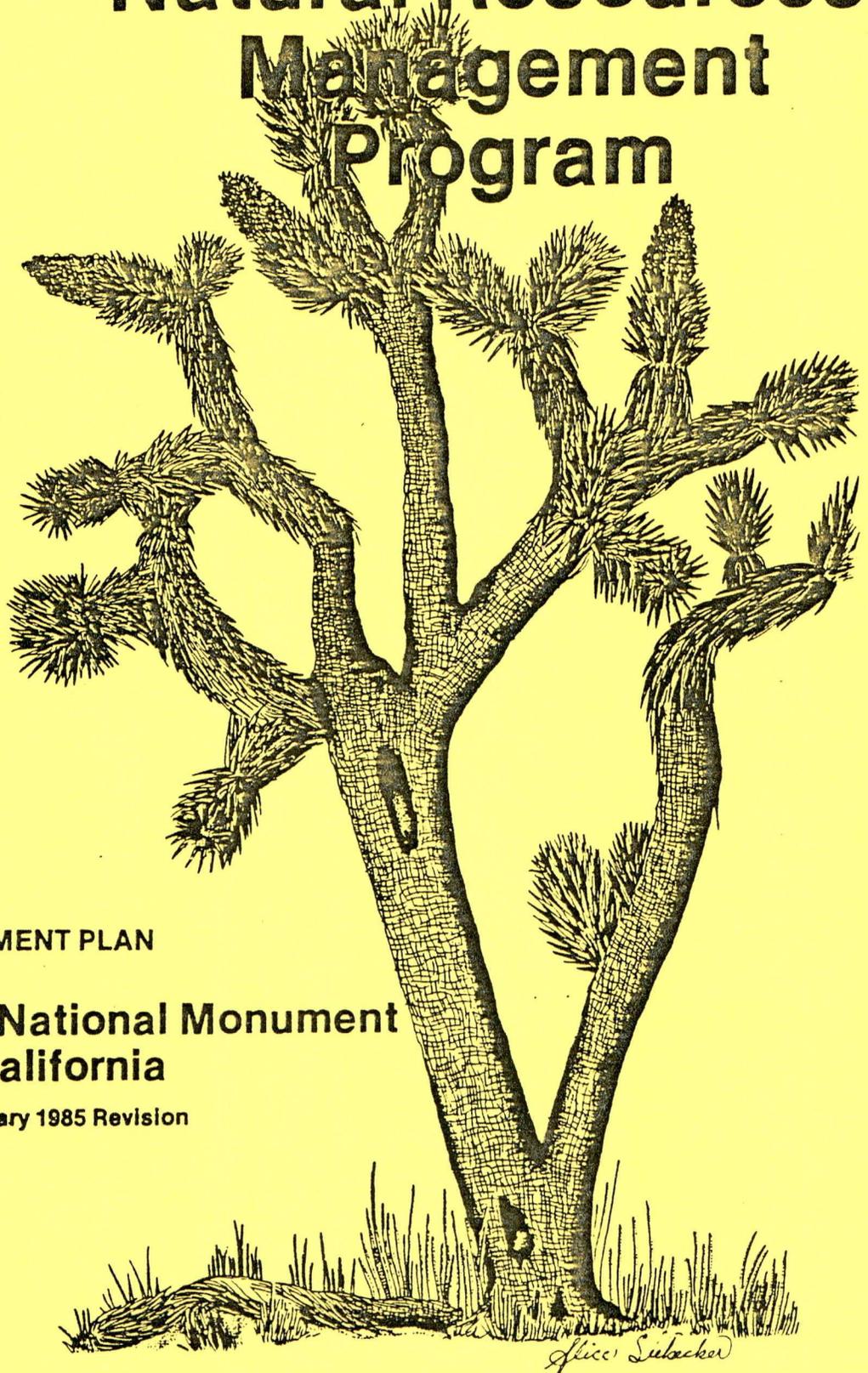


Natural Resources Management Program



AN ADDENDUM
TO THE NATURAL
RESOURCE MANAGEMENT PLAN
FOR

Joshua Tree National Monument California

January 1985 Revision

Prepared by
Joshua Tree National Monument

NATIONAL PARK SERVICE/U.S. DEPARTMENT OF THE INTERIOR

NATURAL RESOURCES MANAGEMENT PROGRAM

An Addendum to the

NATURAL RESOURCES MANAGEMENT PLAN

for

JOSHUA TREE NATIONAL MONUMENT

JANUARY 1985 REVISION

Prepared by

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NATURAL RESOURCES MANAGEMENT PROGRAM

ABSTRACT

This 1985 revision of the Natural Resources Management Plan is an addendum to previous revisions of the 1974 Natural Resources Management Plan and Environmental Assessment. This revision proposes new resources projects, summarizes present status and identifies progress of projects proposed in previous plans and revisions.

New and continuing projects are outlined in Project Statements. This revision does not contain all Project Statements from previous revisions. Project Statements contained in this plan reflect changes in priorities, inflationary cost increases, and budgetary constraints. All Project Statement titles are listed in priority order along with a summary of costs required to carry them out in a revised Natural Resources Projects Programming sheet. A five-year planning strategy for natural resources management, monitoring and research are presented in a section entitled Overview and Needs.

This Management Program will be reviewed annually, updated and revised as work is completed and new projects are proposed.

INTRODUCTION

Preservation of natural resources within Joshua Tree National Monument is germane to providing use and enjoyment for visitors as an unimpaired natural area of the National Park System. The Monument's Statement For Management (1982) established a broad conceptual base from which other planning efforts are developed. This document, an expanded and updated version of the 1974 Natural Resources Management Plan, provides specific direction for achieving goals established in the Statement For Management.

The Southern California desert is developing rapidly. As more private lands are converted to housing and urbanization, greater pressure is exerted on existing public lands. Management issues have become more complex requiring an accelerated effort to continue a responsive resource management program.

The natural resources management proposals for Joshua Tree National Monument are based on basic ecological tenets. Individual organisms and species can only be preserved by maintaining entire ecosystems. The only sure way to preserve ecosystems is to minimize human disturbance and allow natural processes to mold individual elements within the system.

The plan recognizes that natural resources are presently not receiving adequate care, and therefore, proposes an expanded program. This Management Program will be reviewed annually, updated and revised as work is completed and new projects are proposed. Scheduling of projects will depend on availability of funds and overall priorities in the Monument.

In addition to aforementioned documents, several pieces of legislation have directly influenced this plan.

A. Legislation Affecting the Natural Resources Management Plan.

Legislation influencing planning activities in the park includes the National Park Service Organic Act of 1916, the Archaeological Resources Protection Act of 1979, the American Indian Religious Freedom Act of 1978, the National Historic Preservation Act of 1966 and as amended in 1980, the National Environmental Policy Act Compliance Guidelines as revised in 1984, the Wilderness Act of 1964, Executive Order 11987, the Federal Water Pollution Control Act Amendments of 1972, the Endangered Species Act of 1973, Public Law 94-429, and the Clean Air Act Amendments of 1977.

The Organic Act of 1916 directs the National Park Service (NPS) to regulate park use and promote enjoyment of park lands in a manner consistent with the conservation of park scenery, natural and historic objects, and wildlife. In

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order to fulfill these mandates, all resource planning activities must insure that public use facilities do not disrupt or damage resources to a degree whereby their ability to serve future visitors is reduced, that appropriate non-destructive public use and enjoyment of resources is made possible, and that conscious care and protection are provided to conserve natural and cultural park resources.

The Wilderness Act of 1964 provides guidelines for management of designated wilderness units. On October 20, 1976 Congress enacted legislation that created over 450,000 acres of wilderness and potential wilderness within the Monument. Over 30,000 acres are designated as potential wilderness because of existing disturbance and private inholdings. As these lands are recovered, potential wilderness units will be converted to wilderness status.

The Endangered Species Act of 1973 requires all Federal agencies to consult with the Secretary of the Interior on all projects and programs having potential impact on endangered flora and fauna. The legislation further requires Federal agencies to take "...such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined ...to be critical."

Executive Order 11987 states that "executive agencies shall, to the extent permitted by law, restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease, or hold for purposes of administration; and, shall encourage the States, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States."

The National Historic Preservation Act of 1966 requires all Federal agencies to inform the Advisory Council on Historic Preservation of the effect of any undertaking on any district, site, building, structure, or object that is proposed for, or included in, the National Register and to afford the council a reasonable opportunity to comment.

The Clean Air Act Amendments of 1977 designated Joshua Tree National Monument as a Federal Class I area. This means that visibility within the park is not to be impaired by any man-made source, and that methods must be devised to monitor such visibility.

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B. Management Objectives

Natural resource management objectives are broadly defined in the Monument's Statement For Management (1982). The 1974 Resources Management Plan detailed objectives through specific proposed projects. Based on these documents, as well as the 1978 edition of National Park Service Management Policies, the Monument's Natural Resources Program will be managed to provide the following:

To perpetuate the native plants and animals for their essential roles in the natural ecosystem.

To perpetuate the physical elements such as geological, air and water resources.

Natural processes shall be relied upon to regulate both biotic as well as abiotic elements to the greatest extent possible.

To minimize impacts from external and internal threats such as air, noise, and water pollution, facilities development, visitor use as well as resources management activities.

Monitor resources to facilitate rapid development of mitigation prescriptions for unnatural disturbances.

OVERVIEW AND NEEDS

This is the most significant revision of this plan since May 1980. During the intervening period, there have been several significant changes affecting the natural resources management program. In October 1982, the Western Regional Office authorized a reorganization creating a division of resources management at the Monument. The establishment of this division was to serve as a focal point for the development of an expanded commitment to deal with ever increasing resources issues. In part, this major revision has been a direct result of this expanded emphasis on natural resources. Some of the project statements represent examples of old resources problems that had not been addressed. Unfortunately, most new statements represent new threats that have materialized independent of the expanded program.

At a time when threats to resources are increasing, the appreciation of their significance has also increased. A year ago, a UNESCO committee nominated Joshua Tree National Monument as a World Biosphere. Although the official dedication has not been made, the Washington Office has informed us that the nomination has been approved.

The major elements in the natural resources program include:

1. Ecosystem Rehabilitation
2. Exotic Control
3. Air and Water Quality Monitoring
4. Fire Management
5. Mines and Minerals Management
6. Endangered Species
7. Backcountry Management
8. Wildlife Management

Ecosystem Rehabilitation

Several significant problems exist in this category. Over the past 20 years, many private inholdings have been acquired. Most of these contain extensive developments of no historical significance. Although some buildings have been dismantled for salvage, no sites have received rehabilitation work to restore natural conditions. RM-15 addresses the situation and recommends a recovery program.

Several critical habitat types have been impacted by historic park management. Ten borrow pits were closed almost ten years ago. However, only one has received any rehabilitation. RM-14 was developed to remedy this problem.

For decades old mining sites have been untouched pending historical evaluations. In September 1983, Linda Greene completed a comprehensive Historical Resources Study. In this study, recommendations for rehabilitation of historically non-significant sites were detailed. Hundreds

of sites ranging from shallow prospect pits to sites with tons of accumulated trash have been cleared for rehabilitation. RM-12 addresses this major ecosystem disturbance.

As noted in the 1980 revision, backcountry use has been increasing and this trend has accelerated. Although a backcountry plan was developed over a decade ago, it contains no provisions for habitat monitoring, mitigation efforts or revisions in the permitting process to disperse use from high impact areas. Many areas with significant habitat impacts now exist. The potential for the rapid expansion of these impacts is even more significant. The low productivity of most desert habitats makes many of these sites nonresilient to even low trampling. RM-11 calls for a major revision to the backcountry plan.

Palm Oases are probably one of the most significant habitat types in the Mojave desert. A major rehabilitation effort for the Oasis of Mara is detailed in a 1984 Action Plan. This undoubtedly represents the most complex rehabilitation effort currently underway or planned. RM-5 details the needs for the implementation of this action plan.

Exotic Control

One of the most significant threats to natural resources has been the introduction of the feral burro into the Monument. The first burros were observed in the Monument three years ago. Since then the number of immigrants has increased and resident burros have been reproducing rapidly. A Burro Management Plan is in final draft awaiting regional approval. RM-6 discusses the needs for resolving this critical problem.

Increased urbanization has expanded the number of exotic plants adjacent to the Monument's boundary. An historic pest, tamarisk or salt cedar, has popped up at historic locations as well as many new locations. Its potential to dry up major water sources is of critical concern for wildlife. RM-7 details efforts to eradicate tamarisk as well as other exotic plant pests.

Another exotic¹¹ control problem has been an increase in the illegal release of non-native aquatic animals. This problem is limited to the open water impoundments created by cattlemen at the turn of the century. These include Barker Dam, Cow Camp and Key's Lakes. Visitors have been releasing domestic ducks and goldfish into these waters. RM-17 details both preventive measures as well as remedial prescriptions to deal with this problem.

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Air and Water Monitoring

In the 1980 revision of this plan, air quality was placed at the top of the priority list of threatened resources. Since then, a visibility monitoring program has been established. Last fall, in cooperation with the Washington Office, we initiated an ozone impacts study. The combination of these two efforts, detailed in AQ-1, will provide the majority of necessary information to protect one of the Monument's most sought after natural resources - clean air.

As a desert, it's not surprising that water problems are of critical concern in this area. Threats to water include artificial drawdown of water tables, and quality of ground as well as surface waters. W-2 and W-3 detail programs for monitoring as well as needs for additional research.

Fire Management

There are three areas of concern in fire management: 1)ecological 2)safety 3)economic. Fires start naturally throughout most of the Monument. Fire is a significant ecological force molding entire ecosystems. Unfortunately, up to this point all fires have had to be suppressed. This not only robs the natural systems of an important element, suppression activities frequently cause more impact to the natural systems than the fire. The cost of suppression has escalated over the years. Therefore, we have spent large sums of tax money to put out fires that could have been allowed to burn. Additionally, fire threats to people and structures adjacent to the Monument's boundary have grown rapidly. The need for a comprehensive Fire Management Plan complete with prescribed burn programs has been detailed in RM-10, RM-16 and N-24A.

Mines and Minerals Management

No legal mining claims or operations still exist within the Monument. However, recent mineral values have stimulated a resurgence of prospecting and illegal mining. The Monument contains close to 2,000 mines, shafts and prospects. A plan is needed to develop systematic monitoring for detection of illegal uses as well as identifying safety projects and rehabilitation efforts, RM-12 discusses the needs for implementation of this planning process.

Endangered Species

At this time, there are two significant issues in this category. First, an inventory of ten plants proposed for the endangered species list is needed. U.S.Fish and Wildlife is requesting information from land managing agencies on the status of these plants. Although these plants are known to exist or once exist in the Monument, no

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information on distribution or population dynamics is presently available. To comply with The Endangered Species Act, this survey needs to be accomplished. N-30 proposes the necessary methods to complete this survey.

Another species that has received recent attention is the desert tortoise. Their populations have been reduced to a fraction of their historical range. Again, U.S. Fish and Wildlife is requesting information on the status of this animal. Only one small survey has been conducted. This was done in the Monument's Pinto Basin by a B.L.M. researcher. His conclusions suggested that the population he surveyed was in danger of disappearing. Many small populations exist throughout much of the Monument. However, insufficient data exist to manage these reptiles. N-31 and RM-9 address these problems and provide recommendations.

Backcountry Management

The present problems in this area are discussed above in ecosystem rehabilitation.

Wildlife Management

Several wildlife issues have already been listed. Additionally, bighorn sheep management continues to be a high priority. Reductions in funds have curtailed badly needed census work. Disease problems in adjacent herds in the Santa Rosa Mountains continue to take heavy tolls in juvenile animals. Problems in these herds place greater significance on Monument herds. This is not a time to allow monitoring efforts to slack. RM-2A and RM-1 call for increased efforts to perpetuate these animals.

Ground squirrel populations in two campgrounds pose safety and health hazards to visitors as well as employees. Careful monitoring and control must be an ongoing effort. RM-8 details a plan to deal with these problems.

Five Year Program Objectives by Fiscal Year

All aspects of the natural resources management program have been prioritized using, in order, the following criteria:

- 1) ecological integrity
- 2) endangered species or habitats
- 3) NPS policy
- 4) compliance with Wilderness Act
- 5) enabling legislation
- 6) air and water pollution laws
- 7) public attention
- 8) health and safety
- 9) visitor use
- 10) scenic quality
- 11) park facilities

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FY85

Throughout the five year planning period, there are many routine monitoring programs that will be carried out. Highest priority will be given to air quality, ground squirrels, water, bighorn sheep, and fire effect monitoring. Some mitigation programs will likewise be carried out on an ongoing basis. In priority, these will include tortoise recovery, exotic plant and animal control, prescribed fire in the Oasis of Mara, and bighorn sheep guzzler maintenance.

Several new projects are scheduled for completion in FY85. These include in priority, completion of the Fire Management Plan, testing burro live capture techniques, completion of first complete sheep census in seven years, and systematic survey of tamarisk distribution.

New projects scheduled to begin include vegetation rehabilitation in the Oasis of Mara, and development of a backcountry plan.

FY86

Projects scheduled for completion include borrow pit rehabilitation, endangered plant survey and tortoise study.

New projects to be initiated include burro removal program, mines and minerals plan, and rehabilitation of inholdings.

FY87

Objectives include the completion of mines and minerals plan, removal of existing burros, completion of backcountry plan, and water resources plan. New projects to be initiated include rehabilitation of wilderness roads, guzzler installation and a fire ecology study.

FY88

Two new research projects are scheduled for this year. These are the impacts of man and Joshua tree studies.

Resources projects scheduled for completion include vegetation rehabilitation in the Oasis of Mara, and the fire ecology study.

FY89

Scheduled for completion during this year are the wilderness road rehabilitation, inholdings rehabilitation, guzzler installation, Joshua tree ecology study and the aquatic resources study.

Park: Joshua Tree National Monument

Natural Resources Projects
Programming Sheet

Date: January 1985

Proj No.	Project Title	Proj Type	RMP Pri	Park Pri	10-237 No.	10-238 No.	Five Year Program Costs (in \$1000) and Fund Sources					
							Yr 1 Funded/New	Yr 2 Funded/New	Yr 3 Funded/New	Yr 4 Funded/New	Yr 5 Funded/New	
<u>ON-GOING ONPS PROGRAMS:</u>												
RM2A	Bighorn Sheep Management	Mit./ Mon.					4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	
RM4A	Guzzler Monitoring and Maintenance	Mon.					5.0 (PB) 0	5.0 (PB) 0	5.0 (PB) 0	5.0 (PB) 0	5.0 (PB) 0	
RM7	Exotic Plant Control	Mit./ Mon.					6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	
RM8	Ground Squirrel Monitoring and Control	Mon./ Mit.					0.5 (PB) 0	0.5 (PB) 0	0.5 (PB) 0	0.5 (PB) 0	0.5 (PB) 0	
RM9	Tortoise Recovery Program	Mit.					1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	
RM10	Fire Management Plan	Mit.					6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	6.0 (PB) 0	
RM11	Backcountry Management	Mon./ Mit.					4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	4.0 (PB) 0	
RM12	Mines and Minerals Management	Mon./ Mit.					2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	
RM16	Fire Effects Monitoring	Mon.					1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	1.0 (PB) 0	
W3	Water Source Monitoring	Mon.					2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	2.0 (PB) 0	
RM17	Non-Native Aquatic Wildlife Control	Mon./ Mit.					1.5 (PB) 0	1.5 (PB) 0	1.5 (PB) 0	1.5 (PB) 0	1.5 (PB) 0	

Park: Joshua Tree National Monument

Natural Resources Projects
Programming Sheet

Date: January 1985

Proj No.	Project Title	Proj Type	RMP Pri	Park Pri	10-237 No.	10-238 No.	Five Year Program Costs (in \$1000) and Fund Sources				
							Yr 1 Funded/New	Yr 2 Funded/New	Yr 3 Funded/New	Yr 4 Funded/New	Yr 5 Funded/New
<u>PROGRAMS REQUESTING ONPS FUNDING:</u>											
RM3	Resource Management Administration and Supervision	Mit./Mon.	1	1	103	$\frac{25.0}{43.5}$ (PB)	$\frac{25.0}{43.5}$ (PB)	$\frac{25.0}{43.5}$ (PB)	$\frac{25.0}{43.5}$ (PB)	$\frac{25.0}{43.5}$ (PB)	
RM6	Burro Management	Mit.	2	4	601	$\frac{4}{0}$ (PB)	$\frac{4}{28}$ (PB) (NRP)	$\frac{4}{23}$ (PB) (NRP)	$\frac{4}{0}$ (PB)	$\frac{4}{0}$ (PB)	
RM5	Fan Palm Oasis Management	Mit.	3	6	600	$\frac{6}{0}$ (PB)	$\frac{6}{17}$ (PB) (NRP)	$\frac{6}{17}$ (PB) (NRP)	$\frac{6}{16}$ (PB) (NRP)	$\frac{6}{0}$ (PB)	
RM13	Rehabilitate Wilderness Roads	Mit.	4	13	603	$\frac{2}{0}$ (PB)	$\frac{2}{0}$ (PB)	$\frac{2}{5}$ (PB) (PB)	$\frac{2}{5}$ (PB) (PB)	$\frac{2}{5}$ (PB) (PB)	
RM15	Rehabilitate Acquired Inholdings	Mit.	5	7	604		$\frac{0}{40}$ (PB)	$\frac{0}{30}$ (PB)	$\frac{0}{30}$ (PB)		
RM14	Rehabilitate Borrow Pits	Mit.	6	14	605		$\frac{0}{6.5}$ (PB)	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	
RM1	Wildlife Guzzlers	Mit.	7	17	606		$\frac{0}{40}$ (PB)	$\frac{0}{20}$ (PB)	$\frac{0}{20}$ (PB)	$\frac{0}{0}$	
N31	Desert Tortoise Study	Res.	8	10	607	$\frac{.5}{0}$ (PB)	$\frac{.5}{5}$ (PB) (NRP)	$\frac{.5}{0}$ (PB)	$\frac{.5}{0}$ (PB)	$\frac{.5}{0}$ (PB)	
N30	Endangered Plant Survey	Res.	9	15	608		$\frac{0}{4}$ (RNR)	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$	
N24A	Fire Ecology	Res.	10	18	44			$\frac{0}{5}$ (RNR)	$\frac{0}{5}$ (RNR)	$\frac{0}{0}$	

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<u>Reference No.</u>	<u>Project Title</u>	<u>Status of Project</u>
RM-17	Non-native Aquatic Wildlife Control	continuing
AQ-1	Air Quality Study	continuing
W-2	Water Resources Management Plan	proposed FY87
W-3	Water Source Monitoring	continuing
N-10b	Ecology of Joshua Trees, 2	proposed FY88
N-24a	Fire Ecology	proposed FY87
N-25	Analysis of Impact of Man	proposed FY88
N-29	Study of Aquatic and Riparian Systems	proposed FY89
N-30	Endangered Plants	proposed FY86
N-31	Desert Tortoise Study	proposed FY86

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Joshua Tree National Monument, WRO
2. PROJECT NAME AND NUMBER: Wildlife Guzzlers, JOTR-RM-1
3. STATEMENT OF PROBLEM: A major limiting factor to the survival of the desert bighorn sheep in Joshua Tree National Monument is the continuing decline of water sources due in part to drought and in part to man-caused disturbances. The Monument has become isolated because of the continuing encroachment of civilization and is no longer free to seek additional water sources. Historical water sources lying within the Monumnet have become dry.
4. WHAT HAS BEEN DONE: Three guzzlers have been installed and one adit constructed in an effort to maintain bighorn habitat and that of sympatric wildlife. The installation of four additional guzzlers has been proposed to augment this program. A reconnaissance has been conducted which verifies the need for additional sources and recommends locations. Previous recommendations suggested the need for nine additional guzzlers.
5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Each of four guzzlers will be located as near as possible to an original historical water source. Each guzzler will provide for a minimum of 2,000 gallon storage capacity. Rain catchment aprons will be sufficient to maintain water in the storage tank. Apron surface area required will be determined on the basis of 4" annual average rainfall and then doubled to allow for years of less than average rainfall.

Guzzlers will be constructed to conform as nearly as possible to natural terrain and storage tanks will be buried where feasible. Shape and dimensions of drinking basins, designed for bighorn, with an escape ramp for smaller species will be carefully considered. A standard U. S. Forest Service type rain guage will be installed at each guzzler site and provided with a 1/4 inch layer of glycerin. Where burial of storage tanks is not possible, tanks will be walled in by native rock and mortar to blend in with the landscape, and covered to reduce evaporation.
6. LENGTH OF TIME NEEDED: 3 years .
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: It will not be possible

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LIST OF CONTINUING AND PROPOSED PROJECTS

The following is a list of continuing and proposed projects. Resources management projects are coded "RM", natural science projects are designated "N", aquatic resources projects are coded "W", and air quality projects are coded "AQ".

<u>Reference No.</u>	<u>Project Title</u>	<u>Status of Project</u>
RM-1	Wildlife Guzzlers	proposed FY87
RM-2	Bighorn Sheep Management	continuing
RM-3	Resources Mgt. and Supervision	continuing
RM-4a	Guzzler Monitoring and Maintenance	continuing
RM-5	Fan Palm Oasis Management	proposed FY85
RM-6	Burro Management	proposed FY86
RM-7	Exotic Plant Control	continuing
RM-8	Ground Squirrel Monitoring and Control	continuing
RM-9	Tortoise Recovery Program	continuing
RM-10	Fire Management	continuing
RM-11	Backcountry Management	proposed FY85
RM-12	Mines and Minerals Management	proposed FY86
RM-13	Rehabilitate Roads in Wilderness	proposed FY87
RM-14	Rehabilitate Borrow Pits	proposed FY86
RM-15	Rehabilitate Acquired Inholdings	proposed FY86
RM-16	Fire Effects Monitoring	continuing

Park: Joshua Tree National Monument

Natural Resources Projects
Programming Sheet

Date: January 1985

Proj No.	Project Title	Proj Type	RMP Pri	Park Pri	10-237 No.	10-238 No.	Five Year Program Costs (in \$1000) and Fund Sources <u>2/</u>				
							Yr 1 Funded/New	Yr 2 Funded/New	Yr 3 Funded/New	Yr 4 Funded/New	Yr 5 Funded/New
<u>PROGRAMS REQUESTING ONPS FUNDING, cont'd.</u>											
N25	Analysis of the Impact of Man on the Ecosystem of JOTR	Res.	11	19		311				$\frac{0}{20}$ (RNR)	$\frac{0}{0}$
N10B	Ecology of Joshua Trees, Phase II	Res.	12	20		112				$\frac{0}{10}$ (RNR)	$\frac{0}{10}$ (RNR)
W2	Monument Water Resource	Res.	13	24		809			$\frac{0}{20}$ (PB)	$\frac{0}{20}$ (PB)	$\frac{0}{0}$
N29	Study of Artificial Aquatic and Riparian Systems	Res.	14	29		610				$\frac{0}{5}$ (RNR)	$\frac{0}{5}$ (RNR)
AQ1	Air Quality Study	Mon.	15	30		602	$\frac{4.7}{18.6}$	$\frac{4.7}{18.6}$	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{0}{0}$

Notes: 1/ Natural Resources project types are: Mit = Mitigation, Mon = Monitoring, Res = Research

2/ Fund Sources should be shown in parenthesis after costs as follows: PB = Park Base, RNR = Regionwide Natural Resources Base, NRP = Servicewide Natural Resource Preservation Account, AQ = Servicewide Air Quality Account, AP = Servicewide Acid Precipitation Account, WR = Servicewide Water Resources Account

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to effectively manage the existing population of desert bighorn in this area and losses of animals could be expected through neglect of watering requirements.

8. WHAT ARE THE ALTERNATIVES: Make no attempt to replace historical water sources.
9. PERSONNEL: Work will be accomplished by Monument personnel with the cooperation of the Unit Leader, Cooperative NPS Resource Study Unit, University of Nevada and/or contract.
10. ADMINISTRATION AND LOGISTICS: The program will be extended over a three year period ending in FY 1988. Data gathered from the Bighorn Management project (JOTR-RM-2) and the Bighorn Ecology study (JOTR-N-1a) will provide information useful for placement of water guzzlers. Locations, in order of priority, are Eagle Mountain, Quail Mountain, and Coxcomb.

<u>Funding</u>	<u>Year in Program Sequence</u>			
	1st	2nd	3rd	4th
Personal Services	0	6,000	4,000	4,100
Other Than Personal Services	0	34,000	16,000	16,000
Grand Total	0	40,000	20,000	20,100
Funds Available in Park Base	0	0	0	0
Funds Requested from Regional Office	0	40,000	20,000	20,100

11. REFERENCES AND CONTACTS: Unit Leader, UNLV
12. DATE OF SUBMISSION: May 1980 on form 10-238 pkg#606

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-2a, BIGHORN SHEEP MANAGEMENT

2. STATEMENT OF PROBLEM:

A. Current Conditions:

A decline in Monument's water sources since the 1940's has been determined to be a limiting factor to survival of desert bighorn and other major vertebrates. Lambing failures in adjacent herds in the Santa Rosa Mountains have placed a great deal of importance on annual herd census. As progress on the guzzler project (JOTR RM-1) restores water to historical watering sites, annual census will be needed to determine the effect of restored water on the bighorn population.

B. Past Actions:

Annual census has been conducted at selected water sites from sunrise to sunset for three consecutive days. Evidence indicates that sheep have accepted and are using, new water sources. The use of automatic time-lapse 8mm movie cameras has been tried for sheep census work and the results have been encouraging.

3. ALTERNATE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue Monitoring in Progress:

Without monitoring, our only source of information on herd conditions comes from the occasional observations made by employees and visitors. These untrained observers frequently fail to make note of animal numbers, ages or sex. Additionally, the sporadic nature of these reports prohibits the interpretation of numbers, movement and changes in herd behavior.

B. Continue to Monitor:

Monitoring should be expanded to cover all major water sources over a four day period. Use of the photocensus is less expensive in terms of person-hours, creates less disturbance to animals and provides a permanent record which can be used from year to year for comparative purposes.

4. RECOMMENDED COURSE OF ACTION

Alternative B is the preferred alternative. This procedure provides critical data with which sound management decisions are formulated. The control of observations minimizes impacts to this sensitive species. Trained volunteers have made up the majority of the census personnel for the last three years. This arrangement seems to be effective as well as cost saving.

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5. FUNDING

A. Recurring Funds Available in Park's Base - \$4,000

B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-3 RESOURCES MANAGEMENT ADMINISTRATION AND SUPERVISION

2. STATEMENT OF PROBLEM:

- A. Current Conditions: In October 1982, the Western Regional Office authorized a reorganization creating a division of resources management at JOTR. The division is currently staffed by a GS-11 division chief, one permanent full time GS-9 resources specialist and approximately 1.0 FTE of seasonal technician(s).

This division has responsibility for:

- (1) Planning, organizing and executing resources inventories and surveys to determine status and distribution of wildlife and feral animal populations, water resources, plant communities, geological features and other natural resources. Developing resources management plans and programs to protect, preserve, and perpetuate Monument resources, several of which are rare, threatened or endangered species.
- (2) Providing technical advice and assistance to staff in natural resources matters. Preparing and reviewing environmental impact reports required by the Service. Reviewing environmental impact reports prepared by other agencies. Chief serves as NEPA (National Environmental Policy Act) coordinator insuring that all park operations are in compliance and preparing all necessary documents required by the act.
- (3) Developing and administering park's Natural Fire Management Plan. Maintaining fire weather data, using computer assistance to analyze and store data. Providing a Resources Advisor and monitor on all fires. Planning and executing research and prescribed fires. Maintaining records to assess role of fire in ecosystems. Working closely with fire management agencies such as California Division of Forestry and local fire departments to facilitate existing cooperative agreements. Providing resources advisor during a fire, making onsite decisions regarding the use of suppression activities relative to environmental impacts. Providing offsite information and training to fire agencies on the Service's resources management policies and fire management strategies.

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- (4) Coordinating and supervising the air quality monitoring program. Hiring, training, and supervising a staff of air quality technicians. Working with Western Regional air quality specialist, Denver Service Center and Washington air quality offices, County and State air resources agencies in the administration and protection of a Class I air management area.
- (5) Designing and executing work programs related to environmental (habitat) restoration such as control and eradication of exotic plants. Providing pest management coordination insuring the use of IPM (integrated pest management) systems, preparing all necessary documents.
- (6) Interpreting broad Service resources management policies, laws, and regulations and applying them to Monument operations and problems. Consulting and exchanging technical information with specialists in institutions and other agencies and with colleagues in other parks.

B. Past Actions: The GS-9 resources management specialist position was filled 12/5/1984 by administrative transfer of a protection ranger and salary into this vacant position. The transfer was made with the condition that when the incumbent leaves the position, the funds for her salary will revert back to the ranger division.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS: "No action" can not be considered. Resources management responsibilities are dictated by enabling legislation, several Federal laws such as National Environmental Protection Act, Wilderness Act, Endangered Species Act, Organic Act, Park Service Policy and Guidelines.

4. RECOMMENDED COURSE OF ACTION: Fund administrative operation to accomplish responsibilities assigned to division. Fund 10-237 Inc. #103C to replace funds lost by the division of visitor protection. This will also guarantee future funding for GS-9 position.

5. FUNDING

- A. Recurrent Funds Available in Park Base - \$25,000
- B. ONPS Funds requested ----- \$43,500
on Form 10-237 inc. no. 103 submitted 4/6/84

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-4a, GUZZLER MONITORING AND MAINTENANCE

2. STATEMENT OF PROBLEM:

A. Current Conditions

The guzzlers installed to restore historical water sources (JOTR RMI) need to be monitored and maintained to assure adequate storage and delivery of water. Some of these devices are now more than ten years old. Weathering, vandalism and fatigue due to normal wear require regular inspections to prevent water loss and inaccessibility to wildlife.

B. Past Actions:

The Coxcomb adit has been a source of recurring problems due to siltation and leakage. Sometime during the early 1970's the adit was abandoned. However, reconstruction with modifications have eliminated most of the problems. Some work still remains to bring this unit into full operation.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

Due to the Monument's responsibility to provide effective management and protection for the bighorn herds, the only option is to provide maintenance and monitoring of these critical devices.

4. RECOMMENDED COURSE OF ACTION:

The guzzlers and adit should be inspected on a monthly basis. This will prevent loss of storage water as well as malfunctions that could prevent wildlife from obtaining stored water. Aprons and drinking basins will be cleared of debris. Float valves will be checked for leaks and reset. Tank levels will be monitored to document storage and quantities available to wildlife. When the tanks at Stubbe Springs run dry, maintenance will be requested to pump water into them through the pipeline at Juniper Flats.

5. FUNDING

A. Recurrent Funds Available in Park Base - \$5,000

B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-5, FAN PALM OASIS MANAGEMENT

2. STATEMENT OF PROBLEM:

From the time of discovery in the 1880's until 1946, there were flowing springs and pools of water in the Oasis of Mara. This oasis is now dry and the groundwater level is about 6 to 60 feet below the surface. This threatens the survival of the shallow-rooted native palms. The cause of the lowering water table is imprecisely known, but thought to be due, in part, to a drought cycle; to the pumping of wells for the town of Twentynine Palms; and to the increased growth of unnatural vegetation around the palm trees. In the absence of periodic burning by Indians and natural causes, the Oasis has become overgrown. The fire-controlled sub-climax vegetation is absent and threatens the survival of this oasis.

Six test wells were drilled in the Oasis of Mara and the monitoring of groundwater levels begun during FY 1974. Presently, the wells are being measured monthly by NPS personnel. Controlled burning has been used in the winters of 82-83 and 83-84 as an efficient and natural method of cleaning out palm thatch and decadent mesquite.

In January 1984, WRO approved an action plan for the management of Mara. This comprehensive plan details fire management, palm tree stabilization, vegetation rehabilitation and wildlife projects that must be implemented if the integrity of the natural system is to be preserved. During the summer of 1984, an irrigation system was installed to provide water to palm trees if and when ground water drops below the critical depth for tree survival.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Do Not Implement Action Plan:

While this would be the least costly option, the ecological deterioration would be severe. Additionally, without prescribed burning, fuel loads will continue to accumulate causing extreme fire hazard conditions to continue.

B. Implement approved action plan.

This alternative provides for an aggressive prescribed fire program to be used in conjunction with natural as well as mechanical methods for vegetation rehabilitation. Wildlife restoration projects will

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restore historical fauna populations. Intensive groundwater monitoring will provide a safeguard against unnatural palm tree mortality if commercial pumping causes additional water table losses.

4. RECOMMENDED COURSE OF ACTION

From both an ecological as well as a safety standpoint, option B is recommended. The Oasis is heavily used by visitors. For many of these visitors, the Oasis trail is the only area of the Monument they have time to visit. Additionally, urban development has rapidly surrounded the Oasis and fire hazards to surrounding developments are critical.

5. FUNDING

A. Recurrent Funds Available in Park Base ----- \$6,000
B. ONPS Funds Requested ----- \$50,000
(over 3 years) on form 10-238, Pkg. #600 submitted on
3/26/84

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR - RM-6 - BURRO MANAGEMENT

2. STATEMENT OF PROBLEM:

Feral burros first appeared in the Monument in 1982. Since then, several bands have established, reproduced and expanded their range in the Monument. Burros are impacting indigenous wild species, e.g. Bighorn sheep, deer and tortoise. Existing staff are unable to provide necessary data to provide for efficient removal of this exotic species before they become too well established.

Burro activity has been monitored in the Monument since 1981. Locations, numbers and movements have been documented. A burro management plan is currently in draft form and has been submitted for review and approval to Western Regional Office. Although the plan has not yet been approved, permission to live capture has been provided by the Regional Office.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Do not remove burros.

While cost for removal would be eliminated, future costs for vegetation as well as wildlife rehabilitation could be enormous. Additionally, Park Service Policy precludes the tolerance of exotic species in natural areas. Further, the burros activity is in designated wilderness, the Wilderness Act also has no provision for non-historical exotics.

B. Remove Burros

The humane removal of all burros is the only option that will preserve ecologically sensitive species such as bighorn sheep and tortoise. Live capture by such methods as tranquilization has been shown to be effective for small, widely dispersed groups. Once captured, animals will be included in BLM's burro relocation program at Ridgecrest, California.

4. FUNDING

A. Recurrent Funds Available in Park Base ----- \$4,000
B. ONPS Funds Requested ----- \$51,000
(over 2 years) on Form 10-238 pkg.#601 submitted 3/15/84

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-7, EXOTIC PLANT CONTROL

2. STATEMENT OF PROBLEM:

A. Current Conditions:

The principle resources which the Monument was established to protect are the vegetation systems. The unique interface between the Colorado and Mojave Deserts has created a spectacular diversity of plant life. Five native fan palm oases and approximately 200 springs add additional diversity with their unique ecotypes.

Much of the historical human activity has had significant impacts on Monument's flora. Mining, cattle ranching and fire suppression have all altered the natural composition of most habitat types.

Disturbed systems are readily invaded by exotic weedy species. The Monument's oases, riparian areas, and springs have been invaded by a European phreatophyte (water-loving plant) known as tamarisk (other common names: saltcedar, athel). Seven species are known in California and at least three occur in the Monument. Several characteristics of this plant make it a serious pest. First, it's capable of rapid growth, up to twelve feet a year. Additionally, its capable of transpiring up to 200 gallons of water per day per mature plant. A few plants can dry up a spring in one season.

There are dozens of other exotics that are widespread throughout the Monument. European grasses and Russian thistle (tumbleweed) carpet some areas. European grasses may be dramatically altering much of the basin floral systems.

B. Past Actions

The Monument has had only sporadic programs for tamarisk removal. In some areas, the removal techniques have actually exacerbated the problem by stimulating seed dispersal. No systematic monitoring has been conducted.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Allow Exotics to Spread

Most visitors do not recognize exotic flora as unnatural invaders. Some, such as the grasses, actually provide food for indigenous animals. Although the influence of these plants on the natural systems may seem minimal to the average visitor, the magnitude of their actual impacts is not fully known. However, for some like the tamarisk, the impacts are well documented and devastating.

B. Control and Monitor Exotics

An aggressive, systematic monitoring and control program is the only effective way to deal with tamarisk. Small seedlings can be pulled and removed. Larger plants must be cut, treated with an approved herbicide and all debris removed or burned.

Resumption of natural fire regimes seems to be a promising mechanism for eradication of many exotic weeds. More information will be available on this after completion of JOTR N-24.

Monitoring and control along disturbed areas such as roadways, trails, campsites and facilities are necessary to prevent development of populations from which propagules are available to invade less disturbed areas.

4. RECOMMENDED COURSE OF ACTION

Alternative B is recommended. Water loss from springs would have serious impacts on wildlife. Exotic species control is mandated by NPS policy. Known areas of historical distribution must be monitored monthly during periods when propagation of tamarisk is likely. Mechanical removal of many exotics does not deal with the underlying course of the problem. Rehabilitation of disturbed site is the only long term solution to the problem.

5. FUNDING

A. Recurring Funds Available in Park Base - \$6,000

B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-8, GROUND SQUIRREL MONITORING AND CONTROL

2. STATEMENT OF PROBLEM

A. Current Conditions:

The California Ground Squirrel (Ostospermophilus beecheyi) is indigenous to most habitats within the Monument. Throughout most of these areas natural controls prevail, and while populations tend to be cyclic, population eruptions are uncommon.

An exception to this natural balance is found in two locations, Black Rock Canyon Campground and Hidden Valley Campground. Of these two, Black Rock is by far the most serious. In July 1982, the ground squirrel population at Black Rock reached an estimated two hundred animals in this small area (3-4 hectares). Additionally, squirrels have been habituated to human presence and interact directly with visitors. Further, the occurrence of bubonic plague has increased throughout San Bernardino and Riverside Counties.

The cause of this problem is twofold, site alteration and artificial feeding. Black Rock was purchased from a private developer who had drastically altered the natural setting. The old buried swimming pool and horse stable area are ideally suited for establishment of large squirrel populations. Also, visitors have fed these squirrels for years before the Monument acquired the site.

B. Past Actions

In July 1982, a control program was initiated at Black Rock. Squirrels were removed from concentrated areas. Efforts were also made to rehabilitate altered areas. Monitoring has been used to track population trends. Information to visitors and enforcement of regulations prohibiting feeding of wildlife have been accelerated in both areas.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

Because of the significant health and safety considerations, "no action" can not be considered an option.

A. Relocation of Excess Animals:

Animals can be captured from problem areas as population sizes reach unacceptable levels. These animals could be released in other locations. The results of relocation could have significant impacts on other areas. For

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example, squirrels captured may harbor plague and thus expand the area of infection. Additionally, the artificial increases in numbers in some localities could upset natural balances in the new area.

B. Monitoring and Direct Reduction:

The cause of the population imbalance must be corrected. Visitor information will reduce the artificial feeding. As natural succession slowly recovers denuded areas, the natural regulatory mechanisms will begin to check population development. Until then, monitoring and direct control as per approved plan (memo dated July 26, 1982, N50) should continue. Close cooperation with county health departments will insure information sharing.

4. RECOMMENDED COURSE OF ACTION:

Alternative B is recommended. This alternative provides for public safety as well as preservation of the natural biological systems. Monitoring should include recovery rates for disturbed areas as well as population estimates.

FUNDING

- A. Recurring Funds Available in Park Base - \$500
- B. ONPS Funds Requested----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-9, TORTOISE RECOVERY PROGRAM

2. STATEMENT OF PROBLEM:

- A. Current Conditions: The desert tortoise is a threatened species throughout all of its range. Habitat loss and illegal collecting represent the largest threats to this ancient reptile. While some of the Monument's tortoise populations exist well within the interior of the park, several significant populations are found along the north boundary. This is also the area where rapid development of adjacent private lands is occurring. From the community of Yucca Valley to the east end of 29 Palms, approximately 32 miles, the Monument's boundary transects large alluvial fan deposits. These are ideal habitat areas for the tortoise.

As housing and new road systems have developed, the frequency of human-tortoise encounters has increased. Many residents in these areas discover tortoises moving across roads and their yards. For a number of years, people have brought these tortoises into the visitor centers at Black Rock, Indian Cove and 29 Palms. Additionally, about 10% of these animals has been injured, typically having been hit by automobiles.

- B. Past Actions: Historically, these animals have been relocated into the interior of the Monument. Injured animals have been released to heal on their own. In some cases, tortoises turned in at 29 Palms have been released into the Oasis of Mara.

These past practices are unsound for several reasons. First, much of the habitat in the Monument's interior is unsuitable for tortoises. Most animals were released in the Queen and Lost Horse Valleys. This region exceeds the preferred elevation for this species and no permanent populations have been documented in these locations.

An interior site less frequently used is the Pinto Basin. The Basin does have a resident population of tortoises. However, the carrying capacity for this habitat is small. No consideration of existing densities or carrying capacity was used in relocating tortoises in this area.

A major problem with the past procedures was the failure to maintain records of the releases. No information

exists on numbers or localities of releases. Typically, tortoises were placed in a box and given to the next ranger that was going into the park.

A problem associated with interior releases is one of genetic mixing. Foreign animals released into a local gene pool destroys the integrity of the local population for any future research into associations of relatedness.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: Tortoises would not be accepted for relocation or medical treatment. This would create a major public relations problem. People believe they are doing the animal, as well as the Park Service, a favor by "saving" an animal that is injured or headed for certain capture at the hands of another person. Most people believe that the tortoise has come from the Monument and should be returned.

B. Turn All Tortoises Over to Cal. Fish & Game: Some of the tortoises turned in are legal pets with California Fish and Game stickers attached to the animal. These tortoises have been routinely turned over to the local game warden. Under this alternative, all tortoises would be given to the C.D.F.G. warden. Once C.D.F.G. obtains the animals, they are transported to a holding facility and turned over to volunteer groups for distribution as legal pets. This procedure is followed because relocation efforts have typically failed. The life expectancy of an animal moved any significant distance (more than one mile) is almost always zero. Additionally, the possibility of disease transmission to receiving populations further endangers larger numbers of animals.

C. Adopt Tortoise Recovery Program: This alternative recommends that all legal pets continue to be turned over to C.D.F.G. Additionally, those that have been transported from locations several miles from the Monument either be turned over to C.D.F.G. or returned close to the location from which they were removed. The latter is preferred if a suitable open space exists that could provide adequate habitat. All agencies involved, California Dept. of Fish and Game, Bureau of Land Management as well as the Park Service all agree that the best policy is not to move tortoises unless no alternative exists

If it is determined that the tortoise is a free roaming wild tortoise removed from an area adjacent to the Monument's boundary, and if an area within the Monument near that point has favorable habitat, the tortoise is

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relocated according to the Recovery Plan into predetermined peripheral habitat areas.

Injured tortoises are given to a local individual at Copper Mountain College who is licensed by the State of California to treat and return injured wildlife.

4. RECOMMENDED COURSE OF ACTION:

Alternative C is the recommended course of action. Only those tortoises determined to be good candidates for relocation are placed in a study area. The study areas have been selected to provide good habitat as well as isolation from interior populations.

It is recommended that public information on what to do with tortoises encountered be increased from our visitor centers as well as through local media.

Relocated animals are measured, marked and relocated into one of two sites. Census work should be conducted annually in these sites to establish data on survivorship.

5. FUNDING

- A. Recurring Funds Available from Park Base - \$1,000
- B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-10, FIRE MANAGEMENT PLAN

2. STATEMENT OF PROBLEM:

A. Current Conditions: The Monument was set aside to protect over 550,000 acres of desert ecosystem. Most of this area is well vegetated by several associations of arid adapted plants. Approximately half of this area is subject to recurring natural fires. The Monument has averaged approximately ten fires per year ranging in size from less than a few square meters to over 6,000 acres.

Fire has undoubtedly played a role in shaping the biological systems within the Monument for at least 10,000 years. However, shortly after the establishment of the Monument, all fires were suppressed by NPS as well as local fire fighting agencies.

Fire suppression has been expensive, approaching .75 million dollars in 1984 alone. Fire suppression techniques have been destructive. Almost fifty miles of bulldozer fuel breaks were constructed on a single fire that burned entirely within designated wilderness. The estimated recovery for most of these dozer scars is in excess of 200 years.

Many of these fires could be allowed to burn under careful supervision. Not only would this save money, it would allow a natural process to resume its role in creating unaltered ecosystems. It's not even necessary to understand every facet of the fire/vegetation relationship to justify allowing a natural process to run its course. Preliminary fire history data indicates a regime of constant fire influences.

However, policy dictates that a natural fire program must be documented in an approved Fire Management Plan for each area. Joshua Tree National Monument has no approved plan; therefore, all fires must be suppressed.

B. Past Actions: In 1983 a fire suppression plan was approved for JOTR. Within this plan, a program for modified suppression was developed. These procedures provide for low impact, cost effective forms of suppression for fires that do not pose immediate threats to property or safety.

In January 1984 an approved fire management plan was developed for prescribed fire in the Oasis of Mara.

3. ALTERNATIVE-ACTIONS AND THEIR PROBABLE IMPACTS:

A. Continue to Suppress Fires: This option provides maximum safety for structures such as campgrounds. However, suppression is expensive, especially for remote fires. With full suppression, damage to the environment will continue. Without the resumption of the natural fire regime, the biotic systems will continue to become more unnatural.

B. Develop Fire Management Plan: The plan will provide for natural fire zones. These areas will be set aside for natural fires to run their course. However, even these areas will be subject to specific requisite conditions. Weather and other variables will be considered before a fire is allowed to burn. Additionally, constant monitoring will be used to insure that the fire has not escaped the approved prescriptions. Under hazardous conditions fires in these zones would be suppressed.

Prescribed burning by set ignition for the reduction of unnatural fuel loads will also be developed in this plan. However, the need for this type of fire management is probably low. Only limited areas adjacent to the boundary will be included in this type of zone.

4. RECOMMENDED COURSE OF ACTION: It is recommended that the fire management plan be prepared. Not only is this the ecologically sound option, it will save many thousands of dollars over a few typical fire seasons. While most of the work can be accomplished by the existing staff in the Division of Resources Management, it is recommended that a fire management specialist from another NPS Park assist in the development of this critical plan.

5. FUNDING:

A. Recurring Funds Available from Park Base - \$6,000
B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-11 BACKCOUNTRY MANAGEMENT

2. STATEMENT OF PROBLEM:

A. Current Conditions: On October 20, 1976 Congress enacted legislation that created over 450,000 acres of wilderness and potential wilderness within the Monument. Guidelines for management of these units are provided by the Wilderness Act and NPS policy. The Wilderness Study Plan (1976) provides some discussion of management, but it fails to provide direction for promulgation of discretionary regulations and policies. These are the policies usually set by the superintendent and his staff.

B. Past Actions: Over the past decade, management decisions have been enacted that directly affect the backcountry. However, a comprehensive plan has never been prepared. For example, no monitoring of backcountry use impacts has ever been conducted. Illegal uses are only occasionally detected; and, their impacts have not been measured nor mitigations programs implemented.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Do Not Develop Plan: This option would save money for personnel services required to draft the plan. However, without such a document, the natural systems within the wilderness units will continue to be impacted.

B. Develop Plan: The greatest need is for a systematic monitoring procedure. This will provide information on areas of concentrated use, and types of impacts from illegal uses. From these data, mitigation programs can be enacted. These programs may include use restrictions, increased public information, rehabilitation of vegetation and increased patrol of high abuse areas.

As private inholdings within potential wilderness units are acquired, rehabilitation of some properties and associated roads will be necessary. This work is required under the Wilderness Study Plan which provides for conversion of potential wilderness units into designated wilderness status as inholdings and impacts have been rehabilitated.

4. RECOMMENDED COURSE OF ACTION: It is recommended that a backcountry plan be developed. The plan should include:

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A. Resources Management Actions:

- (1) Planning and implementation of management actions to mitigate human-caused problems identified by the monitoring program.
- (2) Provide personnel and support to increase monitoring program to become parkwide and operational throughout the year.
- (3) Provide information to other operations such as interpretation and law enforcement that can be used to implement their roles in the plan.

B. Monitoring Actions:

- (1) Maintain systematic monitoring transects in representative habitat types to document impacts.
- (2) Monitor use patterns to help establish carrying capacities. Maintain surveillance for external threats such as boundary intrusion by off-road vehicles and poachers.

5. FUNDING

- A. Recurrent Funds Available in Park Base - \$4,000
- B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-12, MINES AND MINERALS MANAGEMENT

2. STATEMENT OF PROBLEM:

A. Current Conditions:

(1) History of Mining in the Monument:

In 1865 Jeff Davis filed a mining claim in Rattlesnake Canyon, the first claim in the area that was to become known as Joshua Tree National Monument. In the years to follow eight mining districts were formed (Twentynine Palms, Washington, Gold Park, Dale, Monte Negras, Eagle Mountain, Cottonwood and Pinyon) consisting, eventually, of over 91 mines and groups of mines, and at least 18 mill sites. In August of 1936 Presidential Proclamation established Joshua Tree National Monument and for some years mining activities continued. By 1973 all 2000 - 3000 mines and claims on monument lands were declared Null and Void by the General Land Office and have been relinquished to the National Park Service or have been abandoned.

(2) Safety:

Several of the more accessible mines have been grated over and more have been fenced. But many shafts and prospects remain open. The danger is obvious.

(3) Rework and Prospecting:

Additionally, illegal reworking of existing tailings and illegal prospecting is known to occur at these mine sites increasing the potential for injury to humans and further damage to the sites.

(4) Impact to Natural Systems

Apart from those areas included on the National Register of Historic Places, impact to the natural system is readily discernible to the human eye. Great piles of tailings streaming down hillsides, concrete slabs, rip-rap roads or scars of wheel tracks from fifty years ago beckon the illegal prospector or casual visitor thus helping to keep the area from returning to its natural state.

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B. Past Actions

Some Hazardous Mines Reports have been done in the past, with some recent V.I.P. investigations adding to the information. Some of the more accessible have been safed, though the majority have been unaffected. A Historic Resource Study of Joshua Tree National Monument has been completed by Linda Green and printed by the National Park Service in 1983. Little else has been done.

3. ALTERNATE ACTIONS AND THEIR PROBABLE IMPACTS

A. Maintain Status Quo:

The potential for accidents, further biological impact and illegal mining activities remains.

B. Develop Action Plan:

First, utilize the computer to bring together information that exists in various sources and reports to create a useful database file. Next, increase monitoring of mining areas and document impact through photographic means. Finally, begin rehabilitation of historically, non-significant sites to mitigate the impact on the natural system.

4. RECOMMENDED COURSE OF ACTION

Alternative B, which includes:

A. Management Actions:

- (1) Research all mining information.
- (2) Establish a computer database for information collation.
- (3) Recommend appropriate action for each site.

B. Monitoring Actions:

- (1) Monitor illegal use and impacts.
- (2) Photograph all accessible mines and mining sites.

C. Rehabilitation:

- (1) Begin erasing visible access routes.
- (2) Clean up and seal mine entrances and surrounding areas so native biota can begin to re-establish.

5. FUNDING

- A. Recurrent funding available in Parks base - \$2,000.
B. ONPS Funds requested----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-13, REHABILITATE ROADS IN WILDERNESS

2. STATEMENT OF PROBLEM:

A. Current Conditions:

On October 20, 1976 Congress enacted legislation that created over 450,000 acres of wilderness and potential wilderness within the Monument. Over 30,000 acres are designated as potential wilderness because of existing disturbance and private inholdings. As these lands are recovered, potential wilderness units will be converted to wilderness status.

Although designated wilderness units are free of private inholdings, many contain human-caused disturbances that were designated by the wilderness proposal for rehabilitation. The most serious blight on existing wilderness is approximately 104 miles of dirt roads. Although all these roads have been closed to travel, illegal vehicle use is still common. As long as these roads remain conspicuous, illegal use will persist.

B. Past Actions:

Shortly after designation, most roads in wilderness were posted closed to vehicular travel. In most cases, the open terrain prevents the development of physical barriers. Therefore, vehicles merely drive around the signs.

No rehabilitation of these road beds has been attempted. Removal of traffic alone is not an effective form of rehabilitation. Many old wagon trail in the desert are still well defined after 100 years of relaxation from use.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. No Action:

This alternative would perpetuate the continued use of closed roads. Continual use further impacts the natural systems. These roads provide access into remote areas where other forms of illegal impacts are common. These include poaching, prospecting, illegal camping and vandalism of archeological sites.

- B. Rehabilitate Wilderness Roads Only:
Under this alternative, only the 104 miles of dirt roads within designated wilderness would be worked. The Wilderness Act requires that these impacts be mitigated. Vegetation rehabilitation through seeding and direct transplanting would be used to recover the common tire ruts which are typical for these roads.
- C. Rehabilitate All Closed Backcountry Roads:
Currently, there are about 12 miles of dirt roads in the potential wilderness units that could be rehabilitated. Although there are many additional impediments to wilderness redesignation for most potential units, recovery of these dirt roads would represent a significant step toward wilderness reclassification.

Additionally, there are approximately 40 miles of closed dirt roads in frontcountry. Like the backcountry roads, these have been barricaded to traffic. Although these roads do not impact wilderness or potential wilderness units, their visibility to the majority of the visitors represents a significant impact.

4. RECOMMENDED COURSE OF ACTION

Alternative B is recommended. All closed dirt roads represent significant impacts on the natural systems. Closed roads in the frontcountry are seen by the majority of all visitors. They attract illegal vehicle traffic which further extends the recovery time.

Extensive research on rehabilitation of desert roads has been conducted by the Bureau of Land Management. Techniques include mechanical alleviation of soil compaction and several means of vegetation propagation.

Frontcountry sites should serve as preliminary test sites. They provide accessibility for equipment and future monitoring. In some areas existing vegetation types may not respond well to artificial propagation techniques. However, earlier successional stages may. Therefore, techniques such as prescribed burning, to reset to earlier seres, may be used to enhance success of revegetation. Most of this information is readily available and little research will be required to fulfill this project.

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5. FUNDING

- A. Recurrent Funds Available In Park Base.....\$2,000
- B. ONPS Funds Requested.....\$5,000
(for 3 years) on form 10-238 pkg. #603 submitted
1/23/85

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-14, REHABILITATE BORROW PITS

2. STATEMENT OF PROBLEM:

- A. Current Conditions: Over the past 40 years, soil material for road work has been removed from many different locations within the Monument. Thirteen significant borrow sites still exist. Ten of these have been closed and three remain open. While some are small, (less than a few thousand cubic yards removed), others are large, (greater than 100,000 cubic yards removed). All sites are located typically 1/4 to 1/2 mile off major roads. The access roads into each borrow site are well established and represent significant visual as well as biological impacts.

Two sites, (Smoke Tree Wash and Cottonwood Canyon), are located in active washes. Although an undetermined quantity of borrow material has been removed from these sites, recurring flash floods have repeatedly refilled excavation sites. Other sites such as the Turkey Flat pit have been unused for such a long period that natural erosion and revegetation have eliminated much of the visual impacts.

Of the ten closed sites, only one (west entrance pit) has received any rehabilitation. And this has been restricted to the entrance road only.

Four of the closed sites have been used for dumping. Land fill material includes concrete rubble, scrap metal, wood, brush trimmings as well as raw sewage from campground toilets.

- B. Past Actions: Ten of the borrow sites were closed about 1978. Some sites have continued to be used for borrow since then. Many of the sites have been used for dumping and temporary storage of road materials. Only one site has received rehabilitation work.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

- A. No Action: Failure to begin rehabilitation of these sites will perpetuate an unacceptable situation. Closure of the ten sites was based on compliance with U.S.D.I. NPS Management Policy (III6, 2/78). However, the policy on borrow pits also directs that "such areas will be restored to fit compatibly with the surrounding environment following abandonment of use."

- B. Rehabilitate Closed Pits: Pits and service roads will be reworked to minimize visual impacts. This should include mechanical leveling and contouring of steep walls and landfill to cover dumped materials. Service roads should be revegetated to eliminate visual impacts and reduce attractiveness for illegal offroad vehicle use.

4. RECOMMENDED COURSE OF ACTION:

Alternative B which includes:

- (1) discontinue use of closed pits
- (2) landfill to bury non-biodegradable debris
- (3) contouring of steep sides and mounds within pits
- (4) closure and revegetation of access roads

An action plan should be prepared to identify specific applications for individual sites. These will include prescriptions that will range from "no action required" to significant rehabilitation applications.

To fully recover these pits, substantial landfill would be required. Most of the sites are in areas where natural erosion and deposition will eventually bring excavations back to original levels. For some sites this has already occurred. Others will require 20 to 40 years and at least two sites will need about 100 to 200 years for full recovery. The lack of availability of borrow material precludes significant refilling efforts.

At most sites, soil available from contouring methods should be sufficient to bury existing nonbiodegradable debris. Flammable material such as brush and old lumber should be burned before contouring.

Service road rehabilitation is of extreme importance. Even if pits are rehabilitated, visibility of service roads will continue to attract illegal uses by offroad vehicles. This traffic not only perpetuates the visibility of the entrance road, disturbance to the pit area will prolong recovery.

5. FUNDING

- A. Recurrent Funds Available in Park Base - 0
- B. CNPS Funds Requested ----- \$6,500
on form 10-238 pkg. #605 submitted 1/23/85

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-15, REHABILITATION OF ACQUIRED INHOLDINGS

2. STATEMENT OF PROBLEM: Within the Monument there are over 150 private inholdings. The majority of these are undeveloped parcels. However, some include significant structures and developments such as retaining walls, fences and other modifications. Occasionally, as properties have been acquired, structures such as cabins and outbuildings have been moved or salvaged by dismantling. In one case several old homes with no salvage value have been burned for cooperative interagency fire suppression exercises.

While salvage and burning has been used to remove some structures, little or no effort has been made to rehabilitate these sites to more natural conditions. See Land Acquisition Plan for details on properties.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

- A. No Action: Under this alternative no rehabilitation would be undertaken. Old structures would be left to deteriorate from natural influences.

This would perpetuate the impact to the natural environment as well as continuing potential safety hazards. Many of these sites are extremely visible to the visitor. Not only is this an aesthetic impact, some represent attractive nuisances. Some old structures are unsafe. Vandalism and arson have been recurring problems.

One special concern is over the existence of several small houses which recently reverted to Park Service ownership. These structures are adjacent to the Monument's boundary at the edge of the community of 29 Palms. When this property reverted to Park Service ownership, adjacent residents expressed concern over the removal of the structures and the eventual rehabilitation of the site. Their concern was well founded as the vandalized structures are eyesores which depreciate the adjacent property values.

- B. Rehabilitate Acquired Inholdings: Structures should be leveled. All debris and foundations should be removed. The area should be surveyed for artificial plantings of exotic shrubs and trees. All exotics must be removed.

After removal of debris, the area should be restored to compatible vegetation. The area should be monitored to prevent re-establishment of exotic plants.

4. RECOMMENDED COURSE OF ACTION:

Alternative B is recommended. Failure to rehabilitate these acquired properties will circumvent the original intent of the acquisitions. The properties were acquired because they were intrusions on the natural setting. We are obligated to take action so that the funds expended for acquisition are not wasted.

5. FUNDING

A. Recurrent Funds Available in Park Base -----0

B. ONPS Funds Requested -----\$100,000
(over 3 years) on form 10-238, pkg #604 submitted 1/23/85

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-16, FIRE EFFECTS MONITORING

2. STATEMENT OF PROBLEM:

- A. Current Conditions: Fire is a natural element in much of the Mojave Desert. Summer lightning is the source of natural ignition. And with increased use, human caused fires are also frequent. Although fire is not uncommon in many areas, there is very little information available on its role and effects on desert vegetation.

Some areas in the Monument are subject to natural fires. Historically, the average number of ignitions has been ten per year. Although most are small, less than one acre, a few have been thousands of acres in size.

Currently, only the Oasis of Mara has an approved fire management plan. Without an approved plan all fires must be suppressed. Obviously, in an area set aside to preserve the natural systems and processes, a natural fire program should be in effect.

Two other efforts, N-24 Fire Ecology and RM-10, Fire Management Plan are designed to fill this need. Monitoring is needed to provide both of these projects with valuable information that would otherwise be lost.

- B. Past Actions: Fire reports have been prepared for at least 30 years on most Monument fires. However, from over 200 reports, only one includes a photo. None of the reports discuss vegetation conditions before ignition. Additionally, most mapping was so inaccurate that only recent large fires can be readily relocated.

3. ALTERNATE ACTIONS AND THEIR PROBABLE IMPACTS

- A. No Action: Without monitoring, the only document prepared after a fire will remain the standard fire report. When research is started on N-24, there would be no baseline data available from historical fires. Therefore, the time necessary for completion of an ecology study might be greatly increased and some information never obtained.

- B. Monitor Fires: Information obtained during and after wildfires should be documented to provide a baseline for future reference. As fires occur in different habitat types, under different climatic conditions or at different locations, monitoring of post fire effects will eventually provide comprehensive information on many aspects of fire effects.

4. RECOMMENDED COURSE OF ACTION

It is recommended that monitoring continue on all prescribed as well as wildfires. Monitoring should include a minimum of one photo point with photos of burned vegetation area and adjacent vegetation. Photo points are to be relocated annually and photos retaken for comparison. Highest priority should be given to new fires as they occur. Photo documentation during fires provides information on fire intensity as well as other elements of behavior.

5. FUNDING

- A. Recurring Funds Available from Park Base - \$1,000
- B. ONPS Funds Requested ----- 0

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR RM-17, NON-NATIVE AQUATIC WILDLIFE CONTROL
2. STATEMENT OF PROBLEM

- A. Current Conditions: Although seeps and springs are common in the Monument, open water is restricted to catchments developed by cattlemen around the turn of the century. The most significant of these include Barker Dam, Cow Camp and Key's Lake. Each of these averages 4-8 acres of open water with depths varying from one to sixteen feet. All are subject to dramatic variations in water levels with seasonal climatic changes.

Barker Dam is the most accessible to the public and has been the primary site for the illegal release of goldfish and a variety of domestic ducks. Currently, this lake is populated by thousands of goldfish. Domestic ducks released at this same lake have established breeding pairs.

The impacts of goldfish on Monument resources are unknown. However, since these are artificial lakes, there are no known indigenous fishes in the Monument. Additionally, although the aquatic systems appear to be well developed with typical desert riparian biota, the systems are artificial and slowly deteriorating.

The impacts from domestic ducks are much more apparent. First, the sight of these animals is typically disagreeable to many visitors. Bird watchers are particularly dismayed to find "city park ducks" in these relatively remote waters. Beyond these aesthetic impacts are genuine biological disturbances.

The open water in the Monument is used by a tremendous variety of native waterfowl. Migrating birds use these waters especially during stormy conditions along the coast and/or in the Coachella Valley. Known nesting waterfowl include coots, mallards and pied-billed grebes. Suspected nesters include eared grebes, sora rails and ruddy ducks.

Although these waters have been artificially created, they are almost one hundred years old and well established systems for existing waterfowl as well as other wildlife. When domestic birds are introduced into these waters, they usually do not last long. Typically, predators like coyotes and bobcats remove these exotics. However, occasionally some may survive long enough to become wary of predators. If they survive the first week, they can be expected to persist for years.

The threat to native waterfowl is in the form of behavioral confrontations between the exotics and native species. These domestic animals typically show no migratory tendencies. Therefore, they establish long term territories which are particularly pronounced on these small bodies of water. When migrating animals land on these ponds, resident domestic birds frequently challenge and harrass them until they are forced to leave. Frequently these migrants are stressed and dehydrated. The availability of these waters can be critical for these birds. Additionally, the domestic residents compete with the nesting native birds.

- B. Past Actions: In the early sixties, an infestation of goldfish was removed from Barker Dam. This was done during a dry period when the water was reduced to a small pond. Rotenone was used to kill the fish.

Historically, domestic waterfowl that became established in these lakes were shot. In one instance the ducks were so habituated to handouts that they were baited on shore and captured by hand.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

- A. No Action: This alternative would perpetuate the impacts on native wildlife. Additionally, no action would violate Park Service Policy as well as the stated objectives of this plan.
- B. Remove Exotics: Goldfish and domestic waterfowl are exotic animals. Therefore, they should be removed on sight. However, removal techniques vary. Goldfish can only be effectively removed through poisoning. Chemicals such as rotenone are hazardous to other organisms.

Ducks can be readily trapped for removal, However, this technique is limited in that resident native birds are frequently trapped instead of the exotics. This places unnecessary stress on these birds. Additionally, traps left unattended are frequently vandalized by predators. Further, the use of shotguns may be extremely disruptive to nesting native birds.

4. RECOMMENDED COURSE OF ACTION

- A. Preventative Measures: These waters (especially Barker Dam) should be posted citing the Federal Regulations that prohibit the release of animals on Park lands. Additionally, information through interpretive activities should be made available to visitors on the hazards of releasing animals as well as feeding wildlife.

Natural Resources Mgt. Program - JOTR

- B. Resources Management Actions: Goldfish should be removed by chemical means only during drought periods when the remaining water is a small fraction of the average levels. This should be possible at about five to ten year intervals.

Once a domestic duck is reported, one week should be adequate to determine if predators will remove the bird. If the bird or birds evade predators, then they should be removed. Live capture is preferred. During nesting seasons, live capture is preferred to shooting. Paired birds displaying territorial behavior are considered a greater threat than a nonterritorial bird.

Monitoring birds in these waters will facilitate removal before animals become well established.

5. FUNDING

- A. Recurring Funds Available in Park Base ---\$1500
B. ONPS Funds Requested -----0

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Joshua Tree National Monument, WRO
2. PROJECT NAME AND NUMBER: Ecology of Joshua Trees, Phase 2, JOTR-N-10b
3. STATEMENT OF PROBLEM: Phase two represents additional research of Yucca brevifolia ecology necessary to complete data accumulation for species management and alleviate population declines associated with a recent pestilence.

During the first week in March 1980, a number of Joshua trees near the West Entrance station (Monument access from town of Joshua Tree) showed signs of debilitation in the form of foliage dieback.

A preliminary survey has located several disease sites throughout the species' distribution within and beyond park boundaries. At this time approximately 1,000 individuals within the Monument appear to be affected. All age classes seem to be affected and clustering may indicate a disease pathogen. The exact extent of the distribution within and beyond Monument boundaries is not known. At this time the causal agent or ecological significance of the losses is undetermined.

4. WHAT HAS BEEN DONE: A study completed in May 1977 through CPSU/UNLV on Joshua tree ecology represents the completion of phase one. This report, title and author, provides data on distribution, plant and animal associations and other aspects of Joshua tree ecology.

To understand the nature of the recent Joshua tree deaths, a study of the distribution, rates of debilitation and disease spread has been initiated. The University of California at Riverside's Agricultural Extension Service has taken samples for laboratory analysis. Several plant ecologists familiar with Yucca brevifolia and arid systems have been contacted. However, at this time neither the pathologists nor ecologists have been able to determine the probable cause.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN: This proposed study should include elements of Yucca brevifolia ecology such as fire regeneration, seedling survival, disease organisms and autecological and synecological assessments of current population debilitation. The research objectives should include an applied phase investigating disease control methods, especially if the pathological considerations indicate the existence of an exotic pathogen.

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6. LENGTH OF TIME NEEDED: 2 YEARS
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: The Monument contributes to the preservation of Joshua trees. It behooves management to understand the ecological requirements of this species as well as possible. If the study is not undertaken, the current population decline would accelerate and destroy many more Yucca brevifolia within the Monument. This would be especially critical if the population decline is related to unnatural processes.
8. WHAT ARE THE ALTERNATIVES:
- a. Do not conduct studies.
 - b. Develop only a reactionary study to identify and describe current disease outbreak without an attempt to place this incident into the broader ecological consideration.
9. PERSONNEL: Unknown, probably contracted specialists to be determined later.
10. ADMINISTRATION AND LOGISTICS:
- | <u>Funding</u> | <u>Year in Program</u> | |
|---|------------------------|--------|
| | 1st | 2nd |
| Personal Services
(Contract) | 8,000 | 8,000 |
| Other Than Personal Services | 2,000 | 2,000 |
| Grand Total | 10,000 | 10,000 |
| Funds Available in Park Base | 0 | 0 |
| Funds Requested from
Regional Office | 10,000 | 10,000 |
11. REFERENCES AND CONTACTS: NPS, Chief, Div. of Natural Science, WRO; UC Riverside, Agricultural Extension Service; Natural Resources Management Specialist, JOTR NM
12. DATE OF SUBMISSION: May 1980 on form 10-237 inc. no. 112 submitted 3/16/82

NATURAL SCIENCE PROJECT STATEMENT

1. JOTR N-24a, FIRE ECOLOGY

2. STATEMENT OF PROBLEM:

A. Current Conditions:

Fire has played a natural role in shaping most of the biological systems in the Monument. Natural fires have burned for thousands of years in the Mojave desert. However, for the last few decades, fire suppression has been a continuous program within the Monument. Empirical data indicate that fire-influenced habitats have significantly different community structures than those of similar origins that have had fire removed by suppression.

B. Past Actions:

Some monitoring of burn sites has been initiated. However, the few sites only represent a small percentage of the diverse vegetation types that are affected by fire. Heavy equipment was used to construct fire breaks on several large fires that burned entirely within wilderness. In all cases, the impact of the equipment was far more severe than any caused by the fire.

3. ALTERNATE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Do Not Fund Research:

If the proposed research is not carried out, park managers will face difficult decisions on how to proceed with development and implementation of the Monument's Fire Management Plan. Future impacts from suppression operations would continue to severely impact the biotic systems.

B. Carry Out Research on Fire Ecology of Biotic Communities.

The information derived from this research will provide critical data for the management of natural fire. This will provide for a more natural structure within the natural fire zones. Additionally, this information will provide a greater margin of safety for the management of fires in difficult areas such as along boundaries with private property and development.

4. RECOMMENDED COURSE OF ACTION:

It is recommended that the proposed study be conducted. The Monument had two of the most costly fires in Western Region in the summer of 1984. Both of these fires were suppressed due to the lack of a fire management plan addressing natural fire zoning. Both could have been managed as natural fires and saved the Government about 3/4 of a million dollars.

5. FUNDING

- A. Recurrent Funds Available in Park Base ----- 0
- B. ONPS Funds Requested ----- \$5,000
(for 2 years) on Form 10-237 Inc.#44 submitted
3/16/82

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Joshua Tree National Monument, WRO
2. PROJECT NAME AND NUMBER: Analysis of the Impact of Man on the Ecosystem of Joshua Tree National Monument, JOTR-N-25
3. STATEMENT OF PROBLEM: Man continues to shape the land as he desires without regard for the consequences. Road and mining scars, air and ground pollution, and sight and sound pollution commonly detract from the naturalness of these ecosystems of the Monument. In addition, the mere presence of man can cause some animals to be attracted and others to be repelled. An analysis of man's impact on the natural environment is needed to assist the resource manager in protecting the integrity of the Monument.
4. WHAT HAS BEEN DONE: Nothing
5. DESCRIPTION OF WORK TO BE UNDERTAKEN: An inventory is needed of all alterations of the ecosystem accomplished by man. The full impact of these alterations must be determined and analyzed. One of the major actions of this project will be to inventory exotic flora, such as tamarisk, and fauna of the Monument and to propose management recommendations to minimize their influence where feasible. External threats such as poaching and illegal offroad vehicle use will be examined. Land tenure and utilization patterns adjacent to the Monument will be assessed.
6. LENGTH OF TIME NEEDED: One year
7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management decisions concerning visitor impact and future development may be based on incomplete data.
8. WHAT ARE THE ALTERNATIVES: Do not conduct the studies.
9. PERSONNEL: An interdisciplinary team comprised of ecologists, a sociologist, a geologist-hydrologist, and a resource management specialist should conduct the study. A management biologist may be used to gather basic details for the team.
10. ADMINISTRATION AND LOGISTICS: These personnel should work as a team and sample the area for the physical changes to the area. The team should study the area during high and low periods of visitation to obtain an overview of the impact of man on the area.

Natural Resources Mgt. Program - JOTR

<u>Funding</u>	<u>Year in Program Sequence</u>
Personal Services (Contract)	First 20,000
Other Than Personal Services	0
Grand Total	20,000
Funds Available from Park Base	0
Funds Requested from Regional Office	20,000

11. DATE OF SUBMISSION: May 1980 on form 10-238 pkg. #311
submitted 1/23/85

NATURAL SCIENCE PROJECT STATEMENT

1. JOTR N-29, STUDY OF ARTIFICIAL AQUATIC AND RIPARIAN SYSTEMS

2. STATEMENT OF PROBLEM:

Although seeps and springs are common in the Monument, open water is restricted to catchments developed by cattlemen around the turn of the century. The most significant of these include Barker Dam, Cow Camp and Key's Lake. Each of these averages 4-8 acres of open water with depths varying from one to sixteen feet. All are subject to dramatic variations in water levels with seasonal climatic changes.

These waters are artificial, but because they are about 100 years old, their biological communities are well established. Presently, no baseline information is available identifying existing biota. Further, the interaction between the arid systems and these aquatic communities is not understood.

The current policy on the maintenance of these structures calls for natural deterioration and eventual loss of impounded waters. However, no estimate of deterioration, through processes such as siltation, has been developed. Additionally, no information is available to assess the impacts on wildlife from the eventual loss of these waters.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Do not conduct study. Failure to develop these necessary data will preclude meaningful management of these unique resources. We will not only be unable to identify existing aquatic resources, but no information will be available to predict future impacts on wildlife.

B. Conduct study. The study should proceed in the following order. First, develop a basic inventory of existing aquatic biota. This would include aquatic plants and animals as well as riparian ecotypes. Second, a hydrological survey should be done to look at the deterioration processes. From this an estimate of life expectancy for each unit should be developed. Finally, an ecological assessment of interaction and dependencies between aquatic and nonaquatic wildlife should be made. From these results a prediction of effects from eventual water loss could be made. All of this information should be synthesized to formulate management recommendations.

Natural Resources Mgt. Program - JOTR

4. RECOMMENDED COURSE OF ACTION

Fund study. This project is interdisciplinary in nature and may require more than one researcher. An interdisciplinary team approach would be desirable.

5. FUNDING

A. Recurring Funds Available in Park Base -----0

B. ONPS Funds Requested -----\$10,000
on form 10-238 pkg.#610 1/25/85

NATURAL SCIENCE PROJECT STATEMENT

1. JOTR N-30, ENDANGERED PLANT SURVEY

2. STATEMENT OF PROBLEM:

A. Current Conditions: Ten native species of plants within JOTR are federally listed as Category 2, Rare and Endangered. This category reflects the need for additional information before final status determination can be made. Further biological research and field study is necessary to better determine distribution of the taxa. Some species require further taxonomical research before their status can be clarified. Information on distribution within the Monument of some of these species is based on single observations made almost 20 years ago. Some of the reported locations are in remote areas and no attempt has been made to relocate these sites.

B. Past Actions: Technical Report #2: Investigation of the Vegetational Communities of JOTR, California was prepared by Patrick Leary in June 1977. This report was based on extensive field survey work. However, only one of the ten species was found frequently enough to prepare a distribution map of its locations. Leary only references older citation of historical locations for the remaining nine species.

In March 1982, one of the species, (Foxtail Cactus), was investigated for a proposal to move it from Category 2 to Category 3. Since then, no further studies have been done to document distribution and abundance of these endangered plants.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. No Action: This alternative would perpetuate the current situation. Without this information, NEPA compliance for park operations would remain difficult to achieve for many routine projects. Additionally, as a land managing agency we are obligated to identify our resources and make this information available to the U. S. Fish and Wildlife so that each species can be placed in an appropriate category.

B. Conduct Survey: This is an extremely cost effective research project. Most of the preliminary field work has been completed by Leary. Historical localities are documented. The researcher will have specific sites to check at appropriate seasons.

Natural Resources Mgt. Program'- JOTR

4. RECOMMENDED COURSE OF ACTION: Contract a botanist to provide detailed information on the distribution and abundance of sensitive plants within the Monument. Document locations of plants and measure population sizes. Prepare habitat descriptions and detailed maps for each population. Determine disturbance factors to minimize impact and prevent losses. Conduct annual censuses to monitor the plants. Prepare files for each species complete with related literature regarding management, research and educational purposes. Maintain close liaison with the California Native Plant Society.

5. FUNDING

A. Funds Available in Park Base ----- 0

B. ONPS Funds Requested -----\$4,000
on form 10-238 pkg #608 submitted 1/23/85

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR N-31, DESERT TORTOISE STUDY

2. STATEMENT OF PROBLEM:

A. Current Conditions: A threatened species, and by some scientists considered endangered, the desert tortoise, Gopherus agassizi, is one of the more well-known animals of the desert. Within the boundaries of Joshua Tree National Monument, there have been, historically, several significant populations of desert tortoise, but little information is available.

B. Past Actions: In 1978 a study of the desert tortoise was done in the Pinto Basin. At the conclusion of that study, John Barrow's report estimated tortoise density to be 75 to 80 in an area of one square mile. Owing to the number of skeletal remains found and several other factors involved, Barrow also concluded that Gopherus agassizi in the Pinto Basin was endangered. In 1984, Kenneth Cooper was doing a study related to tortoise burrows and could not find one active burrow in the Pinto Basin site.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: The distinct possibility exists that large tortoise populations may virtually disappear from the Monument unnoticed. No information would be gathered and available for other agencies, i.e. the U.S. Fish and Wildlife Service request dated 12/21/84 on behalf of the Defenders of Wildlife.

B. Initiate a Study: Locate and document both active and inactive population sites, conduct population census of active sites, and determine effects of tortoise relocation projects on existing populations. Information will be collated and available as a baseline for further studies, in house or by outside agencies.

4. RECOMMENDED COURSE OF ACTION:

Alternative B is recommended. This information is vital to aid in protecting the dwindling populations of Gopherus agassizi.

A. Research: To establish permanent study plots and develop a baseline census.

B. Monitoring: Park staff to utilize study plots for ongoing census.

Natural Resources Mgt. Program - JOTR

5. FUNDING:

- A. Recurring Funds Available From Park Base -----\$500.00
- B. ONPS Funds Requested -----\$5,000.00
on form 10-238 pkg. #607 submitted 1/23/85

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR AO-1, AIR QUALITY STUDY
2. STATEMENT OF PROBLEM:

A. Current Conditions:

Air quality is recognized as one of the Monument's natural resources. Air quality related values such as visibility of panoramas inside the park and clear, long distance vistas outside the park are considered to be primary attractions and essential to a visitor's enjoyment of the park. Some views have already diminished because of a gradual deterioration of air quality in recent decades primarily contributed by polluting sources in the Los Angeles Basin. Various mountain peaks and features such as the Salton Sea are easily seen from within the Monument at particular vista sites. A clear day offers the visitor the enjoyment of seeing features such as Signal Peak in Mexico nearly 100 miles away.

Air pollution is detectable in the park on most days. The Little San Bernardino's often form a barrier to the air pollution sources from the Los Angeles Basin.

Besides existing air pollution sources from Los Angeles Basin, other sources may develop in the future. For example, a Pacific Gas and Electrical Generating Plant has been proposed near Johnson Valley about 25 miles north of the Monument's northwest boundary. Other similar proposals also are currently under consideration, including coal-fired generating plants even closer to the Monument's boundary.

The crux of the problem rests in the lack of quantitative information on air pollutant levels, visibility characteristics, etc. Without such information Service officials have little basis upon which to evaluate and comment on proposals for developments outside the Monument that may further degrade air quality within its boundaries.

Because of its Wilderness Units, Joshua Tree National Monument carries a mandatory Class I status as designated by Congress. The Clean Air Act (Section 169A) grants the service substantial authority and responsibility in "prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made pollution."

B. Past Actions:

For nearly four years air quality has been monitored in the nearby community of Twentynine Palms.

For park air resources to be managed according to the requirements of this Act, baseline data must be identified through research and monitoring programs. Three such programs are in progress.

a. Current levels of air pollutants, soil, salt, industrial and automotive elements are measured through a program with the University of California, Davis. SFS-500 Particulate Sampler stack filters have been sent to U.C. Davis once a week since May 1982.

b. A visibility monitoring and data analysis program has been in effect since June 1982 in conjunction with Air Resources Specialists, Inc. in Fort Collins, Colorado. An automatic Teleradiometer and camera were installed in a remote site and in operation by January 1984, replacing a manual unit that had been in operation since June 1982.

c. A contract was issued and work begun in April 1984. This is a mutual effort between, NPS, University of California, Riverside and Southern California Edison to monitor ozone levels and damage to vegetation in Joshua Tree National Monument. A Dasibi ozone analyzer and a Primline strip chart are the basis for ozone monitoring at Lost Horse Ranger Station.

3. ALTERNATE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue monitoring in progress:

Air quality standards may be already exceeded or become exceeded in the future. This may result in damage to natural and cultural resources, a decrease in visitor enjoyment of recreation opportunities, and possible increase in respiratory health hazards.

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B. Reduce monitoring in progress:

The Service has legal mandates and a moral obligation to strive for acceptable air quality levels in the Monument. Reduction of monitoring could have the same impact as discontinuance.

4. RECOMMENDED COURSE OF ACTION:

A. A continuing program of monitoring and research will be required to identify current adverse effects of air pollutants on air quality and on impacted resources in the park and to prevent significant deterioration to these values and resources in the future.

B. The Resources Management Specialist of the Monument will subsequently direct this program. A full time Air Supervisor, under the Resources Management Specialist, will co-ordinate schedules, monitor and compile information, and dispatch that information to appropriate agencies. Co-ordination from within the park is necessary to avoid loss of valuable information to ourselves and the initiating agencies. The Air Quality Supervisor will also be responsible for training an Air Quality Aid for data collection and equipment maintenance.

5. FUNDING

- A. Recurrent Funds Available in Park Base - \$ 4,700
- B. ONPS Funds Requested ----- \$18,600
(for two years) on form 10-238, Pkg.#602
submitted 3/28/84.

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Joshua Tree National Monument, WRO
2. PROJECT NAME AND NUMBER: Monument Water Resources Management Plan (JOTR-W2)
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: No comprehensive water management plan has been developed for the area. However, some aspects of water resources management have been considered in the Monument's Natural Resources Management Plan approved in October 1974. The plan describes the hydrological nature of the Monument area. U. S. Geological Survey has measured water levels in selected wells in the Monument for 15 years or longer.

Some serious hydrologic problems that need to be solved have already been identified. For example, continued withdrawal from Kaiser Steel Company's well will result in decreased water levels throughout the Pinto Basin. Other examples of hydrologic problems involve a lowering water table at Oasis of Mara, and a reduction in flow of historic springs and their associated biological populations throughout the Monument.

Of over 120 known water sources, including springs, wells, seeps, and impoundments in the Monument, little information exists about water quality and quantity.

5. DESCRIPTION OF WORK TO BE UNDERTAKEN:

Water Resources Management Plan will be prepared with special emphasis on:

- a. An historical report on management of water resources in and adjacent to the Monument.
- b. Classification of all surface and ground 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 and Federal water quality standards.

- (2) Relationship of water quality to any threatened, endangered, or otherwise sensitive species indigenous to the park, and relationship of water quality to the protection of all natural resources.
 - (3) An annotated bibliography and summary statement of available information concerning 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.

Future coordination/cooperation with EPA and the State is required to ascertain established water standards.

6. LENGTH OF TIME NEEDED: 2 years
7. WHAT WILL HAPPEN IF PROJECT NOT UNDERTAKEN: Changes will occur in natural hydrobiological processes within the Monument. Service noncompliance with the above Federal Laws could lead to legal action against the Service.
8. WHAT ARE THE ALTERNATIVES: React only to emergencies and manage water resources on a piecemeal basis.
9. PERSONNEL: Assistance from WRO, Water Resources Division, with contracted U. S. Geological Survey to develop/initiate basic aspects. Future monitoring will be done by Monument staff in conjunction with U. S. Geological Survey.

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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 (Non-NPS)	10,000	10,000	0	0	0
Other than personal services (Equipment, Travel, etc.)	10,000	10,000	0	0	0
Grand Total	20,000	20,000			
Funds available in park base	0	0			
Funds requested from Regional Office	20,000	20,000			

On Form: 10-250 Date Submitted: To be submitted

11. REFERENCES AND CONTACTS: Division of Water Resources, WRO

12. DATE OF PROJECT STATEMENT SUBMISSION: May 1980

on form 10-238 pkg.#809

NATURAL RESOURCES PROJECT STATEMENT

1. JOTR W-3, WATER SOURCE MONITORING

2. STATEMENT OF PROBLEM:

A. Current Conditions:

Water represents the most significant physical factor in the development of arid biological communities. The Monument diverse biota is in part due to the relative abundance of water sources. However, although almost 200 water sources have been mapped, the quantity of water at any one site is small. Many have only intermittent flows with some remaining dry for years at a time.

Water tables have been altered by a variety of human disturbances within the Monument. Historic mining practices used destructive methods to "improve" springs. Ground water was pumped for mining as well as ranching. Further, the Kaiser Steel Company's wells in the Pinto Basin have lowered the water table throughout this wilderness basin. Additional water problems are documented in RM-5's Project Statement.

A recent threat to water quality at springs has been the development of burro populations in the Monument. Burros foul small springs making the water unuseable for many types of wildlife such as bighorn sheep. Another spring threatening organism is an exotic plant called Tamarisk (see RM-7).

B. Past Actions

U.S. Geological Survey has monitored water levels in selected wells in the Monument for over fifteen years. Additionally, a few brief hydrologic surveys were also prepared for selected sites by U.S.G.S.

Tamarisk has been removed annually from most water sites within the Monument. However, replacement has accelerated with proliferation of the exotic on lands adjacent to the Monument.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS

A. Discontinue Monitoring:

This action would save funding for personnel services as well as transportation. However, the loss of these data would be critical to our overall responsibility to monitor natural resources impacted by human disturbances. Future placement of guzzlers to mitigate unnatural water losses must rely heavily on these data.

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B. Continue to Monitor Water Sources:

Critical water sources and wells should be monitored on a regular schedule. These sites have been identified in the Resources Management Plan (1974) as well as the Monument's Water Source Books. Additionally, a spring and guzzler check schedule has been developed.

4. RECOMMENDED COURSE OF ACTION

Alternative B is recommended. Two years ago, Monument staff took over the responsibility of monitoring the test wells in the Oasis of Mara. This was a savings of \$1,000 a year historically paid to U.S.G.S. under contract. Unnatural impacts caused by humans as well as exotic animals must be mitigated to protect this most critical resource.

5. FUNDING

A. Recurrent Funds Available in Park Base - \$2,000

B. ONPS Funds Requested ----- 0

ENVIRONMENTAL ASSESSMENT

It was determined through public and National Park Service review of the 1974 NRMP, Environmental Assessment, and Management Program that proposed actions lacked potential to cause significant impacts on the environment.

Review copies of the documents were sent to 26 agencies or organizations and to 78 individuals in 1974. Former Monument Superintendent, Homer L. Rouse, received 11 responses generally supporting proposed actions. He prepared a "Consultation and Coordination" addendum to the NRMP in April, 1975. This addendum summarized review comments on the NRMP and included responses to these comments.

In carrying out projects proposed in the 1985 revision of the Management Program, provisions of the National Environmental Policy Act, National Historic Preservation Act, and Endangered Species Act will be complied with as they have been in the past. Although newly proposed projects in this document fall within the "umbrella" of the 1974 Environmental Assessment, individual proposed projects have been evaluated for NEPA compliance. Impacts are reviewed in the following impact matrices:

PROJECT STATEMENT TITLE: JO'TR RM-1, WILDLIFE GUZZLERS
 JO'TR RM-4a, GUZZLER MONITORING AND MAINTENANCE

NEED FOR PROPOSAL: Water resources have been artificially impacted by human disturbance. Guzzlers are needed to provide stable water for bighorn sheep as well as other wildlife.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Develop New Guzzlers	No Action
<u>Wildlife</u>		Improve stability of a critical limiting resource.	Wildlife especially bighorn sheep will continue to decline during drought years.
<u>Vegetation</u>		Installation could have limited impacts on small area of vegetation.	No impact.
<u>Aesthetic Values</u>		Installations are visible and detract from wilderness setting. Proper location and painting can reduce impacts to small extent.	Wilderness scene is preserved.
<u>Water</u>		No impact.	No impact.

PROJECT STATEMENT TITLE: JOTR RM-2a, BIGHORN SHEEP MANAGEMENT

NEED FOR PROPOSAL: Desert bighorn sheep are rare and most populations in the Mojave Desert have experienced severe declines in the past few decades.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Monitor Populations	No Action	
<u>Wildlife</u>	Data will provide baselines from which changes can be assessed. Annual census provides early warning of long term declines as well as short lived variations.	Without data, condition of herds will remain unknown. Declines associated with unnatural impacts could not be mitigated.	
<u>Vegetation</u>	No impact.	No impact.	

PROJECT STATEMENT TITLE: JOTR RM-5, FAN PALM OASIS MANAGEMENT

NEED FOR PROPOSAL: Oasis of Mara has been made unstable by removal of natural processes. Perpetuation of this critical ecotype is dependent on reintroduction of influences by water and fire.

IMPACT CATEGORIES ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Manage Oasis System	No Action
<u>Wildlife</u>	During early phases of prescribed burning, some animals may be displaced or injured. Long term effects will improve habitat for wildlife.	Wildlife populations will continue to suffer from low productivity of vegetation system.
<u>Vegetation</u>	Old decadent mesquite will be rejuvenated. Palm trees will be less impacted by insects and disease. Some ecotypes will be less numerous while others will increase.	Old mesquite will continue to dominate system. Understory plants will be robbed of sun as well as water. Palms may be lost due to competition with mesquite or killed by unnatural high intensity fires.
<u>Cultural Resources</u>	No impact.	High intensity burns may damage surface artifacts.
<u>Water</u>	Ground water will be stabilized. Monitoring will provide early warning of possible palm tree deaths.	Without monitoring, further unnatural draw down of water table will go undetected and palm trees could be needlessly lost.
<u>Safety</u>	Prescribed fire will reduce threat of wildfire.	Wildfire potential for spreading to private residences will remain critical.

PROJECT STATEMENT TITLE: JOTR RM-6, BURRO MANAGEMENT

NEED FOR PROPOSAL: Burros are exotic pests threatening critical wildlife.

IMPACT CATEGORIES \ ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Remove burros	No Action
<u>Wildlife</u>	<p>Competing wildlife such as bighorn sheep and tortoise will have less pressure from this exotic.</p> <p>Burros will be live captured and placed out for adoption.</p>	<p>Bighorn sheep will continue to decline as burros destroy forage and water sources.</p>
<u>Vegetation</u>	<p>Browse species will have less grazing pressure.</p>	<p>Many plants in certain locations will be destroyed.</p>
<u>Water</u>	<p>Springs will remain natural with good quality water for wildlife.</p>	<p>Springs will be destroyed and water fouled to the point that it will be unavailable to most wildlife species.</p>
<u>Social-Aesthetic</u>	<p>Some visitors may feel burros are part of historic scene.</p> <p>Indigenous species such as bighorn will remain more available for viewing and photography.</p>	<p>Burros will continue to increase thus replacing bighorn sheep as a large animal for viewing and photography.</p> <p>Burro manure is already heavily concentrated around backcountry springs. This will diminish aesthetic values for backcountry hikers.</p>

PROJECT STATEMENT TITLE: JOTR RM-7, EXOTIC PLANT CONTROL

NEED FOR PROPOSAL: Exotic species replace native plants. Some such as tamarisk are a threat to natural water.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Control Exotics	No Action
<u>Vegetation</u>		Native species will only be subject to natural forms of competition.	Competition will displace many native plants.
<u>Wildlife</u>		Indigenous animals dependent on native species of plants will continue to have natural levels of abundance.	As exotics extirpate native plants some wildlife species would suffer.
<u>Water</u>		Tamarisk removal will help perpetuate small seeps and springs.	Many small water sources will be eliminated due to the high evapotranspiration rates of tamarisk.
<u>Aesthetics</u>		Some uninformed visitors may miss the sight of Russian Thistle (tumbleweeds).	Natural scenes will be altered by presence of exotic plants.

PROJECT STATEMENT TITLE: JOTR RM-8, GROUND SQUIRREL MONITORING AND CONTROL

NEED FOR PROPOSAL: Squirrels in two campgrounds have experienced unnatural population explosions. These animals are known to harbor plague transmitting fleas in populations adjacent to the Monument.

IMPACT CATEGORIES / ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE	ALTERNATIVE
<u>Wildlife</u>	Monitor and Direct Reduction	Monitor and Relocation	No Action
<u>Health and Safety</u>	When squirrels reach high population levels, some would be captured and killed. Other competitive species such as other species of ground squirrels and chipmunks would benefit from stabilization of beechey population.	Ground squirrels in relocation in sites would receive increased intraspecies competition.	Beechey ground squirrels will out compete adjacent competitive species.
<u>Social Aesthetics</u>	Reduction during population eruptions would minimize probability of plague development and possible transmission to visitors and employees.	Infected animals could be introduced into disease free populations thus spreading the problem.	Visitors and employees could be subjected to possible bubonic plague infection. Additional threats will exist such as squirrels biting visitors who offer them food.
	Some visitors may be opposed to even the humane removal and killing of these campground beggars. Extensive excavations would be eliminated improving the natural vegetation cover.	No impact.	Squirrel excavations denude a large percentage of some campground areas reducing the aesthetic value.

PROJECT STATEMENT TITLE: JOTR RM-9, TORTOISE RECOVERY PROGRAM

NEED FOR PROPOSAL: Tortoise populations adjacent to the Monument are being displaced by development of private lands.

<div style="text-align: center;">ALTERNATIVE ACTIONS</div> <div style="text-align: center;">IMPACT CATEGORIES</div>	PROPOSED ACTION	ALTERNATIVE	ALTERNATIVE
	Adopt Tortoise Recovery Program	Turn All Tortoises Over to Cal. Fish and Game	No Action
<u>Tortoises</u>	No impact on legal pets, illegal captives or animals removed from distant locations. Relocated animals deposited in test population areas only.	All tortoises would be placed in legal adoption homes.	Many local tortoises would be taken into illegal captivity. Some would be killed by traffic and vandals.
<u>Social-Aesthetic</u>	Will promote public understanding and cooperation.	No impact.	Will undermine public trust especially among local residents.
<u>Other Wildlife</u>	No impact.	No impact.	No impact.

PROJECT STATEMENT TITLE: JOTR RM-10, FIRE MANAGEMENT PLAN
 JOTR RM-16, FIRE EFFECTS MONITORING

NEED FOR PROPOSAL: Fire is a natural process in Monument's vegetation ecology. Without an approved plan, fires must be suppressed.

IMPACT CATEGORIES ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Manage Fires	Suppress Fires
<u>Soil</u>	<p>Nutrients will increase as they are released from vegetation in combustion process.</p> <p>Water absorption may be reduced in burned area.</p> <p>Soil erosion may increase immediately after fire.</p> <p>Approximately 50-6,000 acres could be affected annually.</p>	<p>Nutrients bound up in old vegetation growth.</p> <p>Soil disturbances include hand line constructing, mop up operations and vehicular traffic off roads.</p>
<u>Water</u>	<p>Increase in surface run off in burns.</p> <p>Less transpiration by plants could cause small increase in ground water. Especially near seeps and springs.</p> <p>Some springs and streams could be impacted by increased silt loads.</p>	<p>If fire is large, same impacts as management option.</p>
<u>Air Quality</u>	<p>Carbon dioxide emissions of 2000 to 3500 pounds per ton of fuel can be expected.</p> <p>Carbon monoxide will range from 200 ppm close to flame to less than 10 ppm 100 feet from fire.</p>	<p>Same as management option.</p>

PROJECT STATEMENT TITLE: JOTR RM-10, FIRE MANAGEMENT PLAN (Continued)

NEED FOR PROPOSAL:

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Manage Fires	Suppress Fires
<u>Wildlife</u>		<p>Hydrocarbons generated at 5 pounds per ton of fuel.</p> <p>Visibility will be reduced at some vistas.</p> <p>Fire stimulates plant growth and increased production.</p> <p>Maintains vegetation diversity thus providing increased number of niches for wildlife.</p> <p>Bighorn sheep will benefit from conversion of brush species to grasses.</p>	Less favorable than management option.
<u>Vegetation</u>		<p>Increased plant productivity.</p> <p>Increased plant diversity.</p> <p>Fire dependent plants favored.</p> <p>Brush habitats returned to grasslands.</p> <p>May reduce density of Joshua Trees.</p>	<p>Old growth, less productive stages maintained.</p> <p>Vehicle and equipment use will have significant impacts.</p>
<u>Social-Aesthetic</u>		<p>Smoke may be inconvenience to visitors in some campgrounds.</p> <p>Burned areas may seem less acceptable than unburned landscapes.</p>	Same as management option.

PROJECT STATEMENT TITLE: JOTR RM-11, BACKCOUNTRY MANAGEMENT

NEED FOR PROPOSAL: Increased backcountry use has caused impacts in many wilderness areas.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
<p><u>Vegetation</u></p> <p><u>Wildlife</u></p> <p><u>Social-Aesthetic</u></p>	<p>Monitor and Manage Backcountry</p> <p>Areas of high use will be rehabilitated and camping in impacted areas may be restricted to allow vegetation to recover.</p> <p>No impact.</p> <p>Some individuals may be affected by camping restrictions. Alternative areas so vast, impact will be minimal.</p>	<p>No Action</p> <p>Trampling and illegal collection will continue to reduce vegetation in high use areas.</p> <p>Little impact.</p> <p>Aesthetics of over used sites will continue to deteriorate.</p>	

PROJECT STATEMENT TITLE: JOTR RM-12, MINES AND MINERALS MANAGEMENT

NEED FOR PROPOSAL: Thousands of mining and prospecting sites exist in the Monument. Impacts include safety, aesthetics and biological degradation.

IMPACT CATEGORIES ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Manage Mining Sites	No Action
<u>Cultural Resources</u>	No impact.	Sites of historical significance will continue to be vandalized.
<u>Vegetation</u>	Some areas will be stimulated to recover natural vegetation components now lost.	Vegetation impacts will persist.
<u>Wildlife</u>	Clean up projects may displace small animals using debris for shelter. Impact short lived.	Little impact.
<u>esthetic</u>	Some areas to be cleared are extensive dumping sites. Aesthetics will be greatly improved.	Human impacts of no historical significance will continue as a blight on many wilderness settings.

PROJECT STATEMENT TITLE: JOTR RM-13, REHABILITATE WILDERNESS ROADS

NEED FOR PROPOSAL: Over 100 miles of dirt roads exist within designated wilderness units. Rehabilitation is mandated by the Wilderness Act.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Rehab Roads	No Action
<u>Vegetation</u>		Vegetation transplanted to barren road beds will represent a significant improvement in diversity and continuity of vegetation.	Visible roads will continue to attract illegal vehicle use which perpetuates vegetation trampling.
<u>Wildlife</u>		Will improve availability of vegetation to wildlife.	Denuded areas will continue to have little or no value to most wildlife species. Some species favoring open ground may benefit.
<u>Cultural</u>		Archeological and historical sites will be less accessible and therefore receive greater protection.	Visible roads attract illegal traffic some of which is used to enter close archeological and historical sites. These impacts would persist.
<u>Aesthetic</u>		Roads would slowly disappear returning area to designated wilderness setting.	Visible roads would remain a blight on designated wilderness scene.
<u>Sociological</u>		Some backcountry hikers use old roads for trails and as navigational aids. Rehabilitation would eventually eliminate this use.	Many backcountry visitors object to the visual impacts these roads make on the wilderness setting. Even more objections are expressed when illegal vehicle use disturbs visitor's wilderness experiences.

PROJECT STATEMENT TITLE: JOTR RM-14, REHABILITATE BORROW PITS

NEED FOR PROPOSAL: Ten borrow pits were abandoned many years ago. Most have received no rehabilitation.

EFFECT
CATEGORIES

ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
	Rehab Borrow Pits	No Action
<u>Vegetation</u>	Since abandonment, some pits have developed pioneering species of vegetation. However, without management most will require about 200 years to recover native vegetation.	Vegetation recovery will require about 200 years.
<u>Wildlife</u>	Some small burrowing animals will be displaced by earth moving techniques.	No impact.
<u>Soil</u>	Erosion will be reduced adjacent to pits.	Erosion will continue to develop. Top soil will be lost and soil structure at each site will be permanently altered.
<u>Social-Aesthetic</u>	Most are out of sight for front country users. Backcountry users will realize increased aesthetic benefits.	Backcountry users will continue to discover most of these pits.

PROJECT STATEMENT TITLE: JOTR RM-15, REHABILITATION OF ACQUIRED INHOLDINGS

NEED FOR PROPOSAL: As inholdings have been acquired by the Park Service, sites have not been adequately rehabilitated to a natural setting.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Rehab Inholdings	No Action
<u>Vegetation</u>		Native vegetation will be allowed to recover disturbed sites. Exotic vegetation will be removed.	Exotic vegetation will persist and possibly continue to spread from these sites.
<u>Wildlife</u>		Some small animals will be temporarily displaced as old debris is removed. Removal of structures and concrete slabs will provide additional space for wildlife use.	No impact.
<u>Safety</u>		Old structures will be eliminated, removing serious safety hazards to visitors.	Hazards from fires and unsafe structures will persist.
<u>Aesthetics</u>		Most of these properties are highly visible. Most are shacks and trash piles. Removal will increase aesthetic values.	Old nonhistoric structures will continue to damage the natural scene.

PROJECT STATEMENT TITLE: JOTR RM-17, NON-NATIVE AQUATIC WILDLIFE CONTROL

NEED FOR PROPOSAL: Exotic ducks and fish are being illegally released into Monument waters.

ALTERNATIVE ACTIONS IMACT CATEGORIES	PROPOSED ACTION	ALTERNATIVE
	Remove Exotics	No Action
<u>Vegetation</u>	Some aquatic plants may become more numerous with wildlife removal.	Vegetation will be consumed, but probably at a non-significant level.
<u>Wildlife</u>	<p>Exotic ducks are threatening native species of both migrant and resident nesting water fowl. Native species will survive better without this unnatural pressure.</p> <p>Some predators may be deprived of a few easy meals.</p>	Native water fowl will decline.
<u>Social-Aesthetic</u>	Removal will preserve historic, natural scene.	Goldfish and white ducks are readily identified as exotics even to the average visitor. Without removal the natural scene is destroyed.

PROJECT STATEMENT TITLE: JOTR N-10~~β~~, N-24, N-25, N-29, N-30, N-31 PROPOSED RESEARCH

NEED FOR PROPOSAL: These new research proposals are designed to provide data to resolve immediate management problems.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
<p><u>Vegetation</u></p> <p><u>Wildlife</u></p>	<p>Conduct Research</p> <p>Data needed to adequately protect 10 endangered species, the Joshua Tree and other critical habitat types.</p> <p>Tortoise propulations could be stabilized with adequate information.</p> <p>Effects of fire are unknown on some desert wildlife. Some could benefit from fire management program while others may not.</p>	<p>No Action</p> <p>Some endangered species could be lost.</p> <p>Without understanding of the role of fire, disease and impacts of exotics managers will not have adequate information to protect resources.</p> <p>Tortoise populations will continue to decline.</p> <p>Effects of management actions such as roads, historical sites and fire will not be understood. Therefore, inadequate information will be available to protect wildlife resources.</p>	

PROJECT STATEMENT TITLE: JOTR AQ-1, AIR QUALITY STUDY

NEED FOR PROPOSAL: This project is needed to gather information on current pollution levels and visibility in establishing air quality standards for this Class I area. Data is also needed on effects of pollutants on other resources.

IMPACT CATEGORIES \ ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE	ALTERNATIVE
	Continue Monitoring Program	Reduce Monitoring in Progress	Discontinue Monitoring in Progress
<u>Visibility and Air Quality</u>	Action will provide data to establish standards and monitor Class I air quality.	Existing monitoring is already a skeletal program. Reducing monitoring will have same impacts as discontinuance.	Air quality standards may already be exceeded. This could result in continued loss of quality as well as visibility.
<u>Vegetation</u>	No impact.	If ozone monitoring is dropped. Research on impacts on plants will not be supported by baseline data.	Data loss will deprive managers of information necessary to protect plants.
<u>Wildlife</u>	No impact.	Because animals are directly linked to plants for critical physiological as well as behavioral requirements, effects on vegetation could directly affect wildlife.	Same as reduced monitoring alternative.
<u>Social-Aesthetic</u>	Monitoring will act as a warning system against further degradation of visibility and its effect on the visitors enjoyment of the Monument.	Data would be incomplete and could jeopardize the value of collected data.	Deterioration of visibility could reduce resource value and cause a decline in visitation.

PROJECT STATEMENT TITLE: JOTR W-2, MONUMENT WATER RESOURCES MANAGEMENT
 JOTR W-3, WATER SOURCE MONITORING

NEED FOR PROPOSAL: Water resources have to be altered by human disturbances within and adjacent to the Monument.

IMPACT CATEGORIES	ALTERNATIVE ACTIONS	PROPOSED ACTION	ALTERNATIVE
		Monitor and Manage Water	No Action
<u>Water quality</u>		No impact.	Currently open water is not used for human consumption or recreation. Quality assurance is not critical for human use.
<u>Water quantity</u>		Monitoring data will provide baseline information to analyze influence from natural climatic factors as well as human disturbances.	Water for critical vegetation use, such as native fan palms, may be lost due to human disturbances to hydrological cycle.
<u>Vegetation</u>		Monitoring data used to determine when supplemental water is necessary to protect palms in Oasis of Mara.	Native fan palms at Oasis of Mara could be lost.

APPENDIX

Information Baseline - - - - - 90

Bibliography I. Reports from completed "Natural Resource
Projects" (NRMP, 1974) - - - - - 95

Bibliography II. Recent research of resource management
significance (organized by ecological components, i.e.
geological substrate, climatic parameters and associated
phenomena, producer organisms, primary consumers, secondary
and tertiary consumers, man - highest level consumer,
decomposers and fire ecology) - - - - - 96

INFORMATION BASELINE

BASIC THEMATIC MAP FILE

Regional Features
Population
Political Subdivisions
Land Use
Outdoor Recreation Facilities
Transportation, Communication, Utilities
Overnight Accommodations
Land Ownership

PARK SPECIFIC FILE

Outdoor Recreation: Maps from the "Joshua Tree Climber's Guide" located in slipcase #2 "Maps" 557 in the Headquarters library; available as handouts from the Natural History Association: non-scale maps of the campgrounds, hiking trails, and points of interest; available in the Interpretive Division office: wayside exhibit plan map - showing locations of roadside exhibits in the Monument, 1977.

Anthropology - Cultural Maps: Various supporting maps in "Country Nodes: an Anthropological Evaluation of William Keys' Desert Queen Ranch, JTNM, CA." Patricia Parker Hickman, 1977 - available at the Headquarters library; Southwest Museum Papers #9 "The Pinto Basin Site" by E. W. Campbell and W. H. Campbell, 1935 - features map of camping area showing location of site - 1:15840 - available through the Natural History Association; maps and illustrations showing archeological site locations are included in Thomas F. King's report entitled "Fifty Years of Archeology in the California Desert - an Archeological Overview of Joshua Tree National Monument" - available at the Headquarters library; "One Hundred Years of History in the California Desert: an Overview of Historical Archeological Resources at JTNM" by Patricia Parker, 1980 - available at the Headquarters library.

Topography: JTNM and the surrounding area covered in a complete series of USGS maps in the 15 minute series, 1:62500. Most of the area surrounding the Monument is also available in 7.5 minute series, 1:24000. Dates of map publication range from 1954 to 1975 - available through the Natural History Association.

Land Use and Ownership: The following maps are all found in the Joint Utilities Management Plan (JUMP), May, 1976, in the Headquarters library: existing energy facilities, proposed energy utility facilities, siting analysis maps for: (1) major fuel storage, (2) major transmission lines, (3) major fuel pipeline, (4) major electrical substations,

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(5) nuclear power plant, (6) fossil fuel power plant. Also in the Headquarters library, the following maps are found: California Desert Conservation Area - a series of maps showing historical land use development from 1902 - 1978, Desert Research Studies #3 979.4 and a series of wilderness inventory maps by the U.S.D.I. encompassing the state of California, 1979, Desert Research Studies #3 979.4. The Superintendent's office contains the following: land ownership in JTNM, USDI, various scales, numerous maps, land status maps and boundary survey - JTNM, USDI, 1976-1978 1:108000. A mutual aid fire management, JTNM, revised 1984 1:126720, and a JTNM wilderness designation map, 1976 1:126720 are located in the Resource Management office along with two CA Desert Conservation Area maps: (1) energy production and utility corridors and (2) interim plan for land use, both found in the Final Environmental Impact Statement and Proposed Plan 1980, BLM Desert Planning Staff.

Hydrology: The following four maps are found in the Headquarters library: (1) Wildlife water sources of JTNM, Welles, 6-9, 1966; (2) general map showing approximate location of better known springs and wells in the Mojave and adjacent deserts - S.E. CA and S.W. NV, 1908, from water supply paper 224, "Some Desert Watering Places in Southeastern CA and Southwestern NV" by W. C. Mendenhall, 551.4; (3) hydrologic and geologic reconnaissance of Pinto Basin, JTNM, Riverside County, CA geological survey water supply paper 1475-D, F. Kunkel, 1963; and (4) a Brief Hydrologic and Geologic Reconnaissance of Pinto Basin, JTNM, Riverside County, CA, geologic survey, open file report, F. Kunkel, 1956. The following two maps are found in the Resource Mgt. office: (1) map showing the location of monitoring wells at the Oasis of Mara, JTNM, T1N, R9E, sec. 33 (bound with USGS geohydrologic reconnaissance report, 1971-1976) and (2) JTNM Water Source Book, vol. 1&2, location of springs, wells, reservoirs and tanks within JTNM.

Wildlife and Vegetation: The following are found in the headquarters library: (1) plant distribution maps, vol. 1, 2, & 3, 581.9; (2) numerous vegetational distribution maps are located in "Investigation of Vegetational Communities of JTNM" thesis by Patrick Leary, 1977; (3) Movements of Desert Bighorn Sheep in the Stubbe Spring Area, JTNM, Douglas & White, 1979; (4) three maps from the Final Environmental Impact Statement and Proposed Plan, 1980, CA Desert Conservation Area: (a) sensitive, rare, threatened and endangered fish and wildlife, (b) rare & endangered plant species, and (c) unusual plant assemblages.

Mining and Economic Geology: The Resource Mgt. office contains the following four maps by the BLM Desert Planning Staff from the Final Environmental Impact

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Statement and Proposed Plan, 1980, CA Desert Conservation Area; (1) economic mineral resources; (2) potential for locatable minerals; (3) potential for saleable minerals; (4) potential for energy geo resources. The Natural History Association has "Mines of the High Desert" by Ronald Dean Miller, 1968 which contains a map showing major mines in the JTNM area. The Interpretive Division has a map of Riverside County, CA showing the location of mines and mineral resources by CA Div. of Mines and Geology, 1968 1:250000. The Headquarters library contains the following: (1) map of San Bernardino County, CA showing the location of mines and mineral deposits, state of CA, div. of natural resources, CA Journal of Mines and Geology, vol. 49, #1&2, Jan. - April 1953; (2) economic and geologic maps and aerial photos of the Barstow Quadrangle, CA, "Geology and Mineral Deposits of the Barstow Quadrangle", Bull. 165, 1954, CA Div of Mines; (3) Trenches & diamond drill holes on main & south ore deposits, Eagle Mtn. iron district, Mining 553; (4) Geologic map of CA, Santa Ana sheet, 1965, Mining 553; (5) Geologic reconnaissance map of part of the southeastern Mojave desert, CA, 1962, Mining 553.

Geology: In the Headquarters library in "The Geomorphology of the Pinto Basin, Southern CA" a dissertation by Bruce Cash Young, 1968 are the following five maps: (1) Fossil Fan Surfaces, (2) Fault Systems and Eagle Mtn. Anticline, (3) Geomorphology, (4) Lithology, (5) Alluvium-Bedrock Contacts and Surface Drainage. Also in the Headquarters library are: (1) a cross sectional map along the western part of the Blue Cut Fault bound in a dissertation by Roger Allen Hope titled "Geology & Structural Setting of the Eastern Transverse Ranges, Southern CA" 1966; (2) numerous geologic maps of southern CA in a slipcase titled "Geology of Southern CA", bull 170, vol.2, 1954, CA Div. of Mines, including (a) Geology of the north side of San Gorgonio Pass, Riverside County, (b) Geology of a portion of Joshua Tree National Monument, Riverside County; (3) supplementary geologic maps to thesis by Roger Allen Hope, CA Maps 557, including (a) geologic map of CA, San Bernardino, scale 1:250000 1969, (b) geologic map of the Joshua Tree Quadrangle, San Bernardino and Riverside Counties, CA, 1967 1:62500, (c) geologic map of the 29 Palms Quadrangle, San Bernardino and Riverside Counties, CA, 1968, 1:62500; (4) a soil analysis of Covington Flat, D. Rainey, 1963; (5) CA desert conservation area - soil sensitivity, BLM Desert Planning Staff, from the Final Environmental Impact Statement & Proposed Plan, 1980.

NARRATIVE FILE

Climate: Weather information, including temperature and rainfall averages by month, is available as a handout at the Visitor Center in Twentynine Palms. More detailed information is available in the Central Files and at the Ranger Office at the administration complex.

Geology: There is no single treatment of the geology of Joshua Tree National Monument. A pamphlet, "Geology and Man," Elden K. Wanrow, is available through the Natural History Association. "Geomorphology of the Pinto Basin," Bruce Cash Young, U.C.L.A., 1968 and "Textural Studies in Igneous Rocks Near Twentynine Palms, California," J.J.Wm. Rogers, 1955 are notable research papers among many available in the headquarters library.

Land Ownership and Use: In addition to maps previously cited, information dealing with acquisition of lands within the park boundaries, as well subsequent boundary changes is in the General File at Monument headquarters. A "Land Acquisition Plan" is currently in preparation.

Hydrology: "Hydrologic and Geologic Reconnaissance of Pinto Basin, Joshua Tree National Monument, Riverside County, California," N.P.S., 1963; "Summary of Hydrologic Conditions at Joshua Tree National Monument, Riverside County, California, Fred Kunkel, 1956-59; "Records of Water Level and Pumpage in Joshua Tree National Monument, California, G.A.Miller, N.P.S. 1967; various minor papers also available either in the Monument library or Resources Management Division.

Vegetation: There are numerous scientific papers, reports and books discussing the vegetation of Joshua Tree National Monument, available in the library and for sale by the Joshua Tree Natural History Association. Notable among them are: "Investigation of the Vegetation Community of J.T.N.M.," Patrick J. Leary, UNLV/NPS, 1977; "An Ecological Study of the Fan Palm Oases of J.T.N.M.," Karen S. Frazier, UNLV/NPS, 1977; "Plant Communities of the Pinto Basin, J.T.N.M.," Ron M. Sheffi, California State College, Long Beach, 1971; "The Ecology of the Joshua Tree in J.T.N.M., California," James T. Hogan. UNLV/NPS, 1977..PA

Wildlife: As with the vegetation of Joshua Tree N.M., there are numerous papers, research reports, and books discussing the wildlife. Many are lengthy dissertations or individual species, others are general and inclusive. All are available at Monument headquarters. Of specific note is "The Lives of Desert Animals in Joshua Tree National Monument," A.L.Stebbins and R.C.Miller, Universtiy of California Press, 1964. In addition, an extensive card file on wildlife observations within the Monument is maintained by the staff and is located at the Twentynine Palms Visitor Center.

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Cultural Values: "Anthropological Evaluation of William Keys' Desert Queen Ranch," Patricia P. Hickman, Western Archeological Center, 1977; "Fifty Years of Archeology in the California Desert: An Archeological Overview of Joshua Tree National Monument," T.F.King, Western Archeological Center, N.P.S., 1975; "Historic Resource Study, A History of Land Use in Joshua Tree National Monument," Linda W. Greene, U.S. Department of the Interior, N.P.S., 1983; "Ambush," Art Kidwell, Pioneer Publishers, 1979. All aforementioned are available at the library in the Twentynine Palms Visitor Center. Available from the natural History Association are the following: "Sand in My Shoe," Helen Bagley, Homestead Press, 1978; "A Peculiar Piece of Desert," Lulu R. O'Neal, Sagebrush Press, 1981, and the "Southwest Museum Papers, Number Seven," and "Number Nine," Elizabeth C. Campbell, 1931 and 1935.

Mining: In additon to information available in the Cultural Values section, "Mines of the High Desert," Ronald Dean Miller, La Siesta Press, 1968 is available through the Natural History Association.

Recreation and Support Facilities: Numerous pamphlets and handouts are available through the Natural History Association on campgrounds, hiking trails and points of interest.

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