

**NATURAL and CULTURAL
RESOURCES MANAGEMENT PLAN
and Environmental Assessment**

REVISION OF DECEMBER 1982

SAGUARO

NATIONAL MONUMENT

ARIZONA



NATIONAL PARK SERVICE / WESTERN REGION

NATURAL AND CULTURAL
RESOURCES
MANAGEMENT PLAN
AND
ENVIRONMENTAL ASSESSMENT

Saguaro National Monument
Tucson, Arizona

Prepared by
Saguaro National Monument
National Park Service
Department of Interior

Revision of December 1982



Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

<http://archive.org/details/naturalculturalr82nati>

Abstract

This revised Natural and Cultural Resources Management Plan reflects major revisions of all formerly submitted Project Statements in the Management Program Addendum. The revisions of both the plan and the management program reflect partially completed studies, cancelled studies, experience gained in assessing resources problems, inflationary cost increases, and mandatory compliance with laws.

Horse Trail Rehabilitation and Resource Protection, SAGU-RM-1, is the most important natural resources project. Severe gulley erosion must be stopped in the lower cactus forest. Trail rehabilitation work and ranger patrols will demonstrate good faith in efforts to protect the resource.

Projects are indicated in priority order on the natural and the cultural resources projects programming sheets. A five year planning strategy for resources management is presented in the overview and needs section of both natural and cultural management programs.

It was determined through public and National Park Service review of the 1979 Resources Management Plan, Environmental Assessment and Management Program that proposed actions lacked potential to cause significant impacts on the environment. Review copies of the plan and management program were sent to 18 organizations and numerous individuals. Review comments were incorporated into the plan and management program revision. Because newly proposed projects in this document fall within the "umbrella" of the 1979

Environmental Assessment, no further consultation and/or documentation of environmental impacts is necessary prior to project implementation.

An Environmental Assessment has been provided with this revised plan for background information. Some minor modifications and additions have been made to the original Environmental Assessment from 1979.

5/3/82
Date

Ross R. Popbine
Superintendent, Saguaro National Monument

5/5/82
Date

John H. Clay ^{W/B}
General Superintendent,
Southern Arizona Group

1/21/83
Date

Howard H. Chapman
Regional Director, Western Region

TABLE OF CONTENTS

	<u>Page Number</u>
SUMMARY	1
NATURAL AND CULTURAL RESOURCES MANAGEMENT PLAN	4
MANAGEMENT OBJECTIVES	5
NATURAL AND CULTURAL MANAGEMENT AND RESEARCH ACTIONS	8
I. NATURAL RESOURCES INVENTORY	9
Biological Resources	9
Water Resources	10
Edaphic Resources	10
II. NATURAL RESOURCES RESTORATION	10
Livestock Damage	10
Horse Damage.....	10
Mine Shaft Fencing.....	11
Mining Damage.....	11
Exotic Flora	11
Exotic Fauna	12
III. HUMAN IMPACT ASSESSMENT.....	12
IV. FIRE MANAGEMENT.....	12
V. ARCHEOLOGICAL SITE SURVEYS	14
VI. HISTORIC RESOURCES STUDY	14
INTERRELATIONSHIPS WITH OTHER PROJECTS	15
DESCRIPTION OF THE ENVIRONMENT	18
I. NATURAL ENVIRONMENT	18
Location	18
Climate	18
Geology	19
Soils	20
Water Resources	21
Air Quality	23
Vegetation	24
Wildlife	32

	<u>Page Number</u>
II. CULTURAL ENVIRONMENT	35
Archeological	35
Historical	36
III. REGIONAL ENVIRONMENT	37
Access	37
Population	38
Visitor Use and Facilities	38
Land Classification	39
Air Quality	43
PROBABLE FUTURE ENVIRONMENT WITHOUT THE PLAN	44
ENVIRONMENTAL IMPACTS OF THE PROPOSED PLAN	45
Research	45
Vegetation	46
Fire Management.....	47
Grazing	48
MITIGATING MEASURES INCLUDED IN THE PROPOSED ACTIONS	48
ADVERSE EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED	49
THE RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY	51
ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED	52
ALTERNATIVES TO THE PROPOSED ACTION	52
CONSULTATION AND COORDINATION	54
NATURAL AND CULTURAL RESOURCES MANAGEMENT PROGRAM (ADDENDUM)	
TABLE OF CONTENTS	A 1

SUMMARY

The Saguaro National Monument Natural and Cultural Resources Management Plan outlines broad, long-range action oriented programs for meeting management and research needs required to preserve unique natural and cultural resources. The plan addresses broad resource topics such as human, horse and cattle impacts; flora and fauna inventories and analysis; archeological and historical resources; fire ecology research and fire management; water resources management and air quality monitoring.

Proposed actions. Proposed management actions are designed to perpetuate endemic biota, and restore natural landscapes. Historic mining activities in the Tucson Mountain Unit and cattle grazing in the Rincon Mountain Unit have had deleterious effects on park environments. Vascular plant and vertebrate fauna surveys will identify exotic species as well as threatened and locally rare species. Environmental monitoring proposals include studies of vegetation recovery on grazed areas, saguaro cactus population trends, backcountry use impacts, hiker/horse use impacts, and water and air quality determinations. Cultural resource related proposals recognize the necessity of preserving non-renewable archeological and historical resources. Systematic archeological investigations in both units will complement past surveys which were done at levels of intensity ranging from reconnaissance to intensive.

The historic resource study is needed for management, interpretation and compliance with Executive Order 11593 since National Register criteria must be met before any environmental rehabilitation projects can be undertaken on mines, dams, roads, buildings, and other cultural features.

Impacts. Overall impacts of the plan are in consonance with the Establishment Act of August 25, 1916, since restoration of natural landscapes, environmental conditions and ecological relationships will be greatly enhanced. Environmental deterioration will be minimized or eliminated. Impacts will occur as a result of the fire management program with generation of wood smoke and removal of ground fuels. Alternatives selected for the management proposals will have negligible impact upon the human environment but will promote a quality experience for the visitor. Major thrusts in the plan concern the quantification and qualification of impacts on natural and cultural resources from rapidly increasing human pressures.

Alternatives. Alternatives to the actions proposed in resource projects are no-action, and continuing use of existing inadequate information. For decision making, no-action may result in such problems as: increasing deterioration of physical, biotic and cultural resources due to direct human impact, deleterious impact on vegetation, soils and archeological sites from increasing random horse use; increasing impacts on vegetation, soil and water resources by feral livestock; and continuation of safety

hazards associated with mine sites. No-action on archeological resources inventory and monitoring could result in management decisions which are in violation of Executive Order 11593. No-action on the historic resources study could result in loss or neglect of cultural resources due to inadequate data. Studies proposed will provide information that is now lacking yet necessary for proper decisions to achieve the park management objectives. Other alternatives are closure of areas to horse/hiker use, removal of feral cattle by roundup or use of firearms, and initiate a prescribed fire program. Management policies, public use and inherent natural values were used in arriving at suggested action programs.

NATURAL AND CULTURAL RESOURCES MANAGEMENT PLAN

Introduction

Saguaro National Monument contains 33,836 hectares (83,576 acres) in two units on the east and west sides of Tucson, Arizona in eastern Pima County. The 25,303 hectares (62,499 acres) Rincon Mountain Unit (east) was established on March 1, 1933, and contains plants and animals ranging from the desertscrub community at 823 meters (2700 feet) altitude to the montane pine and fir forests on Mica Mountain at 2,641 meters (8666 feet). The Rincon Mountain Complex is one of the last remaining examples of a relatively undisturbed continuum of natural warm-desert to mountain-forest biotic associations in the southwestern United States. Roads and accompanying man-made intrusions do not exist in the Rincon Mountain Wilderness. The 8,533 hectares (21,078 acres) Tucson Mountain Unit (west) was established on November 15, 1961, and contains spectacular stands of saguaro cactus in a wholly desert setting from 616 to 1,429 meters (2020 to 4687 feet).

Both units of the monument contain significant historic and prehistoric cultural resources; the preservation of which is essential to further interpretation of Tucson Basin history, prehistory and ethnohistory.

The monument is experiencing increasing visitation which is due primarily to the rapidly growing metropolitan Tucson area with a current population

of over one-half million people. There is a growing demand for recreational use of the area with major visitor impacts in the developed and accessible portions of the fragile desert scrub ecosystem of both units of the monument.

Management and research proposals in The Plan are consistent with the enabling legislation for the monument, the Wilderness Designation of Public Law 94-567 and Title 36, Code of Federal Regulations. The Plan is designed to provide a systematic method of documenting environmental impacts, and developing action plans so management can mitigate or eliminate adverse impacts on natural and cultural resources. The primary goal of the natural resources management program at Saguaro National Monument is to maintain naturally evolved biotic communities and landscapes. Management programs will minimize and/or eliminate changes in the natural environment and landscapes resulting from human influences on natural processes of ecological evolution. Cultural resource inventories and studies are essential to preserve the historic and prehistoric features of the park.

MANAGEMENT OBJECTIVES

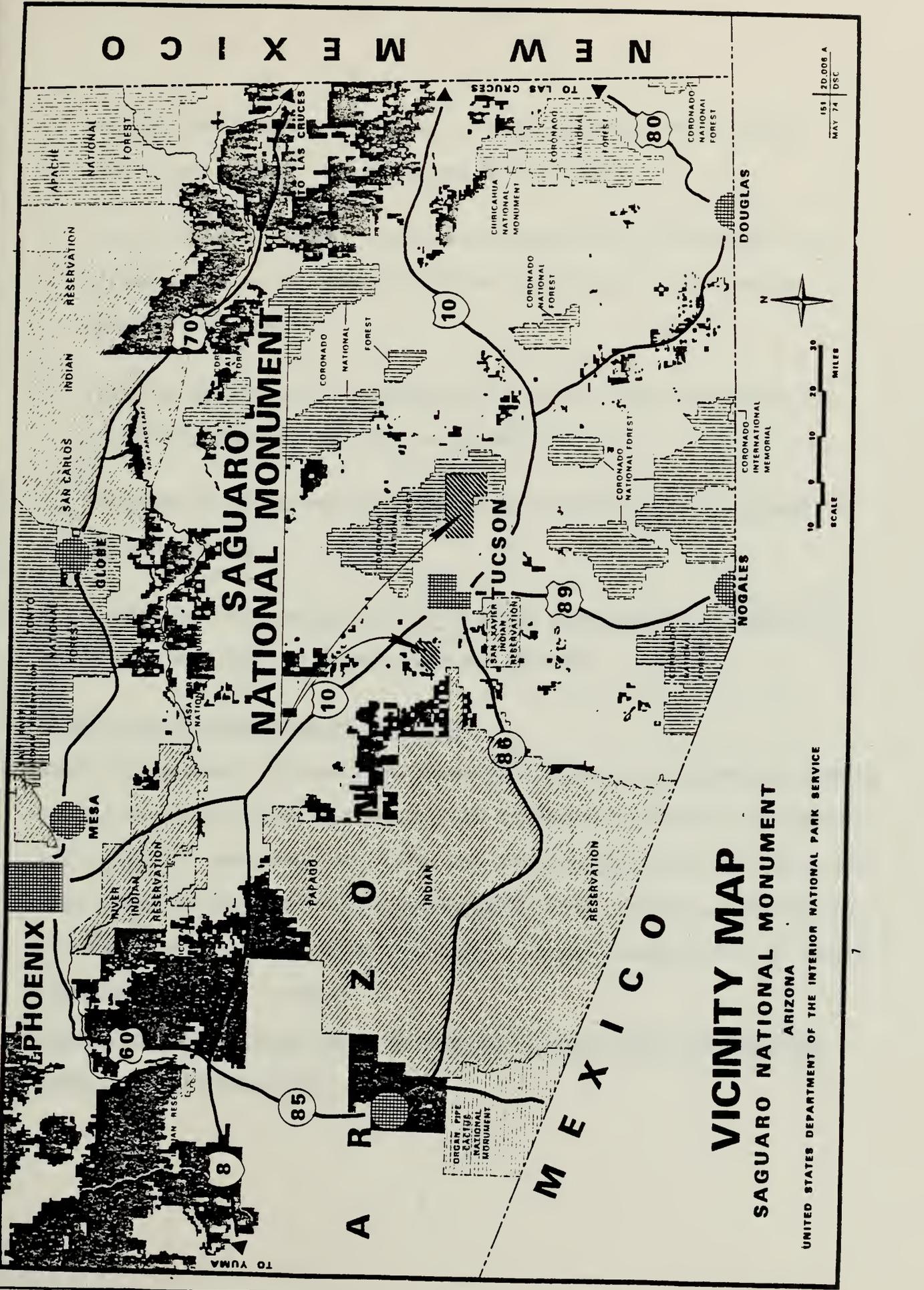
The following natural resource management objectives will lead to environmental conditions that: (1) perpetuate natural functions and energy flow in the biotic communities, (2) begin a trend toward naturally evolved conditions in both desert and montane ecosystems. In addition to providing

direction and thrust for the projects in The Plan, these objectives are flexible enough to meet continuously changing conditions of the natural resources. Relatively rapid changes due to precipitation, freezing temperatures and dynamic natural forces such as wildfire, are a normal and significantly important characteristic of the communities of this region.

The resource management objectives are:

1. Restore and/or maintain natural ecosystems so monument landscapes may resemble environments as they would have been without the influence of European Technology.
 - a. Maintain natural environmental conditions in the saguaro forests to preserve and perpetuate the prime scenic resource of the monument.
 - b. Allow lightning-caused wildfire to assume its natural historic role in the montane ecosystem of the Rincon Mountain Unit.
 - c. Establish carrying capacity limits for all allowable visitor use to prevent detrimental effects on long-term perpetuation of monument resources.
 - d. Restore areas which have been subjected to adverse use.
 - e. Control and/or eliminate all nonconforming uses within the monument.
 - f. Perpetuate wildlife populations in their natural habitats.
2. Cooperate with Government agencies and public and private interests in

N E W M E X I C O



SAGUARO NATIONAL MONUMENT

VICINITY MAP SAGUARO NATIONAL MONUMENT ARIZONA

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE



151 2D.006 A
MAY 74 DSC

planning for management and use of resources which affect scenic, natural and cultural values in and near the park.

3. Assure that all monument facilities harmonize with the natural environment and do not adversely affect significant natural and/or cultural resources.
4. Preserve the historic and prehistoric features that trace human use of both the monument and the Tucson Basin.
5. Encourage an active research program which will assist management in decision making.
6. Provide quality opportunities for visitor understanding, compatible use and enjoyment of Saguaro National Monument.

NATURAL AND CULTURAL MANAGEMENT ACTIONS

Resource management proposals and research actions are designed to minimize impacts of current human activities, and to normalize altered environments and ecological imbalances resulting from previous activities of modern man. Highly deteriorated sites may require manipulation; however, most park environments will only be subject to natural changes brought about by normal climatic and biotic factors.

The natural and cultural resource proposals in this plan are discussed under the following general headings:

I. NATURAL RESOURCES INVENTORY

A. Biological Resources. Generate and compile data concerning the abundance and distribution of park flora and fauna. This information is essential to guide future studies and to direct management actions.

1. Flora. A vegetation type map of the Rincon Mountain Unit will delineate biotic communities by composition, abundance and distribution of vascular flora. Mapping will permit environmental changes, especially those related to fire, to be identified with follow-up monitoring. Vascular plant surveys in both units of the Monument will identify exotics, and endangered plants for compliance with the Endangered Species Act.

The vegetation type mapping will be coordinated with the archeological survey since identical techniques may be applicable, and knowledge of vegetation patterns are important in predicting archeological site locations.

2. Fauna. Vertebrate fauna monitoring will identify and map the distribution and abundance of park vertebrate populations. Studies will include recommendations for the management of endangered, threatened and locally rare species, and will identify areas in which more detailed research is needed. Montane vertebrates

which may need further study include black bear, Arizona gray squirrel, white-tail deer and turkey.

- B. Water Resources. The park will prepare a water resources management plan with the assistance of the Division of Water Resources, Western Regional Office.
- C. Edaphic Resources. Soil maps currently being compiled by the Soil Conservation Service will be coordinated with the vegetation type survey and archeological surveys.

II. NATURAL RESOURCES RESTORATION

- A. Livestock Damage. The feral cattle herd on Rincon Creek is reducing plant cover, altering species composition, causing soil erosion and fouling water holes. The removal of these cattle is of primary management concern. An environmental assessment is being written to allow removal of about twenty cattle which remain from past round-ups.
- B. Horse Damage. Investigations of increasing equestrian use of the

Rincon Mountain Unit, lower cactus forest, indicates that damage is occurring to the soils, vegetation and cultural resources. Designation of primary horse trails, rehabilitation of eroded trails, and rerouting trails around archeological sites is essential to prevent continuing natural and cultural resource damage. Some vegetation damage occurs with random off-trail use.

- C. Mine Shaft Fencing. In the Tucson Mountain Unit, over 100 open mine shafts and prospect holes pose significant safety hazards, primarily on lands acquired in the 1976 boundary expansion. After evaluating the danger of each mine shaft, they will be fenced on a priority basis, beginning with the most dangerous ones.

- D. Mining Damage. Before environmental rehabilitation of old mine roads and scores of mine sites and prospect holes, a historic resources study will be conducted to ascertain the significance of the sites within the context of National Register criteria, as required by Executive Order 11593.

- E. Exotic Flora. Exotics will be identified during the vascular plant surveys. They will be evaluated as to importance in plant composition and degree of naturalization in park habitats. Exotic plants are widespread in the park, and in most cases have become naturalized. Recommendations will be made regarding control of exotics, if feasible.

F. Exotic Fauna. Known exotic fauna inhabiting the park include dogs, cats, and cattle. Recommendations are being made for management or elimination of these species. Two exotic species of lizards may be breeding successfully in the Tucson Mountain Unit.

III. HUMAN IMPACT ASSESSMENT

Visitor use of the cactus forest scenic drive at the Rincon Mountain Unit, and Bajada Loop Drive at the Tucson Mountain Unit, is especially heavy during the winter and spring seasons. Total park visitation in 1981 was 470,598. Human impacts will be assessed in both units and the Rincon Mountain Unit backcountry and carrying capacities will be established.

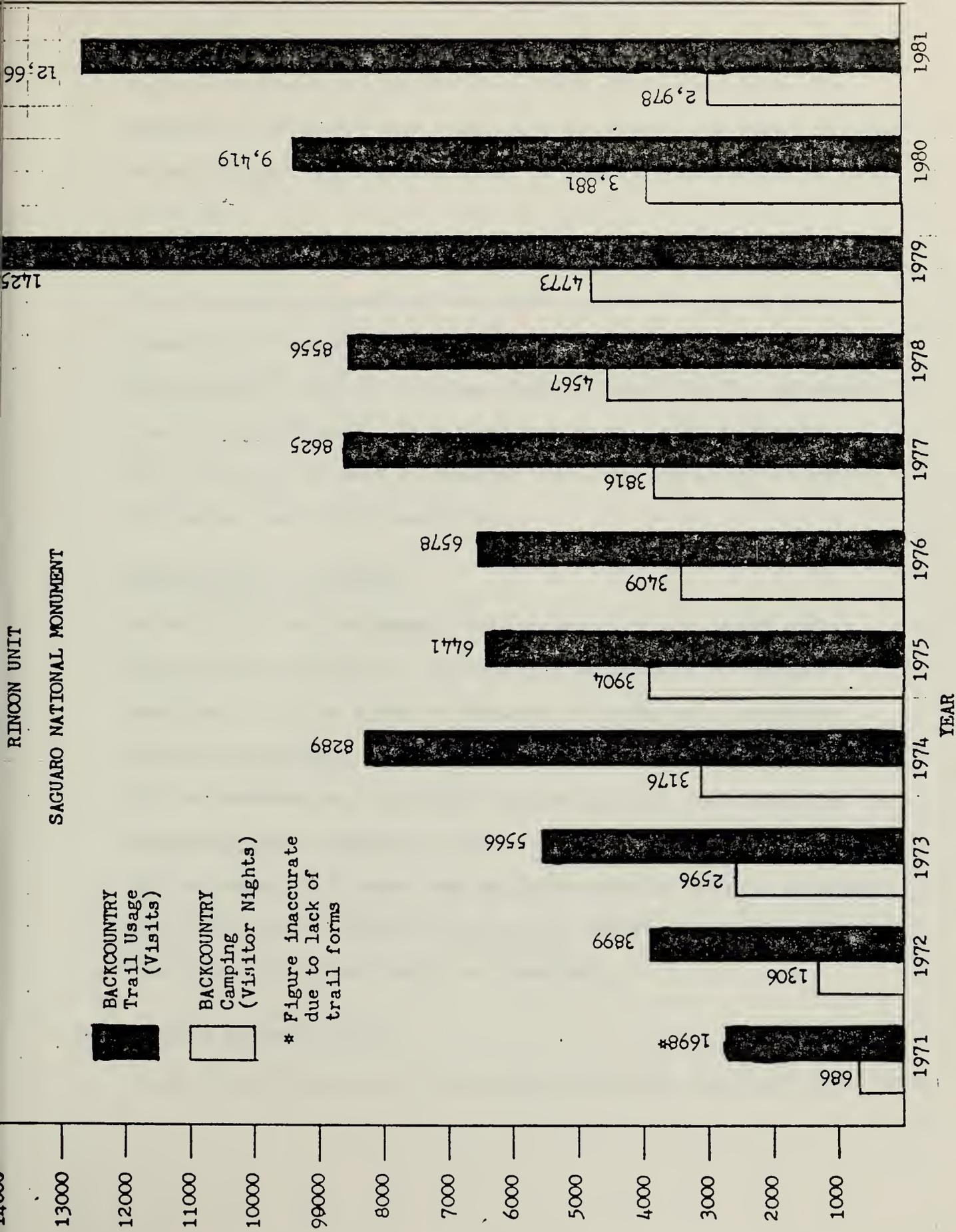
A systematic inventory and analysis of park facilities, sensitive biotic and cultural areas, and user attitudes and activities will be conducted. Following the identification of sensitive indicators and the analysis of human imperatives affecting the resources, specific management actions will be recommended to protect the resources.

IV. FIRE MANAGEMENT

A wildfire management plan to permit natural lightning-caused fires to burn in the Rincon Mountain Unit, under prescribed conditions, was initiated in 1971. This plan is currently in effect, and excludes natural fires that occur in or threaten portions of the saguaro forest

VISITOR USE

RINCON UNIT
SAGUARO NATIONAL MONUMENT



* Figure inaccurate due to lack of trail forms

excluded from grazing in 1958, and all fire that causes a threat to cultural resources and physical facilities within, or outside, the monument. Fire suppression action will be conducted in such a way that extinguishing a fire does not result in unnecessary damage to cultural resources.

Data accumulated for over a decade indicates that the current prescription for natural prescribed fire cannot restore fire to the biotic communities of the Rincon Mountains. Upon completion of a proposed Rincon Mountain Unit Fire Ecology Study, a prescribed fire management plan will be developed. Prescribed burning will reduce hazardous fuels, which could carry holocaustic fires, for the safety of people, structures, and biotic communities.

V. ARCHEOLOGICAL SITE SURVEYS

Archeologists have recommended that research projects which would disturb the archeological resources only be approved if important questions arise that cannot be answered by archeological research outside the monument. An inventory archeological survey in both units will be performed on a settlement pattern approach; relating sites to topography and to localized natural resources. The lack of archeological knowledge could hinder some decision making on resource management and visitor use. The park will not be in compliance with Executive Order 11593 until the surveys are conducted.

VI. HISTORIC RESOURCES STUDY

In the Tucson Mountain Unit, the numerous features associated with mining

and prospecting activities must be evaluated for historical significance before obliteration and naturalization can be undertaken.

A general historic background study and base map will include recommendations for management to obliterate or preserve cultural features such as buildings, roads, wells, dams, and dikes in both units of the Monument.

INTERRELATIONSHIPS WITH OTHER PROJECTS

A General Management Plan has not been developed for the Monument; however, the Statement for Management contains Legislative and Administrative Constraints, Internal and External Influences, and the Management Objectives which are incorporated in this plan.

Public Law 94-567, 90 Stat. 2692, passed on October 20, 1976, designated a total of 28,907 hectares (71,400 acres) of wilderness in both units of the Monument. Public Law 94-578, passed on October 21, 1976, expanded the Tucson Mountain Unit by 2,203 hectares (5,440 acres).

The ramifications of these laws have been considered in the Natural and Cultural Resources Management Plan. The plan conforms with the approved Outline of Planning Requirements.

The Rincon Mountains Prescribed Natural Fire Program of the Santa Catalina Ranger District, Coronado National Forest 1977, a plan developed by the Forest Service, has been implemented. This plan complements the 1971 park plan A Natural Method of Introducing Prescribed Fire Into Saguaro National

Monument.

Portions of the Coronado National Forest are contiguous to the north, east and south boundary of the Rincon Mountain Unit.

ENVIRONMENTAL
ASSESSMENT

ENVIRONMENTAL ASSESSMENT

DESCRIPTION OF THE ENVIRONMENT

I. NATURAL ENVIRONMENT

Location. Saguaro National Monument contains 33,836 hectares (83,576 acres) in two units on the east and west sides of metropolitan Tucson in south-central Arizona. The Rincon Mountain Unit is at the eastern edge of the Arizona Uplands Region, one of seven subdivisions of the Sonoran Desert. The Rincon Mountain Unit is not only near the saguaro's distribution limits, but the saguaro species boundary line runs through the unit. Therefore saguaro populations are marginal in that they are often affected by freezing winter temperatures.

Climate. Saguaro National Monument experiences distinct winter and summer rainfall periods separated by spring and fall droughts which usually last 60 to 90 days. Approximately one-half of the annual rainfall, which averages 11 inches at headquarters, occurs during July, August and September. This summer rainfall is caused by thunderstorms associated with currents of moisture moving into Arizona from the southeast, and originating over the Gulf of Mexico. The second rainfall period begins in December and extends through March as storms from the Pacific Ocean sweep across Arizona from the west. These rains are usually gentle and prolonged and cover vast areas. Snow flurries may occur on the desert, and heavy snow cover often occurs at the

higher elevations of the Rincon Mountains.

In the cactus forest portion of the monument the average maximum temperature in July is approximately 35^o Celsius (95^o Fahrenheit) and the annual rainfall varies from 127 to 610 millimeters (5 to 24 inches).

In contrast, near the top of Mica Mountain the average July temperature is approximately 20^o Celsius (68^o Fahrenheit) and the annual rainfall varies from 533 to 889 millimeters (21 to 35 inches). The average annual relative humidity is under 30 percent in the Tucson area.

Geology. The Rincon Mountains and the Santa Catalina Mountains are composed of Precambrian and metamorphic rocks described as granite, granitic gneiss, and schists, which includes some granite intrusive of younger age and the Catalina Gneiss. The Tucson Mountains are composed of intrusive plugs, flow and welded tuffs, and sedimentary rocks. The lower flanks of the mountains are covered by terrace deposits or other alluvium. Alluvium deposits occur in the western portion of each unit of the park. These deposits are relatively thin in the Rincon unit, the maximum being about 30 meters (100 feet). Their maximum thickness in the Tucson Mountains unit is about 122 meters (400 feet).

Two notable structural geologic features are found in the Rincon unit. An anticline, trending approximately N60E, extends from the southwest

corner of the unit. Also from the southwest corner of the unit, the Catalina fault extends through the park at approximately N30E. A geological map of the Rincon Mountains is available.

The Tucson Mountains are a typical example of the mountain ranges of the basin and range province. The length of the range is about 37 kilometers (23 miles) and the width 11 kilometers (7 miles) with a maximum relief from the Santa Cruz Valley to Wasson Peak of about 747 meters (2450 feet). Oriented northwest-southeast, the mountains are composed of tilted sedimentary rocks such as quartzites, sandstones, conglomerates, shales, slaty rocks and their metamorphosed products ranging in age from 136 to 570 million years. Atop these rocks rest much younger (less than 65 million years old) extrusive volcanic rocks of many kinds and textures. Amole and Wasson Peaks are formed of granite. The geology of the Tucson Mountains is very complicated, but as research continues the geologic history will slowly be revealed. Only 10 kilometers (6 miles) of the 37 kilometer (23 mile) length of the range lies within the monument.

Soils. Twenty-two soil phases in the Rincon Mountain Unit have been identified and mapped. They represent eleven soil series and two miscellaneous units. The soils have been classified into the Comprehensive System of Soil Classification in order to obtain congruity of soil naming,

management interpretations, and correlation with other soils that have similar characteristics. A standard soil survey is currently being conducted by the Soil Conservation Service which will include both units of the monument.

Soils of the mountain slopes are shallow, coarse textured and well-drained. Soils of the bajadas are alluvial. These range from talus and coarse rock at the base of the mountain slopes to increasingly finer texture at lower elevations. Distinct areas of sandy or rocky soil occur with equally distinct plant associations.

Water Resources. Deep wells provide domestic water for the headquarters operation and residences in both units of the monument. In the Rincon Mountain Unit over 3,785 kiloliters (1 million gallons) a year are pumped from a well of 152 meters (500 feet) depth. This well and a standby well, are located in the NW 1/4 of NW 1/4 section 31. This property is approximately 1.6 kilometers (one mile) outside the monument boundary. The Service purchased this property to acquire land upon which to situate water wells -- the alluvium within the monument boundary is either dry, or too shallow to be adequate as an aquifer. In the Tucson Mountain Unit

approximately 2,650 kiloliters (700,000 gallons) a year are pumped from a 171 meter (560 feet) well in the SW 1/4 of SW 1/4 section 34. These water supplies are not chlorinated; however, purity tests are made twice monthly.

A water supply problem exists at Madrona Ranger Station. In 1964 a producing well was drilled adjacent to Chiminea Creek; however, because of unsatisfactory water quality it cannot be used for drinking (54 ppm of iron). Since then, water has been hauled from the X9 Ranch, or headquarters to a 38 kiloliter (10,000 gallon) domestic water storage tank.

The water supply for Manning Camp, at 2,438 meters (8,000 feet) in the Rincon Mountains, is a small reservoir behind a concrete dam. There are a few perennial springs in the Rincon Mountains which both hikers and wildlife utilize. Backcountry hikers are cautioned to chemically treat all water sources and to be especially careful about treating water in tinajas (rock holes) before using. There is one perennial seep in the Tucson Mountain Unit in King Canyon.

The unique deciduous riparian woodland and desert riparian communities exist because of water in the canyons and washes. Free water may run in the washes for a few hours following summer thunderstorms, and for weeks following heavy winter rains. Some water is retained in the deep

sand of major washes and in tinajas of the canyons.

Most groundwater in the area immediately west of the Rincon Mountain Unit meets both mandatory and recommended chemical quality limits of the 1975 Federal Drinking Water Regulations.

A water resources management plan will be prepared to meet the legal requirements of Public Law 92-500, 86 Stat. 816.

Air Quality. The overwhelming source of air pollution in Tucson is associated with motor vehicles. Numerous dirt roads are a significant source of particulates. Aircraft and industry also contribute to air pollution in the Tucson Basin.

Visible air pollution may be categorized two ways in the Tucson Basin. Locally, a temperature inversion layer frequently forms over the Tucson Basin during winter months capping in dark, grey colored pollutants in the downtown area. The inversion layer usually breaks up about mid-morning as the sun heats the city. Visitors are generally unaware of this source of visible air pollution since it has "disappeared" by the time most visitors arrive at the park. The visible form of air pollution, which can affect the aesthetic experience of visitors, is smelter emissions (sulfates and particulates) which can reach lightscattering concentrations that prevent observers in the Tucson Basin from discerning

mountainous features such as tree lines, rock faces and canyons. Smelter emission plumes are sometimes observed drifting into the Tucson Basin from the northeast. When ambient air reaches the stage where features of surrounding mountains are obscured, the quality of the visitor experience is diminished.

Desert and mountain vistas have always played an extremely important traditional role in the aesthetic enjoyment of southwestern landscapes. The cactus forest drive in the Rincon Mountain Unit and the bajada loop drive in the Tucson Mountain Unit contain numerous vantage points for viewing the surrounding mountains and valleys. Generally speaking, the visibility of the desert landscapes from the scenic drives has gradually improved during the past decade.

Vegetation. Saguaro National Monument was created because of its scientific interest, specifically for the intrinsic interest of the natural vegetation. The primary significance of the monument, therefore, lies in the natural associations of the vegetation within the boundaries.

The Sonoran Desert is much richer in variety of life forms and diversity of biotic communities than the other North American Deserts. Both units of the monument are in the Arizona Uplands Region of the desert. Elevations in the Rincon Mountain Unit range from 823 to 2,641 meters

(2,700 to 8,666 feet) above sea level. This vertical difference between the desert floor and mountaintop is equivalent, in a biological sense, to the latitudinal difference between the Mexican and Canadian borders. The continuum of plants is highly diversified with six different and distinct plant communities.

It is the native perennial desert plants that are the ever present, sensitive, readily observed, measurable and mappable indicators of environmental factors. These are climate, soil, topography, and such biotic factors as man and his domestic animals. Generally the plants rather than the animals tell most precisely what the overall environmental conditions were at a given time and place in the past, as well as what the effective environments are today. Careful monitoring of animal communities over a long term will reflect microclimates, and is a valuable tool to be included in the vegetation history.

Evolution of the present-day flora of this region offers a key to understanding the structure and dynamics of the monument's ecosystems. The existing biotic communities, and their component species are derived from two distinctively different geofloras; the cold-adapted Arcto-Tertiary Flora of northern origin and the warm adapted Madro-Tertiary Flora of southern origin. These communities evolved under the pressures of gradually increasing aridity. Reflecting these

origins, a majority of the plants growing below 1,829 meters (6,000 feet) elevation today are basically of southern origin; most of those above this elevation are of northern origin. Both geofloras evolved throughout the 65 million-year Tertiary Period of earth history.

In the Tucson Mountain Unit the ecosystem is characterized by the desertscrub biotic community (paloverde-saguaro plant association) with a restricted grassland-transition community at the higher elevations. The desertscrub community here is more verdant and luxuriant than in the Rincon Mountain Unit due to the presence of ironwood trees, dense stands of saguaros, and in some areas a dense understory of triangle bursage. In the paloverde-saguaro association the perennial plants consist of small-leafed desert trees, as well as shrubs and numerous cacti exhibiting highly varied spinose life forms. Primary desert trees in the Tucson Mountain Unit are foothill paloverde, mesquite, ironwood, saguaro, and several species of large cholla.

Vegetation of the desertscrub community in the Rincon Mountain Unit is conditioned in large measure by the associated Rincon Mountain mass. Rocky outcrops, rolling hills and flat terrain habitats exhibit conspicuous differences in number and density of plant species. The number of plants per unit of area increases with elevation, due to the appearance of desert grassland species and the greater variety of micro-habitats on.

the rocky lower slopes of the mountains. Turpentine bush, snakeweed, and burroweed which indicate overgrazed range are locally abundant. In many parts of the lower cactus forest, snakeweed and/or burroweed are the predominant low shrubs, and on the south sides of the rolling hills brittlebush assumes this role.

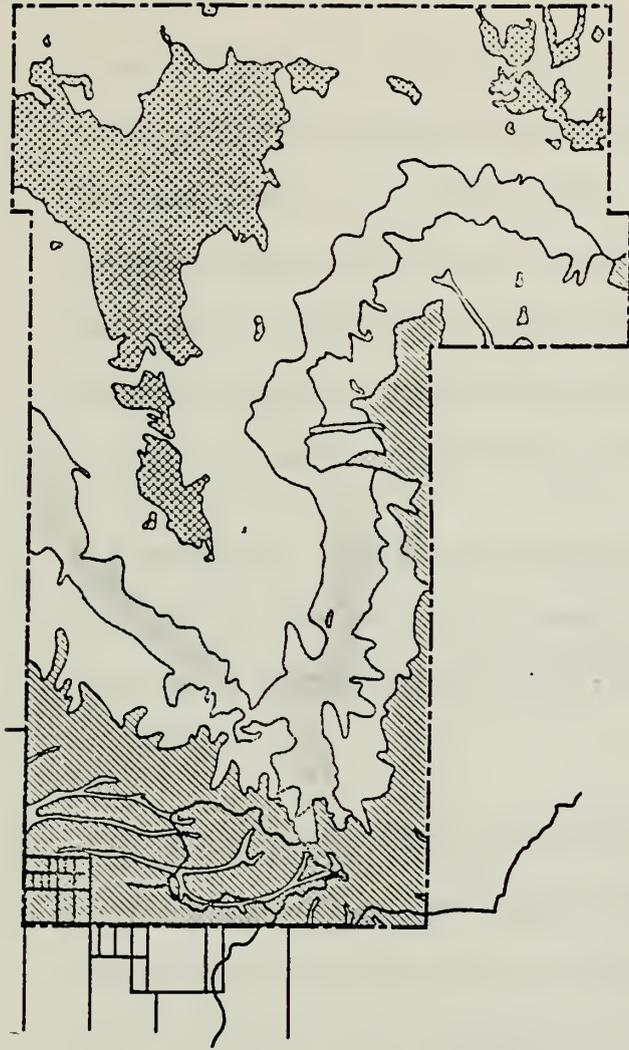
The once spectacularly dense concentration of large saguaros in the lower cactus forest of the Rincon Mountain Unit has dwindled in a few decades to an unimpressive population of sparsely scattered, dying, old individuals. The Tucson Mountain Unit still encompasses some of the most dense saguaro stands in the Tucson area. The decline of saguaro populations in both units is primarily the result of natural climatic events, and there is nothing that can be done to control these natural population fluctuations. The long-term trend of saguaro populations in the monument depends primarily upon the future winter climate of the region - specifically upon the frequency and intensity of catastrophic freezes. Differences in density and age composition of saguaros in varied habitats is reflected by differences in soil, topography and elevation. At the lower elevations the saguaro occurs in relatively even aged stands of both very old and very young plants. On rocky lower slopes of both sides of Tanque Verde Ridge, size distribution of saguaros appears to be more nearly normal with a wide range in plant size. Historical man-caused factors of environmental change in saguaro

habitats include physical vandalism, plant collecting, woodcutting and cattle grazing. These activities have acted primarily in an indirect manner to decrease the number and suitability of sites for germination, establishment and survival of young saguaros. When adverse uses have ceased, the plant community has recovered, as is illustrated in the Rincon Mountain Unit by the large numbers of juvenile saguaros in some locations in the lower cactus forest. These small plants will not become conspicuous for many years.

The number of species and abundance of annual plants is highly variable, reflecting the great range and variability of rainfall. Most conspicuous among summer annuals are the six-week grasses. Except for occasional bladderpod displays early in spring there are no really spectacular annual wildflower shows in either unit, even during favorable years.

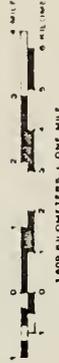
In the Rincon Mountain Unit there are the following major biotic communities in a continuum of overlapping but recognizable zones:

- A. Desertscrub. This community occurs between 823 and 1,219 meters (2,700 and 4,000 feet), and has been described earlier in this section.
- B. Desert Grassland Transition. The desert grassland transition has a plant species composition characteristic of more than one plant community, and occurs between the elevations of 1,066 and 1,372.

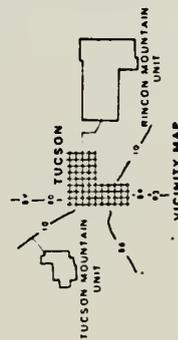
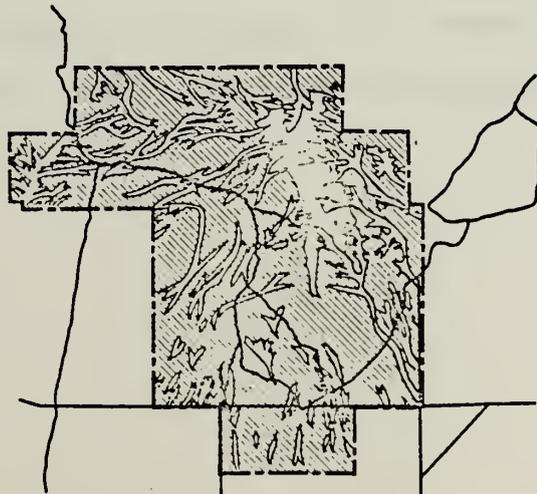


LEGEND

- MONUMENT BOUNDARY
- [Diagonal lines] DESERT SCRUB
- [Horizontal lines] GRASSLAND TRANSITION
- [Vertical lines] OAK WOODLAND
- [Dotted pattern] OAK PINE WOODLAND
- [Cross-hatch pattern] CONIFER FOREST
- [Blank box] RIPARIAN WOODLAND



151 40.004
MAY 74 OSC



VEGETATION MAP
SAGUARO NATIONAL MONUMENT
ARIZONA

UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

meters (3,500 and 4,500 feet). This is a transition area between the lower desertscrub and higher oak woodland biotic communities. Dominant plants are grasses such as black, slender, side oats and Rothrock grammas; tanglehead; cane beardgrass; curly mesquite; and bush muhly. Perennials include turpentine bush, shin daggers, wait-a-minute bush, sotol, bear grass, catclaw, mesquite and saguaros up to 1,372 meters (4,500 feet) on south-facing slopes and ridges.

- C. Oak Woodland. Ranging in elevation from 1,372 to 1,981 meters (4,500 to 6,500 feet) this community is typified by such overstory species as Mexican blue oak, Arizona oak, emory oak, and Arizona rosewood.
- D. Oak/Pine Woodland. The oak/pine is prevalent between 1,677 and 2,134 meters (5,500 and 7,000 feet) and is characterized by Mexican pinyon pine, alligator juniper, numerous oaks including netleaf and silverleaf and chihuahua pine.
- E. Ponderosa Pine Forest. In addition to the predominant stands of ponderosa pine from 2,134 meters (7,000 feet) to the summit of the Rincons at Mica Mountain are Mexican white pine, silverleaf oak and Gambel's oak.
- F. Douglas Fir/White Fir Forest. This community occurs only on north facing slopes, and is best developed below Mica Mountain and Rincon Peak on steep slopes.

G. Riparian Woodland Community. Riparian woodland communities are narrow, vertically oriented, and cut through the other biotic communities. Species composition changes with elevation. These habitats are often the only source of free water for wildlife during the arid fore-summer of May and June. Wildlife is usually abundant because of water availability and the wide diversity of plant species. At the higher elevations riparian tree species include boxelder, alder and chokecherry; at the lower elevations cottonwood, Arizona sycamore, netleaf hackberry, velvet ash and Arizona walnut.

A significant element of the monument flora is the Arizona cypress which is common in the canyons on the east side of Rincon Peak. This is a species which was perhaps a dominant plant of the montane climax forest under different climatic conditions.

Introduced Plants. Several introduced plant species occur in the monument. There appears to be no feasible way to eliminate those which are naturalized, widespread or growing adjacent to the monument boundary. Growing in degraded habitats these exotics help control erosion and establish a soil horizon. Characteristic plants include Russian thistle, Filaree, African daisy, rumex and several grasses including natal grass and four species of lovegrass. A systematic collection of all vascular

plants needs to be made during the growing seasons for compliance with Executive Order 11987, May 24, 1977.

Wildlife. Animals are abundant in both desert and montane ecosystems. Little is known about many of the smaller organisms, particularly the invertebrates. Distribution and behavior of the fauna is regulated by such key factors as competition, temperature, moisture and extent of specific adaptations to an arid environment.

Mammals. Mammals of the monument range in size from the small Arizona pocket mouse to the desert mule deer. Many mammals are adapted to life in certain plant communities, and the adaptations are not related strongly to elevations, but to structure and species composition of the vegetation. Also, competition between ecologically similar species plays an important part in determining distribution. White-tail deer seldom range below the coniferous forest; mule deer and javelina range from the desert scrub through the oak woodland communities. Pocket mice, kangaroo rats, jack rabbits and ground squirrels are desert or grassland transition community species. Cliff chipmunks and Abert's squirrels are residents of the oak-pine woodland and ponderosa pine forest. Large predators such as grey foxes, coyotes, bobcats and mountain lions occur in all biotic communities. Skunks, raccoons and ringtail cats also occur from desert to mountaintop, and often travel along the riparian habitats (canyons).

Rodents and bats make up the large majority of the mammal species occurring in the park. With the exception of Harris and round-tail ground squirrels, they are seldom seen because of their nocturnal habits. Man is responsible for the disappearance of some large mammals. The black bear is rarely seen, but may be fairly common on the east slopes of the Rincon Mountains. Desert bighorn sheep and an occasional jaguar and grey wolf were observed in the Rincon Mountains before World War II. Hunting, trapping, cattle grazing, predator control and increasing human encroachment on lands adjoining the Rincons are the main reasons these mammals are no longer present. Exotic mammals currently in the monument include dogs, cats, horses, and cattle.

Birds. The great variety of habitats ranging from desert scrub through fir forest provide shelter for many kinds of birds. Food and nesting requirements usually restrict each species to a limited habitat. Many birds only stay in the mountains during the summer while nesting, and migrate south for the winter months. Permanent resident birds are well represented in the desert habitat. Commonly observed residents include the Cactus Wren, Gambel's Quail, Roadrunner, Curve-billed Thrasher, Gila Woodpecker, House Finch, Desert Sparrow and Great Horned Owls in the lower canyons of the Rincon Mountains. Uncommon birds include the Golden Eagle, Black Hawk, Zone-tailed Hawk, Spotted and Long-eared Owls, and the endangered Peregrine Falcon.

Reptiles and Amphibians. These animals are well represented in the monument. A few reptiles are confined to the Rincon Mountain forests and woodlands such as the Western rattlesnake, Sonora mountain kingsnake, Arizona alligator lizard and short-horned lizard; however, most reptiles are restricted to the desertscrub biotic community. Three species, the desert-horned lizard, desert iguana and sidewinder rattlesnake occur in the Tucson Mountain Unit, and not in the Rincon Unit.

Introduced reptiles may include two lizards in the Tucson Mountain Unit; the chuckwalla and the Northern false iguana which have probably escaped from the adjacent Arizona-Sonora Desert Museum and were reported as breeding populations in 1977. In the Rincon Mountain Unit western box turtles are in the cactus forest - apparently released by visitors.

Amphibians are represented by five toads and two frogs. Canyon treefrogs and leopard frogs are commonly found around the tinajas (rock holes) in the major rocky canyons of the Rincon Mountains.

Invertebrates. Invertebrates constitute the largest element of park fauna in both numbers and species represented. The arthropods include many species of unusual interest to visitors such as scorpions, centipedes, tarantulas and tarantula wasps, velvet ants, butterflies and moths. The role of invertebrates in the energy flow and operation of natural ecosystems is not well known.

II. CULTURAL ENVIRONMENT

Archeological. The Western Archeological Center recommends that primary importance be assigned to preservation of cultural resources within the monument, and that no archeological excavations be conducted except under unusual circumstances. An inventory archeological survey of both units is necessary for compliance with E.O. 11593.

Evidences of the San Dieguito complex (prior to 8-9000 BP) occur on terraces and on ridges at the mouths of canyons in the Rincon Mountain Unit. The Tucson Mountain Unit contains evidence of this same phase on bajadas, lower ridges and terraces. In both units preceramic sites are inconspicuous, scattered and associated with land forms of the proper period.

The remainder of the monument's cultural history shows a phase sequence of the Hohokam Culture of the Gila Basin as follows: Rillito (A.D. 700 to 900); Rincon (A.D. 900 to 1200) with sparse representation, and Tanque Verde (A.D. 1200 to 1300) with abundant representation. The monument lacks remains from the early phases of the Tucson Basin sequence, and lacks firm evidence for a Tucson phase occupation (A.D. 1300 to 1400). It appears that the strongest evidence for monument occupation by the Hohokam ranges from A.D. 700 through 1300, and includes the whole historical sequence from Early Papago through Anglo-American use

and occupation.

Prehistoric Hohokam sites in both sections of the monument appear to occupy lower elevations, on the valley floor or on the bajadas, and to be associated with major or tributary washes where water could be readily obtained. Higher mountain slopes may not have been used for settlement location, but this zone has not been examined intensively. The only recorded use of steeper slopes is that of caves and rock-shelters for human habitation.

Historical. Manning Cabin, at 2,438 meters (8,000 feet) on Mica Mountain, was constructed in 1905, and is on the National Register of Historical Places. The Freeman Homestead and the Lime Kilns are on the State Register of Historic Places. There are a number of structures in the Tucson Mountain Unit which were constructed by the Civilian Conservation Corps in 1936. These remain in use today as shade ramadas and comfort stations at the picnic sites. There are two Lime Kilns near the Sus Picnic Area in the Tucson Mountain Unit which were described in May 1977, and may qualify for the State Register of Historic Places. There are also 18 concrete check dams in the arroyos of the Tucson Mountain Unit which were constructed by the CCC, and 3 cement dams in the Rincon Mountain Unit within wilderness boundaries. The dams have disrupted natural drainage patterns, and have affected plant species

composition and disposition.

Land which is now included within the boundaries of the Tucson Mountain Unit has been closed to mining since 1929, but a great deal of activity took place from 1880 to 1910. Evidence of mining during that period is visible throughout much of the Tucson Mountain Unit. The Gould and the Mile-wide Mines along with their access roads are quite conspicuous today. There are three patented claims which lie partially within the southeast corner of the Tucson Mountain Unit, and negotiations are underway to acquire these claims. Open mine shafts have been fenced to reduce the potential safety hazard to visitors. Open mine shafts on the lands acquired in the 1976 boundary expansion have not been fenced.

Mining sites have not been evaluated in terms of National Register criteria with respect to historical significance. Any action cleaning up and sealing tunnels and shafts, or otherwise affecting these sites, will require a historic resources study.

III. REGIONAL ENVIRONMENT

Access. The City of Tucson has an international airport, transcontinental bus and railway services, and major highways which provide excellent vehicular access from all directions. Interstate Highway 10 permits easy cross-country travel for winter and summer visitors, and Interstate 19 provides access to Mexico.

Visitors may reach the Rincon Mountain Unit from the south via Interstate 10 and Houghton Road, or by traveling east from downtown Tucson and proceeding down Old Spanish Trail. The Tucson Mountain Unit may be entered by Kinney Road from the south, Golden Gate Road from the northeast, and Interstate 10 exit at Avra Valley Road from the north.

Population. The population of Tucson is growing rapidly. In 1950 the population of metropolitan Tucson was 45,454, and in 1960, 212,892. The 1982 Pima County Planning and Zoning Department population estimate for Eastern Pima County is 568,000. In 1990, it will be 710,000; and by the year 2005, it will exceed one million.

Annual tourism and travel expenditures in Arizona exceed one billion dollars. Growth stimulators in recent years include the influx of "clean" industry, and heavy advertising about vacationing and retirement living.

Visitor Use and Facilities. In 1964, the total monument visits totaled 215,873, and in 1974 there were 363,769 visits despite a gasoline shortage. In 1977 there were 422,498 total visits and in 1978 there were 549,112. In 1980 there were 611,317 visits, but 1981 visitation dropped dramatically to 470,598 visits due most probably to the economic situation. There are approximately 120 kilometers (75 miles) of trails in the Rincon

Mountain Backcountry, and 21 kilometers (13 miles) of trails in the Tucson Mountain Unit. In 1973, 2,600 hikers used the backcountry campsites, and in 1978, 3,460 hikers used the campsites. A backcountry use plan, incorporating the present carrying - capacities for six campsites, was established in 1973.

There are two picnic sites in the Rincon Mountain Unit and five sites in the Tucson Mountain Unit. These sites are usually filled to capacity during weekends of the winter/spring seasons.

Land Classification.

A. Natural Zone. The monument is primarily classified as a Natural Zone for management purposes. This zone is further broken down into three subzones to describe the actual management practices carried out.

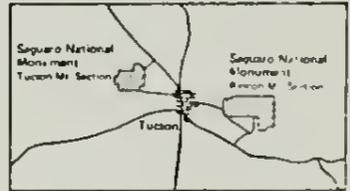
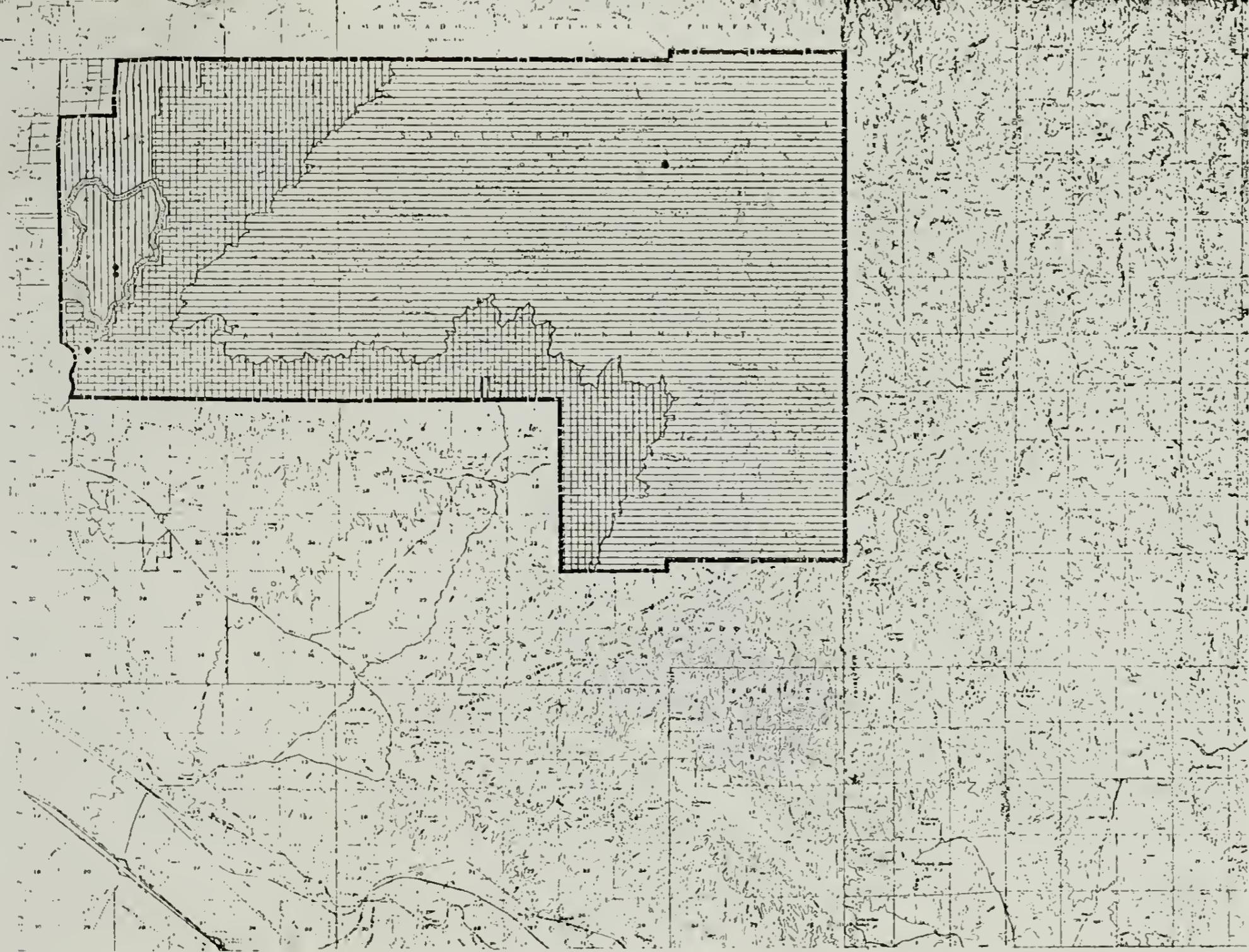
1. Wilderness Subzone

This subzone is the area designated as wilderness by the Act of October 20, 1976, 90 Stat. 2692. It is managed to perpetuate wilderness character with only appropriate use permitted.

(RMU 23,453 hectares (57,930 acres) and TMU 5,269 hectares (13,014 acres).

2. Natural Environment Subzone

Areas managed to preserve and protect natural resources and

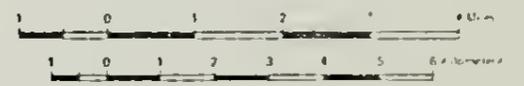


LAND CLASSIFICATION

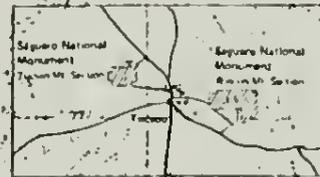
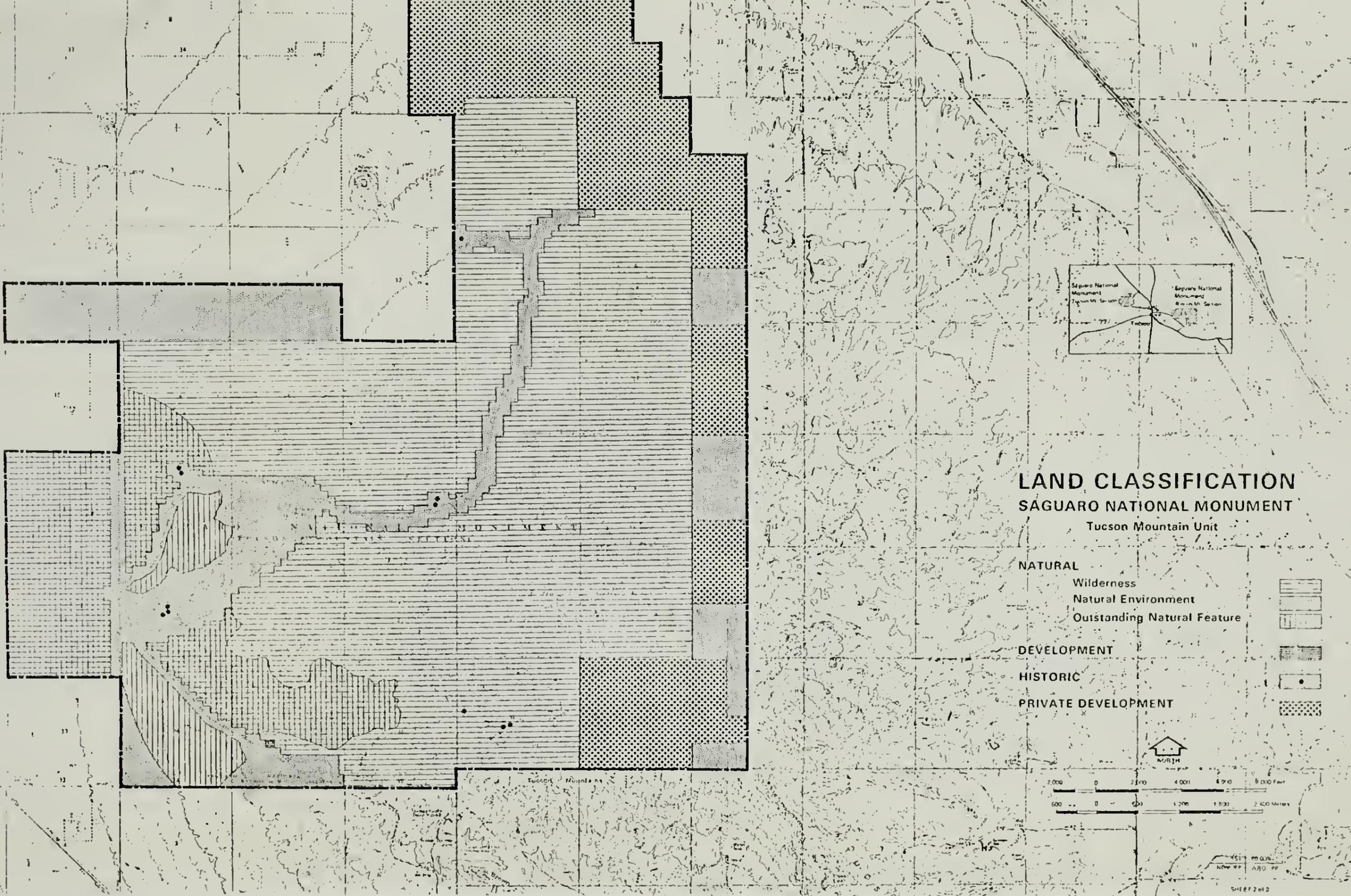
SAGUARO NATIONAL MONUMENT

Rincon Mountain Unit

- NATURAL**
- Wilderness
 - Natural Environment
 - Outstanding Natural Feature
- DEVELOPMENT**
- HISTORIC**

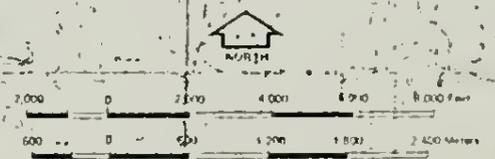


07



LAND CLASSIFICATION
SAGUARO NATIONAL MONUMENT
 Tucson Mountain Unit

- NATURAL**
 - Wilderness 
 - Natural Environment 
 - Outstanding Natural Feature 
- DEVELOPMENT** 
- HISTORIC** 
- PRIVATE DEVELOPMENT** 



provide transition to wilderness. Visitor use developments are allowed in this subzone. Such developments include picnic areas, tour roads and interpretive trails. (RMU 207 hectares (511 acres) and TMU 1,519 hectares (3,752 acres).

3. Outstanding Natural Feature Subzone

This subzone contains the stands of saguaro for which the monument was named. It overlaps the Wilderness Subzone and portions of the Natural Environment Subzone. It is managed to preserve and protect the saguaro forest and associated flora. Visitor use is regulated although relatively unrestricted. (RMU 8,219 hectares (20,300 acres) and TMU 1,376 hectares (3,398 acres).

B. Historic Zone. This zone includes the site nominated to the National Register of Historic Places (Manning Cabin). Other sites scheduled for nomination to the National Register are the CCC Historic District, the Gould Mine, and the Rincon Foothills Discontiguous Archeological District. The Freeman Homestead and Lime Kilns are on the State Register of Historic Places.

C. Federal Development Zone. This zone includes the main visitor use and management facilities in both units. It is managed to provide for these essential services while protecting adjacent natural resources. (RMU 17 hectares (42 acres) and TMU 4 hectares (10 acres).

D. Non-Federal Development Zone. This zone covers lands in the Tucson Mountain Unit which were added by Public Law 94-578, and consist of the following categories: State 543 hectares (1,341 acres), Private 81 hectares (200 acres) and Pima County 12 hectares (30 acres).

Air Quality. Saguaro National Monument is designated as a mandatory Class I area under the Clean Air Act as amended in 1977. Section 169A of the Act declares as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in Mandatory class I Federal areas." The Tucson Air Planning Area is classified by the State of Arizona as a non-attainment area for both carbon monoxide and particulates.

In the foreseeable future the Tucson Air Planning District will undoubtedly become a non-attainment area for oxidants (ozone) with increasing air pollution due to population growth (more vehicles).

PROBABLE FUTURE ENVIRONMENT WITHOUT THE PLAN

In view of the Monument's location, studies of the human impact on the natural resources will be especially important if the integrity and natural values of this area are to be perpetuated.

The Tucson city limit is now only two miles west of the Rincon Mountain Unit boundary line. Recent industrial growth indicates that fairly rapid development will be the trend for the foreseeable future. Another growth indicator is a recent Pima County trend to change long established low density zoning plans to high density and commercial zoning. In the future there will obviously be more land developed for human use and less preserved as natural desert throughout the Tucson Basin, and in portions of Pima County which are located west and north of the Tucson Mountain Unit. The 1982 population of eastern Pima County is 568,000. It is projected to be 710,000 by 1990, and about one million by the end of this century.

The proposed studies and management actions deal with natural and cultural resource management problems. The management objectives for perpetuating current and future natural environmental conditions will be impossible to meet without implementation of the proposed studies and management actions. A gradual trend away from natural environmental conditions can be reversed by implementing the proposals in this plan.

Without implementing the plan there will be an accelerating impact and subsequent deterioration of the biotic communities as human use of Monument lands increases.

ENVIRONMENTAL IMPACTS OF THE PROPOSED PLAN

The plan proposes a number of actions which will have positive impacts on both desert and montane ecosystems in such a way that the biotic communities of those ecosystems will be restored and/or maintained at a level representative of an essentially natural environment. Deleterious human impacts on the normal energy flow of the biotic communities will be minimized to the greatest extent possible by the proposals. Where past and present use has caused severe environmental degradation, some manipulation may be necessary to reduce adverse effects. The inventory archeological surveys proposed for both the Rincon and Tucson Mountain Units will not effect the natural environment. Specific environmental impacts of the proposals are examined under the following headings.

Research

Without the accumulation of objective information upon which to base management actions described in the proposals, some "remedial actions" might conceivably have an adverse impact on cultural and natural resources.

Flora surveys and fauna monitoring and various other monitoring programs and proposed feasibility studies will have no impact on the natural environment. Failure to implement recommendations which are derived from research actions could result in long-range harmful impacts. Although herbarium specimens and

faunal specimens will be collected for both monument and University of Arizona study collections, the quantity will be insignificant.

Lack of substantial knowledge about natural, historical and archeological resources can hinder development of viable natural and cultural management programs. Research and analysis of human impact will have no adverse environmental effects, but will generate valuable objective management information upon which to base high resource management standards.

Vegetation

A basic inventory of vascular plants, and a vegetation type analysis to determine the status of native and exotic plants will have virtually no impact on the biotic communities, but will provide information upon which action to perpetuate native species may be based.

Physical closure and revegetation of impromptu parking pullouts along scenic drives in both units will improve the appearance of the roadways, and prevent approved pullouts from expanding. These disturbed areas may not recover for several years. Collection of plants for revegetation will have a temporary impact on the plant species composition in the collection areas. Most disturbed areas will be allowed to revegetate by natural means with transplanting techniques applied to only the most grossly disturbed sites. Areas to be rehabilitated must be reviewed within the context of National Register criteria, as required by Executive Order 11593. Vegetation will be salvaged, whenever possible, for replanting and rehabilitation purposes.

Fire Management

The future utilization of prescribed burning will gradually restore and maintain natural vegetation mosaics in the montane biotic communities.

The effects of fires will change with the removal or reduction of ground fuels and understory vegetation. Changes due to fire include a reduction of shrubby growth and replacement with grasses in the grassland transition community (above the desertscrub). In biotic communities at higher elevations in the Rincon Mountains, there will be an increase in herbaceous growth with less danger of a catastrophic fire, and the creation of diverse habitats which have an extremely important benefit for wildlife.

Following prescribed burns, the absence of catastrophic fires will permit normal vegetation succession to occur in all biotic communities above the desertscrub with a possible exception in the coniferous forests where absence of destructive wildfires may preclude the formation of open meadows and aspen groves.

Soil erosion and changes in water resources are not anticipated based on observations of naturally prescribed fires in 1972 which occurred in montane biotic communities of the Rincons.

Grazing

Although grazing has been eliminated from the Tanque Verde Grazing Allotment, soil erosion will remain a problem until a mixture of perennial grasses and shrubby plants - the climax of the desert grassland transition community - becomes established in the heavily impacted northern part of the allotment. Ten study plots, established in 1976, will be used to monitor this deteriorated part of the allotment.

Removal of the feral cattle in the Rincon Creek drainage will have a positive environmental impact by permitting the perennial grasses and shrubby plants to recover from trampling and consumption, stopping the alteration of plant species composition; slowing soil erosion by eliminating hillside trailing and bedding sites; stopping the fouling of tinajas (water holes) in the canyons; and eliminating the adverse impacts on wildlife habitat.

MITIGATING MEASURES INCLUDED IN THE PROPOSED ACTIONS

Fire Management

There will be some temporary noticeable effects on the Monument, such as wood smoke from fires during prescribed burns, and temporarily blackened ground. These are natural effects and public concern will be mitigated by the appearances of monument personnel on local television, and radio, and by press releases to local newspapers to explain the prescribed fire program and what it will achieve.

Similar efforts were helpful in gaining public acceptance during natural prescribed fires in 1972. Further mitigating measures for prescribed burns include research to refine the burning prescriptions in order to ascertain the effects on the biotic communities. The Pima County Air Quality Control Officer will be kept informed at regular intervals during prescribed burns, and he may require suppression of some fires if the smoke exceeds acceptable Air Quality Control Standards.

Vegetation

Future development plans for facilities will exclude saguaro habitats. Possible removal of facilities which currently have an adverse effect on saguaro habitats will be determined during assessment of human impact. In compliance with Executive Order 11593, all proposed ground disturbing activities will be checked by an archeologist. No properties listed on the National and State Historic Registers will be affected by the proposed actions.

ADVERSE EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

The proposed actions are designed to enhance the resources and avoid adverse environmental impacts. Some adverse effects of this plan, however, will be unavoidable. The objective of the plan is to arrive at an essentially "natural" environment.

Fires will destroy some flora and fauna and temporarily remove or reduce food in wildlife habitats. Smoke from these fires will be visible in Tucson and will cause citizen concern in spite of education efforts. Some back-country visitors will feel that a blackened landscape, although only temporary, is an unaesthetic condition. Subjective opinions of citizens will vary widely regarding prescribed fires.

Domestic dogs may occasionally be destroyed when caught in the pursuit of wildlife, or attacking visitors.

Removal of perennial plants, especially cacti, to revegetate grossly disturbed areas is considered an acceptable trade-off; however, any manipulation of plants in the desertscrub biotic community will have an adverse effect. Environmental rehabilitation and revegetation techniques could create some minor surface disturbance to sites which may have started to recover through natural revegetation.

Removal of the feral cattle in the Rincon Creek drainage will directly and adversely affect those animals.

Cultural resources may be affected if they are not located, and evaluated for human impact. Archeological clearances are required before any area is developed.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM
USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE
AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The legislation which established Saguaro recognized the importance of its natural resources. The proposed actions provide for long-term enhancement of productivity in the form of recreational, educational (both cultural and natural history), and scientific benefits.

Consumptive uses of the resources, such as permitting the feral cattle on Rincon Creek to increase in numbers, is antithetical to restoring the natural biotic communities and maintaining park landscapes in a natural state for the long-range benefits to society in general.

Actions proposed will provide for protection and, where necessary, restoration of natural processes to the ecosystems while providing for the enjoyment and non-consumptive use by visitors. Proposals to evaluate, monitor and preserve archeological sites and historic structures are also contained in the plan.

The population growth in the Tucson vicinity is causing the Tucson Mountain Unit to be surrounded by urban development on three sides and the Rincon Mountain Unit on two sides. Therefore; it is necessary to make special efforts to preserve the integrity of the natural biotic

communities as important long-term investments for scientific, educational and recreational purposes.

Research programs will formulate the basis for future decisions regarding the restoration of natural environments, and proposed management actions will reverse trends toward environmental degradation and preserve the natural and cultural resources.

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES
WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD
IT BE IMPLEMENTED

The proposals in the plan are designed to enhance the natural processes of the biotic communities and to preserve cultural resources. No irreversible commitments of the resources will result from any actions proposed in the plan.

ALTERNATIVES TO THE PROPOSED ACTION

Research

Alternatives to the proposed research actions were considered. Alternatives to the research proposed in both natural science and natural resource project statements are to omit the studies, or to use the existing inadequate and outdated information. Without research, natural resource management will be based on partial and incomplete data which will result in only partial

fulfillment of management objectives. This is contrary to the monument's enabling proclamation and the Service's administrative policies for natural areas.

The natural research proposals, archeological inventories and historic resources study are an integral part of the natural and cultural resources management plan, and their environmental impacts are minimal or nonexistent. If the flora, fauna, historic and archeological resources are not qualified and quantified, then management will lack the necessary information on which to base intelligent decisions.

Fire Ecology Study Alternatives are: No action, and continue implementing the existing fire management plan. The objectives of a prescribed burning program will be impossible to achieve without basic research which will justify a radical change to the current natural prescribed fire plan.

Human Impact Assessment

Postponing or not undertaking a human impact assessment on Monument resources may allow a time lag between recognition of resource deterioration and remedial action to prevent additional deterioration.

There is no alternative to restricting horse use from archeological sites since compliance with Executive Order 11593 is mandatory.

Removal of Feral Cattle

Legislative mandates for the National Park System provides no alternative to removal of the cattle. If all attempts to round-up fail, then cattle will be eliminated with firearms.

CONSULTATION AND COORDINATION

Several experts were consulted for their specialized knowledge of various subjects during the preparation of the natural/cultural resources management plan. Primary consultants were Warren F. Steenbergh, Acting Unit Leader of the National Park Service Cooperative Resources Studies Unit at the University of Arizona, and Dr. Keith Anderson, Regional Research Archeologist, Western Archeological and Conservation Center. Consultation for 1982 revisions to the plan were held with Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit at the University of Arizona, and Don Morris, Archeologist, Western Archeological and Conservation Center.

Rough draft review copies of the plan and environmental assessment were sent to the following organizations and individuals to solicit input to the plan. All letters or comments received were reviewed for incorporation into the plan.

Coronado National Forest
Pima County Health Department
Southern Arizona Hiking Club
Southern Arizona Environmental Council
Saguaro Forest Associates
Saguaro Horsemen's Association
Pima County Planning and Zoning Department
Pima County Parks and Recreation Department
Sierra Club, La Seccion del Rincon Chapter

Tucson Audubon Society

Arizona Game and Fish Department, Tucson

Dr. David Mouat, Director, OALS, University of Arizona

Dr. Raymond M. Turner, Research Botanist, USGS

Dr. Stanley M. Alcorn, Plant Pathologist, University of Arizona

Dr. R. L. Gilbertson, Plant Pathologist, University of Arizona

Dr. Stanley K. Brickler, School of Renewable Natural Resources, University of Arizona

Dr. Robert M. Humphrey, Professor Emeritus, Range Management Specialist, University of Arizona

Dr. L. K. Sowls, Leader, Cooperative Wildlife Research Unit, University of Arizona

Dr. E. Lendell Cockrum, Mammalogist, University of Arizona

Dr. Charles Mason, Botanist, University of Arizona

Dr. Floyd G. Werner, Entomologist, University of Arizona

Dr. Walter Miller, Malacologist, University of Arizona

Dr. Robert F. Wagle, School of Renewable Natural Resources, University of Arizona

Mr. Gerald I. Day, Research Biologist, Arizona Game and Fish Department, Tucson

Mr. William Brooks, Ecologist, OALS, University of Arizona

Mr. C. Lee Fox, Director, Pima County Air Pollution Control District

Mr. Robert L. Coshland, Representative N. P. Recreation & Conservation Association

NATURAL AND CULTURAL
RESOURCES
MANAGEMENT PROGRAM

AN ADDENDUM TO THE
NATURAL AND CULTURAL RESOURCES
MANAGEMENT PLAN

FOR

SAGUARO NATIONAL MONUMENT
TUCSON, ARIZONA

Prepared by

Saguaro National Monument
National Park Service
Department of Interior

Revision of December 1982

TABLE OF CONTENTS

	<u>Page Number</u>
SUMMARY	A3
NATURAL RESOURCES OVERVIEW AND NEEDS.....	A4
NATURAL RESOURCES PROJECT PROGRAMMING SHEET	A7

LIST OF PROPOSED NATURAL RESOURCES PROJECTS

<u>Project Title (and Reference Number)</u>	
Horse Trail Rehabilitation and Resource Protection, Lower Cactus Forest, Rincon Mountain Unit, SAGU-RM-1....	A8
Feral Cattle Removal, Rincon Creek Drainage, SAGU-RM-2...	A10
Vascular Plant Survey and Map, TMU, SAGU-N-7	A12
Fire Ecology Study, SAGU-N-1.....	A14
Human Impact Assessment, Park General, SAGU-N-2.....	A16
Fire Management Plan and Implementation of Initial Prescribed Burning, Rincon Mountain Unit, SAGU-RM-4....	A19
Air Quality Monitoring, SAGU-AQ-1.....	A21
Vegetation Type Map, Rincon Mountain Unit, SAGU-N-3.....	A23
Vertebrate Fauna Monitoring, Rincon Mountain Unit and Tucson Mountain Unit, SAGU-N-4.....	A26
Vegetation Analysis on Tanque Verde Grazing Allotment, SAGU-N-5.....	A28
Saguaro Population Monitoring, SAGU-N-6.....	A30
Water Resources Management Plan, SAGU-W-1.....	A32

CULTURAL RESOURCES OVERVIEW AND NEEDS..... A34
CULTURAL RESOURCES PROJECT PROGRAMMING SHEET..... A35

LIST OF PROPOSED CULTURAL RESOURCES PROJECTS

Project Title (and Reference Number)

Archeological Site Monitoring, RMU, A-1 A36
Inventory Archeological Survey, RMU, A-3..... A38
Historic Resources Study, H-1..... A40
Inventory Archeological Survey, TMU, A-2..... A42

MANAGEMENT PROGRAM

SUMMARY

This Management Program for Saguaro National Monument is a document that proposes management and research actions, which will implement the Natural and Cultural Resources Management Plan. The Plan outlines a general long-term program designed to provide for natural and cultural resource management and research. The Management Program however, proposes specific projects to be carried out, according to availability of funds, for five years, beginning with Fiscal Year 1983. The Management Program will be revised and updated annually as the need arises to add new management or research projects and to reevaluate priorities.

The Management Program that follows contains:

A list of natural and cultural resources projects (see Table of Contents).

An overview and needs statement including a description of anticipated accomplishments for Fiscal Years 1983 through 1987.

A natural and cultural resources project programming sheet listing each project in relation to park priority, funding, and time scheduling for the five-year period.

Natural and cultural resources project statements that serve as "blueprints" for proposed actions.

NATURAL RESOURCES OVERVIEW AND NEEDS

The natural resources of Saguaro National Monument comprise an outstanding example of the Arizona Upland subdivision of the Sonoran Desert. These natural resources include the last remaining example of a nearly pristine continuum of natural warm desert to mountain forest biotic associations in the Southwestern United States. A total of 71,400 acres of park land was declared as wilderness in order to maintain the singular, undisturbed resources. Saguaro is also one of the most accessible units of the Park System to a large and rapidly expanding metropolitan center (15th fastest growing city in the United States).

The objective of maintaining an equilibrium condition in the naturally evolved desert and montane ecosystems is being threatened by the absence of natural fires, feral animals and especially the multifarious problems associated with increasing human impacts from a metro area of well over one-half million people.

Major aspects of natural resources management are:

1. Horse Trail Rehabilitation.
2. Feral Cattle Removal.
3. Mine shaft Fencing.
4. Human Impact Assessment.
5. Fire Management.

This plan presents a five year strategy of resources management, monitoring, and research to mitigate or reverse the effects of indentified natural resource problems as listed in park priority on the project programming sheet.

HORSE TRAIL REHABILITATION

There are over 100 miles of unplanned, unmaintained horse trails in the lower cactus forest of the Rincon Mountain Unit. Where the trails cross arroyos or traverse steep gradients there has invariably been a severe gully erosion problem. Trail work will consist of environmental rehabilitation, general clean-up, rerouting of trails, and especially erosion control at the deep gullys.

FERAL CATTLE REMOVAL

About 20 cattle are living in the Rincon Creek Drainage. Round-ups in recent years accounted for removal of more than 50 animals which considerably reduced adverse environmental impacts. Upon completion of an environ-

mental assessment, the remaining cattle will be removed in the most expeditious manner. Prevention of another buildup of cattle numbers is a primary management concern.

MINE SHAFT FENCING

Over 100 open shafts and prospect holes occur on lands acquired in the Tucson Mountain Unit Boundary Expansion of 1976. They will be evaluated as a public safety hazard and fenced in priority according to their inherent danger. Also, many of the mine shafts and prospect holes within the "old" Tucson Mountain Unit Boundary need major rehabilitation of the fencing which keeps people from entering the sites, and serves as a warning of the danger.

HUMAN IMPACT ASSESSMENT

Rapidly increasing human impacts on the resources of both Units take numerous forms within an urban population of over one-half million people located mid-way between the two units of the park (the Rincon and Tucson Mountain Units). Opportunities for enjoyment of intended purposes of the park are diminished by growing intensive visitor use patterns. A systematic inventory and analysis needs to be conducted of physical facilities, sensitive biotic and cultural areas, and user attitudes, preferences, perceptions, and activities. Integration of these data will identify principal factors affecting individual and combined constraints leading to identification of sensitive use indicators (physical, biotic, cultural and user resources). Following inventory and analysis of individual and collective constraints, management decisions based on National Park Service directives and policies will determine management actions.

FIRE MANAGEMENT

The 1971 Natural Prescribed Fire Plan, which is in current use, has not achieved the objectives of restoring fire to the montane ecosystems. Heavy fuel buildups may result in hot destructive fires in the future with possible severe damage to the environment. The proposed fire ecology study will permit development of a fire management plan, so prescribed burning can be initiated in the Rincons.

ANTICIPATED ACCOMPLISHMENT OF FISCAL YEAR:

FY-83 - Some monies will become available to solve the most significant resource management problem of horse trail rehabilitation, and possibly mine shaft fencing. Trail work will be accomplished at the most severely eroded locations in the lower cactus forest. Also, some deteriorated fencing around mineshafts in high visitor impact areas of the Tucson Mountain Unit will be rehabilitated.

- FY-84 - Monies for significant resources management problems will permit mine shaft fencing and cattle removal activities to proceed and possibly be concluded. Horse trail rehabilitation and rerouting of some trails will be progressing. Fire ecology research will begin as will research on the assessment of human impact.
- FY-85 - Significant resource problems of mine shaft fencing and feral cattle removal will be completed. Horse trail rehabilitation will continue. The fire ecology study and vegetation type mapping of the Rincons will be used to develop the Rincon Mountain Fire Management Plan with initial prescribed burns near Manning Camp. Human impact research will conclude with recommendations on how best to cope with impacts by implementation of scientifically valid carrying capacities. Vertebrate fauna monitoring will begin as a graduate student thesis to plan and set up transects. Saguaro population monitoring and vegetation analysis on Tanque Verde Grazing Allotment, RMU, will be accomplished to ascertain changes over a 10 year time span. Work toward completion of the Water Resources Management Plan will begin. Air quality monitoring of ozone concentrations will begin.
- FY-86 - Horse trail rehabilitation will continue. The prescribed burning program will be expanded in the Rincon Mountains. Air Quality and vertebrate fauna monitoring will continue.
- FY-87 - Horse trail rehabilitation will continue. The prescribed burning program will continue to be refined and expanded. Air Quality and fauna monitoring will continue.

NPS Costs Expressed in \$1000

Area Reference Priority No.	Project Title	Yr. 1 BASE NEW	Yr. 2 BASE NEW	Yr. 3 BASE NEW	Yr. 4 BASE NEW	Yr. 5 BASE NEW	10-237 DATE
1 RM-1	Horse Trail Rehabilitation and Resource Protection, Lower Cactus Forest, RMU	51.9	51.9	51.9	51.9	51.9	03/82
2 AQ-1	Air Quality Monitoring and Baseline Studies	23.5	13.5	13.5	13.5	13.5	01/82
3 RM-2	Feral Cattle Removal, Rincon Creek Drainage, RMU	10.0					01/82
4 N-7	Vegetation Type Map and Vascular Plant Survey, TMU	20.0	20.0				11/82
5 N-3	Vegetation Type Map, RMU	30.0					01/82
6 N-1	Fire Ecology Study, RMU	6.0					01/82
7 RM-4	Fire Management Plan, RMU		10.0	10.0	10.0		
8 N-2	Human Impact Assessment, RMU and TMU		35.0	35.0			01/82
9 N-4	Vertebrate Fauna Monitoring, RMU and TMU			10.0	10.0	11.0	
10 N-5	Vegetation Analysis on Tanque Verde Grazing Allotment, RMU					6.5	
11 N-6	Saguaro Population Monitoring, RMU and TMU					5.5	
12 W-1	Water Resources Management Plan, RMU and TMU					12.0	8.0

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region
2. PROJECT NAME AND NUMBER: Horse Trail Rehabilitation and Resource Protection, Lower Cactus Forest, Rincon Mountain Unit, SAGU-RM-1.
3. STATEMENT OF PROBLEM: Over 100 miles of unplanned, unmaintained horse trails now exist in the lower cactus forest. Gulley erosion ranges from moderate to severe on trails crossing slopes. Many trails were originally meandering "cowpaths" during the grazing era before 1958, the year grazing ended in the lower cactus forest. Sheet and gulley erosion of soils and unnatural vegetation mosaics gradually developed over many decades, beginning in the latter part of the nineteenth century with grazing. Scarcity of young saguaros, before the 1960's, is also a legacy of the grazing. An appearance of young plants, since cattle were removed, is dramatic evidence of the multifarious impacts of grazing on the desertscrub biotic community. The trails east of the Speedway horse gate receive the most intensive horse use, due to the proximity of the Tanque Verde Guest Ranch. Douglas Spring Trail receives major impacts of both horses and hikers and is very severely eroded.
4. WHAT HAS BEEN DONE:
 - A. Archeological surveys indicate that some cultural resources are becoming adversely affected by horse trails, in violation of E.O. #11593.
 - B. A horse use impact study by Monument personnel in 1977 and 1978 could not be used to establish carrying capacities or limit use because the data was not scientifically valid.
 - C. Horse trails were inventoried in 1979 by Office of Arid Land Studies, University of Arizona.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Trail work will consist of clean-up and environmental rehabilitation, rerouting of trails, and erosion control and prevention measures. Also, it will be important to define an aesthetically acceptable trail system by working directly with the Saguaro Horsemens Association and Tanque Verde Guest Ranch. Present horse use levels can be accommodated on most existing trails with horse-back riders receiving a diversified, quality experience. It is of primary importance that initial rehabilitation work to stop the accelerating gulley erosion of horse trails at arroyo crossings be undertaken soon.

Any new horse trail construction will only be accomplished to circumvent archeological sites, or at the steep arroyo crossings where numerous stirrup-deep gulleys have formed.

Trail construction will incorporate gentle gradients, in order to prevent or mitigate further erosional degradation. Natural material at trail construction sites will be used.

Ranger patrols to deter misuse of the resource and to contact horse-back riders is also necessary.

6. LENGTH OF TIME NEEDED: Long-term project.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Horse trails will continue to erode. Complaints by hikers/runners, who share the Douglas Springs Trail with horses, will increase as the gulley erosion worsens. Trail rehabilitation work and patrols would demonstrate good faith in efforts to protect the resource. Failure to perform basic patrols and repair trail damage is weakening the Service stance in that the park discusses it's problems, but does nothing to improve the deteriorated trails.

8. WHAT ARE THE ALTERNATIVES:

A. No action.

9. PERSONNEL: Monument staff.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services	54,900	54,900	54,900	54,900	54,900
Other than Personal Services	0	0	0	0	0
Grand Total	54,900	54,900	54,900	54,900	54,900
Funds available in Park Base:	0	0	0	0	0
Funds requested from Regional Office:	54,900	54,900	54,900	54,900	54,900

On Form:
10-237

Date Submitted:
April 1982

11. REFERENCES AND CONTACTS:

A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.

B. Dr. Kim Mortensen, Office of Arid Land Studies (OALS), University of Arizona.

12. DATE OF SUBMISSION: March 31, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region
2. PROJECT NAME AND NUMBER: Feral Cattle Removal, Rincon Creek Drainage, SAGU-RM-2.
3. STATEMENT OF PROBLEM: Approximately 20 cattle are grazing a 6 square mile area north of Rincon Creek and east of Madrona Ranger Station. The cattle are very wild, and the terrain is extremely rugged. These cattle are: (a) consuming and trampling vegetation, (b) altering plant species composition, (c) causing soil compaction and thereby permitting erosion of hillside trails and bedding sites, (d) fouling natural water catchments, (e) adversely affecting wildlife habitat.
4. WHAT HAS BEEN DONE: More than 50 cattle were removed by round-ups during the past five years. Cowboys and horses sustained injuries, and several cattle died or had to be dispatched. Methods used to "tame" cattle sufficiently to drive them are so inhumane that recovered animals, which are starved, dehydrated and battered, are not of high market value.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Remove the cattle in the most expeditious manner upon completion of an environmental assessment with a 30 day review period.
6. LENGTH OF TIME NEEDED: Two months.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: The cattle population will increase, as will deleterious impacts on wilderness landscapes. The cattle will expand their geographical range, and future removal will be more difficult and costly.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do nothing.
 - B. Continue periodic cattle removal by round-up.
 - C. Eliminate the cattle by shooting.
9. PERSONNEL: Monument employees and contract helicopter services.

10. ADMINISTRATION AND LOGISTICS:

Funding

		<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>	
Personal services	1000					
Other than personal services	9000					
Grand total	10,000					
Funds available in park base	0					
Funds requested from Regional Office	10,000					

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:

A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.

12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Vascular Plant Survey and Vegetation Type Map, Tucson Mountain Unit (TMU). SAGU-N-7
3. STATEMENT OF PROBLEM: Accurate knowledge of the composition, abundance and distribution of the vascular flora in the Tucson Mountain unit is essential for making wise decisions about resources management and rapidly increasing visitor use. The mapping will be needed to measure future environmental changes caused by climate and mans activities, and will indicate future changes in species composition and species evolution. Identification of vascular flora is also necessary for compliance with the Endangered Species Act, and to determine critical habitat. A plant currently listed as Category I (threatened and endangered species) occurs in the unit.
4. WHAT HAS BEEN DONE: A generalized vegetation map of the Tucson Mountain Unit was produced in 1970, based on an aerial survey of 1966. A hypothetical plant check list was compiled in 1969.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Utilize remote sensing techniques involving ground truthing, color photography and mapping at a scale of 1:24,000. Determine the composition, abundance and distribution of the vascular flora in both sections of the monument. Vegetation communities will be mapped to permit future environmental changes to be identified during follow-up monitoring. A survey of all vascular plants in the unit will be conducted to identify native and exotic species and for compliance with the Endangered Species Act.
6. LENGTH OF TIME NEEDED: Two years.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Endangered species may be inadvertently destroyed. Some resource management decisions may be based on inadequate information. Accurately quantifying and qualifying environmental changes will be impossible. Lack of baseline data, including species diversity, composition, density and successional dynamics will be a constraint on management decisions. Wildlife habitats will not be delineated since the parameters of the vegetation communities will remain unknown. Interpretation of the biotic communities will remain inaccurate, and the plant checklists will remain hypothetical.
8. WHAT ARE THE ALTERNATIVES:
 - a. Do not conduct the mapping and survey.
9. PERSONNEL: Contract.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal servoces	0	0			
Other than personal services	20,000	20,000			
Grand Total	20,000	20,000			
Funds available in park base	0	0			
Funds requested from Regional Office	20,000	20,000			

On Form

10-237

Date Submitted:

November 10, 1982

11. REFERENCES AND CONTACTS:

- A. Monument Staff.
- B. Unit Leader CPSU/UA.
- C. May, Larry A. 1970. Vegetation Type Map of Tucson Mountain Unit of Saguaro National Monument.
- D. Dr. R. M. Turner, 1974. Vegetation Map of the Tucson area.
- E. Wadleigh, Richard, 1969. Hypothetical Plant List of the Tucson Mountain Unit.
- F. Dr. Charles Mason, University of Arizona Botanist, Taxonomist and Herbarium Curator.

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Fire Ecology Study, SAGU-N-1.
3. STATEMENT OF PROBLEM: Fire Ecology Research must be accomplished in the Rincon Mountains in order to develop the Fire Management Plan, SAGU-RM-4.
4. WHAT HAS BEEN DONE: A fire atlas has been compiled which contains the history of fires in the Rincon Mountains since 1940.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: A Fire Ecology Study must address the following research needs:
 - A. Classify the biotic communities, and principal vegetation comprising each community, which will be used in the Rincon Mountain Fire Ecology Study, SAGU-N-1.
 - B. Determine the relationships of plants and plant communities to fire.
 - C. Determine burning characteristics and aerial spread of fire in the biotic communities.
 - D. Determine fuel loads in the biotic communities.
 - E. Compile a long-term fire history, and determine fire frequencies by core sampling trees, cross sectioning logs, and studying age structures.
 - F. Accomplish a literature review for relevant information on fires in similar montane ecosystems.
 - G. Define benefits to wildlife by diversification of habitats resulting from fires.
6. LENGTH OF TIME REQUIRED: One-half year.
7. WHAT WILL HAPPEN IF PROJECT IS NOT UNDERTAKEN: Failure to conduct this study will preclude development of the Revised Fire Management Plan, Rincon Mountains, SAGU-RM-4, and adequate prescriptions to allow a greater use of prescribed fire.
8. WHAT ARE THE ALTERNATIVES:
 - A. No action.
 - B. Continue implementing the existing Fire Management Plan.
9. PERSONNEL: Monument staff, Regional staff, U.S. Forest Service and University of Arizona personnel.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services	5,500	0	0	0	0
Other than Personal Services	500	0	0	0	0
Grand Total	6,000				
Funds available in Park Base	0	0	0	0	0
Funds requested from Regional Office	6,000				

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:

- A. Kathleen M. Davis, Plant Ecologist, Western Regional Office.
- B. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.
- C. Robert F. Wagle, University of Arizona.

12. DATE OF SUBMISSION: Revised March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Human Impact Assessment, Park General, SAGU-N-2.
3. STATEMENT OF PROBLEM: Determination of deleterious impacts on areas where increased human pressures are most evident has become a major Saguaro National Monument management concern within the last decade. Analyses required for an appropriate determination are complex and require in-depth investigation into all aspects of human impact and activity. All of the following user type activities are increasing dramatically:
 - A. Backcountry Users - Rincon Mountain Unit.
 1. Overnight backcountry hikers with permits.
 2. Overnight backcountry hikers without permits.
 3. Campers (1 and 2 above) with dogs and weapons, and campers who do not stay in designated sites.
 4. Para-military groups (Citizens Defense Force) "TRAINING" with weapons and explosives.
 5. Equestrian groups and individuals, both overnight and day use activities.
 6. Hikers making day trips only.
 7. Transient/indigent visitors who are non-resource oriented.
 8. Cactus and animal poachers, rock-hounds, and pot-hunters.
 9. Recreational runners (5 mountain marathons are held on trails annually).
 - B. Front Country Users - Rincon and Tucson Mountain Units.
 1. Tucson Mountain Unit Commuter Traffic across the Monument lands from Avra Valley.
 2. Visitors using motorcycles, cars, trucks, recreational vehicles, and busses compete with one another for recreational experiences on scenic drives in both units.
 3. On Cactus Forest Drive, at Rincon Mountain Unit, large numbers of bicyclists and runners interface with vehicles to reduce the quality of visitor experience for both groups.

4. Visitors who illegally feed wildlife along scenic drives and at picnic areas.
5. Visitor pets on and off leash, and free roaming dogs and cats from outside the boundaries of both units.
6. Horseback users on and off trails.
7. Motorized hang glider users.
8. Plant and animal poachers and pot-hunters.
9. Visitors who ignore entrance fees at Rincon Mountain Unit.
10. Visitors with non-resource oriented activities; such as, beer parties; frisbee, ball, and rock throwing contests; blaring radios; illegal drug users; sunbathing; love making; and other recreational uses.
11. Natural history and ecological investigators from Universities and other governmental agencies.
12. Vandals who destroy the physical facilities, especially in the Tucson Mountain Unit.

4. WHAT HAS BEEN DONE:

- A. Development of a tourist incentive questionnaire in 1979 by the Arizona Office of Tourism.
 - B. Tucson Mountain Unit visitor record keeping system was revised with assistance of Denver Service Center.
 - C. Hourly baseline data for 1981 was collected on visitor vs. vehicle numbers at Rincon Mountain Unit.
 - D. Visitor observation for interpretation records were maintained in 1979 and 1980 at Rincon Mountain Unit.
 - E. Vehicular traffic counter statistics and backcountry use statistics are compiled annually.
 - F. Horse counter statistics have been maintained since 1976 at five horse gates and at two locations on interior trails.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: A systematic inventory and analysis will be conducted of existing monument physical facilities (roads, trails, buildings); sensitive biotic and cultural areas; and user attitudes, preferences, perceptions, and activities. The integration of this data can be used to identify the principal factors affecting individual and combined constraints leading to the identification of sensitive use indicators; including physical, biotic, cultural, and user resources.

6. LENGTH OF TIME NEEDED: Two years.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management decisions concerning human impact will lack valuable scientific and public input. Hiking and nature trails, backcountry campsites, picnic facilities, cultural resources, and various flora and fauna habitats may deteriorate as a result of increasing human impact.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not impose constraints on visitor use.
 - B. Impose visitor use limitations based on subjective opinions.
9. PERSONNEL: An interdisciplinary team comprised of Behavioral Scientists, and Resource Management Specialists.
10. ADMINISTRATION AND LOGISTICS: Monument staff and research personnel would work as a team to combine data showing ecological and social relationships for arriving at management decisions regarding human impacts and carrying capacities at Saguaro National Monument.

Funding

	<u>1st</u>	<u>Year in Program Sequence</u>			
		<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services (Contract)	0	35,000	35,000	0	0
Other than Personal Services	0	0	0	0	0
Grand Total	0	35,000	35,000	0	0
Funds Available in Park Base	0	0	0	0	0
Funds requested from Regional Office	0	35,000	35,000	0	0

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:
 - A. Dr. Stanley K. Brickler, School of Renewable Natural Resources, University of Arizona.
 - B. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona
12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region
2. PROJECT NAME AND NUMBER: Fire Management Plan and Implementation of Initial Prescribed Burning, Rincon Mountain, SAGU-RM-4.
3. STATEMENT OF PROBLEM: In 1971, a natural prescribed fire plan was implemented at Saguaro. Data accumulated for over a decade indicate that the current prescription for natural prescribed fire cannot achieve the management goal of restoring fire to biotic communities of the Rincon Mountains. In addition, using prescribed burning is necessary to reduce hazardous fuels for the safety of people, structures, and biotic communities. Fire exclusion has created problems in the ecosystems by causing a trend toward minimizing plant diversity and the natural succession of vegetation following fires. Montane vegetation has evolved with fire, so it is an essential element in maintaining natural plant community composition along with climatic, geographic, and edaphic factors. Effective removal of fire for nearly three decades has led to heavy accumulation of fuels and alteration of fire related processes in all the biotic communities of the Rincon Mountains.

Monument wildlife has been adversely affected by the absence of fire because of less diversity of vegetation. Many animals are dependent upon conditions created by periodic fires with abnormal energy flow and food chains resulting from the absence of fires.

4. WHAT HAS BEEN DONE: No effort has been made to use prescribed burning to augment the existing fire management plan. A fire history from 1940 exists.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Fire Management actions will enable the Fire Management Plan to be revised, based on the fire ecology study, Project Statement SAGU-N-1. The study will indentify and relate biotic communities to fire, ascertain fuel loads, indicate long-term fire history, and define wildlife benefits.
6. LENGTH OF TIME NEEDED: Long-term project.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Fuel accumulations, already quite high in most montane environments, will increase and may cause very hot fires that could be difficult or impossible to suppress. Natural fire will be excluded from the biotic communities, and adverse effects on wildlife will continue with less habitat diversity, or complete destruction of habitat by holocaustic fires.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not suppress any fires.
 - B. Suppress all fires.

C. Continue to use the approved natural prescribed fire plan.

9. PERSONNEL: Monument staff, Regional Specialists, U.S. Forest Service Staff, and University Specialists.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	10,000	10,000	10,000	0	0
Other than personal services		0	0	0	0
Grand total	10,000	10,000	10,000	10,000	10,000
Funds available in park base	0	0	0	0	0
Funds requested from Regional Office	10,000	10,000	10,000	0	0
<u>On Form</u>	<u>Date Submitted:</u>				
10-237	April 1982				

11. REFERENCES AND CONTACTS:

- A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.
- B. Kathleen M. Davis, Plant Ecologist, Western Regional Office.
- C. Robert F. Wagle, Fire Ecologist, University of Arizona.
- D. Area Management Plan for prescribed Natural Fire.
- E. United States Forest Service Plan for natural prescribed fire in the Rincons.
- F. Fire Atlas, Rincon Mountains.

12. DATE OF SUBMISSION: Revised March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region
2. PROJECT NAME AND NUMBER: Air Quality Monitoring, SAGU-AQ-1.
3. STATEMENT OF PROBLEM: Air Quality related values, such as visibility of panoramas within the park, and long-range vistas outside the park are primary attractions essential to visitor enjoyment of the natural resources. Air pollution of the Tucson Basin and surrounding inter-montane valleys is readily discernable most days of the year from vistas in both the Rincon and Tucson Mountain Units.

The Tucson Air Planning Area is currently classified by the State of Arizona as a non-attainment area for carbon monoxide and particulates. In the foreseeable future the Tucson Air Planning Area may become a non-attainment area for oxidants (ozone). In 1981, the EPA standard of .12 PPM in one hour average concentration occurred often in downtown Tucson, but was not exceeded.

Urban areas of over one-half million population, such as Tucson, may have oxidant levels which can cause vegetation damage (reduced growth with and without symptoms). In Tucson, the damage caused by ozone in combination with other photochemical oxidants (PAN) has not been determined.

Southern Arizona copper smelters emit sulfur dioxide which eventually forms various sulfates and reaches the Monument, but concentrations are so low that vegetation damage would not be expected. The smelters are exempt from requirements for installation of BART (Best Available Retrofit Technology), to prevent impairment of visibility in Class I areas.

4. WHAT HAS BEEN DONE: Nothing.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN:
 - A. Determine if ozone monitoring should be conducted at Rincon Mountain Unit or Tucson Mountain Unit.
 - B. Obtain and install an ozone monitor if a determination is made to conduct air quality studies.
 - C. Develop an agreement with the Pima County Air Quality Control District for calibration and precision testing of monitor.
 - D. Operate the monitoring equipment.
 - E. If possible, ascertain any vegetation damage from pollutants.

6. LENGTH OF TIME NEEDED: Long-term project.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Changes in air quality will be undetermined. Possible vegetation damage may go undetected.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do nothing and rely on data from Pima County Air Quality Control District.
 - B. Contract for Pima County Air Quality Control District to provide monitoring equipment in the Monument.
 - C. Monument personnel to monitor ozone with training and assistance from the Pima County Air Quality Control District.
9. PERSONNEL: Pima County Air Quality Control District Technicians and Monument staff.
10. ADMINISTRATION AND LOGISTICS: Western Regional Office to provide ozone monitoring equipment and Pima County Air Quality Control District to assist in calibration and precision testing.

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Grand Total	23,500	13,500	13,500	13,500	13,500

On Form:
10-237

Date Submitted:
April 1982

11. REFERENCES AND CONTACTS:
 - A. Bill Mount, Chemist, Pima County Air Quality Control District.
 - B. Dr. James P. Bennett, Environmental Specialist, Denver Service Center.
 - C. Donald N. Christensen, Regional Air Quality Coordinator, Western Regional Office.
 - D. Dr. Roger Caldwell, Plant Pathologist, University of Arizona.
12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguario National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Vegetation Type Map, Rincon Mountain Unit, SAGU-N-3.
3. STATEMENT OF PROBLEM: Accurate knowledge of vegetation types, and biotic communities, in the Rincon Mountains is essential to the fire ecology study (SAGU-N-1) and the development of a fire management plan (SAGU-RM-4). This knowledge is also necessary for wildlife management and visitor use decision making and for interpretive purposes. The mapping is needed to measure future environmental changes in species composition and species evolution. Two vascular plant surveys currently underway in the Rincon Mountain Unit will become much more valuable when synchronized with a vegetation type map.
4. WHAT HAS BEEN DONE: The National Park Service Branch of Forestry, Civilian Conservation Corp, and Works Projects Administration produced a vegetation type map of the Rincon Mountains in 1937. The survey has limited usefulness now because of climatic changes, grazing, fire suppression, and some large wildfires. Vascular plants of the Rincon Mountains are currently being surveyed under research grants by the Cooperating Natural History Association (Southwest Parks & Monuments Association).
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Utilize remote sensing techniques involving ground-truthing, color photography, and mapping at a scale of 1:24,000.
6. LENGTH OF TIME NEEDED: One year.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Resource management decisions on fire and wildlife will have to be based on inadequate or outdated knowledge. Accurately quantifying and qualifying environmental changes will be impossible. Lack of baseline data, including species diversity, composition, density, and successional dynamics will be a constraint on Fire Management Program decisions, Resource Management Project Statement (SAGU-RM-4). Wildlife habitats will not be delineated, since the biotic communities will not be accurately defined.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do nothing.
 - B. Base fire management actions (prescribed burns) on the fire ecology study (SAGU-N-1) without the aid of current knowledge on vegetation types. Utilize the outdated 1937 vegetation type map.
9. PERSONNEL: Remote Sensing, Office of Arid Land Studies, University of Arizona.

10. ADMINISTRATION AND LOGISTICS:

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services	0	0	0	0	0
Other than Personal Services	30,000	0	0	0	0
Grand Total	30,000	0	0	0	0
Funds Available in Park Base	0	0	0	0	0
Funds requested from Regional Office	30,000	0	0	0	0

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:

- A. Blumer, J.C. 1910. A Comparison Between Two Mountain Sides, The Plant World.
- B. Humphrey, R. R. 1960. Forage Production on Arizona Ranges; Pima, Pinal and Santa Cruz Counties.
- C. Kearney, T. H. and R. H. Peebles. 1960. Arizona Flora. U. Cal Press, Berkeley, CA. 2nd Ed.
- D. May, Larry A. 1970. Vegetation Type Map of Tucson Mountain Unit of Saguaro National Monument.
- E. Marshall. 1956. Summer Birds of the Rincon Mountains, Saguaro National Monument. The Condor, Vol 58, March-April 1956.
- F. Dr. Charles Mason, University of Arizona Botanist, Taxonomist and Herbarium Curator.
- G. Dr. Kim Mortensen, Office of Arid Land Studies, University of Arizona.
- H. Dr. David Mouat, Director, Remote Sensing Program, Office of Arid Land Studies, University of Arizona.
- I. Roseberry, R. D. and N. E. Dole. 1937. The Vegetation Type Survey of Saguaro National Monument.
- J. Steenbergh, W. F. 1967. Preliminary Checklist of the Cacti of the Rincon Mountain Unit of Saguaro National Monument.

K. Shreve, F. and I. L. Wiggins. 1964. Vegetation and Flora of the Sonoran Desert.

L. Unit Leader, CPSU/UA.

M. Turner, R. M. 1974. Map Showing Vegetation in the Tucson Area.

N. Wadleigh, Richard 1969. Plant Lists for Rincon and Tucson Mountain Unit of Saguaro National Monument.

12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Vertebrate Fauna Monitoring, Rincon Mountain Unit and Tucson Mountain Unit, SAGU-N-4.
3. STATEMENT OF PROBLEM: The highly diverse biotic communities of the Monument support a vertebrate fauna about which little is known regarding seasonal distribution and abundance of present vertebrate populations. Cattle grazing, fire suppression, and human encroachment on lands adjacent to the Monument have altered the natural biotic communities and their dependent fauna. Data concerning vertebrates, past and present, is essential to identify problem areas needing detailed ecological analysis.
4. WHAT HAS BEEN DONE: Observation records have been maintained since Saguaro National Monument was established. Current checklists have been maintained on birds and large mammals, and extensive research has been conducted on heteromyid rodents. An extensive wildlife monitoring project in the Tucson Mountains is currently underway by the Arizona Game and Fish Department, and will result in an Environmental Impact Statement for the Central Arizona Project in June, 1982.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: A long-term monitoring project is needed to map changes in distribution and abundance of Monument's vertebrate populations. Studies will lead to recommendations for management of locally rare species. Very little is known about populations of tree-squirrels, turkeys, white-tail deer, black bear, and coati-mundi. A historic overview of fauna history should be included in this project. Successful breeding of exotic lizards in King Canyon in the Tucson Mountain Unit have been reported and needs investigation. The initial planning and set-up of transects would cost considerably more than the routine annual monitoring operation.
6. LENGTH OF TIME NEEDED: Long-term project.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Knowledge of vertebrate species will be incomplete for interpretive purposes and for compliance with the Endangered Species Act of 1973. Management's decisions regarding visitor use and impacts, and the fire management program will be based on limited knowledge with possibly unforeseen adverse consequences to certain vertebrate species. Growing visitor contact with front country fauna, such as Javelina, are having deleterious impacts on the animals. Free roaming dogs in both units and snake collecting in the Tucson Mountain Unit are having deleterious impacts. Tucson's population growth will affect the Monument's fauna more severly with each passing year.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do nothing.

B. Base decisions on information collected at random.

9. PERSONNEL: Monument staff and contract to be coordinated through Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.

10. ADMINISTRATION AND LOGISTICS:

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services	0	0	8,000	4,000	4,000
Other than Personal Services	0	0	2,000	0	0
Grand Total	0	0	10,000	4,000	4,000
Funds available in Park Base	0	0	0	0	0
Funds requested from Regional Office	0	0	10,000	4,000	4,000

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:

- A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.
- B. Dr. Lyle K. Sows, University of Arizona, Cooperative Wildlife Research Unit, University of Arizona.
- C. Dr. E. Lendell Cockrum, Mammalogist, University of Arizona.
- D. Rincon Mountain Unit and Tucson Mountain Unit wildlife observations records.

12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Vegetation Analysis on Tanque Verde Grazing Allotment, SAGU-N-5.
3. STATEMENT OF PROBLEM: Livestock grazing ended on Tanque Verde Allotment in May, 1978. Natural regeneration of native vegetation and such exotics as lovegrasses and natal grass is starting in this area where the condition of the vegetation and soils has been substantially altered.
4. WHAT HAS BEEN DONE: Baseline data was collected on 10 study plots during the spring of 1976.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: The study plots need to be resurveyed and analyzed at 10 year intervals.
6. LENGTH OF TIME NEEDED: Four months for data collection and analysis.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management will not know the plant species composition and recovery rate of vegetation in the area. If historic information is not available to document the recovery rate, future management decisions, such as use of fire, will not be based on scientific data.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not resurvey.
 - B. Shorten or extend the intervals between surveys.
9. PERSONNEL: Contract, University of Arizona based scientists.
10. ADMINISTRATION AND LOGISTICS: The surveys will be coordinated through the Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal Services	0	0	6,000	0	0
Other than Personal Services	0	0	500	0	0
Grand Total			6,500		
Funds available in park base	0	0	0	0	0
Funds requested from Regional Office			6,500		

On Form

10-237

Date Submitted:

April, 1982

11. REFERENCES AND CONTACTS:

A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.

B. Area files containing baseline data.

12. DATE OF SUBMISSION: March 30, 1982.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Saguaro Population Monitoring (SAGU-N-6).
3. STATEMENT OF PROBLEM: Knowledge of the status and trend of saguaro cactus populations in characteristic and topographically dissimilar habitats provides a measure of the effect of climatic change, and is necessary for management decisions and interpretation.
4. WHAT HAS BEEN DONE: Ten saguaro population study plots (4 in Tucson Mountain Unit, 6 in Rincon Mountain Unit) were established in 1975 to monitor long-term historic status and subsequent trend of the populations; thus establishing a basis for predicting the future conditions of these populations.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Monitor the study plots at ten year intervals. The first ten year resurvey and analysis should be scheduled for FY 1985.
6. LENGTH OF TIME NEEDED: This is a long-term investigation.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management and interpretive information will be lacking on this key natural resource of the park.
8. WHAT ARE THE ALTERNATIVES:
 - A. No Action.
 - B. Use available data.
9. PERSONNEL: Monitoring will be accomplished under contract by University of Arizona based scientists under the direction of the Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona.
10. ADMINISTRATION AND LOGISTICS:

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	0	0	3,000	0	0
Other than Personal Services	0	0	2,500	0	0
Grand Total			5,500		
Funds available in park base:	0	0	0	0	0
Funds requested from Regional Office	0	0	5,500	0	0

On Form

10-237

Date Submitted

April 1982

11. REFERENCES AND CONTACTS:

- A. Dr. R. Roy Johnson, Unit Leader, Cooperative National Park Resources Studies Unit, University of Arizona
- B. Dr. Raymond M. Turner, Research Botanist, U.S. Geological Survey, Tucson, Arizona
- C. Dr. Stanley M. Alcorn, Plant Pathologist, University of Arizona.
- D. Publications of the Desert Botanical Laboratory, 1903-1940.
- E. Bibliography: The Saguaro Giant Cactus, by Warren F. Steenbergh, Research Scientist, Saguaro National Monument, 1974.

12. DATE OF SUBMISSION: March 30, 1982

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region
2. PROJECT NAME AND NUMBER: Water Resources Management Plan, SAGU-W-1.
3. STATEMENT OF PROBLEM: In compliance with Public Law 92-500, (Federal Water Pollution Control Act) and as amended by Public Law 95-217 (Clean Water Act of 1977) and as furthered by the Service Memorandum of Understanding with Environmental Protection Agency (EPA), each area must develop a Park Water Plan.
4. WHAT HAS BEEN DONE: A well and spring inventory has been completed for the Rincon Mountain Unit of the park and a similar inventory has been started for the Tucson Mountain Unit. This information has been collected to complete Statement of Claimant forms for response to the Department of Justice with regards to the State of Arizona Adjudication of the San Pedro River and in anticipation of the registration of all existing wells as required by the Arizona Groundwater Management Act of 1980. A cursory inventory of the water quality of the park's ground and surface waters has also been completed for those sites visited.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN:
 - A. An historical report on management of water resources in the park.
 - B. Classification of all surface waters by present and proposed uses.
 - C. An analysis of the present status of park waters, including:
 1. Identification of water quality required to support specified uses and, where appropriate, to comply with or assist in establishing state water quality standards.
 2. Relationship of water quality to any threatened, known rare or endangered species indigenous to the park and the relationship of water quality to the protection of all natural resources.
 3. A bibliography of available information concerning the existing quality of park waters.
 - D. A description of proposed actions relating to management of park waters.
 - E. A detailed plan for monitoring the quality of park waters that will reveal existing water quality and significant trends.

6. LENGTH OF TIME NEEDED: Two years.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Damage or loss of water resources may occur.
8. WHAT ARE THE ALTERNATIVES: Do nothing.
9. PERSONNEL: Staff of Western Region, Division of Water Resources; Independent Consultants or other Federal agencies and monument staff.
10. ADMINISTRATION AND LOGISTICS:

Funding

	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services		4,000	2,000	0	
Other than personal services		8,000	6,000	0	
Grand Total		12,000	8,000		
Funds available in park base	0	0	0	0	0
Funds requested from Regional Office		12,000	8,000		

On Form

10-237

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:

A. Division of Water Resources, Western Regional Office

12. DATE OF SUBMISSION: Revised - March 30, 1982.

CULTURAL RESOURCES MANAGEMENT

Overview and Needs

Management cannot begin obliteration and environmental rehabilitation of the numerous mining sites in the Tucson Mountain Unit until a historic significance survey, in terms of National Register criteria, is conducted for each mine and prospect hole, mining structures, mining roads, and overburden dumps. Tucson Mountain Unit wilderness landscapes are replete with ugly mining scars of old roads and mine dumps. These anachronistic features on wilderness lands need to be obliterated, and the areas restored to appear as part of the undisturbed desertscrub biotic community again.

Archeological resources inventories in the Rincon and Tucson Mountain Units need to be conducted for compliance with Executive Order No. 11593. Approximately 12% of the Rincon Mountain Unit, all within the Rincon Foothills Archeological District, has been surveyed. About 3% of the Tucson Mountain Unit has been surveyed. Surveys in both units were conducted along major road and trail corridors.

The annual Papago Indian Saguaro Fruit Harvest in the Tucson Mountain Unit will be examined during the 1982 summer harvest season. A meeting with park staff and Indians on-site will give insights to the fruit harvest operation, camping area problems, harvest/campsite visitation by educational groups and other park visitors. Harvest camping has been in progress for seven years and needs to be studied objectively for improvement.

The list of Classified Structures for Saguaro National Monument is incomplete, and the National Register listings are incomplete. The museum catalog records for cultural materials are current.

Archeological site monitoring in the Rincon Mountain Unit is the cultural resource project with the highest priority, especially those sites located in the maze of horse trails in the lower cactus forest. Loss of cultural material is occurring as a consequence of soil erosion of the trails in archeological sites. Transects for monitoring purposes were set up at one site. Pot hunting has occurred in recent years, and petroglyphs continue to be removed and vandalized in both units. Horse trails crossing archeological sites will be rerouted as stated in the Natural Resources Project Statement, Horse Trail Rehabilitation and Resource Protection, SAGU-RM-1.

Interpretation of cultural resources, both historic and prehistoric, is of secondary significance to the natural history and ecological relationships of Monument flora and fauna. The Archeological Overview of Saguaro National Monument is an excellent document and an adequate source for current prehistoric interpretive endeavors at Saguaro National Monument.

Cultural Resources Project Programming Sheet

Saguaro National Monument

December 1982

NPS Costs Expressed in \$1000

Area Reference Priority No.	Project Title	Yr. 1		Yr. 2		Yr. 3		Yr. 4		Yr. 5		Form No. & Date 10-250 10-237 10-238
		BASE	NEW	BASE	NEW	BASE	NEW	BASE	NEW	BASE	NEW	
1. A-1	Archeological Site Monitoring - RMU	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	04/82
2. A-3	Inventory Archeological Survey - RMU	40.0	40.0									04/82
3. H-1	Historic Resources Study - Park General	20.0										04/82
4. A-2	Inventory Archeological Survey - TMU	23.0										04/82

CULTURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Archeological Site Monitoring (A-1).
3. STATEMENT OF PROBLEM: Numerous horse trails occur in archeologically sensitive areas scattered throughout the lower cactus forest, and loss of cultural material is occurring in some areas due to equestrian impact. The potential for pot-hunting is high near the mouth of Box Canyon and at the Four Saguaros Rockshelter. Extensive vandalism to petroglyphs has already occurred on Tanque Verde Ridge near the SW corner of the monument.
4. WHAT HAS BEEN DONE: Two reports have been prepared by Archeologist Thomas King, in 1977: "An Archeological Survey of Some Horse Trails in Saguaro National Monument" and "Cultural Resources and the Impact from Horse Trail Use in Saguaro National Monument." A report prepared by a Pima Community College Archeological Team in 1977: "Four Saguaros Rockshelter." Occasional ranger patrols are made to the Box Canyon area to ascertain vandalism to cultural resources. Pot-hunting evidence has been found in recent years.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Continue the ranger patrols to the mouth of Box Canyon to detect vandalism. Continue ranger inspection patrols to the Four Saguaros Rockshelter as recommended in the 1977 Pima Community College report to periodically photograph the midden surface to detect changes. An archeological site impacted by equestrian use in the lower cactus forest is being monitored for surface disturbing activity by a qualified archeologist. Horse trails must be rerouted around the archeological sites, or the sites must be fenced to keep horseback riders out.
6. LENGTH OF TIME NEEDED: Long-term Project.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Loss of cultural resources may occur in violation of Executive Order No. 11593. The loss of such resources may be prevented or reduced through early detection of vandalism and equestrian impact on archeological sites.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not monitor sites.
 - B. Contract all the monitoring through the Western Archeological and Conservation Center.
 - C. Accomplish all the monitoring with monument staff.

9. PERSONNEL: WACC archeologists and monument staff.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	1,500	1,500	1,500	1,500	1,500
Other than personal services	0	0	0	0	0
Grand Total	1,500	1,500	1,500	1,500	1,500
Funds available in base:	0	0	0	0	0
Funds requested from Regional Office:	1,500	1,500	1,500	1,500	1,500
<u>On Form:</u> 10-238				<u>Date Submitted:</u> April 1982	

11. REFERENCES AND CONTACTS:

- A. Dr. Keith Anderson and Don Morris, Western Archeological and Conservation Center.
- B. Reports listed under Item #4.
- C. "Saguaro National Monument, An Archeological Overview" by V. K. Pheriba Stacy and Julian Hayden, June 1975.

12. DATE OF SUBMISSION: March 30, 1982

CULTURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Inventory Archeological Survey, Rincon Mountain Unit (A-3).
3. STATEMENT OF PROBLEM: Archeological research in the Rincon Mountain Unit consists of several surveys of varying degrees of coverage, which are the starting point for systematic archeological investigations needed. The major survey, by Jack Zahniser in 1965, provided no precise maps or descriptions; so the areas he surveyed cannot be accurately determined.
4. WHAT HAS BEEN DONE: Zahniser's 1965 survey; King's two 1976 Horse Trail Surveys and 1976 Javelina Rockshelter Report; Pima College 1977 report on the Four Saguaro Rockshelter, Goddard's 1976 report Archeological Survey Report for Manning Camp. Also, some sites were discovered in the early 1940's, which were occasionally recorded and filed with Gila Pueblo or the Arizona State Museum. Approximately 12% of the Rincon Foothills Archeological District has been surveyed. There are an estimated 600 to 800 sites in the District.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: An intensive archeological survey requiring on-foot ground coverage which will result in a final report based on a comprehensive research design. The survey would encompass all major lands below the 3,600' contour, and all major canyons, peaks, and rockshelters in the Rincon Mountains within the external monument boundaries. The initial survey should be accomplished in the Rincon Foothills Archeological District.
6. LENGTH OF TIME NEEDED: Two years.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: The archeological resources of the Rincon Mountain Unit will remain largely unknown. Legislation regarding historic preservation will not be satisfied, and knowledge of pre-historic occupancy will not be available for interpretive purposes.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not survey.
 - B. Survey areas that are impacted by visitors to identify and protect cultural resources.

9. PERSONNEL: WACC and university personnel.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	30,000	30,000	0	0	0
Other than personal Services	10,000	10,000	0	0	0
Grand Total	40,000	40,000			
Funds available in park base:	0	0	0	0	0
Funds requested from Regional Office:	40,000	40,000			

On Form

Date Submitted:

10-238 .

April 1982

11. REFERENCES AND CONTACTS:

A. Dr. Keith Anderson and Don Morris, Western Archeological and Conservation Center.

B. Reports listed under Item #4.

C. "Saguaro National Monument, An Archeological Overview" by V. K. Pheriba Stacy and Julian Hayden, June 1975.

12. DATE OF SUBMISSION: March 30, 1982

CULTURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Historic Resources Study (H-1).
3. STATEMENT OF PROBLEM: Prior to any environmental rehabilitation, obliteration, or removal projects at mining sites, old roads, dam structures, and building foundations, all such existing cultural features will be evaluated for historical significance in terms of National Register criteria for compliance with Executive Order No. 11593. Mine shafts which are fenced or will soon be fenced can then be rehabilitated to appear natural. Please refer to SAGU-RM-3, Mine Shaft Fencing, in the Natural Resource Management Program.

Human activities, other than Indian, occurred on monument lands prior to establishment in 1933 (Rincon Mountain Unit) and 1961 (Tucson Mountain Unit). Quicklime production, woodcutting, grazing, hunting, plant collecting, mining, logging and farming (Rincon Mountains), homesteading and other activities are all documented in the monument's historic resources file. To understand and interpret these historic activities, a synthesis of historic information from all available sources needs to be undertaken. Some interviews still need to be conducted for historic resource documentation.

4. WHAT HAS BEEN DONE: The park staff has compiled a historic resources file, and has conducted interviews with "old-timers."
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: The monument requires a general historic background study in a usable format. Review of source material is required to gain more knowledge about Manning Cabin, which is on the National Register, and to augment description and evaluation of sites which may have potential for nomination to the State Register. A background study and historical base map needs to be compiled with recommendations concerning management of man-made structures, especially those associated with mining. Special emphasis on grazing history should provide knowledge about past ecological conditions of the saguaro forests which will aid in management and interpretation of the park.
6. LENGTH OF TIME NEEDED: One year.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Park developments may not have adequate management guidelines for preservation of historical resources, in violation of Executive Order No. 11593. The historical aspect of the park's interpretive program will remain inadequate. If former woodcutting, plant collecting, and cattle grazing activities in the

cactus forest could be quantified; then researchers and resource managers could more accurately predict natural ecosystem recovery based on man-caused factors of environmental change.

8. WHAT ARE THE ALTERNATIVES: Use existing information supplemented by opportunity gathered data.
9. PERSONNEL: Service and/or university personnel.
10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	17,000	0	0	0	0
Other than personal Services	3,000	0	0	0	0
Grand Total	20,000				
Funds available in park base:	0	0	0	0	0
Funds requested from Regional Office:	20,000				

On Form

10-238

Date Submitted:

April 1982

11. REFERENCES AND CONTACTS:
 - A. Historic resources file in naturalist division.
12. DATE OF SUBMISSION: March 30, 1982.

CULTURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Saguaro National Monument, Western Region.
2. PROJECT NAME AND NUMBER: Inventory Archeological Survey, Tucson Mountain Unit (A-2).
3. STATEMENT OF PROBLEM: The only survey in the Tucson Mountain Unit provided minimal coverage, and is adequate both as an inventory and for management purposes. An intensive survey of the area is necessary to identify sites and areas that need protection for preservation, and to learn the type and distribution of cultural resources for interpretation, and to satisfy the requirements of existing Federal legislation regarding historic resources preservation.
4. WHAT HAS BEEN DONE: A 1965 survey by Jack Zahniser recorded 29 sites. A 1962 stylistic study of some petroglyph sites was made by Cheryl White. Monument personnel have recorded several sites which indicate that Zahniser's survey omitted lithic workshops and hearths. Road and trail corridors were surveyed by Pima Community College archeologists in 1979.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: Conduct an inventory archeological survey to assess the numbers, kinds and locations of all cultural resources. Future research cannot proceed without a well designed and well executed inventory survey. Research design and road and trail corridors are to be included in the first year of work.
6. LENGTH OF TIME NEEDED: One year.
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management decisions will not be based on knowledge of cultural resources in violation of Executive Order No. 11593, and information for interpretive purposes will remain unknown.
8. WHAT ARE THE ALTERNATIVES:
 - A. Do not survey.
9. PERSONNEL: WACC and university personnel.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>
Personal services	15,000	0	0	0	0
Other than personal Services	8,000	0	0	0	0
Grand Total	23,000				
Funds available in park base:	0	0	0	0	0
Funds requested from Regional Office:	23,000				

On Form

Date Submitted:

10-238

April 1982

11. REFERENCES AND CONTACTS:

- A. Dr. Keith Anderson and Don Morris, Western Archeological and Conservation Center.
- B. Reports listed under Item #4.
- C. Special Report by Ken Rozen in 1977: "A Comparative Analysis of Three Southwestern Lithic Samples with Special Reference to the Nature and Availability of Raw Materials."
- D. "Saguaro National Monument, An Archeological Overview" by V. K. Pheriba Stacy and Julian Hayden, June 1975.

12. DATE OF SUBMISSION: March 30, 1982.

