.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	8.3	0.1
Year 2:	RES	One-Time	8.2	0.1
		Total:	16.5	0.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative entails maintenance of the status quo. No research on the native fishery would be undertaken. There would be no efforts to evaluate opportunities for potential re-introduction of experimental native fish populations.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 E(6) **Proposal Date: 1990**

MOCA-N-708.001 Implement Long-Term Monitoring Protocols of Native Fishes

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-708.001

TITLE: Implement Long-Term Monitoring Protocols of Native Fishes

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The native fish fauna of Wet Beaver Creek and Beaver Creek has been modified by water management practices and introductions of non-native fishes. Five species of native fishes (Gila Mountain Sucker, Gila Sucker, Roundtail Chub, Speckled Dace and Longfin Dace) are known from these waters. Several species have been extirpated from Wet Beaver Creek and Beaver Creek. These were reviewed by Minckley (1973).

Native fishes have been a significant resource consideration for monument staff due to the relatively low diversity of natives, threats posed by non-native fishes, and water management practices. Arizona Game and Fish Department and U.S. Fish and Wildlife Service have conducted periodic inventories of the Wet Beaver Creek and Beaver Creek drainages. However, these efforts are generally targeting non-native gamefishes. There are no known impacts on current park activities or health and safety of park employees and visitors resulting from the existing native fishery.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring protocols of native fishes. The Principal Investigator in the inventory and assessment (708.000) will design long-term monitoring protocols for these components of the ecosystem. Monument staff will be trained in the implementation of these protocols to conduct a long-term monitoring program.

Year 1: Conduct Long-Term Monitoring.

Year 2: Conduct Long-Term Monitoring.

Year 3: Conduct Long-Term Monitoring.

Year 4: Conduct Long-Term Monitoring.

Note: This is an ongoing, long-term monitoring program. : additional work on specific species may result from the research.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	Recurring	1.0	0.1
Year 2:	RES	Recurring	1.0	0.1
Year 3:	RES	Recurring	1.0	0.1
Year 4:	RES	Recurring	1.0	0.1
		Total:	4.0	0.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative entails maintenance of the status quo. No monitoring on the native fishery would be undertaken. There would be no efforts to evaluate opportunities for potential re-introduction of experimental native fish populations.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 E(6)

Proposal Date: 1990

MOCA-N-800.000 Measure Outflow for Montezuma Well

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-800.000

TITLE: Measure Outflow for Montezuma Well

FUNDING STATUS: FUNDED: 10.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Natural spring flows from Montezuma Well are monitored through an agreement with the US Geological Survey (USGS). This agreement has been in force since the late 1970s. The USGS maintains the flow records and reports the results to the NPS on a annual basis. The NPS takes daily readings according to a protocol developed by the USGS and sends these data to the Survey for compilation and summary. This is the only long-term monitoring currently being performed on the water resources of the Well.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Continue current monitoring agreement with USGS. This would keep the current agreement in force and continue the interagency cooperation that is so important to this effort.

Year 1: Continue to take daily readings and send data to the USGS for compilation and summary.

Year 2: Continue to take daily readings and send data to the USGS for compilation and summary.

Year 3: Continue to take daily readings and send data to the USGS for compilation and summary.

Year 4: Continue to take daily readings and send data to the USGS for compilation and summary.

Note: This is an ongoing, long-term program.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
1	SNWR	MON	One-Time	2.5	0.1
2	SNWR	MON	One-Time	2.5	0.1
3	SNWR	MON	One-Time	2.5	0.1
4	SNWR	MON	One-Time	2.5	0.1
			Total:	10.0	0.4

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.0
Year 2:	MON	Recurring	1.0	0.0
Year 3:	MON	Recurring	1.0	0.0
Year 4:	MON	Recurring	1.0	0.0
		Total:	4.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Do not continue with present management. This would entail the cessation of the monitoring program and is an unacceptable alternative.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-801.000 Identify and Inventory Water-Related Resources

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-801.000

TITLE: Identify and Inventory Water-Related Resources

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 20.0

SERVICEWIDE ISSUES:

N13 Lack of Secure Water Rights
N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The water-related resources of the monument have not been fully identified. An inventory is needed to both identify the possibility of impact and to measure its magnitude, in the event impact does occur. This information will be required in water rights litigation or in any other similar arena in which the NPS seeks relief from such impact to protect the monument for the purposes for which it was created.

At present there exists an incomplete, and perhaps inadequate, understanding of the relationship of water to the resources of the monument. The first step in developing this understanding is identifying and inventorying the resources that are affected by or dependent upon water, both surface and subsurface.

The possibility of future impact to water-related resources exists due to residential and commercial development which is increasing in locations peripheral to the site. Water withdrawals from aquifers underlying the monument or alterations in surface water flow regimes are likely to affect water-related resources. Without an identification and inventory, assessments to arrest and reverse effects will be delayed resulting in additional or longer-lasting effects.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a thorough inventory of all water-related resources in the monument. Such a broad survey will give the superintendent an adequate data base from which to make informed

management decisions and to protect water rights. Such results will also be of use to all other resource related inventories conducted at the monument.

This basic inventory of water-related resources will require a technical assessment of natural resources and scientific literature. This project will be best undertaken by an interdisciplinary team working as a unit. Field and office assessments will result in summary reports, maps, and atlases. When completed, additional projects and/or studies will be required to evaluate the nature and magnitude of the relationship between water and water-related resources. Some of these studies identified as separate program statements in this resources management plan are: to evaluate the water delivery monitoring system, conduct analysis of adjacent land use and status, inventory basic natural resources of Montezuma Well and adjacent riparian and terrestrial habitat, assess habitat requirements of aquatic organisms at the Well, conduct riparian ecosystem research, conduct visitor use survey, delineate and evaluate strategies for wetlands protection, protect hydrologic characteristics of the archeological and historical setting at the Well, evaluate effects of hydrologic characteristics on morphological properties of flowing streams, and evaluate effects of hydrologic characteristics on regeneration of vegetation in riparian areas.

Year 1: Identify and inventory water-related resource attributes. Develop monitoring protocols.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	20.0	0.0
		Total:	20.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. This would leave the monument without an adequate data base to protect its water rights or to understand the relationships between water resources of the monument and early man's activities at the site. Water-related resources might be lost under such stewardship.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-802.000 Conduct Analysis of Existing Water Monitoring System

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-802.000

TITLE: Conduct Analysis of Existing Water Monitoring System

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 10.0

SERVICEWIDE ISSUES:

N13 Lack of Secure Water Rights

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Rights to the use of the water yield from Montezuma Well are held by the NPS and others. The rights held by the NPS are used for administrative purposes and historic irrigation. The existing system for monitoring the delivery of water to parties having rights thereto is inadequately installed. The result of this installation inadequacy is a poor data set and possibly inappropriate apportionment of available water. Further, this data inadequacy may place the NPS in an undesirable position if it were to be involved in water rights-related litigation.

Population increases have occurred in this area as in many others in the southwest. Consequently, residential and commercial development have been steadily increasing in locations peripheral to the site. The nature and effect of increased water use and consumption associated with this development are presently unknown. However, it may be that water is being removed from the natural avenues of surface and subsurface water delivery that supply the Well. If a significant diminution in water delivery occurs, the water rights of the United States may be impaired.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct analysis of existing water monitoring system. Conduct an evaluation of the water monitoring system to ensure that the partitioned water rights are being fairly and correctly metered. The effects of population growth in the Verde Valley on spring flow also need to be evaluated.

Year 1: Conduct an analysis of the existing water monitoring system.

BUDGET AND FTEs:

. . . . . **Funded** . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.0
		Total:	10.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument would continue to operate its water rights partitioning program under an antiquated delivery system that has not been monitored or evaluated for accuracy for many years.

COMPLIANCE CODE (s): EXCL, Section 106

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-802.001 Construct New System and Correlate Old Data with New Data

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-802.001

TITLE: Construct New System and Correlate Old Data with New Data

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 10.0

SERVICEWIDE ISSUES:

N13 Lack of Secure Water Rights

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Rights to the use of the water yield from Montezuma Well are held by the NPS and others. The rights held by the NPS are used for administrative purposes and historic irrigation. The existing system for monitoring the delivery of water to parties having rights thereto is inadequately installed. The result of this installation inadequacy is a poor data set and possibly inappropriate apportionment of available water. Further, this data inadequacy may place the NPS in an undesirable position if it were to be involved in water rights-related litigation.

Population increases have occurred in this area as in many others in the southwest. Consequently, residential and commercial development have been steadily increasing in locations peripheral to the site. The nature and effect of increased water use and consumption associated with this development are presently unknown. However, it may be that water is being removed from the natural avenues of surface and subsurface water delivery that supply the Well. If a significant diminution in water delivery occurs, the water rights of the United States may be impaired.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Construct new system and correlate old data with new data. Evaluate the water monitoring system. Conduct an evaluation of the water monitoring system to ensure that the partitioned water rights are being fairly and correctly metered. The effects of population growth in the Verde Valley on spring flow also need to be evaluated.
Improving the water delivery monitoring system requires a careful analysis of all existing data, construction of a new monitoring system, and the correlation of old with new discharge

data. This project will require some facility construction and the development of rating curves.

Year 1: Conduct an analysis of the existing water monitoring system.

Year 2: Construct a new monitoring system and collect data.

Year 3: Correlate old data with new data and continue to evaluate the water monitoring system.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

		Activity	Fund Type	Budget($1000s)	FTEs
Year 1:		RES	One-Time	10.0	0.0
			Total:	10.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument would continue to operate its water rights partitioning program under an antiquated delivery system that has not been monitored or evaluated for accuracy for many years.

COMPLIANCE CODE (s): EXCL, Section 106

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-803.000 Conduct Riparian Ecosystem Research and Develop Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-803.000

TITLE: Conduct Riparian Ecosystem Research and Develop Monitoring Protocols

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 50.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle National Monument was set aside because of its ". . . ethnological value and scientific interest. . ." The historic and prehistoric structures around which the major interest for visitors is focused are located on cliffs immediately adjacent to the floodplain and riparian lands along Beaver Creek. The surface and groundwater sources that currently support riparian ecosystems also served as water supplies for domestic and agricultural use for prehistoric humans. Additionally, riparian vegetation produces the cooler, more mesic landscape that is so attractive to visitors in this arid region. Further information is needed for increasing the interpretive values and general understanding of these riparian lands.

Structures currently located in the riparian zone include surfaced walks, drinking fountains, interpretive displays, a picnic area, and a several-hundred-foot-long gabion structure of rock and reinforcing metal mesh constructed by the CCC in the 1930's to deflect flood waters from areas of high visitor-use.

Visual examination of the riparian zone indicates that reestablishment rates of riparian trees (Arizona sycamore, net-leafed hackberry, chinaberry, velvet ash, etc.) seem low. Recruitment rates of young trees may be insufficient to replace the desirable riparian groves which are an important part of both the natural and cultural landscape. Examination of similar (control) areas nearby is needed to determine the relative condition of our groves and, if they are in poor condition, whether current and/or past management practices and/or visitor activities may be implicated and what changes would be needed to modify current impacts.

Two areas of concern are the completion of an inventory and assessment of natural riparian resources and an assessment of past, current, and proposed management actions and visitor activities on natural riparian resources.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct riparian ecosystem research and develop monitoring protocols. This would provide management with alternatives, including proposed actions and probable results, based on solid research findings. In addition to vegetation and faunistic implications of proposed management actions, attempts will be made to integrate information on soils, hydrology and flood regimes, and supporting information from current and past research programs in the area. The Principal Investigator will also design long-term monitoring protocols for these components of the ecosystem.

An inventory of the riparian zone adjacent to both Montezuma Castle and Montezuma Well will examine biotic and abiotic ecosystem components with emphasis on vertebrates and flowering plants. An assessment of major components will be conducted for riparian trees, birds, and other groups that are determined to be of particular significance during the study. In addition, close monitoring of other studies is needed to interrelate and synthesize information of value to this project. Emphasis will be placed on ecological components, e.g. indicator species, that are of particular concern to interpreters and resource managers. Major program components, or subprojects, identified at the time of writing this program statement are listed below. However, additional components may be identified from information gathered during the course of the projects.

- Conduct an inventory and assessment of tree and shrub populations, their demographic structure, distribution, and health.
- Examine hydrologic and soil parameters associated with riparian groves.
- Conduct an assessment of riparian plants and their interrelationships with hydrology, soil, and animal species.
- Use information from the avian inventory and assessment to examine avian populations in relation to vegetational parameters and interpretive value.
- Use information from the mammalian inventory and assessment to examine mammalian populations in relation to vegetational parameters with special emphasis on pest species, e.g. rock squirrels and ring-tailed cats.
- Use information from the herpetological inventory and assessment to examine amphibians and reptiles with emphasis on their interrelationships with vegetational communities and interpretive values.
- Use information from the invertebrate inventory and assessment to examine interrelationships with plants and other animals and interpretive value of such information.

- A long-term monitoring program will be designed for these components of the ecosystem.

Year 1: Begin research with riparian vegetation, especially woody plant communities of the Castle and Well sections, and make collections of riparian non-woody species.

Year 2: Begin collection of information documenting interrelationships between plant species and communities, and plants and animals in the riparian ecosystem.

Year 3: Start integration of information from other studies for riparian biota, particularly information on vertebrates, endemic invertebrates, and riparian processes.

Year 4: Complete integration of information from all files, studies, etc. and prepare reports for resources management and interpretive programs. Provide management alternatives and projected results of management actions. Long-term monitoring protocols will be designed.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	10.0	0.2
Year 2:	RES	One-Time	10.0	0.2
Year 3:	RES	One-Time	15.0	0.4
Year 4:	RES	One-Time	15.0	0.4
		Total:	50.0	1.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. The monument would continue to be managed with insufficient knowledge of existing ecosystem components and processes with possible losses to both the natural and cultural landscapes and reduction in visitor satisfaction.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-803.001 Implement Long-Term Monitoring and Management Strategy for Riparian Ecosystem

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-803.001

TITLE: Implement Long-Term Monitoring and Management Strategy for Riparian Ecosystem

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 4.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Montezuma Castle National Monument was set aside because of its ". . . ethnological value and scientific interest. . ." The historic and prehistoric structures around which the major interest for visitors is focused are located on cliffs immediately adjacent to the floodplain and riparian lands along Beaver Creek. The surface and groundwater sources that currently support riparian ecosystems also served as water supplies for domestic and agricultural use for prehistoric humans. Additionally, riparian vegetation produces the cooler, more mesic landscape that is so attractive to visitors in this arid region. Up-to-date information is needed for increasing the interpretive values and general understanding of these riparian lands.

Structures currently located in the riparian zone include surfaced walks, drinking fountains, interpretive displays, a picnic area, and a several-hundred-foot-long gabion structure of rock and reinforcing metal mesh constructed by the CCC in the 1930's to deflect flood waters from areas of high visitor-use.

Visual examination of the riparian zone indicates that reestablishment rates of riparian trees (Arizona sycamore, net-leafed hackberry, chinaberry, velvet ash, etc.) seem low. Recruitment rates of young trees may be insufficient to replace the desirable riparian groves which are an important part of both the natural and cultural landscape. Examination of similar (control) areas nearby is needed to determine the relative condition of our groves and, if they are in poor condition, whether current and/or past management practices and/or visitor activities may be implicated and what changes would be needed to modify current impacts. Two areas of concern are the completion of an inventory and assessment of natural riparian

resources and an assessment of past, current, and proposed management actions and visitor activities on natural riparian resources.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring and management strategy for riparian ecosystem. This would provide management with alternatives, including proposed actions and probable results, based on solid research findings. In addition to vegetation and faunistic implications of proposed management actions, attempts will be made to integrate information on soils, hydrology and flood regimes, and supporting information from current and past research programs in the area. The Principal Investigator for the original research, 803.000, will design long-term monitoring protocols for these components of the ecosystem. Monument staff will be trained in the implementation of these protocols.

Year 1: Monument personnel will be trained to carry out long-term monitoring.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	MON	Recurring	1.0	0.2
Year 2:	MON	Recurring	1.0	0.2
Year 3:	MON	Recurring	1.0	0.2
Year 4:	MON	Recurring	1.0	0.2
		Total:	4.0	0.8

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. The monument would continue to be managed with insufficient knowledge of existing ecosystem components and processes with possible losses to both the natural and cultural landscapes and reduction in visitor satisfaction.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-804.000 Delineate and Evaluate Strategies for Wetlands Protection and Develop Long-Term Monitoring Protocols

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-804.000

TITLE: Delineate and Evaluate Strategies for Wetlands Protection and Develop Long-Term Monitoring Protocols

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Corps of Engineers and EPA regulations (33 CFR Section 238.3 and 40 CFR Section 230.3 respectively) define wetlands as "...areas that are inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." This definition has been in effect since 1977. Both Montezuma Castle management districts have wetlands that have not been evaluated or clearly delineated. External factors are impacting the quality and quantity of these water related resources, which directly affects management's ability to preserve and protect the resources.

National Wetland Inventory (NWI) maps are available for the park (dated 1991). These maps can be used as base maps for wetland delineations in the monument. Further refinement based on ground-truthing efforts can be added, especially if the digitized NWI information is a layer in the monument's GIS. The aerial photography used for the NWI maps in the monument are dated June 1980, so it is possible that change has occurred in the subsequent 14 years and this can be the basis for a trend analysis of wetland fluctuations within the monument.

The best known of these water resources is Montezuma Well, which is an unstratified, thermal limnocrene, with an area of 0.76 ha and a maximum depth of 17 meters with average subterranean flows of 1.5 million gallons a day. It is internationally recognized for its scientific and cultural uniqueness.

Beaver Creek, Wet Beaver Creek, and adjacent wetlands are integrated components of the cultural setting and are the primary resources responsible for maintaining the existing biological diversity. The Final Master Plan (1975) calls for staff to preserve the integrity of the cultural and natural settings. This cannot be accomplished without evaluating the permanence of the existing wetlands using a multidisciplinary approach. A multidisciplinary strategy must be developed to generate management options to reduce the external pressures exerted upon the monument's resources. Furthermore, an examination of regulatory issues is mandatory to provide management with the appropriate context for decision making.

In addition to developing a multidisciplinary approach to collect the necessary field data and information, many technical judgments and inferences will have to be made to delineate and evaluate the wetlands in the appropriate jurisdictional setting. Operational methodologies will have to be developed for monitoring the health and stability of the water resources. Administrative policies, guidelines, and constraints will have to be reviewed extensively in the delineation process to secure and protect these wetlands.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Delineate and evaluate strategies for wetland protection and develop long-term monitoring protocols. A multidisciplinary team would be contracted or assembled to address the concerns outlined in the above problem statement. NPS specialists, along with other experts, would participate actively to develop the necessary management strategies involved in protecting these resources. Some technological analysis may have to be contracted to obtain the necessary field data and hydrological information. Based upon the results of the visitor use survey and the inventory and assessment of vegetation and flora, the research team will quantify the current status of existing and potential threats to Montezuma Castle's wetland resources. Subterranean water flow, stability, and other hydrological factors will be examined along with stream dynamics and erosion potentials. Administrative guidance for these actions may be found in Executive Order 11990, the 1975 Final Master Plan, the current Resource Management Plan, and numerous Department of Interior regulatory requirements and or guidelines. In addition to quantifying water resource threats, the research team will develop strategies to protect these resources. Management alternatives and options will be identified to mitigate each threat. All recommendations would be subsequently prioritized and evaluated on evidence.

Year 1: Assemble multidisciplinary team to design research program. Initiate field work. Write report with long-term monitoring protocols and management strategies to protect wetlands.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	15.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Management will not be able to assess the degree of external threats and pressures exerted upon the monument's cultural, natural, and water resources. Management will have to make decisions in the absence of knowledge and without quantification of hydrological factors that are used in evaluating, delineating, and protecting water resources and wetlands.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-804.001 Implement Long-Term Monitoring and Management Strategies for Wetlands Protection

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-804.001

TITLE: Implement Long-Term Monitoring and Management Strategies for Wetlands Protection

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 15.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Corps of Engineers and EPA regulations (33 CFR Section 238.3 and 40 CFR Section 230.3 respectively) define wetlands as "...areas that are inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." This definition has been in effect since 1977. Both Montezuma Castle management districts have wetlands that have not been evaluated or clearly delineated. External factors are impacting the quality and quantity of these water related resources, which directly affects management's ability to preserve and protect the resources.

National Wetland Inventory (NWI) maps are available for the park (dated 1991). These maps can be used as base maps for wetland delineations in the monument. Further refinement based on ground-truthing efforts can be added, especially if the digitized NWI information is a layer in the monument's GIS. The aerial photography used for the NWI maps in the monument are dated June 1980, so it is possible that change has occurred in the subsequent 14 years and this can be the basis for a trend analysis of wetland fluctuations within the monument.

The best known of these water resources is Montezuma Well, which is an unstratified, thermal limnocrene, with an area of 0.76 ha and a maximum depth of 17 meters with average subterranean flows of 1.5 million gallons a day. It is internationally recognized for its scientific and cultural uniqueness.

Beaver Creek, Wet Beaver Creek, and adjacent wetlands are integrated components of the cultural setting and are the primary resources responsible for maintaining the existing biological diversity. The Final Master Plan (1975) calls for staff to preserve the integrity of the cultural and natural settings. This cannot be accomplished without evaluating the permanence of the existing wetlands using a multidisciplinary approach. A multidisciplinary strategy must be developed to generate management options to reduce the external pressures exerted upon the monument's resources. Furthermore, an examination of regulatory issues is mandatory to provide management with the appropriate context for decision making.

In addition to developing a multidisciplinary approach to collect the necessary field data and information, many technical judgments and inferences will have to be made to delineate and evaluate the wetlands in the appropriate jurisdictional setting. Operational methodologies will have to be developed for monitoring the health and stability of the water resources. Administrative policies, guidelines, and constraints will have to be reviewed extensively in the delineation process to secure and protect these wetlands.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Implement long-term monitoring and management strategies for wetlands protection. The research team assembled to conduct the initial delineation in 804.000 will develop strategies to protect these wetland resources. Management alternatives and options will have been identified to mitigate each threat. These recommendations will be implemented with the long-term monitoring. Monument staff will be trained in monitoring protocols.

Year 1: Monument personnel will be trained to carry out long-term monitoring.

Year 2: Conduct long-term monitoring program.

Year 3: Conduct long-term monitoring program.

Year 4: Conduct long-term monitoring program.

Note: This is an ongoing, long-term project.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . **Unfunded** . . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	15.0	0.0
		Total:	15.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. Management will not be able to assess the degree of external threats and pressures exerted upon the monument's cultural, natural, and water resources. Management will have to make decisions in the absence of knowledge and without quantification of hydrological factors that are used in evaluating, delineating, and protecting water resources and wetlands.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4)

Proposal Date: 1990

MOCA-N-805.000 Evaluate Effects of Hydrologic Characteristics on Morphological Properties of Flowing Streams

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-805.000

TITLE: Evaluate Effects of Hydrologic Characteristics on Morphological Properties of Flowing Streams

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 40.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The channel features found in monument streams (Beaver Creek and Wet Beaver Creek) are associated with water-related resource attributes such as the historic setting and the rationale for early habitation at the site. These measurable features can be dramatically altered through human-induced changes in the hydrologic regime (amount, duration, and timing of discharges). Alterations of this kind may affect existing channel form in such a way as to severely compromise site integrity and thereby diminish scientific values for scholars and the recreational and interpretive values for visitors.

The potential for changes in sediment and hydrologic regimes arises from mining, upstream diversions, and/or storage. Changes in existing diversion and storage arrangements are likely to occur as population pressure increases in this geographic area. Therefore, the alterations in channel form could arise in the near future if they have not already. In either case, the NPS presently lacks the data describing existing or potential impacts which could be used in litigation aimed at preventing or providing remedy for adverse effects of this kind.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Study effects of hydrologic characteristics. Thoroughly evaluate hydrologic effects on morphological characteristics of flowing streams in Montezuma Castle National Monument. Develop a mathematical model for such characteristics to assist the superintendent in protecting water rights, evaluating the potential effects of proposed upstream land developments, etc.

An evaluation of hydrologic effects upon morphological characteristics of flowing streams from changes in hydrologic regimes will require the characterization of existing hydrology, channel features, sediment transport, as well as the modelling of existing and potential flow regimes. The collection of discharge and sediment data will be accompanied by the characterization of channel geometry, bed material, and depositional forms. Standard approaches for modelling sediment transport will be applied to existing and collected data to describe the likely future form of the channel under a set of hypothetical hydrologic regimes. Evaluation of the effects upon the historic scene, and other water-related resource attributes will be made using analytical methods as well as expert opinion.

Year 1: Conduct the field study.

Year 2: Complete data analysis and prepare report.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	30.0	0.0
Year 2:	RES	One-Time	10.0	0.0
		Total:	40.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue to operate the monument without any type of hydrologic evaluation. This deprives the interpretive program of information relative to the relationship between the presence of the flowing streams and implications for life during the prehistoric occupation period. The effects of external activities on water quantity, quality, sediment load, and flood hazard will remain unknown.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-806.000 Evaluate Effects of Hydrologic Characteristics on Regeneration of Vegetation in Riparian Areas

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-806.000

TITLE: Evaluate Effects of Hydrologic Characteristics on Regeneration of Vegetation in Riparian Areas

FUNDING STATUS: **FUNDED:** 0.0 **UNFUNDED:** 75.0

SERVICEWIDE ISSUES:

N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Riparian vegetation at Montezuma Castle is a water-related resource attribute of specific concern to management. Many riparian plants have regeneration requirements which are related to the normal periodicity of over-bank discharges. Elimination of these discharges or a change in their periodicity may adversely affect vegetation replacement and the organisms dependent upon riparian vegetation. The potential for a change in over-bank flows can arise from upstream water development such as diversion and storage, or from on-site channel modifications. These effects may already exist or could arise in the future due to off-site water development or on-site human impacts.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Evaluate the effects of current hydrologic characteristics on vegetation in the riparian zone. This information will be valuable to the superintendent when responding to proposed developments upstream of the monument. It will also be very helpful in evaluating the long-term prospects for riparian ecosystems in the monument.

An evaluation of hydrologic effects on regeneration of vegetation in riparian areas will require the characterization of existing hydrology, channel features, sediment transport, and riparian vegetation, as well as mathematical modelling of existing and potential flow regimes. The collection of discharge and sediment data will be accompanied by the mapping of floodplain areas and their associated vegetation. Standard approaches for frequency analysis will be applied to existing and collected discharge data in a modelling effort which will describe areas and frequency of inundation under existing and possible conditions of off-site

water development and on-site channel modification. Evaluation of the effects on riparian vegetation and organisms dependent thereon will be made by experts using results of the above described assessment.

Year 1: Conduct field work.

Year 2: Complete data analysis and write report.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	35.0	0.0
Year 2:	RES	One-Time	20.0	0.0
Year 3:	RES	One-Time	20.0	0.0
		Total:	75.0	0.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. The monument will be operated without any empirical data regarding the current status of vegetative reproduction in the riparian zone, or the hydrologic factors influencing the health of this ecosystem.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

MOCA-N-807.000 Determine Vulnerability of Unique Biota to Changes in Hydrologic Regimes

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-807.000

TITLE: Determine Vulnerability of Unique Biota to Changes in Hydrologic Regimes

FUNDING STATUS: **FUNDED:** 79.0 **UNFUNDED:** 163.0

SERVICEWIDE ISSUES:

N02 Impacts on Threatened, Endangered, and Other Sensitive Animals
N12 Alteration of Natural Flow Regimes

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The Verde Valley is one of the fastest growing areas in the Southwest. Its running streams, and associated riparian and aquatic resources, make this valley one of the choice natural and cultural landmarks of the Sonoran Desert. Montezuma Castle National Monument possesses unique aquatic resources that are severely threatened by the valley's exploding growth.

Montezuma Well, a unit of the monument, is a unique, spring-fed lake, nearly circular in shape, with a diameter of about 360 ft. (112 meters). It is a collapsed travertine mound, formed approximately 10,000 years ago. No other ecological equivalent has yet been found worldwide. Seven taxa have been identified, to date, in the Well which are found nowhere else on earth. This includes a crustacean (Hyalella montezuma), a water scorpion (Rantatra montezuma), a leach (Erpobdella montezuma), three diatoms (Caloneis latiuscula var. reimeri), (Cyclotella pseudostelligera form parva), (Gomphonema montezumense), and another endemic diatom currently being named. Two additional taxa, a mud turtle (Kinosternon) and a pondweed (Potamogeton), have been tentatively identified and are also as yet unnamed. The breadth of species diversity and the complexity of interactions among organisms in this one-of-a-kind ecosystem are only now beginning to be recognized. Ecological knowledge of the Well is very limited. It is anticipated that this proposed research may well disclose additional taxa that are new to science.

The growing population nearby necessarily increases demand for and consumption of groundwater. This will alter the hydrologic regimes in the region and may have significant impacts on the Well and the organisms that live in it. A survey of all biotic resources

associated with the Well and an assessment of their habitat requirements are essential to the proper management of the monument and the protection of these sensitive resources.

The riparian zone along Beaver Creek is also threatened by the growth in the surrounding areas and associated water withdrawals. This riparian zone is immediately adjacent to the historic and prehistoric structures of the monument and is integral to the historic scene. Yet, little is known of the biological resources in this zone, their water requirements, and possible impacts of additional water withdrawal. Endangered species in the monument region include nesting Bald Eagles (Haliaeetus leucocephalus), the spikedace (Meda fulgida) and two other reintroduced fishes, the razorback sucker (Xyrauchen texanus) and Colorado River squawfish (Ptychocheilus lucius). In addition, there are several state-listed species of fish found in the region. The importance of retaining historic flows in Beaver Creek on these sensitive species is currently unknown.

Alteration of natural flow regimes through activities such as water diversion, gravel mining, and other human perturbations in Beaver Creek could cause down-cutting or deposition in the channel, flooding, or change of flow levels. Most or all of perennial Beaver Creek is diverted for irrigation during the summer months. Such activities pose a serious threat to the integrity of native ecosystems. Human activities have already drastically reduced populations of beavers (Castor canadensis), and have extirpated river otters (Lutra canadensis) locally.

To work effectively with other agencies, groups, and individuals to protect the park's important biotic resources and its water rights, the park needs to (1) systematically track proposed nearby development; (2) determine the hydrologic consequences of additional groundwater withdrawal in the area on Montezuma Well, Beaver Creek, and the aquifers of the region; and (3) better understand and document the water-related biotic resources in the park and their habitat requirements.

The first two objectives are currently being met. First, the Western Region has funded a $60,000 University of Arizona study now underway to assess the risks associated with proposed land use changes and to develop a system for tracking land use proposals of concern. Secondly, the NPS Water Resources Division has funded a three year $150,000 USGS study also underway to determine the physical hydrology of the monument region, to measure the outflow from Montezuma Well and evaluate the current water delivery monitoring system below the Well, and to conduct a broad survey of water-related resources in the monument.

This project will provide the final critical piece. It will include an intensive inventory of the park's water-related biota, an assessment of the habitat requirements of these organisms, and the development of strategies for effectively protecting them. This project, combined with the hydrologic data now being compiled, will provide a database that will enable the park to make informed management decisions and to successfully protect its water rights. Without solid, scientifically-based information derived from the proposed studies, management has only weak, subjective means of attempting to protect these unique values.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Determine vulnerability of unique biota to changes in hydrologic regimes. In the first phase, a bibliographic search and intensive resource inventories and assessments of Montezuma Well and the Beaver Creek riparian zone will be conducted. In the second phase, a complete taxonomic listing of aquatic and riparian plants and animals will be developed and their habitat requirements will be identified. And in the final phase, a multidisciplinary group will be convened to develop management options, and the results of this research will be prepared for use in park interpretive programs.

Information from the study and training staff in the use of monitoring protocols will provide the park with an early warning system for detecting changes and will increase management's ability to respond effectively to these changes in a timely manner.

Four major components (birds, flora and vegetation, mammals, and synthesis) of this multidisciplinary study will be accomplished under the direction of NPS scientists, thereby requiring a total of 1.5 FTE's each year for half-time biological technicians. Three other major components (herpetology, invertebrates, and aquatics) will be accomplished under contracts or cooperative agreements, thereby requiring no additional FTE's.

Year 1: Conduct a thorough bibliographic search, review, and summary of information from literature. Over 50 scientific reports and papers have been published on a variety of scientific subjects regarding water resources of the monument, mostly related to the Well. This search will include historic photos and aerial photographs of the aquatic and riparian portions of the monument.

Conduct inventories and assessments of the monument's biota in and adjacent to Montezuma Well and within the Beaver Creek riparian zone, including invertebrates, amphibians and reptiles, birds, mammals, flora and vegetation. The species inventory within the Well and its associated outflow ditch will include phytoplankton and zooplankton.

Develop monitoring protocols and train park staff in their use.

Year 2: Continue conducting inventories and assessments of the monument's biota, developing monitoring protocols, and training park staff in their use.

Produce a complete taxonomic listing of aquatic and riparian plants and animals that occur in the monument, including annotations on relative abundance, distribution, life history, phenology, etc., based on observations during this study as well as information from the literature.

Determine habitat requirements of aquatic and riparian organisms and other ecological relationships within the aquatic and riparian zones. The unique environment and the evolution of these organisms in isolation suggest that these organisms may well have very narrow habitat requirements. Each identified organism will be studied to determine what those requirements might be. Some of the Well's unique

characteristics include its constant temperature and its high calcium carbonate content, which precludes many species, including all fish.

Year 3: Continue work on taxonomic listing of aquatic and riparian plants and animals and the species inventory within the Well and its associated outflow ditch.

Continue study to determine habitat requirements.

A multidisciplinary group will be convened to develop management options for reducing the external pressures exerted upon the monument's resources.

Provide information from the scientific studies for interpretive programs. This will provide valuable information to the visiting public about the importance of wetland ecosystems at the same time that it upgrades park interpretive programs.

BUDGET AND FTEs:

. . . . . Funded . . . . .

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
1		RES	One-Time	79.0	1.5
			Total:	79.0	1.5

. . . . . Unfunded . . . . .

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	79.0	1.5
Year 2:	RES	One-Time	84.0	1.5
		Total:	163.0	3.0

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present knowledge. The park does not have an early warning system for detecting changes. Therefore, management does not have the ability to respond effectively to these changes in a timely manner. Necessary information for resources management and working effectively with other agencies, groups, and individuals to protect the park's important biotic resources and water rights will not be forthcoming.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1991

MOCA-N-900.000 Conduct Survey and Assessment: Soils

PROGRAM STATEMENT

PARK & FIELD AREA: Montezuma Castle National Monument, Intermountain Field Area

PROJECT NUMBER: MOCA-N-900.000

TITLE: Conduct Survey and Assessment: Soils

FUNDING STATUS: FUNDED: 0.0 **UNFUNDED:** 13.9

SERVICEWIDE ISSUES:

N20 Lack of Basic Data: Insufficient Understanding of Park Ecosystems and Threats to Them

CULTURAL RESOURCE TYPE CODE:

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The soils of Montezuma Castle National Monument have never been surveyed or mapped. No site specific information exists that can be used by the superintendent to make informed decisions regarding management of pastures and open fields on prehistoric agricultural lands within the monument, siting of visitor use facilities, protection of cultural sites and critical habitats, and prevention of soil erosion. This project will also develop data for the monument's geographic information system, and provide baseline information useful in integrating other ecological studies performed at the Montezuma Castle. The study is also designed to provide a long-term monitoring program for this component of the ecosystem.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

Conduct a soil survey. The information resulting from this survey will contribute significantly to allowing the superintendent to manage the monument resources, both cultural and natural, from a solid basis. Visitor services facilities can be located in areas of stable soils, areas of high erosive potential can be delineated and protected from humans impacts, management requirements for the prehistoric agricultural fields can be scientifically developed, and information on soils, which often are a major ecological controlling factor, can be made available to researchers working on other park problems, thus enhancing their ability to draw solid conclusions from their data bases. The Principal Investigator will also design a long-term monitoring protocols for the soils of the monument.

The Soil Conservation Service, the U.S. Forest Service, a university researcher, or a private consultant should be funded to conduct a level III soil survey. This project can be conducted independent of any other project underway or planned for the monument. Products of this

survey should include a detailed soils map, soil series descriptions, and an assessment of the significant properties of these soils as related to cultural site preservation, prehistoric landscape scene preservation, ecological protection, and visitor services development.

This project will first require that low level black and white aerial photography be taken of the monument. Once the photography has been acquired, approximately two person-weeks of office work with the aerial photographs will be needed to delineate soil associations on a preliminary working map. Following this work, approximately two person-weeks on-site will be required to ground truth and refine the preliminary map. Following the field work, approximately two person-months will be needed in the office to finalize the maps, prepare the soil series descriptions, prepare an assessment of soil properties relative to managing Montezuma Castle National Monument, and write the final report. A draft final report should be ready for NPS review within three person-months of project initiation. A long-term monitoring program will be designed for the soils of the monument. The monument staff will be trained in the implementation of these protocols.

Year 1: Conduct a soils survey.

Note: Additional site specific soils data may be needed in the future.

BUDGET AND FTEs:

Funded

Year	Source	Activity	Fund Type	Budget($1000s)	FTEs
				0.0	0.0
			Total:	0.0	0.0

Unfunded

	Activity	Fund Type	Budget($1000s)	FTEs
Year 1:	RES	One-Time	13.9	0.2
		Total:	13.9	0.2

ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Continue with present management. This alternative will force the superintendent to continue to manage the monument without a general soils map and the attendant information a soil survey provides. Better information makes for better management. This alternative may well leave the superintendent out of compliance with laws and regulations governing protection of antiquities, water quality, historic landscapes, and visitor safety.

COMPLIANCE CODE (s): EXCL

EXPLANATION: 516 DM6 App. 7.4 B(4), E(2)

Proposal Date: 1990

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APPENDICES

Appendix 1. List of Preparers for Montezuma Castle National Monument Natural and Cultural Resources Management Plan.

1996 Revision

Amy Moore, Resources Manager, Southern Arizona Group
Kathy Davis, Chief, Resources Management, Southern Arizona Group
Glen Henderson, Superintendent, Montezuma Castle NM and Tuzigoot NM

1994 Revision

Amy Moore, Park Ranger, Southern Arizona Group
Mary Glen, Secretary to the General Superintendent, Southern Arizona Group
Steve Sandell, Chief Ranger, Montezuma Castle NM and Tuzigoot NM
Glen Henderson, Superintendent, Montezuma Castle NM and Tuzigoot NM
Kathy Davis, Resources Manager, Southern Arizona Group
Ron Sutton, Volunteer, Southern Arizona Group

1987 Scoping Session

Cultural Resources Section
Thomas D. Mulhern, Jr., Chief, Park Historic Preservation, Western Region
Richard A. Borjes, Reg. Historic Architect, Western Region
Dr. Gordon S. Chappell, Regional Historian, Western Region
Diane L. Nicholson, Regional Curator, Western Region
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Glen Henderson, Montezuma Castle/Tuzigoot
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Dr. Dennis B. Fenn, Cooperative Parks Studies Unit/University of Arizona
Michael Kunzmann, Cooperative Parks Studies Unit/University of Arizona
Kathy Davis, Resources Management Specialist, Southern Arizona Group Office
Michael Hoffman, Biological Science Technician, Cooperative Parks Studies Unit/University of Arizona
Dr. Mietek Kolipinski, National Park Service, Washington Office
Dr. George Ruffner, Ruffner Associates
Dr. R. Roy Johnson, Cooperative Parks Studies Unit/University of Arizona
William Werrell, Water Resources Division, Washington Office
Dr. Stan Ponce, Water Resources Division, Washington Office

Appendix 2. Cultural Resources Status Summary Charts for Archeological Sites, Structures, Objects, and Cultural Landscapes.

MONTEZUMA CASTLE NATIONAL MONUMENT

SUMMARY CHART FOR ARCHEOLOGICAL SITES

SIGNIFICANCE		CONDITION				IMPACTS				DOCUMENTATION		
	Total	Good	Fair	Poor	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National	64	59	4	1		4	20	39	1	63		1
State and Regional												
Local												
Not Evaluated	2	2						1	1	2		
TOTALS	66	61	4	1		4	20	40	2	65		1

MONTEZUMA CASTLE NATIONAL MONUMENT

SUMMARY CHART FOR STRUCTURES

SIGNIFICANCE		CONDITION				IMPACTS				DOCUMENTATION		
	Total	Good	Fair	Poor	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National	8	7	1				1	7		1		7
State and Regional												
Local												
Not Evaluated	3	2		1		1		2				3
TOTALS	11	9	1	1		1	1	9		1		10

MONTEZUMA CASTLE NATIONAL MONUMENT

SUMMARY CHART FOR OBJECTS

DOCUMENTATION*	ARCH	ETHNO	HIST	ARCHV	BIOL	PALEO	GEOL	TOTAL
Registration Data Only								
Registration and Catalog Data	450	24	22		555			1151
Total Items Cataloged	450	24	22		555			1151
Backlog to be Cataloged	3							3
TOTAL COLLECTION SUMMARY	453	24	22		555			1154

*Form 10-254 Submitted to National Catalog at Harpers' Ferry

CONDITION**	ARCH	ETHNO	HIST	ARCHV	BIOL	PALEO	GEOL
Excellent	8	10			74		
Good	540	14	10		369		
Fair	5		12		112		
Poor							
Unknown							

**The Percentage of Collection in the Following Categories

MONTEZUMA CASTLE NATIONAL MONUMENT

SUMMARY CHART FOR CULTURAL LANDSCAPES

SIGNIFICANCE		CONDITION				IMPACTS				DOCUMENTATION		
	Total	Good	Fair	Poor	Unknown	Severe	Moderate	Low	Unknown	Good	Fair	Poor
National												
State and Regional												
Local												
Not Evaluated	1							1			1	
TOTALS	1							1			1	

Appendix 3. Cultural Resources Documentation Checklist.

CULTURAL RESOURCES DOCUMENTATION CHECKLIST

TITLE	CURRENT; APPROVED	NEEDS REVISION	NEEDED
PLANNING DOCUMENTS			
Preauthorization and Authorization	NA		
Statement for Management (SFM)	X		
Outline for Planning Requirements (OPR)	X		
General Management Plan (GMP)		X	
Development Concept Plan (DCP)			X
Resources Management Plan (RMP)	X		
Interpretive Prospectus (IP)			X
SERVICEWIDE INVENTORIES, LISTS, CATALOGS, AND REGISTERS			
Cultural Resources Bibliography (CRBIB)		X	
Archeological Site Management Information System (ASMIS)		X	
List of Classified Structures (LCS)		X	
National Catalog of Museum Objects		X	
National Register of Historic Places			X
BASIC CULTURAL RESOURCE DOCUMENTS			
Archeological Overview and Assessment		X	
Archeological Identification Studies	X		
Archeological Evaluation Studies	X		
Ethnographic Overview and Assessment			X
Ethnographic Oral History and Life History			X
Ethnographic Program	NA		
Historical Base Map		X	
Historic Resource Study Map (HRS)		X	
Park Administrative History		X	
Scope of Collection Statement	X		

TITLE	CURRENT; APPROVED	NEEDS REVISION	NEEDED
SPECIAL RESOURCE STUDIES AND PLANS			
Archeological and Ethnographic Collections Studies			X
Archeological Data Recovery Studies			X
Collection Management Plan			X
Collection Storage Plan	NA		
Collection Condition Survey			X
Cultural Landscape Report (CLR)	NA		
Ethnohistory	NA		
Exhibit Plan	NA		
Historic Furnishings Report	NA		
Historic Structures Preservation Guide (HSPG)			X
Historic Structures Report	NA		
Social Impact Study	NA		
Special History Study	NA		
Traditional Use Study	NA		