



CHIRICAHUA

NATIONAL MONUMENT
ARIZONA

NATURAL RESOURCES MANAGEMENT PROGRAM


FEBRUARY 1980

AN ADDENDUM
TO THE
NATURAL RESOURCES
MANAGEMENT PLAN

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NATURAL RESOURCES MANAGEMENT PLAN
FOR
CHIRICAHUA NATIONAL MONUMENT
FEBRUARY 1980

Prepared By
CHIRICAHUA NATIONAL MONUMENT
NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR



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ABSTRACT

This Management Program is an action document designed to assist the Superintendent in carrying out the Natural Resources Management Plan for Chiricahua National Monument. The Management Program consists of:

- A. A Status List of Proposed Natural Resource Projects for the monument.
- B. Natural Resources Project Statements that serve as "blueprints" or "mini-assessments" for proposed projects.
- C. A Natural Resources Projects Programming Sheet listing each project and showing: its relative park priority; funding and manpower requirements; and a work schedule for a five-year period.

The Natural Resources Management Plan outlines a continuing long-term program for natural resource management and research. The Management Program presented here however, proposes specific projects to be carried out, subject to availability of funds, for five years beginning with Fiscal Year 1980. The Management Program will be revised and updated approximately annually as work is completed and as the need arises to revise priorities and to add new management or research project statements.

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STATUS LIST OF PROPOSED NATURAL RESOURCE PROJECTS
FOR CHIRICAHUA NATIONAL MONUMENT

<u>PROJECT NAME AND REFERENCE NUMBER</u>	<u>PROPOSED START* IN FISCAL YEAR</u>	<u>PROPOSED ENDING IN FISCAL YEAR</u>
Expand The Resource Monitoring System (RM-1)	1981	Continuing
Boundary Fencing (RM-2)	1982	1986
Bonita Campground Periphery Trail (RM-3)	1980	1982
Closure and Rehabilitation of Heavy Use Areas (RM-4)	1980	1984
Site Management With Native Plants (RM-5)	1980	1984
Endangered Species Management (RM-6)	1980	1984
Fire Management (RM-7)	1980	1981
Vertebrate Inventory (N-1)	1980	1981
Air Quality Monitoring System (N-2)	1980	1984
Soils Research (N-3)	1983	1985
Fire Ecology Research (N-4)	1980	1981
Endangered Species Research (N-5)	1981	1982
Natural Resources Basic Inventory (N-6)	1981	1985

*Projects will start in fiscal years as indicated only if funds are available.
Proposed new starts will depend mainly on funds requested from the National
Park Service, Western Regional Office.

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region
2. PROJECT NAME AND NUMBER: Expand The Resource Monitoring System
CHIR-RM-1

3. STATEMENT OF THE PROBLEM:

A knowledge of the current status and changes in vegetation and soil conditions for different management zones is necessary in order to identify areas of high visitor or maintenance impact. Baseline measurements were initiated in 1974 and continued assessment and monitoring are required to assist management in deciding when restorative measures must be undertaken. In addition, monitoring is necessary to identify natural changes in the monument and to provide baseline information for future manipulative or experimental projects.

4. WHAT HAS BEEN DONE:

In 1939, a vegetation survey of the monument was completed by R. D. Roseberry and N. E. Dole. The study included photographs of major vegetation features and production of a vegetation type map. Their field data provide old records of the approximate vegetation composition as it existed at that time. Mr. Tim Reeves of Arizona State University also completed an excellent Vegetation and Flora of Chiricahua National Monument in 1976.

In March and April of 1974, fully quantitative procedures for resource monitoring were worked out and field measurements initiated by Dr. Will Moir. At present, the Resource Monitoring System consists of 115 field

plots at 15 locations and approximately one dozen permanent photopoints. The initial data from these has been summarized, and a baseline vegetation and soil evaluation has been made.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

Existing plots need to be re-examined in late summer or autumn when vegetation reaches highest foliar densities after summer rains. Lost or vandalized plots need replacement, and new plots installed. Additional photopoints based upon 1936-1937 locations need to be re-found and photographed.

Voucher plant specimens need to be collected to firm up the taxonomic base of plot description.

Personnel of the monument's staff need on-the-job training necessary for future updating and maintenance of the resource monitoring system.

Statistical summaries and data analysis must be performed, and the initial report, Resource Monitoring System, revised and updated to include all of the 1974 data. Similar analyses must be continued in subsequent years.

6. LENGTH OF TIME REQUIRED:

The monitoring system was completed in its basic dimensions by the end of CY 1974. Annual maintenance and monitoring are now required. Professional assistance will be required every 3 to 5 years to insure the continuing accuracy of the program.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Management will not have accurate data on which to make decisions concerning natural resources. Mistakes or simply not knowing could result in a loss or serious impairment to the resource.

8. WHAT ARE THE ALTERNATIVES:

A. Continue the visual monitoring system, without use of quantitative plot measurements. The visual evaluation of natural resources and their responses to both natural and man-caused impacts has to date provided a poor method of assessing the land manager's responsibility in fulfilling the preservation and perpetuation requirements of Service directives. In view of the limited number of monument visitors in the past, the visual qualitative assessment may have been at best satisfactory, however, this method did not give scientifically accurate and documented evidence of resource conditions or trends, nor reveal these trends to management personnel quickly enough to prevent serious deterioration of the resource.

B. Employ alternative techniques of resources monitoring. Techniques of remote sensing are becoming increasingly useful, available, and sensitive to changing resource conditions. It should be noted, however, that satisfactory remote sensing data interpretation usually requires ground truth information of the type provided by small plots or other field techniques such as the Resource Monitoring System. Also, resolution scales may not be appropriate for micro-site observations of vegetation or soils. In addition, the cost factor must be considered, especially in the early stages of resource monitoring.

C. Alternative field methodologies of resource monitoring, such as examination of fossil sequences, study of landforms of differing ages, comparison of existing features with old records, and other varieties of sampling procedures, have been documented in the references below and could be adapted into the existing monitoring program whenever appropriate.

9. PERSONNEL:

Approximately 0.1 MY will be required on an annual basis to carry out the work described. Manpower capable to doing this work is presently available and additional manpower requirements are programmed under Operating Program Increases for the monument. (CHIR-8620-2)

10. ADMINISTRATION AND LOGISTICS:

Once every three years, assistance from a qualified plant ecologist may be required to review the monitoring system.

Funding:

Funding is available for work which would be accomplished by the park staff. An additional \$5,000 would be required for a program evaluation. Cyclic funding, every three years, is proposed for this purpose.

11. REFERENCES AND CONTACTS:

Brown, Dorothy, 1954. Methods of Surveying and Measuring Vegetation,
Bulletin 42, Commonwealth Agric. Bureau, Farnham Royal, Bucks,
England, 223 pp.

- Cain, S. A. and C. M. de Oliveira Castro, 1959. Manual Of Vegetation Analysis, Hafner Publications Co., New York, N.Y., 325 pp.
- Daubenmire, R., 1968. Plant Communities, a textbook of plant synecology, Harper and Row, New York, N.Y., vii, 300 pp.
- Moir, W. H. and J. F. Franklin, 1972. Baseline Measurement Programs On Federal Research Natural Areas. Report No. 1 to the Pacific N. W. Natural Area Committee, 20 unnumbered p., mimeo.
- Murray, W. B. Park Ranger, National Park Service, Chiricahua National Monument.
- National Academy of Sciences, 1970. Remote Sensing With Special Reference To Agriculture And Forestry, N.A.S. Washington D.C. 424 pp.

12. DATE OF SUBMISSION:

January 1, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Boundary Fencing
CHIR-RM-2

3. STATEMENT OF THE PROBLEM:

Cattle grazing on both private and National Forest lands which surround the monument is an important part of the local economy. Of the 18.5 miles of exterior boundary, approximately 9 miles are unfenced.

The Resource Monitoring System in the Northwest (lower Picket Park) region indicates that grazing and bedding of livestock reduced grass canopy coverage and left many cattle trails. In portions of the Southeast region (East Whitetail Canyon) grazing pressure has lowered grass canopy cover and otherwise altered natural vegetation systems. In addition, cattle grazing is not compatible with the purpose for which the monument was established and is not provided for by law.

4. WHAT HAS BEEN DONE:

Fencing of the boundary has been accomplished on those sections where in the past grazing has had the greatest adverse impacts. Trespass grazing has been eliminated at present but fencing has been proposed for the remaining open boundary. Local ranchers have been cooperative in attempting to discourage cattle trespass by placement of water and salt some distance from the boundaries. When cattle by-pass fences, and are discovered, owners have removed them as quickly as possible.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

The remaining portions of the monument boundary should be fenced before grazing impacts occur. Four strand barbed-wire fence, or other fencing which will allow safe passage by native wildlife, will be used

6. LENGTH OF TIME NEEDED:

The project will be completed as funds become available. Construction time etc., will be determined by engineer's estimates.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Additional trespass grazing could occur in the monument at some future time and result in serious natural resource deterioration. As demands on the land outside the park become greater, or Coronado National Forest grazing permits increase, more animals could become dependent on the environment adjacent to unfenced sections of the monument, trespass into the park and alter vegetation systems. In addition, fencing would delineate the lawful monument boundaries and assist in law enforcement efforts to eliminate hunting in the park.

8. WHAT ARE THE ALTERNATIVES:

A. Allow grazing to continue without additional fencing.

B. Fence immediately. Although desirable, trespass grazing is not evident at present and the need to place a high priority on this action does not seem necessary.

9. PERSONNEL:

Whenever funding is available, and construction by contract is not feasible, the monument staff could accomplish small portions of the fencing

project. Monument personnel have constructed approximately six miles of fence in the past three years.

10. ADMINISTRATION AND LOGISTICS:

Funding:

	Year In Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services					
Other Than Personal Services	0	0	2,000	12,000	12,000
GRAND TOTAL	0	0	2,000	12,000	12,000
Funds Available In Park Base	0	0	0	0	0
Funds Requested From Regional Office	0	0	2,000	12,000	12,000

11. REFERENCES AND CONTACTS:

Resource Monitoring System

Park Files

12. DATE OF SUBMISSION:

December 30, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region
2. PROJECT NAME AND NUMBER: Bonita Campground Periphery Trail
CHIR-RM-3
3. STATEMENT OF THE PROBLEM:

The periphery of Bonita Canyon Campground shows high levels of use by campers as reflected by numerous pathways, crushed vegetation, and scattered trash. Wood gathering has resulted in sawed off or chopped woody limbs and branches.

Natural resource deterioration begins in the immediate campground perimeter and extends outward in a decreasing manner. Three different zones of deterioration are recognizable: (1) Severe, in the campground; (2) High, in a zone extending 100m from the campground; (3) Low, decreasing to near zero at the base of the cliffs one-quarter mile north of the campground.

Designated trails around the campground do not exist, therefore, visitors travel at random to points of interest near the campground. This random travel results in numerous trails, removal of vegetation, and increased erosion.

If campground visitors are to be provided with a satisfying experience, they cannot be confined to the campground limits. The visitor must

be provided with opportunities to satisfy other desires of the type which will have an acceptable impact on the environment. Recognized activities which the camper wishes to pursue include: wildlife observation, hiking, and photography.

4. WHAT HAS BEEN DONE:

Campground signs prohibiting wood gathering and ground fires have been installed. Sale of charcoal by the cooperating association was initiated in 1974 to help reduce the amount of wood gathering. Litter cleanup around the periphery of the campground has been intensified and routes for the proposed periphery trail have been located.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

A number of interrelated actions are proposed to reduce resource deterioration. A trail will be constructed around the campground to provide designated avenues of travel so that campers may satisfy the desire for hiking or exploration. Engineering considerations will include accomodating visitor activities as well as minimizing natural resource impacts. In addition to covering the perimeter of the campground, the trail will lead to locations such as the Environmental Study Area, Stafford Cabin, and Visitor Center. Vegetative restoration and rehabilitation of the campground periphery zone will be included in this project. Trailside interpretation devices will be provided in order to enhance the visitor's experience and make it pleasing enough that the desire to remain on trail surfaces will prevail.

6. LENGTH OF TIME NEEDED:

This determination will depend on available funding and engineering

considerations. Resource conditions and visitation projections indicate that the project must be completed by 1982 or serious resource damage will continue and accelerate. Resource monitoring will provide more definite information in the future.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Natural resource deterioration will move outward as visitors find the immediate environment less satisfying. Serious erosion problems on adjacent slopes could ultimately cause the campground to be out of service during the summer-rain season due to flooding.

8. WHAT ARE THE ALTERNATIVES:

A. Allow the deterioration to progress. This would ultimately result in long-term damage to vegetation, soils, and wildlife which depend on the existing environment.

B. The campground could be closed. This alternative would satisfy the need for controlling visitor related impacts and permit natural recovery of the resources.

C. Fence the campground. Fencing would restrict camping to present limits but would not permit visitors to hike to points of interest near the campground.

D. The campground could be closed and relocated. A new campground, designed to accomodate present types and intensities of use would be the most ideal and expensive alternative. However, a new campground would almost certainly have to be located outside the park's present boundaries, since locations within the park are either designated wilderness, involve historic structures, or are presently occupied by other facilities.

9. PERSONNEL:

This project is a construction or day-labor project and can be accomplished by monument personnel with additional assistance as needed for engineering estimates and minor financial support.

10. ADMINISTRATION AND LOGISTICS:

Funding:

\$2,000 required: \$1,000 in each of second and third years in program sequence.

Later planning stages may indicate need for additional funds to be requested from Western Regional Office.

11. REFERENCE AND CONTACTS:

Natural Resources Monitoring System, CHIR

12. DATE OF SUBMISSION:

January 1, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region
2. PROJECT NAME AND NUMBER: Closure And Rehabilitation Of Heavy Use Areas
CHIR-RM-4

3. STATEMENT OF THE PROBLEM:

The soil and vegetative resources of Bonita Canyon Campground and some other localized areas have been in a state of decline for many years. Resource deterioration has resulted from a combination of use intensity, type of use, and improper management. Problem factors are as follow:

(1) Bonita Canyon Campground was not designed for the amount or type of use it is presently experiencing. The thirty-seven site area was designed in the 1930's to accomodate use intensities and patterns of that time. Provisions were not made for present use intensities. As an example, there were less than 2000 campers/year in 1939 but present use is approximately 11,000 campers/year. The campground is 4.2 acres and present use results in every .25 acres being occupied by two people each day of the year.

Developemt of self-contained recreation vehicles has incréased nót only the numbers of campers but the length of time each one stays. In addition, the campground does not have a dump station or adequate waste water disposals.

(2) The vegetation and soils in the campground cannot sustain present

levels of use and maintain their resiliency unless management action is taken. Soil compaction has progressed to the point where permeability to water has been reduced over 90 percent. When this factor is considered with the fact that annual rainfall is less than 20 inches per year, the reasons for severe declines in annual vegetation and lack of regeneration of perennial plants become apparent.

(3) Past management decisions directed the removal of all litter and duff in the campground as a fire prevention measure. The campground area was cleared of all surface litter, to mineral soil, annually. The time of removal was late spring, before summer rains, and the moisture holding capacity of the soil was sharply reduced. This management policy continued for several years and resulted in extremely adverse impacts to vegetation and soil resources in the campground.

(4) During the Civilian Conservation Corps period, the monument was selected as the site for the local C. C. C. camp. Barracks, mess-halls, roads, garages, and other facilities were constructed to accomodate the workers and supervisors. Regard for natural resources was not of prime consideration during the Corps occupation and while facilities to serve the public were constructed, engineering considerations did not call for restoration of construction areas before the Corps left the area. As a result, many road scars, concrete platforms, and denuded areas still exist in the monument and are in need of removal and restoration. Most of these reminders of the Corps occupation are located near the visitor center and the Silver Spur Meadow.

4. WHAT HAS BEEN DONE:

Two campground sites were closed in the spring of 1976 and 25 meter belt transects were installed to measure vegetation. After measurements were completed, the sites were mulched, fertilized, tilled and irrigated throughout the summer. The transects were reexamined in the fall. Results of the study indicated that vegetation recovery was less than one percent when compared to the non-impacted control plots, however, campers were not excluded from the experimental plots and seeding with native vegetation was not attempted.

All of the road scars remaining from the C.C.C. occupation have now been permanently closed and trash piles created when the camp buildings were torn down have been removed.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

Campground sites will be closed in groups of nine for one year on an alternating basis. Following closure, the sites will be mulched, seeded with native vegetation, irrigated on a regular basis, and excluded to visitor travel during the growing season. Split rail fencing will be used to exclude visitors from the seeded sites. Additions of native vegetation such as agave, yucca, and manzanita, will be made as necessary. Specific tent camping squares (12x12) will be installed to restrict tent camping to specific sites. Installation of additional waste water disposals will be considered and redirection of use patterns attempted by the use of interpretive devices and designated pathways to restrooms and the amphitheater. In addition, research related to soil conditions in the campground is proposed to provide information necessary for more effective rehabilitation measures.

6. LENGTH OF TIME REQUIRED:

The threshold of resistance of vegetation and soils to use impacts has been surpassed and left to natural processes alone recovery will take many years if it occurs at all. As an example, the area used as a campground prior to the present location has not recovered significantly and the camp-sites, trails, and roads are clearly visible after forty years of closure. There are no reasons to expect more rapid recovery rates in the existing campground unless intensive management assistance is provided. Continued heavy use of the campground will demand that this project be a continuing one.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Natural Resource deterioration will continue.

8. WHAT ARE THE ALTERNATIVES:

A. Continue to allow natural resources to deteriorate.

B. Close the campground and/or relocate. This alternative is desirable considering the condition of the resources in the campground and the fact that the present facility is not capable of sustaining the use it is presently experiencing. Since camping has been allowed for many years, and use patterns have become established, this alternative would have to be approached with caution and public involvement. Relocation of the campground would also be desirable. (See CHIR-RM-3)

C. Close the campground and change to a day-use-only system. This alternative would have the advantage of reducing the numbers of visitors to the campground but would not provide a camping experience in the monument.

9. PERSONNEL:

This project can be accomplished by monument personnel with additional

assistance provided by personnel conducting soils research.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding:</u>	Years In Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services					
Other Than Personal Services	2,000	2,000	2,000	2,000	2,000
GRAND TOTAL	2,000	2,000	2,000	2,000	2,000
Funds Available In Park Base	0	0	0	0	0
Funds Requested From Regional Office	2,000	2,000	2,000	2,000	2,000

11. REFERENCES AND CONTACTS:

Beardsley, Wendell G., Herrington, Roscoe B., Wagar, Alan J., How To Rehabilitate A Heavily Used Campground Without Stopping Visitor Use, Journal of Forestry, Vol. 72 No. 5, April 1974.

Lucas, Robert C., User Evaluation of Campgrounds, USDA Forest Service Research Paper, NC-44 1970.

Lime, David W., and Stankey, George H., Carrying Capacity Maintaining Outdoor Recreation Quality, Recreation Symposium Proceedings USDA Forest Service, Northeastern Forest Experiment Station, Upper Darby, PA.

Natural Resource Monitoring System, CHIR.

Wagar, Alan J., The Carrying Capacity of Wild Lands For Recreation, Forest Service Monograph No. 7, 1964.

12. DATE OF SUBMISSION:

December 31, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Site Management With Native Plants
CHIR-RM-5

3. STATEMENT OF THE PROBLEM:

Local areas of soil and vegetation damage have resulted from a variety of heavy visitor use and maintenance impacts. The areas cannot be readily restored using shrubs or succulents as a protective cover. Damage includes reduction of plant diversity, erosion of steep roadside and trail banks, and loss of vegetative cover in severely trampled areas.

4. WHAT HAS BEEN DONE:

Seeds of native plants have been gathered and scattered around nature trails and other locations to restore plant cover. Grass seeding has been conducted near the visitor center and at impacted campground areas.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN:

A. Native Seed Collection: Seeds will be collected from sources within the monument, properly labeled, and stored.

B. Seed Germination Research: Information will be gathered relative to techniques such as stratification, use of cytokinins, gibberellins, and indoleacetic acid, and other methods necessary to break dormancy of native seeds.

C. Seedbed Preparation: Seedbed preparation will include scarification, mulching with litter or rocks, supplemental watering, fertilization and erosion control until herbaceous cover is established.

D. Site Management For Seedlings: Attendance of seedbed locations will

continue until vegetation is well established. This will include erection of temporary and/or permanent visitor barriers at seedbed locations, continued supplemental watering, mulching, and the use of woody plant species when necessary.

6. LENGTH OF TIME REQUIRED:

This project will last for three years with a subsequent review and evaluation of results. The program will be modified for improvements.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Deterioration of impacted areas will continue and expand. Loss of plant cover and diversity will deprive the visitor of some of the aesthetic experiences expected in a natural area and result in unacceptable loss of natural resources.

8. WHAT ARE THE ALTERNATIVES:

A. Use of Exotic Species: Easily managed exotic plant species such as Orchard grass, Smooth Brome, Lehmann's Love grass, and Farmington Side-Oats Gramma, could be used, however, the wisdom of using exotic species has been challenged in scientific literature and would not be an acceptable alternative.

B. Allow Deterioration To Continue: This alternative is not acceptable and is not in keeping with Service policies or management objectives.

C. The alternatives concerning Closure and Rehabilitation of Heavy Use Areas CHIR-RM-4 are applicable to this project as well.

9. PERSONNEL:

The monument staff can undertake this project with some supplemental

assistance in the area of seed germination research.

10. ADMINISTRATION AND LOGISTICS:

<u>Funding:</u>	Year In Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services					
Other Than Personal Services	2,500	2,500	2,500		
GRAND TOTAL	2,500	2,500	2,500	2,500	2,500
Funds Available In Park Base	2,500	2,500	0	0	0
Funds Requested From Regional Office	0	0	2,500	2,500	2,500

This project has been carried on sporadically with funds from park base but future assistance in funding will be needed.

11. REFERENCE AND CONTACTS:

Schwarzmeier, Jerry, 1971, Genetic Contamination Of Native Remnants.

Letter to Professor E. C. Gasiorkiewicz, 11. November 1971.

Soil Conservation Service Plant Material Center

Wilson, James, 1970, Effect Of Variety Choice On Stand Establishment Of Native Grasses In Prairie Restorations. Second Prairie Conference Proceedings, J. H. Zimmerman (Editor) University of Wisconsin Arboretum, Madison, Wisconsin.

Elton, C. S., 1958. The Ecology Of Invasions By Animals and Plants, John Wiley and Sons, New York, New York.

12. DATE OF SUBMISSION:

December 1, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Endangered Species Management
CHIR-RM-6 (See CHIR-N-5)

3. STATEMENT OF THE PROBLEM:

Three species of wildlife, Peregrine Falcon, grey wolf, and jaguarundi, are known to occur in the monument. These endangered or threatened species must be managed in a manner that will allow for their protection and perpetuation. In addition, other species of plants and animals that are not on Federal or State endangered species lists deserve special management attention at Chiricahua National Monument. These species include those which are endemic to the Chiricahua Mountains, species which are rare outside the monument but common within, species which are at the limit of their geographic distribution, such as the coati, Apache fox squirrel, and Coppery Tailed Trogon, and other species which may not be rare in other locations but are rare in the monument area.

4. WHAT HAS BEEN DONE:

Checklists have been compiled identifying those endangered or threatened species present in the monument. Critical habitat necessary for the Peregrine falcon has been identified and mapped for the Fort Collins, Colorado Peregrine falcon research and stocking program.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

Endangered or threatened species checklists will be updated periodically. Having recognized endangered or threatened species, park management will adopt protective and cautionary measures to prevent the inadvertent loss

of those species and provide for their perpetuation. Management action relative to endangered species will also include discouraging public access to nesting sites, prohibiting destructive scientific collection, and insuring that other park management or visitor activities will not have adverse impacts on endangered species or any other species recognized as deserving special management attention.

6. LENGTH OF TIME REQUIRED:

This project will be a continuing program.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Endangered or threatened species could be lost and other species which deserve special management attention could become extinct within the monument area, or decline to the point where management would be difficult or impossible.

8. WHAT ARE THE ALTERNATIVES:

In accordance with the Endangered Species Preservation Act of 1973, there are no alternatives. Management Objectives of Chiricahua also do not provide for alternatives to the management of plant or animal species unless they provide for the protection, preservation and perpetuation of those species.

9. PERSONNEL:

Park personnel will identify endangered species, determine those areas in the monument that serve as critical habitat for those species and update checklists as new endangered species are identified. In addition, those species which deserve special management attention will

be identified by monument personnel, and plans will be made for specific management actions based on research results (see CHIR-N-5). In second and third years of program funding will be required from Regional Office for consultants to assist (or through contract) to carry out actions to be proposed.

10. ADMINISTRATION AND LOGISTICS:

Reprinting of checklists will be handled through the cooperating association. Checklists will be maintained in accordance with the Scope of Collections Statement.

Funding:

	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	1,000	1,000	5,000	5,000	5,000
Other Than Personal Services					
GRAND TOTAL	1,000	1,000	5,000	5,000	5,000
Funds Available In Park Base	1,000	1,000			
Funds Requested From Regional Office			5,000	5,000	5,000

11. REFERENCES AND CONTACTS:

Arizona Game and Fish Department

Bureau of Sport Fisheries and Wildlife

Houston, D. B., Ecosystems Of National Parks, Science 172:648

Threatened Wildlife Of the United States, USDI, Endangered Species

Preservation Act of 1973, Threatened and Endangered Plants and Animals

of Arizona, and Threatened Wildlife In the Western Region, USDI,

National Park Service, July 1974.

12. DATE OF SUBMISSION:

December 10, 1977

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Fire Management

CHIR-RM-7

3. STATEMENT OF THE PROBLEM:

Fire exclusion, consisting of a program of total suppression within a minimum time limit, has been management policy during the past forty-three years of the monument's history and has created a series of environmental problems related to vegetation systems and wildlife.

With the exception of the last four decades, vegetation systems in Chiricahua evolved and adapted in an environment where natural fires occurred with seasonal regularity for over 10,000 years. Natural fires, therefore, are one part of a complex, interacting, group of climatic, geographic, and edaphic factors which together are responsible for the development, content, modification, and perpetuation of the vegetation types present in Chiricahua. The removal of fire has resulted in changes to the vegetative resources of the monument including the alteration of fire related plant succession, changes in plant community structure and composition, reduction in plant diversity, increases in fuel accumulations, and an overall alteration of fire related processes which influence the monument's ecosystems.

Wildlife populations, which depend directly or indirectly on vegetation, have been affected by the absence of fire. As plant diversity

declines in the absence of fire for example, the diversity of wildlife also decreases. The absence of fire may have been favorable to many animal species, such as rodents and ground nesting birds, but it has been adverse to others, such as deer and those species which depend upon conditions created by periodic natural fires. The overall impacts to vegetation and wildlife created by the prolonged absence of natural fires are numerous and complex. However, it can be stated that the exclusion of fire in ecosystems historically modified and shaped by fire certainly affects every aspect of those ecosystems, from food chains to energy flow, and is not desirable management policy in natural areas.

4. WHAT HAS BEEN DONE:

A prescribed burn was conducted at Heart of Rocks Park during the Spring of 1976. The purposes of the burn were for fuel reduction, data collection, and measurement of the response of Arizona Cypress to fire. A history of fire in Chiricahua National Monument from 1940-1975 was completed in 1976. Belt transects have been installed in recently burned areas to measure the recovery and/or mortality of vegetation following natural fires. The Roseberry and Dole Vegetation Type Map (1939) has been compared with vegetation types as they now exist and a substantial amount of fire research data relative to this area has been accumulated.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

A. Areas within the monument which exhibit the following fire related characteristics will be identified and mapped: (1) Areas of heavy fuel accumulations; (2) Areas characterized by fuel models which typically are associated with high rates of fire spread, high energy release

and high resistance to fire control efforts.

B. Utilizing the 1978 National Fire Danger Rating System, all the major fuel models present in the monument will be identified and mapped.

C. The monument will be divided into fire management units. Each unit, or zone, will be separated from others by natural and/or existing man-made boundaries capable of limiting the spread of natural or prescribed fires and will include the following: Natural Fire Zones; Prescribed Fire Zones; and Fire Control(Exclusion)Zones.

D. Where necessary, prescribed burns will be conducted to reduce high amounts of fuel accumulation and/or to obtain information relative to the burning characteristics of various vegetation types.

E. A Fire Management Plan will be developed and implemented to guide the fire management program and assist in the return of fire to the monument's ecosystems. (See CHIR-N-4)

6. LENGTH OF TIME REQUIRED:

Two Years

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Fuel accumulations will reach concentrations that could result in very hot fires which are difficult if not impossible to control. Natural fire will be excluded from the monument's ecosystems. Changes in wildlife habitat and populations will continue to occur as the vegetation upon which they depend is altered.

8. WHAT ARE THE ALTERNATIVES:

A. Continue the present system of fire suppression.

9. PERSONNEL:

Monument and Regional personnel, University personnel

10. ADMINISTRATION AND LOGISTICS:

Funding:

Minor funds, \$2,000 per year, are available in park base during first two years of program while the Fire Ecology Research project (see CHIR-N-4) is underway. However, additional funding will be required later for an expanded fire management program, based on recommendations from the research project. Details will be presented in Project Statements to be developed in future updating of this document, i.e., Natural Resources Management Program.

11. REFERENCE AND CONTACTS:

Cable, D. R., 1957, Recovery Of Chaparral Following Burning and Seeding In-Arizona. USDA, Rocky Mountain Forest & Range Experiment Station, Res. Note 28, 6pp.

Hendrickson, W. H., Fire In The National Parks Symposium, Tall Timbers Fire Ecology Conference 12:339-343.

Lindenmuth, A. W., 1971, Effects Of Prescribed Fire On Vegetation And Sediment In Oak-Mountain Mahogany chaparral, Journal of Forestry, 69:800-805.

Zwolinski, M. J., and J. H. Ehrenreich, 1967, Prescribed Burning On Arizona Watersheds, T.T.F.E.C. 8:195.

12. DATE OF SUBMISSION:

January 10, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region
2. PROJECT NAME AND NUMBER: Vertebrate Inventory
CHIR-N-1
3. STATEMENT OF THE PROBLEM: Information concerning the numbers and kinds of vertebrate species which occur in the monument is insufficient for interpretation or management. Checklists of the area's mammals, birds, and reptiles are reasonably accurate; however, an inventory of vertebrates has never been compiled for Chiricahua.
4. WHAT HAS BEEN DONE: Checklists of the most prominent mammals, birds, reptiles have been compiled. A survey of the small mammals was conducted by Dirk Lanning in conjunction with a distribution study of the coati.
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: An intensive field survey of the vertebrate species which occur in Chiricahua, covering all the monument's habitats, needs to be conducted. The survey should provide the following:
 1. An inventory of vertebrate species.
 2. Checklists of all major groups of vertebrates.
 3. Habitat preference for identified species given in terms of major biotic community.
 4. Estimation of relative abundance with special emphasis given to rare or endangered species.
 5. Notations on seasonal fluctuations in number and species.
 6. Review of the autecology of threatened and endangered species.

7. Some comments or recommendations regarding management of endangered or threatened species.
8. Review of literature and an annotated bibliography dealing with vertebrates of the Chiricahua region.
6. LENGTH OF TIME REQUIRED: Two years
7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN: The resource management and interpretive programs at Chiricahua will have insufficient information concerning vertebrate species in the monument.
8. WHAT ARE THE ALTERNATIVES:
 - a. No action.
 - b. Rely on interested individuals to gradually provide the information in conjunction with university research projects.
9. PERSONNEL: University Personnel
10. ADMINISTRATION AND LOGISTICS:

<u>Funding:</u>	Year In Program Sequence		
	1st	2nd	3rd
Personal Services			
Other Than Personal Services	5,000	5,000	
GRAND TOTAL	5,000	5,000	
Funds Available In Park Base	0	0	
Funds Requested From Regional Office	5,000	5,000	
11. REFERENCES AND CONTACTS: Dr. Roy Johnson and Warren F. Steenbergh, NPS, Cooperative Studies Unit, University of Arizona, Tucson, Arizona.
12. DATE OF SUBMISSION: December 30, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region
2. PROJECT NAME AND NUMBER: Air Quality Monitoring
CHIR-N-2
3. STATEMENT OF THE PROBLEM: During the last few years, air pollution levels have increased in Arizona. The Clean Air Act As Amended August of 1977 designated the Wilderness Area of Chiricahua National Monument as a Class I area where significant deterioration of air quality would be prevented. At, present no instruments in or near the monument are collecting air quality data.
4. WHAT HAS BEEN DONE: Nothing
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: If Chiricahua is to attempt any management of air quality conditions, then a system of air quality research and monitoring must be installed to provide a baseline measurement of current air quality conditions and monitor any fluctuation in air quality levels. Reports of results will be prepared and will include management recommendations, if applicable.
6. LENGTH OF TIME NEEDED: Five Years
7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN: The monument will not have reliable data concerning air quality conditions with which to base management decisions or plan corrective measures designed to reduce air pollution levels if they occur.
8. WHAT ARE THE ALTERNATIVES: No Action

9. PERSONNEL: Western Region Air Quality Coordinator and monument staff

10. ADMINISTRATION AND LOGISTICS:

Funding:

	1st	2nd	3rd	4th	5th
Personal Services					
Other Than Personal Services	5,000	25,000	5,000	5,000	5,000

Increased costs in the second year are associated with purchasing air quality monitoring equipment.

	1st	2nd	3rd	4th	5th
Funds Available in park base	-	-	-	-	-
Funds Request From Regional Office	5,000	25,000	5,000	5,000	5,000
GRAND TOTAL	5,000	25,000	5,000	5,000	5,000

11. REFERENCES AND CONTACTS: Kathy Davis, Western Regional Office,
San Francisco; Air Quality Team, Denver Service Center

12. DATE OF SUBMISSION: December 30, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Soils Research

CHIR-N-3

3. STATEMENT OF THE PROBLEM:

The monument's natural resource data base will be incomplete without adequate soils studies and mapping. All natural resource management and development planning will be inaccurate and/or incomplete without this data.

4. WHAT HAS BEEN DONE:

The Resources Studies Unit/University of Arizona conducted a soil analysis of Bonita Canyon Campground in 1977.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

The monument's soils will be mapped and inventoried in a form suitable for incorporation into the Natural Resource Evaluation System.

6. LENGTH OF TIME REQUIRED:

Two-Three Years

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

The monument's natural resource data base will be incomplete.

8. WHAT ARE THE ALTERNATIVES:

Continue to manage natural resources without information related to soils.

9. PERSONNEL:

University personnel, Soil Conservation Service personnel

10. ADMINISTRATION AND LOGISTICS:

Assistance will be required where development of research agreements or contracts are necessary.

Funding:

Approximately \$30,000 in additional funds will be required to complete a soils inventory.

	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Funds Available In Park Base	-	-	0	0	0
Funds Requested from Regional Office	-	-	10,000	10,000	10,000

11. REFERENCES AND CONTACTS:

Cooperative National Park Studies Unit/University of Arizona, Tucson, Arizona; 1977, Soil Analysis Bonita Campground, Chiricahua National Monument.

12. DATE OF SUBMISSION:

January 10, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Fire Ecology Research
CHIR-N-4

3. STATEMENT OF THE PROBLEM:

Research directed toward the determination of fire frequencies in major vegetation types has not been conducted in the monument. This type of research information is essential to the development of a fire management plan designed to return fire to the monument.

4. WHAT HAS BEEN DONE:

Information related to the burning characteristics and recovery of various components of the monument's vegetation systems has been collected. One burn for the purpose of fuel reduction and determination of the response of Arizona Cypress (Cupressus Arizonica) to fire was conducted in 1976.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

A fire frequency study, using tree ring analysis, will be conducted in selected vegetation types within the monument. The research objectives will be to locate these vegetation types in the "fire cycle" and to determine the regularity with which they were affected by fires. Researchers will prepare a report with vegetation/fire maps. The report will recommend management actions and, if necessary, additional research leading to management.

6. LENGTH OF TIME REQUIRED:

Two Years

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Failure to conduct this research will preclude a Fire Management Plan designed to return natural fires to the monument's ecosystems.

8. WHAT ARE THE ALTERNATIVES:

- a. No Action
- b. Implement the Fire Management Program without research information
- c. Continue to suppress all fires in the monument

9. PERSONNEL:

University Personnel and Monument Staff

10. ADMINISTRATION AND LOGISTICS:

Funding:

	1st	2nd	3rd	4th	5th
Personal Services					
Other Than Personal Services	5,000	10,000			
GRAND TOTAL	5,000	10,000			
Funds Available In Park Base	0	0			
Funds Requested From Regional Office	5,000	10,000			

11. REFERENCES AND CONTACTS:

Regional Office, Plant/Fire Ecologist, Kathy Davis

See CHIR-RM-7

12. DATE OF SUBMISSION:

December 30, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME AND NUMBER: Endangered Species Research
CHIR-N-5

3. STATEMENT OF THE PROBLEM:

The population status and distribution of endangered species found in the monument are unknown. Management actions designed to assist in the perpetuation of endangered or threatened species will be difficult without research information.

4. WHAT HAS BEEN DONE:

Endangered species of animals have been identified in the monument and include the following: Peregrine Falcon, grey wolf, and jaguarundi.

Endangered species identified in the past but not in the last fifty years include the Jaguar (last seen in the monument in 1912) and Thick Billed Parrot (last sighted in Chiricahua in 1917).

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

Research will be conducted to locate, identify, and determine the status of all endangered and/or threatened species in Chiricahua. Identification of critical habitat, where feasible, will also be included in the research process. Recommendations will be made for management of species and habitat where needed; management will then be carried out as described in CHIR-RM-6.

6. LENGTH OF TIME REQUIRED:

Two Years

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN:

Management of endangered species will be difficult without sufficient information concerning their status.

8. WHAT ARE THE ALTERNATIVES:

In accordance with the Endangered Species Preservation Act of 1973, there are no alternatives.

9. PERSONNEL: Monument staff, University of Arizona personnel

10. ADMINISTRATION AND LOGISTICS:

<u>Funding</u>	<u>Year in Program Sequence</u>				
	1st	2nd	3rd	4th	5th
Personal Services	-	-			
Other Than Personal Services	2,500	2,500			
GRAND TOTAL	2,500	2,500	0	0	0
Funds Available In Park Base	-	-			
Funds Requested From Regional Office	2,500	2,500			

11. REFERENCES AND CONTACTS:

Arizona Game and Fish Department

Bureau of Sport Fisheries and Wildlife

Houston, D. B., 1971. Ecosystems of National Parks. Science 172:648.

Threatened Wildlife of the United States, 1973 ed. - USDI

Endangered Species Preservation Act of 1973.

Fawcett, C. W., 1971. Vanishing Wildlife and Federal Protective Efforts.

Ecol. Law Quart. 1 (3); 520-560.

12. DATE OF SUBMISSION:

December 30, 1978

NATURAL RESOURCE PROJECT STATEMENT

1. PARK AND REGION: Chiricahua National Monument, Western Region

2. PROJECT NAME NUMBER: Natural Resource Basic Inventory

CHIR-N-6

3. STATEMENT OF THE PROBLEM:

While information for some groups of natural resources is reasonably well developed, some other groups of biota and physical resources remain to be inventoried and researched. A basic inventory of all natural resources is necessary to produce a data base capable of providing information needed for the proper management of those resources.

4. WHAT HAS BEEN DONE:

All major terrestrial plant community types have been described and mapped. A checklist of the monument's flora was derived from Ora Clark's work in the monument in the late 1930's. Clark's plant specimens are on file at the Western Archaeological Center. Tim Reeves of Arizona State University completed a Vegetation and Flora of Chiricahua National Monument in 1976. Reeves' plant collection, representing over six-hundred plant species, is on file at the monument.

An inventory of small mammals was completed by Dirk Lanning in 1974. Mr. Lanning also studied the numbers and movements of Coatimundis in the Monument and adjacent regions. The existing mammals checklist for the monument lists thirty-five species but this represents only one-third of the collected mammalian fauna of the Chiricahua region.

Over the past several years, a bird checklist has been compiled by the monument staff. The checklist indicates that over 160 species of birds occur in the monument.

Recent studies and collection of the area's herpetofauna have resulted in an updated checklist for snakes. The checklist presently indicates thirty-two species. C. H. Lowe's checklist of amphibians is used at Chiricahua but is not satisfactory for local needs.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN:

The following research and inventory actions will be conducted over the next several years: (1) Inventory of aquatic ecosystems and their associated biotic components; (2) Inventory of the monument's invertebrates; (3) Research and inventory of the monument's "special ecosystems" such as rock ledge communities, cave communities, epiphytic and cryptogamic communities; (4) Inventory of the monument's amphibians. In addition, the monument's checklists will be continually updated and improved.

6. LENGTH OF TIME REQUIRED:

This project will be a continuing program of research, inventory, and improvement of knowledge concerning the monument's natural resources.

7. WHAT WILL HAPPEN IF THE PROJECT IS NOT UNDERTAKEN:

Park management will not have a complete knowledge of the monument's natural resources and the park interpretive program will be deficient in its information base.

10. ADMINISTRATION AND LOGISTICS:

Funding: An operating program increase of \$5,000 per-year for Continuing Research On Historical and Natural Resources CHIR-8620-3 was submitted for this project.

11. REFERENCE AND CONTACTS:

CHIR-8620-3

12. DATE OF SUBMISSION:

January 10, 1978

NATURAL RESOURCES PROJECTS PROGRAMMING SHEET

CHIRICAHUA NATIONAL MONUMENT, ARIZONA

AUGUST

NPS Costs Expressed In \$1000

Area Pri- ority	Refer- ence No.	Project Title	Yr. 1 (80) Base*New**	Yr. 2 (81) Base New	Yr. 3 (82) Base New	Yr. 4 (83) Base New	Yr. 5 Base
1	N-4	Fire Ecology Research	- 5.0	- 10.0			
2	N-1	Vertebrate Inventory	- 5.0	- 5.0			
3	RM-7	Fire Management	2.0 -	2.0 -			
4	N-2	Air Quality Monitoring	- 5.0	- 25.0	- 5.0	- 5.0	-
5	N-5	Endangered Species Research	- 2.5	- 2.5	-		
6	RM-6	Endangered Species Management	1.0 -	1.0 -	- 5.0	- 5.0	-
7	RM-4	Closure and Rehabilitation of Heavy Use Areas	- 2.0	- 2.0	- 2.0	- 2.0	-
8	N-3	Soils Research			- 10.0	10.0	
9	RM-5	Site Management With Native Plant Species	2.5 -	2.5 -	- 2.5	- 2.5	-
10	N-6	Natural Resource Basic Inventory	- -	- 5.0	- 5.0	- 5.0	-
11	RM-1	Expand the Natural Resource Monitoring System	- -	- 5.0	- -	- -	-
12	RM-2	Boundary Fencing	- -	- -	- 2.0	12.0	
13	RM-3	Bonita Campground Periphery Trail	- -	- 1.0	- 1.0		

*BASE = Funds Available in Park Base

**NEW = Funds Requested From Regional Office

