NATURAL RESOURCES MANAGEMENT PLAN

FOR

BIG BEND NATIONAL PARK

Revised November
1982

Prepared by: Big Bend National Park Staff and the Southwest Regional Office of Natural Resources

Reviewed by: Southwest Regional Offices of History, Archeology, Planning, Maintenance and Interpretation

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11/24/82
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OVERVIEW

RESOURCES MANAGEMENT PLAN

BIG BEND NATIONAL PARK

AIR QUALITY

Statement: #1 priority (SRP) Significant Resource Problem. Big Bend National Park is a Class 1 air quality area and is currently involved in three monitoring programs: (a) telephotometer (3 readings daily, 354 days per year = 1,092 man-hours per year, (b) National Atmospheric Deposition Program (NADP) (3 hours per week, 52 weeks per year = 156 man-hours per year) and (c) High Volume and Particulate Samples, suspended particulate program, (1 hour per week, 52 weeks per year = 52 man-hours per year.

Needs: Data needs to be correlated with climatic parameters and integrated on a systematic basis. Only until such a system is activated can causative elements be identified and steps taken to correct or reduce the problem.

Proposed program: Big Bend National Park will continue to monitor the current systems in place until such time as (a) the problem components have been identified and steps initiated to correct or reduce problems (b) support or funding for the program is discontinued, or (c) more sophisticated systems (remote sensing) become available so that on-site systems are no longer needed. If each station had to fund data collection and analysis for all current air quality research, the funding level would approach $50,000 per station.

FY	83	84	85	86	87
Research	-	-	-	-	-
$ Support	10,000	10,000	10,000	10,000	10,000
NPS Man-hours	1,300	1,300	1,300	1,300	1,300

VEGETATIVE ANALYSIS

Statement: Currently there is no integrated vegetative baseline information system for Big Bend National Park.

Needs: Complete mapping program, initiate analysis or a species system, and update plant list.

Proposed program: The proposed program will integrate mapping, species occurrence and relative abundance by formation and association. (1) Complete mapping (DSC) as soon as possible, (2) Complete updated Plant List, (3) Initiate Vegetation Analysis in 1984.

FY	83	84	85	86	87
Research					
Vegetative Analysis					
Mapping	25				
Analysis		30	30	30	
Digitize Data			10	10	10
Maintenance					
Plant List	2,000	2,000	2,000	2,000	2,000
NPS Man-hours	200	200	200	200	200

RIVER USE AND MANAGEMENT PLAN

Statement; Use of the Rio Grande River for recreational purposes is expected to increase over the next five to ten years.

Needs: Since the addition of the Rio Grande Wild and Scenic River to the management functions of Big Bend National Park, several factors need to be considered in development a Management Plan. (1) Visitor use trends (2) Impact definition and a determination of carrying capacity.

Proposed program: (1) Develop long-term trend data concerning river use (continue issuing permits) (2) Assessment of impact generated by use (3) Develop "carrying capacity" information and (4) Develop a River Management Plan.

FY	83	84	85	86	87
Research					
Impact Analysis		30,000	30,000		
Carrying Capacity				20,000	
Support (permits)	20,000	20,000	20,000	20,000	20,000
NPS Man-hours	2,080	2,080	2,080	2,080	2,080

ENDANGERED SPECIES

Statement: There are three endangered species reported to be found within Big Bend National Park; The Peregrine Falcon. the Big Bend Gambusia, and one cactus.

Peregrine Falcon

Statement: There are currently four active eyries within the Park and one active eyrie along the lower canyons of the Rio Grande Wild and Scenic River.

Needs: Essential habitat portfolios need to be completed on the Chisos and lower canyons eyries. A contract should be re-negotiated for a comprehensive monitoring program for the months January through May.

Proposed program: Big Bend National Park personnel will continue to monitor eyries, along with State personnel, but because of travel restrictions and logistical problems, the Park would recommend that the monitoring be contracted out and supplemented through NPS observations.

FY	83	84	85	86	87
Research					
Habitat Folder		10,000			
Predation			15,000		
$ Support (Monitor)	10,000	10,000	10,000	10,000	10,000
NPS Man-hours	1,000	1,000	1,000	1,000	1,000

Big Bend Gambusia

Statement: This fish is found only in one artificially maintained pond in the Rio Grande Village area of Big Bend National Park.

Needs: The Management Plan requires updating and the pond needs to be cleaned out about every two years. Research should be undertaken to establish feasibility for developing a non-mechanical water flow system.

Proposed program: Big Bend National Park personnel will continue to monitor the pond, the Management Plan will be updated in FY 83; final modifications to the system (if needed) should be undertaken in FY 83; and the pond should be cleaned out during the winter of 82 and on alternate years thereafter.

FY	83	84	85	86	87
Research					
Non-Mechanical Water Flow			30,000		
$ Support (Monitor and Maintain)	4,000	4,000	4,000	4,000	4,000
NPS Man-hours	500	500	500	500	500

Plants

Statement: There is one species of plant listed as endangered, two species listed as threatened, 14 species listed as Category 1 and at least 24 species listed as Category 2.

Needs: The status of Ancistrocactus tobuschii (endangered) requires clarification as to its existence within the Park. This plant has been reported from the Dead Horse Mountains, but there appears to be some controversy as to the validity of the sighting, as well as whether or not it occurs within the Park. Two threatened species, 14 Category 1 species, and 24 Category 2 species occur within the Park and need background data workups.

Proposed program: Monitor those species known to exist in known locations. Begin data gathering on those plants whose identification or location remains obscure.

FY	83	84	85	86	87
Research		15,000	15,000		
$ Support	4,000	4,000	4,000	4,000	4,000
NPS Man-hours	500	500	500	500	500

WATER RESOURCES MANAGEMENT PROFILE

Statement: This profile is being developed by G. Moore of the Southwest Regional Office and will be utilized as an appendix to this Plan. Projects such as the Water Aquafer Study and Water Quality will be handled in a detailed manner. See Project BIBE-N-009 for a short synopsis of current water-related project.

CULTURAL RESOURCES

Historical

Statement: Currently there are 38 structures on the LCS, of which several are National Register properties.

Needs: Critical - Re-evaluate the LCS and set up maintenance and inspection guidelines for future day-to-day maintenance of structures. The compilation of a Historic Resources Study is needed to consolidate historic information.

Proposed program: (a) Update LCS in FY 83, (b) Begin developing guides for maintenance and inspection for each structure on the LCS in FY 84, (c) Train a maintenance person in the day-to-day maintenance of LCS structures in FY 84, and (d) Initiate Historic Resource Study as soon as possible.

FY	83	84	85	86	87
Research					
HRS	30,000	30,000	30,000		
Guidelines	8,000	6,000	10,000		
Maintenance $	20,000	20,000	20,000	20,000	20,000
NPS Man-hours	3,000	3,000	3,000	3,000	3,000

Archeological

Statement: Big Bend National Park has a wealth of archeological sites of which little is known.

Needs: Critical needs include site survey of Burro Mesa and surveying several intensive visitor use areas.

Proposed program: Big Bend National Park will continue to document recorded sites and new sites as they are located. The Park will initiate a data search to locate collections. Research should be initiated on Burro Mesa, high impact areas, and finally a general survey should be undertaken.

FY	83	84	85	86	87
Survey					
Phase I	5,000				
Phase II	10,000				
Phase III		25,000			
Phase IV			50,000	50,000	50,000
Burro Mesa		25,000			

SRP'S NOT ADDRESSED IN RMP

Poaching, both plant and animal.
Off-road vehicle use.
Vandalism.
Mineral surveys and exploration outside boundary.
Recreational development sites along boundary.

These items are primarily surveillance or enforcement problems and many may be reduced by "presence" along the boundary or backcountry. Currently, only the "front country" is receiving any semblance of "presence". The Park has initiated aircraft overflights to monitor activities along the boundaries, but with little or no backcountry presence, we are meeting less than minimum standards in resource protection.

FOREWARD

In 1976, Big Bend National Park was designated as a Man and the Biosphere Reserve because of its unique international standing and association with the Chihuahuan Desert. All research activity at Big Bend should accordingly recognize that the Rio Grande (Rio Bravo del Norte) is only a political, and not an ecological boundary.

Research design should incorporate, where possible, comparative research in Mexico. Also where appropriate, bi-lingual reports should be produced for distribution to Mexican Universities and sources.

INTRODUCTION

The Resources Management Plan (RMP) is a strategic planning document describing constraints upon park management as well as delineating required knowledge and actions to best maintain the park in its natural character.

The RMP provides recommended management actions and work plans as they relate to park resources. Where sufficient base line data on natural resources are not available, RMP's must prioritize required research activities and specify best possible interim management guidelines until research results are available. Research priorities, however; must remain flexible enough to provide for varying degrees of access into the area of continually changing park needs.

The RMP should be reviewed and updated annually and completely reassessed every three years by the park Superintendent and Resources Management Plan Coordinator to best reflect current status of projects and park needs.

The RMP is oriented to serve the area Superintendent in two ways:

1. As a set of National Park Service activity guidelines with which, as best as possible, to preserve the natural, physical and cultural resource of the park.

2. As a set of prioritized research projects and objectives designed to obtain critical management and interpretive information.

All actions included in the RMP are designated as one or a combination of four basic types:

I. Actions that will have significant and measurable effect on the environment or are highly controversial. (Significant Action).

II. Actions which will continue existing management activities. (Continued Maintenance).

III. Actions which will initiate new management activities. (New Maintenance).

IV. Research actions and activities. (Research).

All management actions must be in compliance with provisions of the Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the Archeological and Historic Data Preservation Act of 1974.

BIBE-N-001 Air Quality

Statement of Problem

Big Bend National Park is designated as a manadatory Class I Air Quality Area, as well as a "Man in the Biosphere" Area. As such, the delineation of standards from which air quality deterioration can be ascertained must be procured. Long term monitoring is essential for obtaining base line information and acquiring trend data. This project is considered a "Significant Resource Problem".

Background Information

The use of telephotometer readings to measure visual range was initiated in late 1978. The data has indicated periods of substantially impaired visibility to the extent that additional monitoring systems have been established.

Current Management Action

Telephotometer readings are taken three times per day, seven days per week on a year round basis. There are approximately three years of accumulated data and the Park has achieved a 90% data acquisition level. Analytical findings show visibility ranging from less than twelve miles to two hundred and thirty-six miles.

The N.A.D.P. (National Atmospheric Deposition Program) has been in operation for two years. Samples are taken weekly and forwarded to Champagne, Ill. for analysis. A computer printout is received periodically but no formal analysis of the information has been accomplished to date.

A Sierra High Volume Particualte Sampler is operated on a six day rotational system and the data is analyzed at the University of Arizona through atomic absorbtion spectrophotometry. Printouts of trace elements are received biannually. This operation has been on line for approximately two years but no analysis to tie the various parameters together has been accomplished.
The SFS-500 Particulate Sampler was installed in May 1982 and date acquistion has been initiated.

Legal Authority

Amendments to the Clean Air Act of 1977

Alternative Action and Probable Impacts

1. No Action: This action implies nonconformance to the amendment of the Clean Air Act of 1977 whereby Class I areas must develop base-line standards. As a Class I and a Man in the Biosphere Area, deterioration

of Air Quality is a significant resource problem. This alternative would be considered unacceptable.

2. Continue Current Management Action (Monitoring Program):

   A. Continue to take telephotometer readings and photographs three times per day seven days per week.

   B. Continue to monitor the National Atmospheric Deposition Program three hours per week year round.

   C. Continue to monitor the Sierra High Volume Particulate Sampler one hour per week year round.

   D. Continue to monitor the SFS-500 Particulate Sampler one hour per week year round.

Approximately $10,000 a year is utilized to carry out this monitoring program at a relatively high degree of acquisition.

3. Modified Monitoring Program: If funding is reduced for the Air Quality Program at Big Bend National Park the following operations will be dropped in order of costs in money and manpower:

   A. Telephotometer operation

   B. NADP Operation

   C. Sierra High Volume Particualte Sampler

   D. SFS-500 Particulate Sampler

Recommended Course of Action

As long as funding and manpower remains sufficient, alternative # 2 (continue current management action) should be continued for a minimum of another three to five years.

Any Air Quality related research should receive assistance from the Park in the form of housing, transportation or other nonfunded associated support. The proposal for interdisciplinary science team research in three Southwest Region parks dated September 1982 would receive such support if funded.

BIBE-N-002 Vegetative Analysis for Natural Resource Basic Inventory

Statement of Problem

There is no integrated vegetative base line information system for Big Bend National Park. There is an urgent need to assimilate information concerning vegetative formations/communities/associations and individual species into a usable data base. This project would assist in getting a firmer cognizance of the "Significant Resource Problem" associated with the vegetative components of the Park.

Background Information

I. Mapping: The most current vegetative map of the Park was completed in 1970 by Warnock and Kittam for the Park's Master Plan. Vegetative schemes by Wauer (1980), MacDougal and Sperry(1951), and the map by Warnock and Killan (1970) all lack extensive vegetative data to support a park-wide vegetational mapping scheme. Leopold (unpublished) presents a mapping scheme for the area of the Park below the 3500' elevation. It does include an extensive series of vegetative transects for support data.

II. Plant List: The most current plant list available to the staff, the visiting public or researchers is of 1967 vintage. This list includes those species in the Park's herbarium or those known to occur in the Park.

III. Basis Data Concerning Individual Plant Species: No integrated system concerning individual species of plants or correlating ecological parameters in association with these vegetative components currently exists.

Current Management Action

I. Mapping: A vegetative map of the Park is currently being developed by the Science Division-remote sensing of the Denver Service Center. Until its completion, the Park must rely on a very rough base map of Leopold and the Wornock and Kittam (1970). Both are lacking in completeness and detail. A comprehensive vegetation map is imperative to key off of for the section III Basic data concerning individual plant species initiation.

II. Plant List: The Office of Resource Management has updated the plant list to the point of having the rough draft proofread for final typing.

III. Basic Data Concerning Individual Plant Species: The Office of Resource Management has initiated an individual card file of plant species and has begun to add some information to the file.

Alternative Actions and Probable Impacts

A. No action: This action would involve remaining in the status quo, ie. little or no basic integrated vegetative analysis, incomplete and unacceptable vegetative mapping as well as relying on an outdated and incomplete plant list.

B. Complete Sections I and II of the Proposed Vegetative Analysis: This action would update the level of vegetative association mapping to an acceptable level. The plant list would be updated to a minimumally acceptable list.

C. Initiate Section III of the Proposed Vegetative Analysis: This action would entail approximately two to three years of intensive vegetative analysis on a species by species basis considering the following items:

1. Taxonomy (family, genus, species, common name)
2. Occurrence by association and formation in the Park
3. Relative abundance of each species in each association
4. Occurrence by Texas vegetation zones (Gould 1975)
5. Annual or perennial
6. Life form (tree, shrub, forb, grass, other)
7. Flowering information (showy, not showy, date, color)
8. Reference /age numbers (Cornell and Johnston, 1970-1979) and other pertinent references, such as grasses (Gould, 1975) and trees, shrubs and vines (Vines, 1976)
9. Comments (exotic species, endangered, threatened, category 1, catagory 2, fire tolerance, medicinal value, etc.)

Recommended Action and Time Frames

Complete Plant List and annually update the plant list for corrections and additions. Est. completion date Jauary 1983.

Complete Mapping Section as soon as possible. Use mylar for the mapping sceme at both the 1:100,000 scale and the 1;24,000 scale for quad. overlays. Est. completion date July, 1983.

Fund Section III (approx. 20 - 30,000 dollars/year for three years. Initiate Section III as soon as possible after Section I is completed. Year 2-5, Est completion date Dec. 1986.

Digitize Section III data. Year 3-5, completion date Dec. 1986. To be accommplished along with Section III.

BIBE-N-003 ENDANGERED SPECIES: PLANTS

Statement of Problem

Very little is known concerning the status of endangered, threatened, Category I and Category II plants in Big Bend National Park.

Background Information

The listing of endangered(1), threatened(2), Category I(14), and Category II(24) plants of February 1981, (Federal Register) identified a total of forty-one plants as possibly occurring in Big Bend National Park. (See appendix I for listing of species)

Current Management Action

Some information is available concerning Ancistrocactus tobuschi. It is reasonable to assume that this species may not occur within the Park. Very little information has been consolidated concerning threatened, endangered, Category I and Catagory II plants. The Park's plant list is presently being updated and upon completion, further information canbe gained concerning Category I and Category II listings for the Park. Close contact is kept with the U.S. Fish and Wildlife Service Office of Endangered Species in Albuquerque.

Alternative Actions and Probable Impacts

1. No Action: Not a viable alternative in that National Park Service Areas are required by law to protect endangered, threatened and Category I plants.

2. Determine the status of Ancistrocactus tobuschi within the Park.. Failure to accomplish this task will only continue to cloud the issue of its presence in the Park.

3. Consolidate known data and determine current status of threatened species within Big Bend National Park. Failure to accomplish this task will continue to make monitoring these species next to impossible as the vast majority of the Park's Protection Personnel could not identify them if found in the field or in a visitor's possession.

4. Consolidate known data and determine the current status of Category I species within the Park. Failure to accomplish this task will make monitoring of these species next to impossible. These plants should be managed as threatened species.

5. Consolidate known data and determine status of Category II species within the Park. The need for this information is lower in priority than alternatives 1-4 as these species may be dropped from further consideration.

Recommended Action and Time Frames

1. Complete alternative # 2 as soon as possible (3-6 months).

2. Consolidate known information about alternative # 3 in a timely manner (6 months).

3. Consolidate known information about alternative # 4 as a third priority (1 year).

4. Delineate alternatives # 2, 3, 4 and 5 as high priority species in the event BIBE-N-002, alternative # 3 is initiated.

BIBE-N-004 ENDANGERED SPECIES: PEREGRINE FALCON

Statement of Problem

Big Bend National Park and the Rio Grande Wild and Scenic River together have documented five active Peregrine Falcon eyries, possibly the greatest density of eyries per unit area in the lower 48 states. To monitor the eyries and obtain production information requires considerable knowledge of the species as well as great patience, expenditure of time and the ability to overcome logistical complications.

Background Information

Studies conducted over the past several years have indicated that the nesting success, number of nesting pairs and number of fledged young are quite variable. DDT has been suggested as being a causitive agent for this species decline, but varience in the birds from year-to-year have not been fully explained. Recent observations concerning relatively large numbers of Great Horned Owls along the river may have some significant influence on the mortality rates of young falcons.

The difficulty of obtaining specific information on the eyries activity and production is well known. The logistics, critical time frames, and relative inaccessibility of the eyries make for a very difficult monitoring program. The expenditure of Park funds and manpower often results in a poor return of investment, and must also compete with other programs needing attention during the spring, when the Park experiences heavy visitation.

Current Management Action

The Park has initiated a half day training program to acquaint the field staff with the identification of Peregrines and the eyrie locations. The past year resulted in a large number of observations. Without the contracted expertise, this could have been a poor documentary year on production.

The Park closes the Canyon areas in the vicinity of the river eyries to motorized vessels to lessen the possiblity of noise disturbance from January to June. A close record and consolidation of sightings is maintained monthly from January to August. Assistance to contracted researchers is scheduled on an as-needed basis.

Alternative Actions and Time Frames

1. No Action: This is not a viable alternative in that legislative mandates require a degree of effort to monitor endangered species.

2. Continue Park Monitoring Program: (a) Hold a spring training session, (b) consolidate sighting information, (c) schedule personnel to observe known eyrie locations. Failure to continue the monitoring program will result in the reduction of information concerning the Peregrine's status

in the Park.

3. Continue to close the river to motorized traffic during the active eyrie period (January -June). Failure to continue closures may result in unnecessary eyrie disturbance levels and could result in eyrie abandonment.

4. Continue to contract for experienced personnel to coordinate and write up peregrine reports. Failure to do so will result in poor documentation of activities.

5. Initiate research into the relationship between Great Horned Owls and Peregrine Falcons. Failure to investigate this aspect of possible predation will leave the role between owls and peregrines unknown.

6. Continue to monitor DDT levels in prey species and collect broken egg shells from the active eyries after the birds have left. Failure to continue these programs will only create questions rather than answer them.

7. Develop essential habitat folders for the Lower Canyons and Chisos Mountain eyries. Failure to do so will only continue to make it difficult to transfer information.

8. Develop an overall comprehensive recovery and maintenance plan to insure against loss of data. The plan should delineate times, needs, costs, and techniques of an annual monitoring program which could be programmed over a long time frame.

Recommended Action and Time Frames

1. Continue alternatives 2,3,4,6, on an annual basis to maintain trend data.

2. Initiate # 7 as soon as possible to delineate exact eyrie location and specific information about the eyrie. (approximately 6 months)

3. Develop # 8 within the next Fiscal Year to consolidate and set up an annual ongoing program. (FY 84)

4. Initiate predator research to further delve into the natural history of the Peregrine Falcon in the Park. (FY 85)

BIBE-N-005 ENDANGERED SPECIES: BIG BEND GAMBUSIA

Statement of Problem

Big Bend National Park is the sole habitat for the Big Bend Gambusia, except for a small population being maintained at the U.S. Fish and Wildlife hatchery in Dexter, New Mexico. This population of fish has been seriously threatened with extinction on several occasions.

Background Information

This fish is maintained in an artificial habitat with the water being pumped from a well into a pond with an overflow drainage. The gambusia occupy both the pond and the drainage. The 1977 Habitat Management Plan is outdated and a rough draft revision is to be completed soon. The revision will call for making the water source less reliant on mechanical pumping and will also recommend increasing the drainage area.

Current Management Action

The well system is checked periodically and the wwll fluctuations are monitored on a Stevens water level recorder. Cattails are removed periodically to reduce the amount of emergent vegetation. Dead trees are removed as needed.

Alternative Actions

1. No Action: Not a viable alternative. Failure to keep the current system active and monitored could result in the loss of fish to freezing water. The failure to remove emergent vegetation periodically would result in the gradual succession of the pond to the point where the Gambusia could no longer survive.

2. Continue Current Management Action: Monitor well system closely and keep emergent vegetation at a reasonable level.

3. Initiate the forthcoming recommendations of the Recovery Plan.

4. Initiate research into the possibility of developing a natural flow of water into the pond and drainage to reduce the reliance on the mechanical system.

Recommended Action and Time Frames

1. Continue Alternative # 2 until the Recovery Plan can be implemented. (year 1)

2. Implement the Recovery Plan recommendations as soon as it is feasible.

3. Initiate the necessary research to evaluate the possibility of converting the present system to a more natural system. (year 2-3).

BINE-N-006 RIVER USE AND MANAGEMENT PLAN

Statement of Problem

Use of the Rio Grande River for recreational purposes is expected to increase over the next five to ten years. Currently, this use, like general backcountry use, tends to be concentrated during the periods of heavy visitation, such as Easter, spring break, 4th of July, Thanksgiving, and Christmas. Although use occurs year round, the impacts are most pronounced during the heavy visitation periods and as yet are not well defined.

Background Information

Four factors stand out: the addition of the Rio Grande Wild and Scenic River to the management functions of Big Bend National Park, periods of heavy visitation, areas of abnormally heavy impact, and an expected increasein river recreational pursuits. All indicate an increased need for (1) development of long term trend data concerning river use, (2) an assessment of impacts generated by use, (3) a future concensus of the carrying capacity and (4) the development of a River Managament Plan for river use which will provide for consistancy and continuity.

Current Management Action

Trend data is being developed through the permit system now in effect. All floaters, both private and commercial, are required to obtain a Backcountry Use Permit, and must meet certain specific safety and environmental requirements.

Alternatives and Probable Impacts

1. No Action: This alternative precludes the development of trend data as well as impact information and is therefore an unacceptable alternative.

2. Continue issuance of Backcountry Use Permits to all users. Failure to continue this action will end our data gathering system.

3. Designate high impact areas and types of impacts. Failure to accomplish this task will result in not developing the necessary mitigating measures to alleviate impacts. (FY 84, mid-year)

4. Determine carrying capacities based on impact information. Failure to do so places the Park in the situation of failing to meet congressional mandates. (FY 84, mid-year)

5. Explore the feasibility of converting to a concessionaire system of commercial river use. Failure to do so will decrease the Park's control over river use and impacts.

6. Complete a comprehensive River Management Plan for Big Bend National Park and Rio Grande Wild and Scenic River. (FY 86, mid-year)

7. Complete the anaylsis of the National River Use Survey questionnaire. Failure to do so will result in the losee of valuable data.

Recommended Actions and Time Frames

1. Continue to utilize alternative # 2 as the basic long term trend gathering system for river use.

2. Complete alterntive # 7 as soon as possible. (End of FY 83)

3. Complete alternatives # 3 and 5 by mid FY 84.

4. Complete alternative # 4 by mid FY 85.

5. Complete alternative # 6 by mid FY 86.

BIBE-N-007 EXOTIC SPECIES: FLORA

Statement of Problem

To date there have been thirty-three (33) species of plants designated as exotic or introduced that have been documented as occurring in the Park (Warnock, 1967, Wauer, 1970). See Appendix K . Further plant work will probbaly turn up additional species to add to the list.

Currently there is only one introduced genus considered as a high priority concern and listed as a Serious Resource Problem: Tamerix. These species are invading spring areas and water courses within the Park, resulting in reduction of available water for wildlife, particularly during periods of low rainfall.

Background Information

Tamerix species have invaded springs throughout the Park and now threaten the existance of free water for wildlife. A Medium sized tree can transpire up to 200 gallons of water per day, and present a seed source for further invasion into unaffected springs. Currently, 74 of the 280 (approximate) springs are infested: 23 are considered to be heavily infested; 29 as medium; and 29 as lightly infested.

Current Management Action

The Park has initiated an update of the Tamerix occurrence at springs. Slightly infested springs receive high priority for control efforts. Approval for the use of Tordon RTU herbicide has been obtained and was tested at several areas last fiscal year. Requests for funding a Resource Management crew has repeatedly been found to fall outside Region priorities, but continued requests will be made.

Alternative Actions and Probable Action

1. No Action: To utilize this alternative will result in increased infestation throughout the Park.

2. Initiate a basic research project into the life history of the genus Tamerix to (a) develop guidelines on potential weaknesses to be exploited in a reduction program; and (b) develop cna test a wide range of possible reduction alternatives so that as chemicals are banned or developed, a reasonable alternative would be available on an interim basis. Failure to complete this basic research would hamper future control efforts if this current herbicide is banned.

3. Initiate a basic research project into the possible factors which adversely affect Tamerix species (diseases, invertabrates, fungi, etc.). The possibility of an integrated Pest Management Program would increase. Failure to initiate such a program will only prolong the amount of time spent on basic control efforts.

4. Continue current program of Tamerisk control utilizing Tordon RTU as a stump applicant. Failure to continue current control efforts will only result in increased Tamerisk in the Park.

5. Develop a compresensive action plan to reduce start-up time if funding support is forthcoming. Failure to develop alternative # 5 would result in postponement of of an effective program.

Recommended Actions and Time Frames

1. Continue alternative # 4 as a continued maintenance program.

2. Initiate alternative # 3 in FY 83.

3. Request that alternatives # 2 and 3 be funded and initiated in FY 84 or 85.

BIBI-N-008 EXOTIC SPECIES: FAUNA

Statement of Problem

There are several introduced faunal species within the Park but other than trespass livestock, they constitute only a minor problem. See appendix

The grazing of livestock within the Park has resulted in severe impacts and is considered a Serious Resource Problem.

Background Information

Schmidly and Ditton (1976) quantified trespass livestock impacts along the Rio Grande River, within the Park, and estimated that the impacts of trespass livestock would be similar along the East, West and North boundaries of the Park. The majority of trespass livestock is Mexican in origin. The adjoining U.S. ranchers still continue to exhibit a lack of aggressiveness in building and maintaining boundary fences. The possibility aoways exists that trespass stock may take up residence within the Park and become feral.

Current Management Plan

Trespass livestock are rounded up as manpower and access permit. Monthly overflights do document stock location, but very poor road access along the West River Road preclude an aggressive trespass livestock program. Roundups are expensive in manpower and equipment allocation. Loss of the U.S.D.A. River Rider stationed in the Park has only added to the shortage of manpower needed for such operation.

Alternative Actions and Probable Impacts

1. No Action: To utilize this alternative will only increase the already severe livestock trespass impacts.

2. Continue, as manpower and equipment access permit, an a aggressive livestock control program. Failure to do so will only aggrevate the problem.

3. Continue to monitor the Park for the introduction of exotic species and immediately remove or if needed, elimininate exotic animals found loose in thePark. Failure to continue such activities could allow a serious buildup to occur over a relatively short time frame.

4. Continue to work with Park neighbors on fencing. When funding permits, fence problem areas to reduce trespass problems and delineate boundary lines. Failure to develop a fencing program in these areas to the East, North and West will result in potential future trespass problems.

5. Continue to patrol the boundary activity for both current and potential problem areas. Failure to do so will result in the possibility of a serious problem going unnoticed for a relatively long time.

Recommended Actions and Time Frames

1. Alternatives 2,3,4,and 5 all must be continued on a day to day basis to keep abreast of potentially serious problems.

2. Reinstate, in cooperation with U.S.D.A., a River Rider program to assist in livestock trespass along the river. (FY 84,85)

3. Improve road access on west end of River Road for vehicles and equipment. Maintain a minimum of an annual touch up of the complete road. (FY 84)

BIBE-N-009 WATER RESOURCES MANAGEMENT PROFILE

Statement of Problem

The Office of Water Resources, South West Region, is currently compiling a Water Resources Management Profile to be utilized as an appendix to this Resource Management Plan.

Background Information

A short synopis of the current ongoing and proposed Water Resources Management Projects follows:

BIBE-W-001 HISTORIC WATER USE AT PANTHER JUNCTION AND RIO GRANDE VILLAGE

This project is currently active and will document past water use for these areas.

BIBE-W-002 FLOOD PLAIN MAPPING

The Flood Plain Management and Wetland Protection Exucutive Order of 1978 stimulated the need for flood plain mapping in National Parks. This project is currently active.

BIBE-W-003 UPDATE OF WATER DEMAND AT CHISOS BASIN

This project is currently active.

BIBE-W-004 WATER AQUIFER STUDY OF THE NORTHERN CHISOS ALLUVIAL FAN

This project is into its third year of data gathering and is being conducted by a contingent of researchers from Texas A & M University. Information concerning groundwater discharge, age and chemistry as well as recharge based on geology, rainfall and pumping demands is a high priority project in conjunction with future development plans.

BIBE-W-005 RIVER FLOW

Big Bend National Park continues to monitor river gauge readings and rainfall to develop long term trend data. Man's influence over the Rio Grande and Rio Conchos drainages have rendered flows that bear no resemblance to the historical river flows. The Rio Grande between Presidio and El Paso is almost nonexistant because of water diversion above El Paso. The Rio Conchos, flowing out of Mexico, supplies almost all the water in the Rio Grande from Presidio, Texas through the Park. The Rio Conchos is controlled through three major impoundments in Mexico and while having some flood control capability, their major

function is to provide water for agriculture. This system of dams has vastly altered the river flow and the river may or may not respond to rainfall depending on where it rains and the amount. One example of abnormal flows occurred in October, 1978 when after an extended dry period, the impoundments were filled. Additional rains came and the threat of the impoundments failure caused a massive release of water. The river reached 23.5 feet at Rio Grande Village and remained above 12 feet for a month. Normal flow during this period would have been 2-5 feet.

BIBE-W-006 WATER QUALITY

The Rio Grande forms one of the major attractions to the Big Bend Area. The river is used by float parties, fishermen, swimmers and as a scenic attraction. As use of the river increases, so will concern over pollution. The high number of potentially adverse outside influences from development, agriculture, stock use and other land use practices stress the need to develop a comprehensive water quality monitoring program. The International Boundary and Water Commission and the Texas Water Resource Board have some data available through State channels. The available data needs to be analyzed to determine if additional parameters need to be added or perhaps additional monitoring sites should be added.

BIBE-W-007 WATER SOURCE (SPRING) INVENTORY

An initial survey and inventory of approximately 180 springs, seeps, tanks and tinajas was undertaken in 1976. These water sources need to be monitored and trends ascertained. There is a general feeling that many water sources are undergoing a reduction in available water because of vegetative encroachment. Critical visitor use and wildlife springs need to be determined and the decision made as to the possibility of modifying or developing certain key resources. Each water resource should be revisited at least on a five year cyclic program. Only through such a program will long term trends become evident and short term changes will be noted.

BIBE-W-008 HYDROGEOLOGIC STUDY (CHISOS BASIN-OAK SPRING)

Sewage effluent from the Basin could possibly, over time, contaminate a key water source for the Basin, Oak Springs. Ideally, a tertiary water treatment plant in the Basin to recycle effluent and the removal of the sewage lagoon would alleviate the potential problem. Fundamental conditions preclude this alternative at this time. Thus the hydrogeologic study to ascertain the potential of contamination occurrence.

These water related projects will be further enhanced in the Water Resources Management Profile.

BIBI-N-010 FIRE MANAGEMENT (BASIN DEVELOPED AREA)

Statement of Problem

Increased fuels (brush and grass) in the Basin Developed Area threaten human life and property in the event of an uncontrolled wildfire between the campground and the Window.

Background Information

La Sala (1976), in a trip report, stated an extreme fire hazard situation existed in the Basin Developed Area. $7,500 was allocated from Regional Reserves resulting in some work being accomplished. The Laguna Meadow fire of March 1980 emphasized the vulnerability of the Basin to wildfire. A draft of a Lower Chisos Basin Hazard Reduction Plan was completed in May 1980, but was never brought to fruitation.

A year of heavy rainfall in 1981 again stimulated fuel buildup around the Basin Developed Area. A safety report by Warren, G. 1981 stated that the trees near the cabins needed to be trimmed away from the powerlines and that vegetation needed to be removed from around the Remuda'a LPG tank.

A trip report by Warren, M. 1981 stated that

> "It was the general conclusion of the group that there was a significant threat to both the development and the Park user, from wildfire. The best way to ease this threat was felt to be fuel reduction. Several ways to do this were discussed and the use of Management Fires seems to be the most promising and cost effective. It was also pointed out that no matter what management treatment was chosen, it could not be viewed as a one-shot thing but would have to be part of an on-going program."

A burn plan was completed in April 1982, but was not implemented because of inclement weather. The fuel problem is still present, aggrevated by two successive seasons of high summer rain and vigorous plant growth. A manual fuel reduction program was initiated in September 1982 and resulted in a 50-100 feet wide fuel break below the developed area.

Current Management Plan

The burn plan is still a viable document and will be utilized for a fall or spring burn if money, manpower and weather permit. The use of manual fuel reduction has been initiated and will continue as money and manpower allow.

The aquisition of a retardent to use on and adjacent to the fuels break is expected and hopefully will be available on a year round basis, as needed

Alternative Actions and Time Frames

1. No Action: To utilize this alternative will only increase the problem over time and is not a viable alternative.

2. Mechanical removal of fuels from key areas followed by periodic burning. This alternative is viable and over time will remove shrubby species and favor grasses and forbs - a desirable fuel type for ease of manipulation.

3. Herbicide application: Not a viable alternative in that it would only increase the level of fuel loading which is already crictical.

4. Use of fire with a minimum of mechanical removal: This is a viable alternative but without some mechanical removal could require manpower and critical timing more than with some key mechanical removal of fuels.

Recommended Actions and Time Frames

1. Initially use a combination of key fuels reduction in association with strictly controlled burning. If burn plan is not implemented, utilize manual fuel reduction to alleviate potentially serious problems. (2-3 year program to alleviate major problems)

2. Utilize a fire retardant to protect hazardous areas until the fuel problem is alleviated. (as needed)

3. After initial fuel reduction, develop a cyclic program to keep fuel buildup from occurring. (3-5 year cycle)

BIBE-N-011 OTHER FUTURE PROJECTS

There are many other projects that are in need of research or monitoring but are of lower priority than the projects currently listed.

a. Roadside Brush Removal
b. Cottonwood Decline in Developed Areas
c. Unique or Important Flora
d. Unique or Important Fauna
e. Spring trends
f. Fire Fuels Inventory
g. Fire Prescription fine Tuning
h. Analysis of Historic Aerial Photography
i. Climatological analysis
j. Photo Point Establishment
k. Digitization of Base-line data
l. Cave Inventory

And Many More.

Future revisions, along with Bissonetts analysis will no doubt develop many new projects.

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ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1 NPS cost/ M.Y.$1000	Year 2 NPS cost/ M.Y.$1000	Year 3 NPS cost/ M.Y.$1000	Year 4 NPS cost/ M.Y.$1000	Year 5 NPS cost/ M.Y.$1000	Date Submitted 10-237 10-238
	1	N-002	Vegetation Analysis Mapping Veg. Analysis Digitize. data	25	30	30 10	30 10	10	
	2	N-003	Endangered Plants		15	15			
	3	N-004	Peregrine Falcon		10	15			
	4	N-005	Gambusia			30			
	5	N-006	River Use & Mgt.Plan		30	30	20		1/16/81
	6	N-007	Exotic flora		30	30			
	7	N-009	Water Resources	Estimates being prepared by SWRO					

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	1	N-001	Air Quality (Monitor)	.5	10	.5	10	.5	10	.5	10	.5	10	1981
	2	N-002	Plant List (update)	.1	2	.1	2	.1	2	.1	2	.1	2	
	3	N-003	Endangered Plants	.2	4	.2	4	.2	4	.2	4	.2	4	1981
	4	N-004	Peregrine (Monitor)	.5	10	.5	10	.5	10	.5	10	.5	10	
	5	N-005	Gambusia (Monitor)	.2	4	.2	4	.2	4	.2	4	.2	4	
	6	N-006	River use & Plan (Permits, Commercial)	1.0	20	1.0	20	1.0	20	1.0	20	1.0	20	
	7	N-007	Exotic Flora	1.0	20	1.0	20	1.0	20	1.0	20	1.0	20	1981
	8	N-008	Exotic Fauna	.5	10	.5	10	.5	10	.4	10	.5	10	1981
	9	N-009	Water Resources	.2	4	.2	4	.2	4	.2	4	.2	4	1981
	10	N-010	Fuel Reduction	1.5	30	1.5	30	1.5	30	1.5	30	1.5	30	

ARCHEOLOGICAL SECTION

Archeological research in the park has been sporadic and an intensive survey of the total park has never been done. Archeological surveys were conducted by the National Park Service in 1936-37 and by T. N. Campbell of the University of Texas in 1966-67. These surveys were superficial and the time alloted for the studies allowed only a portion of the park to be sampled. However, 628 sites were recorded by the surveys, and Campbell estimated that a total survey would record more than 5,000 sites.

The analysis of data acquired by archeological research to date clearly points to a very long human occupation of the Big Bend area. This began with at least sporadic occupation by Paleo-American hunters, possibly as early as 10,000 to 12,000 years ago. This was followed by Archaic hunting and gathering groups who had become adapted to the desert environment that developed after the slow climatic shift to much drier conditions some 7,000 to 8,000 years ago. In the Big Bend region these "Chisos" or "Big Bend" Archaic groups seem to have developed a basic culture that changed slowly over a long span of time, from about 6,000 B.C. to at least 500 A.D., which clearly indicates a hunting and gathering economy with the dart or hand-thrown spear as the principal tool item.

Sometime after 500 A.D. a few changes signaled a new development and formed the basis for recognition of a new stage, the "Neo-American." In the Big Bend region the most dramatic innovation during this time was the appearance of the bow and arrow. Ceramics may have been introduced, but as yet no survey party has reported potsherds from a park site (a few plain gray sherds have been found by local collectors). It may be that the Neo-American Stage in Big Bend represents nothing more than a slightly changed Archaic way of life, but this remains for future excavtion to determine. Evidence suggests that the Neo-American groups of the Big Bend were much less isolated from the outside world than the preceding Archaic groups. Also, it appears that some of the Neo-American groups of the Big Bend may have been ancestral to the Indian groups encountered by Europeans during the early historic period, and in time it may be possible to link assemblages of late prehistoric artifacts with specific Indian groups who lived in the Big Bend until they were displaced by Apaches and Europeans.

The presence or absence of certain kinds of artifacts, primarily projectile points and modern artifacts, permit us to make statements about the frequency of occupations during the four cultural stages recognized: Paleo-American, Archaic, Neo-American and Historic. A total of 177 sites yielded artifacts diagnostic of certain stages. At four of these sites unmistakable types of Paleo-American dart points occur; at 152 sites Archaic types of dart points occur; at 80 sites Neo-American types of arrowpoints occur; and at 26 sites appreciable amounts of recent artifacts occur and indicate occupation during the late historic stage. The low frequency of Paleo-American materials suggests a very light occupation of the area during that early stage, but it must be remembered that the remains of the oldest occupations are more likely to be deeply covered and less likely to be exposed by erosion. The high frequency

of Archaic materials, as well as the presence of dart point types indicative of early, middle, and late Archaic phases, reflects continuous occupation over a period of at least 6,000 years by desert-adapted populations. The lower frequency of Neo-American sites is best explained by the relative brevity of the related time span, less than 1,500 years. It is tentatively concluded that during both Archaic and Neo-American stages the population density remained about the same, somewhat less that the resources of the area could support at a hunting and gathering level.

COMPLIANCE WITH PRESERVATION LEGISLATION

All management actions must be in compliance with provisions of the Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, Executive Order 11593, the National Environmental Policy Act of 1969, and the Archeological and Historic Data Preservation Act of 1974.

Any construction activities or permits for construction activities within the park's boundaries must have the required archeological surveys and, where necessary, mitigating actions must be taken to comply with applicable legislation. Special use permits for construction activities such as roads, buildings, campgrounds, etc. require consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation in compliance with Section 106 of the National Historic Preservation Act of 1966 if these activities affect a site listed on the National Register of Historic Places.

The park Superintendent should notify the Southwest Cultural Resources Center in the Southwest Regional Office upon learning that construction activities are planned which will affect the park.

PRESERVATION OF UNEXCAVATED SITES

In some cases the archeological sites of Big Bend are naturally preserved from further deterioration by the fill material which has accumulated since the site was abandoned. As long as this natural fill completely covers the sites, no additional preservation efforts are necessary. However, further site survey is certain to locate many cases where erosion or other exposure to severe conditions is resulting in the deterioration of sites of this type. A number of sites, such as lithic scatters, may have no depth but may simply occur as lithic debris strewn about the surface. Technically speaking, these sites are always in a state of natural deterioration.

All sites, regardless of natural conditions and exposure, are subject to human erosion. The various levels of site pilfering ranging from sporadic collecting to total dismemberment by pot hunters is a problem

which can be expected to increase wherever visitation in the park is increased. Facility development in the park is another potential factor which can adversely affect archeological resources.

Previous archeological surveys by the National Park Service and by T. N. Campbell were superficial and the time allotted for the studies allowed only a portion of the park to be sampled. However 628 sites were recorded by the surveys and this data provides some information base for park management and indicates the potential of archeological resources contained in the park. Subsequent survey projects will utilize of the fullest extent the information derived from prior surveys as well as information available from the park staff. The results of a comprehensive archeological survey of the park and the preparation of a site base map will facilitate careful site-by-site preservation and protection planning. A continuing program of surveillance will be made of significant sites to determine any damage or deterioration, and the source. A schedule of regular inspection and maintenance will be followed. Backcountry use of the park will be controlled where there are concentrations of sites. Persons using the back-country will be informed that archeological sites are protected by law. Visitation to certain sites may have to be prohibited entirely.

In sites were natural fill completely covers the site, no additional preservation efforts (other than surveillance) should be necessary. For exposed sites or sites in imminent danger of erosion, excavation or surface collection may be required as an emergency measure. For cave sites or shelters, excavation or collection should be considered if the site is deemed vulnerable or delicate, although alternatives should be considered which would mitigate factors which imperil the site.

BIBE-C-001 ARCHEOLOGICAL SITE SURVEY

Statement of Problem:

The Big Bend area of Texas is imperfectly understood from the Archeological standpoint. Only cursory surveys have been undertaken and much remains to be documented in the Park. The relatively accessible backcountry is subject to both vandalism and artifact removal, particularly around springs, roads, backcountry campsites and along the river.

Background Information:

Archeological research in the Park has been sporodic and an intensive survey of the Park has never been accomplished. Surveys were conducted by the National Park Service in 1936-37 and by T.N. Campbell, of the University of Texas, in 1966-67. These surveys were relatively superficial and the time constraints alloted for the studies allowed only for a relatively small portion of the Park to be sampled. However, 628 sites were recorded and Campbell estimated that a total survey would record more than 5000 sites. The survey would do much to round out the prehistoric sequence, giving greater definition to the prehistoric cultures, their relationship and temporal phases. Further,the archeological record of Big Bend will present numerous opportunities for investigating the dynamics of the prehistoric occupation. Questions regarding the adaptation of hunting - gathering groups to the desert environment, demographic change, seasonality and scheduling of subsistance activities, exploitive patterns and resources utilization and other areas of interest may be explored during the course of the survey, while directions for future research are sure to emerge.

Current Management Action:

A baseline map of archeological sites has been initiated and sites not previously listed are added as reported. Information concerning archeological studies or finds is being consolidated to assist future archeological investigators.

Alternatives and Probable Impacts:

1. No Action: This is not a viable alternative, as various Legislative mandates require protection of archeological resources.

2. Phase 1: Initiate a comprehensive literature and collection search. A compilation of all available field notes, site reports, excavation reports and artifact assemblages from previous archeological research should be made and organized into compendium which will give a complete up-to-date detailing of the known archeological findings in the Park. This will provide data which would prove invaluable in developing a research design prior to fieldwork. Failure to initiate Phase 1. would violate one of the basic principles of project development.

3. Phase 2: Analyze the latest color infrared photography (aerial) in an attempt to delineate the extent and location of possible archeological sites. Failure to utilize all available sources of information, particularly Color IR aerial photography would be a major oversight in the early phases of this project.

4. Phase 3: Survey high impact areas of the Park (High impact areas are defined as areas where visitation and backcountry use is heavy and where existing or proposed Park facilities represent adverse impacts on archeological resources. Failure to initiate and complete phase 3 will result in vandalism and/or loss ao artifacts and increase the number of individual trips needed to clear projects.

5. Phase 4: Because of the large size of Big Bend National Park, it will be feasible to survey only a portion of the Park. A 25% stratified sample of the area within each microenvironment has been suggested as one sampling strategy which may be employed. Failure to initiate an overall sampling strategy for the Park will result in vandalism and artifact removal from the Park.

6. Phase 5: Limited test excavation or surface collection at a few selected sites may be necessary either during the survey or following the survey. Limited test excavations would greatly increase the information from the survey and would be usefull in illuminating many of the questions raised during the survey. Failure to initiate limited test excavations or surface collections will result in loss of artifacts through vandalism or removal and loss of valuable information concerning the sites.

Recommended Action:

1. Initiate Phase 1 and 2 as soon as possible.

2. Phase 3 along with Phase 5 may be required to alleviate vandalism and loss from high impact areas (river, backcountry campsites, ect.). Year 2-3.

3. Initiate Phase 4 begining in year 3 and continuing through year 5.

BIBE-C-002 ARCHEOLOGICAL INVESTIGATIONS AT BURRO MESA

Statement of Problem:

The Burro Mesa archeological complex consists of a quarry, two large rock shelters and an open camp area. Investigations of the Burro Mesa complex is necessary, in part, because of the increased back-country use of this area and the evidence of vandalism and disturbance of the rock art and quarry site.

Background Information:

The Burro Mesa complex is a site of Regional significance and appears to have been in use over a considerable period of time. An increased interest in Indian rock art (Pictographs and Petroglyphs) as well as the collecting of Indian artifacts has led to vandalism and pilfering of this significant area. While site preservation is preferred, the present situation may warrent retrieval of archeological data from the Burro Mesa sites. Study of this complex is certain to yield scientific information concerning the past use of this complex.

Current Management Action:

Other than attempting to discourage use of the area, nothing is actively being done to protect this site.

Alternative Actions and Probable Impacts:

1. No Action: This action is currently in effect and the site has shown evidence of vandalism and pilfering and data continues to be lost at an undetermined rate.

2. Close off the area to Public use: Due to the evidence of vandalism and disturbance to this area, this would appear to be a viable option, although by closing the area, there is a good chance of drawing greater attention to the complex, thus increasing the potential of increased disturbance from artifact collectors.

3. Intensively study the area over a relatively short time frame: This option is probably the most viable in that a great amount of information could be gleaned and the information could augment the Interpretive program as well as documenting a significant archeological site.

Recommended Action:

Alternative # 3 should be implimented as soon as possible. While the study is operational, initiate alternative # 2 until the study is completed.

Time frame:

The intensive study should take no more than a year and should be initiated as soon as possible. After completion, the area could once again be opened to the general public, and the information gleaned could be utilized in the Interpretive aspects of the area.

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	1	C-001	Archeological survey						
			Phase I	.1 5					
			Phase II	.2 10					
			Phase III		.5 25				
			Phase IV			1.0 50	1.0 50	1.0 50	1979
	2	C-002	Burro Mesa		.5 25				1979

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Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1 NPS cost/ M.Y.$1000		Year 2 NPS cost/ M.Y.$1000		Year 3 NPS cost/ M.Y.$1000		Year 4 NPS cost/ M.Y.$1000		Year 5 NPS cost/ M.Y.$1000		Date Submitted 10-237 10-238
	1	C-001	Preservation of sites	.1	5	.1	5	.1	5	.1	5	.1	5	

HISTORIC RESOURCES

Alvar Nunez Cabeza de Vaca, a prominent figure in the history of the American Southwest and of New Spain, became the first European to enter the Big Bend region sometime around 1530. While Spanish concerns during the following 150 years along the Rio Grande remained concentrated further west in New Mexico, Spanish soldiers were called upon on occasion to offer protection to the native peoples living along the Big Bend of the Rio. After 1776 two mission-presidios were established in the region, the Missions San Vicente and San Carlos. San Vicente was intended to protect the villages along the river where the Apaches and Comanches made their easternmost crossing of the Rio Grande in their forays into northern Mexico. Eventually, however, many of the villages along the Big Bend were destroyed by the northern nomads so that by the mid-nineteenth century no villages were inhabited in the immediate region and the area was rarely, if ever, visited by Europeans. The mission-presidios had long since fallen into abandonment. The area remained as a passageway for raiding Apache and Comanche groups as they moved into New Spain.

Eighteen forty-eight marked the end of the United States-Mexican War. With the Treaty of Guadalupe-Hidalgo, all lands north and east of the Rio Grande were transferred by the United States. The Big Bend ceased to exist as in interior zone, becoming an international border area. Mexican-Indian peoples along the river continued to move back and forth across the river however. The Apaches and Comanches continued to use Rio Grande crossing on the "Comanche Trail" into the last half of the century. Increased use of the Grand Indian Crossing near the mouth of Mariscal Canyon resulted in the abandonment of both sides of the Rio near Castolon toward the close of the nineteenth century.

Just before the outbreak of the Civil War, army reconnaissance expeditions into the Big Bend country focused on the Comanche Trail and the need for protecting the area from marauding groups. These reconnaissance parties passed through several of the well-knwon landmarks in the present park. During the Civil War, all activities along the Big Bend international boundary came to a halt. Indian raids across the Rio Grande by way of the Comanche Trail became most pronounced. The Big Bend remained unoccupied by settlers. But the coming of the railroad and the eventual subjugation of the Indians allowed cattlemen to enter the area in the 1880's. Gradually, the Anglo-Americans population of the area increased. The discovery of quicksilver at the turn of the century accelerated economic development which indirectly brought about about an increase in ranching and irrigated farming activities.

The combination of the Mexican Revolution of 1910, the outbreak of World War I, and later the adoption of the prohibition amendment in the United States led to the creation of a situation along the international boundary between the United States and Mexico which culminated in a long list of raids along this border. Local law enforcement officers, aided by Texas

Rangers , were unable to protect life and property along the border. Consequently, in 1911, the United States began deployment of cavalry forces along the unprotected and unfortified boundary.

The Big Bend country saw sporadic cavalry patrol activity during this time. In the War Department the area became known as the Big Bend District, with headquarters at Camp Marfa. Gradually the danger of trouble along the Mexican border decreased, and military units were withdrawn. During the 20's and 30's, a peaceful period of general mining, farming, and ranching activity resumed and continued until 1944, and the new era of Big Bend history began.

BIBE-C-003 HISTORIC RESOURCE STUDY

Statement of Problem

The history and historic sites of Big Bend National Park have been handled through a series of specific but unrelated studies. The need for a comprehensive package to consolidate, evaluate, and expand on the historic attributes of the Park is long overdue.

Background Information

E.O. 11593 and the National Historic Preservation Act require a basic inventory and evaluation of historic attributes. Baseline inventory and evaluation is essential for the Man and the Biosphere Program as well. While there is a great amount of information available, there are many facets which are lacking or incomplete at this time (i.e., a base map of all known structures; Mexican settlement and use; flood plain farming; Indian history and subsistence use, but to name a few topics).

Current Management Action

A base survey of all reported structures is currently in progress and should be completed by mid FY '83.

Alternative Actions and Probable Impacts

1. No Action. To utilize this alternative would result in continued loss of information concerning the historic resources of the Park.

2. Inventory All Historic Sites Within the Park. Failure to undertake this inventory will result in loss of information over time.

3. Synthesize and Evaluate Existing Studies and Reports. Failure to do so will leave the Park with a disjointed, splintered program to develop a comprehensive action plan.

4. Research and Describe Unstudied Topics.

    a. Mexican settlement and use.
    b. Cultural interaction between north and south sides of the river.
    c. Flood plain farming.
    d. Indian history and subsistence use.
    e. Border conflict.
    f. Twentieth Century relationships between Anglo, Mexican, and Indian.
    g. Old Ore Road.
    h. Comanche raiding trails.
    i. McKinney Springs.
    j. Glenn Springs.
    k. La Noria.
    l. Specific ranch studies.
    m. Trading posts.

n. CCC activities.
o. Santa Elena, San Vicente, Boquillas.
p. Neville Springs (Blue Coat Outpost).

Failure to eventually investigate these historic attributes of the Park will only make the information more difficult to obtain as time passes.

5. Digitize existing information so that data can be readily located (i.e., historic photographs, bibliography, atrifact collections, etc.).

Recommendations and Time Frames

1. Complete alternative #2 as soon as possible so that additional information can be added in the future.

2. Initiate alternative #3 in FY '83 and complete as soon as possible.

3. Initiate alternative #5 upon completion of alternative #4. To set up a comprehensive system of digitization would take from six months to one year.

4. Encourage local universities to undertake various research projects under alternative #4 as Master's and Ph.D. theses, and well as perhaps special projects for classes. To complete the entire list may take 20+ years, but several projects could be programmed per year.

BIBE-C-004 PRESERVATION OF HISTORIC RESOURCES

Statement of Problem

The LCS is in need of updating, along with the need to develop a comprehensive maintenance and inspection program for each classified structure on each management category. The development of a maintenance person to carry out the day-to-day upkeep of the structure is of high priority.

Background information

There are 38 structures on the current LCS (16 B category; 21 C category and 1 D category). A document, (circa July 1977) updated the status for the protection of the National Register sites but has never received Management approval (see appendix L). The Historic Resources Management plan of 1968 is long outdated and obsolete. A comprehensive updating of the Historical structures program is sorely needed, along with the development of a trained Park Person to carry out the day-to-day maintenance of the structures.

Current Management Action

Several structures have undergone serious deterioration over the past three-five years and need considerable work. Rehabilitation of the Garlick House (for adaptive use) is scheduled for FY 83, but the Luna Jacal and the Alvino residence are currently in need of repair (Luna Jacal was damaged in a severe hail storm in mid-June of 1982). There is no current ongoing maintenance or repair program in effect and a maintenance position needs to be trained in the day-to-day upkeep of the primary historic structures.

Alternative Actions and Probable Impacts

1. No action. This action is not acceptable in that it precludes any work at all to be done on these structures.

2. Update LCS. This alternative is of high priority. Failure to update the LCS will only cloud the structure status and prioritization of work.

3. Update management category of each building on the LSC. Failure to accomplish this task will only prolong the development of a strategy of management for the individual structures.

4. Develop a management plan for each structure. Failure to complete this task will keep specific action plans in abeyance.

5. Develop Preservation guides _ie, a realistic inspection and maintenance plan for each structure. Failure to develop guides will prolong the development of a systematic approach to Historic resource protection.

6. Train a Maintenance position in the day-to-day upkeep of LCS Structures. Failure to accomplish this alternative will allow structures to deteriorate.

Recommendations and Time Frames

1. Initiate alternative #2 as soon as possible, preferably by January, 1983.

2. Initiate alternative #3 as soon as possible, this could be accomplished in conjunction with recommendation # 1.

3. Initiate alternative # 4 & 5 by FY 84.

4. Have a maintenance person on the job with responsibility for the day-to-day upkeep of the LCS structures. Target date, Oct. 1983.

HISTORIC RESOURCES
RESEARCH

Page____ of _____

ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1 NPS cost/ M.Y.$1000	Year 2 NPS cost/ M.Y.$1000	Year 3 NPS cost/ M.Y.$1000	Year 4 NPS cost/ M.Y.$1000	Year 5 NPS cost/ M.Y.$1000	Date Submitted 10-237 10-238
	1	C-003	Historic Resources Study	1.0 30	1.0 30	1.0 30			198
	2	C-004	Hist. Structure Maint. & Inspect. Guides						
			Castolon	.4 8					
			Wilson & Luna		.3 6				
			Hot Springs			.2 4			
			Mariscal			.3 6			

HISTORIC RESOURCES
MAINTENANCE
ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1 NPS cost/ M.Y.$1000		Year 2 NPS cost/ M.Y.$1000		Year 3 NPS cost/ M.Y.$1000		Year 4 NPS cost/ M.Y.$1000		Year 5 NPS cost/ M.Y.$1000		Date Submitted 10-237 10-238
			Preservation	Class B		Class C		Class D						
			Interim	5.5	101	4.0	73	0.5	20					
			Treatment		54		67.5		--					
			Maintenence											
			Castolon	0.2	4	0.2	4	0.2	4	.2	4	0.2	4	
			Wilson	0.1	2	0.1	2	0.1	2	0.1	2	0.1	2	
			Hot Springs	0.1	2	0.1	2	0.1	2	0.1	2	0.1	2	
			Mariscal	0.3	6	0.3	6	0.3	6	0.3	6	0.3	6	
			Luna Jacal	0.5	15	0.1	2	0.1	2	0.1	2	0.1	2	
			Rancho Estelle	0.2	4	0.2	4	0.2	4	0.2	4	0.2	4	

APPENDIX A

STATUS OF RESEARCH

Research Completed (Natural)

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Research in Progress
Cultural

None

APPENDIX B

SCOPE OF COLLECTION STATEMENT

SCOPE OF COLLECTION STATEMENT - BIG BEND NATIONAL PARK

The following scope of collection statement was formulated using the July, 1975 Interpretive Prospectus for Big Bend and the guidelines contained in the Museum Operations Handbook.

Scope of collection, specifically, is barely touched upon in the Interpretive Prospectus:

> "The park's museum collection is small and should remain small. Big Bend is too remote from the established circuit of scholars to encourage the growth of a large study collection. The park should limit acquisitions to specimens in good or potentially good condition for exhibits actually planned or programmed. An herbarium, a cabinet of minerals, and similar collections of representative species may be very useful in the daily work of the interpretive staff. These do not belong in the museum collection, however, except individual objects with significant monetary value. After all, if a pressed lupine is damaged or lost, it can be easily replaced."

However, as the Prospectus later discusses in greater detail, a large number and variety of specimens will be necessary if and when a Visitor Center and exhibit room ever materialize. After a number of years, exhibit concepts and specimens needed for them may change substantially from those now envisioned. For this reason, the park's collection of exhibit-quality objects, whether biological or historic, should remain flexible and, when possible, continue to grow.

The museum collection is currently used primarily as a study collection for the interpretive staff and visiting researchers. It contains approximately 4596 cataloged items, falling into the following categories:

Botanical - 2489 herbarium sheets.
The Interpretive Prospectus and the Museum Handbook are in conflict over the necessity of cataloging herbarium specimens. Expendable specimens of the commonly seen plants are available for visitor use in the form of a "Know Your Plants" Layman's Herbarium in the main lobby. However, a more complete series fills a definite need in the museum collection and should be continued.

Archeological - approximately 400 specimens
Many of these are from pre-park field collections, acquired by donation.

Historical - approximately 300 specimens

Geological and Paleontological - approximately 250 specimens

Zoological -
Birds - approximately 140 - study skins
Mammals- approximately 50 - study skins
Reptiles and Amphibians - approximately 75 preserved specimens
Fish - approximately 30 preserved specimens

In addition there is an insect collection of several hundred pinned specimens.

In addition, paleontological and archaeological specimens are being retained at the researching institutions, due to lack of storage space and specialized curatorial care available in the park. Most of these specimens are also more accessible to researchers and/or the viewing public under this arrangement.

The entire collection is housed in the Naturalist Workshop, a small room at Park Headquarters which also contains the slide files and projection equipment, darkroom, and workspace for the Interpretive staff. Space for museum activities is therefore minimal. Access is from the interior of the Headquarters building, by building key. When not in use the room is kept locked. There are few specimens of actual monetary value, and security needs at this time appear to the adequately met.

The collection is available at any time to park staff and persons engaged in research in the park, and to interested visitors when an employee is available to accompany them.

Very few items are on open display, due to the fact that there are currently few places or opportunities for this type of use. There is a display in the Community Room at Park Headquarters of common insects and arthropods which attracts much visitor attention before and after programs held there. Like the museum, however, this room is open to the public only when an employee is there. Study skins, skulls, and similar specimens have been used successfully in afternoon "workshops," to acquaint visitors with such topics as bird identification, Indian Life in the desert, and identification of animal tracks and skulls.

Specimens have been acquired from field work by the park staff, by donation from interested persons in the surrounding area, and from in-park researchers. This is an especially valuable source of good specimens since it 1) fulfills the requirement on the collecting permit of providing tangible benefit to the park and 2) in many cases insures a greater degree of expertise in specialized fields than that immediately available from the park staff.

Museum items are handled according to the Museum Handbook standards. Accession book, catalogue cards, and source of accession file are kept up to date. Storage is in standard specimen cabinets, and checked on a regular basis. An oral history tape library is being built up, for which a different type of storage will be required. A safe or vault will be needed to protect master tapes from temperature and humidity extremes, as well as from all sources of magnetism. Working copies of tapes will need separate storage, along with associated files and index cards.

Date of the last complete inventory is unknown. Spot-checks in the course of up-dating the collection during the past year have been helpful in locating misplaced and uncatalogued specimens.

We do not anticipate disposal of any specimens in the near future.

Big Bend with its wide range of natural history, geological formations, and human history, requires for adequate documentation and interpretation an equally wide ranging museum collection. Natural and archaeological objects should relate specifically to the park itself. On the other hand, historic objects may originate in the surrounding area, but still be representative of life in Big Bend during the ranching, mining, military, and other periods, as interpreted at specific sites within the park. i.e., Glenn Springs, Hot Springs, Castolon, Wilson Ranch, and Mariscal Mine. Unless there is some immediate, specific purpose (exhibit), the park should avoid acquisition of many objects pertaining to lesser themes, or objects already adequately represented.

There is room for expansion and improvement in all natural history categories as research priorities are determined.

APPENDIX C

SPECIFIC MANAGEMENT PLANS

SPECIFIC MANAGEMENT PLANS

1. Statement for Management
2. Historic Resources Management Plan
3. Fire Management Plan
4. Backcountry Management Plan
5. Habitat Management Plan for Big Bend Gambusia

SPECIFIC MANAGEMENT PLANS

1. Statement for Management

This document has been recently updated in 1981 and is available both at the Southwest Regional Office, Santa Fe, New Mexico and Big Bend National Park Headquarters.

2. Historic Resources Management Plan

The 1968 plan was updated by the SWRO of cultural resources in 1977 but has never received formal management approval. Copies of both documents may be obtained through the same places as # 1.

3. Fire Management Plan

Completed in 1980, this document is relatively up-to-date. Work on Fuels reduction is being initiated by the office of ONR - SWRO concerning the Basin in the Chisos Mts. A rather comprehensive plan is needed to initiate a multi-faceted fuels reduction program to reduce potential loss of lives and property.

4. Backcountry Management Plan.

Completed in 1980, this plan is current and up-to-date except for a couple of minor revisions- ie Trespass Livestock Guidelines and River Use.

5. Habitat Management Plan for the Big Bend Gambusia

This plan, completed in 1977, was in the appendix section of the RMP (1977). This plan is no longer current and needs updating.

Plans yet to be completed include:

A. River Management Plan

B. Aquatic Resources Management Plan

APPENDIX D

PESTICIDES

Project number - BIBE-19-82
Common name - Tordon RTU
Chemical name - Picloram & 2,4-D
EPA Registration # - 464-510
Specific targets - Tamarisk spp.
Active ingredients - Picloram 5.4%
2,4-D 20.9%
Mix of product/dilution - NA applied full strength
Form applied - stump application
Use area - springs and creek beds
Remarks - careful application to stump only
On hand - 15 1/3 quarts
Status - Active NPS

Project number - BIBE-20-83
Common name - Wipe v
Chemical name - NA
EPA Registration # - 270-149
Specific targets - flies
Active ingredients - Pyrethrins .01%; Piperoyl butoxide tech. .50%;
2,2-dichlorovinyl dimethyl phosphate .05%;
Related compounds .04%; Oil of citronella 2.00%;
White mineral oil 37.17%; Deodorized kerocene 37.20%
Mix of product with dilution - Applied full strength
Form applied - Liquid wipe
Use area - Horses
Remarks - not to exceed 2 oz. / application
On hand - 3 quarts
Status - Active NPS, Chisos Remuda

Project number - BIBE-21-83
Common name - Hornet and Wasp Killer
Chemical name - NA
EPA Regitration number - 239-2390-ZA
Specific targets - Wasps and Hornets
Active ingredients - 2-(1-methylethoxy)phenyl methylcarbamate .50%
Petroleum distillate 84.43%
Mix of product / dilution - NA applied full strength
Form applied - aerosol
Use area - Developed areas
Remarks - Do not use near open flame
On hand -15 cans
Satus - Active NPS

Project number - BIBE-22-83
Common Name - Golden Malrin Fly Bait (with muscamone)
Chemical name -unknown
EPA Registration # - 2724-274-11787
Specific targets - flies
Active ingredients - Methomyl (S-methyl N-[methylcarbamoyl] oxy) 1.00%
Thiacetimidate (Z-9-tricosene) 0.025%
Mix of product/dilution - NA applied full strength
Form applied - granuals
Use area - Corrals,Chisos Remuda area
Remarks - use where animals can't get to it
On hand - none
Status - Active, Chisos Remuda

Project number - BIBE-23- 83
Common Name - Talon G
Chemical name - Brdifacoum
EPA Registration # - 10182-41
Specific targets - mice and rats
Active ingredients - 3-[3-(4-bromo-[1,1-biphenyl] -4-yl)-1,2,3,4-tetrahydro-1-naphthaloyl] -4-hydroxy-2H-benzopyran-2-one 0.005%
Mix of product/dilution - NA applied full strength
Form applied - mini-pellet
Use area - Visitor use structures, NPC, Chisos remuda
Remarks - Tamper proof bait boxes, inside use only
On hand - Some in place
Status - Active, NPC, Chisos Remuda, contractor applied

Project number - BIBE-24-83
Common name - Dursban 2E
Chemical name - Chlorpyrifos
EPA Registration # - 464-343
Specific targets - Insects and arthropods
Active ingredients -[0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate] 22.4%
Aromatic petroleum derivative solvent 46.2%
Mix of product / dilution - 1 1/3 oz./ gal. water =.25% spray
Form applied - Spray - pressure
Use area - Developed area, NPC and Chisos Remuda
Remarks - Crack and Crevice application
On hand - none
Status - Active, NPC, Chisos Remuda, Contractor applied

Project number - BIBE-25-83
Common name - Dursban LO
Chemical name - Chlorpyrifos
EPA Registration # - 464-571
Specific targets - Insects & arthropods
Active ingredients - [0,0-dimethyl 0-(3,5,6-trichloro-2-pyridyl) phosphorothioate] 42.0%
Xylene range aromatic solvent 10.6%
Mix of product/dilution - 1.35 oz./gal. water = 0.50% spray
Form applied - spray pressure
Use area - Developed area, NPC and Chisos Remuda
Remarks - Crack and Crevice application
On hand - None
Status - Active, NPC, Chisos Remuda, Contractor applied

Project number - BIBE-26-83
Common name - FICAM W
Chemical name - Bendiocarb
EPA Registration # - 45639-1
Specific targets - Insects and arthropods
Active ingredients - 2,2-dimthyl-1,3-benzodioxol 4-ol methylcarbamate 76%
Mix of product / dilution - .4 oz./gal water = 0.25% spray
Form applied - spray , pressure
Use area - Developed area, NPC, Chisos Remuda
Remarks - Crack and Crevice application
On hand - none
Status - Active, NPC, Chisos Remuda ,Contractor applied

Project number - BIBE-27-83
Common Name - Ectiban WP
Chemical name - Permethrin
EPA Registration # - SLN-TX800034
Specific targets - flies
Active ingredients - (3-phenoxyphenyl) methyl Cis,Trans-3-(2,2-dichloroethenyl)-2,2-dimethylcycopropane caboxylate 25%
Mix of product / dilution - 1 1/2 oz/2.75 gal water
Form applied - Liquid spray
Use area - Garbage rooms
Remarks - Walls and ceilings
On hand - 1 1/2 oz.
Status - Active, NPC

Project number - BIBE-09-82
Common Name - Pramitol Liquid 25 E
Chemical Name - Unknown
EPA Registration # - 100-443-AA
Specific Targets - Crab grass
Active Ingedients - 2-methoxy-4,6-bis(isopropylamide)-S-triazine
Mix of product/dilution - 2 oz./gal. water
Form applied - spray - pressure
Usearea - Historic and developed zones
Remarks - bridges and roadsides also
On hand - none
Status - Active, NPS

Project number - BIBE-10-83
Common Name - Diazinon 4E
Chemical name - Diazinon
EPA Registration # - 7273-131
Specific targets - Ants,silverfish,cockroaches,scorpions
Active ingredients - [0,0-diethyl-0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate] 47.79%
Aromatic petroleum derivitive solvent 26.20%
Mix of product /dilution -2.5 oz. /gal. water =1% spray
Use area - Developed zone, concessions
Remarks - NPC and Chisos Remuda areas (contractor applied)
On hand - none
Status - active (Concessions)

Project number - BIBE-13-82
Common name - Chlordane
Chemical Name - Chlordane
EPA Registration # - 876-63-AA
Specific targets - Termites
Active ingredients - Chlordane 70%
Mix of product with dilution - 1.25 oz/gal. water
Form applied - spray - pressure
Use area - Houses, developed area
Remarks - NPS area houses
On hand -
Status - Active NPS

Project number - BIBE-28-83
Common name - Automatic indoor fogger
Chemical name - NA
EPA Registration # - 4822-135
Specific targets - flies and spiders
Active ingredients - Pyrethrins 0.05%; Piperonyl butoxide tech. 1.00%
N-Octyl bicycloheptene dicarboximide 1.67%;
Petroleum distillate 11.83%
Mix of product / dilution - NA used full strength
Use area - Developed area, NPC kitchen, dining room, curio shop
Remarks - Used primarily to reduce fly buildups
On hand - 5 cans
Status - Active, NPC

APPENDIX E

INFORMATION BASE CHECKLIST

BASIC THEMATIC MAP FILE

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

PARK SPECIFIC FILE

Topography. There is a U.S.G.S. map, No. N2900-W12040, 30X80 NPS dated 1969, scale 1:130,000 of Big Bend National Park, Texas. Available at Park Headquarters and Southwest Regional Office, Santa Fe, New Mexico. U.S.G.S. map No. 2858-W10248.5, 44x59.5 dated 1970-71, scale 1:100,000; is available at National Park Concessions, Inc., Chisos Basin, Big Bend National Park, Texas. U.S.G.S. quadrangle maps Series V882, scale 1:24,000 dated 1971 are available at National Park Concessions, Inc., Chisos Basin, Big Bend National Park, Texas.

Geology. Geological map entitled, "Geology Map of the Big Bend National Park,Brewster County, Texas; scale 1:62,500; produced by the University of Texas, Bureau of Economic Geology. This map is contained in an envelope attached to the inside back cover of a book entitled, "The Big Bend of the Rio Grande" Guidebook 7, Ross A. Maxwell, The University of Texas at Austin, 1968. Book and map are available at Headquarters, Big Bend National Park. The section on geology, addresses the need for additional geological research.

Land Use and Ownership. Land Status and Boundary Maps, which denote status of lands within the boundaries of the park, are on file at Headquarters, Big Bend National Park and at Southwest Regional Office, Santa Fe, N.M. Information regarding lands adjacent to the park may be obtained by consulting the plat maps, County Assessor's Office, Brewster County Courthouse, Alpine, Texas. Updated recent boundary changes are available at the Division of Land Acquisition, National Park Service, Santa Fe, N.M. and Big Bend National Park, Texas.

Soils. A general soil map to the association level is available and titled "General Soil Map", Brewster County, Texas; compiled by the U.S. Soil Conservation Service cooperating with Texas Agricultural Experiment Station, Oct. 1973. Map No. 4-R-33, 113. A Soils map and description of soils of Big Bend National Park is scheduled for completion in FY1982. This information will delineate baseline soils information for the park.

Hydrology. Most of the hydrological features of the park may be discerned from any of the several U.S.G.S. maps of Big Bend mentioned above. A detailed hydrological map, current through Fiscal 1969, is contained in, "A Report of the Progress of the Investigation of the Water Resources of Big Bend National Park, Brewster County, Texas" by E.R. Leggat, U.S.G.S. Copies are available at the Southwest Regional Office, Santa Fe and Park Headquarters, Big Bend National Park. A Water source inventory has been completed for the park but needs periodic updating(i.e.) at least every five years. This project will be scheduled for updating in FY 1982. See also Water Resources section in this Plan. Maps of spring locations are included in five large loose leaf binders available at Park Headquarters.

Vegetation. A vegetation map compiled by Dr. Barton Warnock, Sul Ross State University, Alpine, Texas and Walter H. Kittams, National Park Service, in 1970 is available at Park Headquarters. A revision to include the park road system was done in 1977 by Bill Jones, National Park Service. Other vegetation maps, drafted at Denver Service Center during the same period are also available. Also on file at Park Headquarters are a map of threatened plants, prepared by Dr. Warnock; and an overlay of Big Bend vegetation in the park map file which delineated four vegetative "Viomes" (Desert Scrub, Grassland-Sotol, Woodland, and Forest). See also Vegetation Section of this Plan.

Wildlife. There are no overall wildlife maps of Big Bend National Park. Several schematic maps representing portions of the park have been prepared in conjunction with research reports by various investigators for individual species. (Example: Coyote, Deer - Mule Deer and Carmen Whitetail, Javelina). Copies of these reports are available at Park Headquarters, Big Bend National Park.

Cultural. A schematic large map showing archaeological site locations and groupings is included in T.N. Campbell's report on Archaeological Investigations within the Big Bend, and is available at Park Headquarters. This report summarizes Archaeological work in the area dating from before establishment of the park. There has been no complete archaeological survey of the park. The Historic Resources Management Plan for Big Bend National Park, (1968 Vintage) will be updated in FY 1982-1983.

Recreation, Development, and Support Facilities. Maps of these facilities are included in an approved Developmental Concept Plan for Chisos Basin. Future development concept plans have been programmed for Rio Grande Village and Castolon. Each development concept plan is to be consistent with an approved Statement for Management, available at Park Headquarters.

NARRATIVE FILE

Climate. Detailed weather information, including temperature and rainfall averages by month, season, and year; is available at Park Headquarters, Panther Junction. Summary sheets are mailed out to interested persons on request. See also Projects Section of this Section.

Socio-economic Environment. Socio-economic factors were considered in the Chisos Basin Development Concept Plan and such studies will be available at such future time of development concept plans for other areas of the park.

Geology. Narrative treatment of the Geology of Big Bend National Park is best presented in the works of Ross Maxwell, first superintendent of the park, "The Big Bend of the Rio Grande' Guidebook 7" and "Geology of the Big Bend Area, Texas" published by West Texas Geological Society, Publication #65-51, 1965. Both books available at Park Headquarters, Panther Junction.

Land Ownership and Use. In addition to the maps previously cited, documented information dealing with acquisition of lands within the park boundaries, as well as subsequent boundary changes is on file at Park Headquarters.

Soils. See previous reference.

Hydrology. See aforementioned Reports and Projects dealing with this subject, Basic Thematic Map File and Park Specific File.

Vegetation. There are numerous scientific papers, reports and books, discussing the vegetation of Big Bend, available in the library and for sale by the Big Bend Natural History Association at the park. Notable among them are: "Plants of Big Bend National Park" (GPO 290pp), W.B. McDougall and O.E. Sperry, 1951; "Plants of the Big Bend National Park" (Mimeographed 24 pp), Barton H. Warnock 1967; "Naturalists 'Big Bend'" Roland H. Wauer, 1973.

Wildlife. As with the vegetation of Big Bend, there are numerous scientific papers, research reports, and books discussing the wildlife, many are lengthy dissertations on individual species, others are general and inclusive. All are available at Park Headquarters. In the "General" category the following are worthy references: "Ecological Survey of the Big Bend Area" Texas A & M College, 123 pp., K.L. Dixon; "Preliminary Report of an Ecological Survey of Big Bend National Park" mimeographed report for National Park Service, 55 pp., W.P. Taylor, W.B. McDougall, and W.B. Davis,

1944; "Ecological Survey of the Big Bend Area" Administrative report to Texas Game and Fish Commission, 123 pp., C.C. Wallmo, D.O. Dixon, and W.G. Degenhardt, 1957; "Vegetation and Wildlife", National Park Service, typed report, Roland H. Wauer, 1969. In addition an extensive card file on wildlife observations within the park is maintained by the park staff and is located in the park library.

Cultural Values. The Archaeological and Historical (Cultural Resources) sections of this plan contain considerable narrative information. Copies of the "Archaeological Assessment" of Big Bend National Park by C. Britt Bousman and Margaret Rohrt, Southern Methodist University are available at Park Headquarters and at the office of Cultural Resources, National Park Service Southwest Region, Santa Fe, N.M. Historical studies and reports are also available.

Recreation, Development and Support Facilities. See reference regarding Park Specific File.

ANNOTATED BIBLIOGRAPHY

Appendix to Resource Management Plan.

APPENDIX F
GENERAL INFORMATION
AND
RECOMMENDATIONS FOR CAVES

GENERAL INFORMATION AND RECOMMENDATIONS FOR CAVES

The Big Bend region of Texas is one of approximately nine karst regions in Texas; however, due to its remoteness, few organized speleological investigations have been attempted. Paleozoic and Cretaceous rocks are present but caves are known only from the lower Cretaceous age. The two primary cave bearing units are the Del Carmen Limestone (116-135 meters thick) and the Santa Elena Limestone (230-260 meters thick). Fewer than 50 caves are known from these formations, primarily due to lack of organized exploration. The great thicknesses of limestone, accompanied by strong tectonic forces, make these areas excellent candidates for cave discovery.

The following areas require particular consideration:

1. Mt. Emory Cave.

This cave, located on the north-west face of Mt. Emory, is of particular interest since it contains one of two known colonies of the Mexican Long-Tongued Bat (Leptonycteris-nivalis) in the United States. This bat is present only in the summer since it is a nectar feeder. In addition, a new genus and species of beetle (Tenebrionidae) and a new species of beetle (Coleptera) were discovered in this cave in the early 1960's. The cave also acts as a nursery colony for the Western Big Eared Bat (Plecotus townsendii).

There are two recommendations for this cave:

1. The cave is a fault-breakdown cave and is potentially dangerous. No sport caving should be allowed and entrance should be restricted to qualified and competent researchers with specific goals in mind.

2. The cave should be closed between June 1 and August 30 to prevent disturbance of several species of bats which are known to inhabit the cave during these months.

2. Mariscal Mine.

This mercury mine is located on the northern flank of Mariscal Mountain and is extremely hazardous to humans. The mine acts as a nursery colony for the Western Big Eared Bat (Pletcotus townsendii) which is also assumed to hibernate at Big Bend National Park. Owing to the extremely hazardous conditions which exist in the mine, admittance to the mine should be prohibited to all but researchers with unassailable reasons for entering and taking all safety precautions.

3. Mariscal Mountain Bat Cave.

This series of caves, located on the southwest face of Mariscal Mountain and visible from the Solis parking area, contains a population of cave swallows (Petrochelidon fulva) which are relatively rare in the United States. Furthermore, the Bat Cave is reputed to be "unusual in being bottle-shaped with the bottleneck pointing downward, resulting in poor ventilations, high concentrations of ammonia and high temperatures. The cave is dry and a face mask is necessary for protection from breathing guano dust. One must crawl through the bottleneck to enter the foul bat room." (Easterla--Ecology of the 18 species of Chiroptera at Big Bend National Park, Texas, 1973).

This cave contains a nursery colony of Fringed Brown Bat (Myotis thysanodes) and apparently acts as a summer roost for male Mexican Free-Tailed Bat (Tadarida brasiliensis). Entrance to this cave should be restricted from June 15 to August 1.

4. Several other areas should be carefully considered for cave management. The area near Ernst Canyon is reputed to contain a cave of considerable magnitude, although the exact location is unknown to NPS personnel. There is another report of a blowhole in the Dead orse Mountains near Sue Peaks. These areas should be investigated with the assistance of an organized speleological group.

Taylor and McDougall (Preliminary Report of Ecological Survey of Big Bend National Park, March-June, 1944) mention a bat cave in Pine Canyon. They further state that this cave is the only known breeding site of the Mexican Free-Tailed Bat in the United States. Location of this cave is presently unknown to park personnel.

The cave on the south side of Mule Ears Peak was found to contain fragments of the bones of California condor and the remains of an Audubon caracara. Other caves no doubt exist which contain significant paleontological and archeological data. A cave on the south side of Mule Ears Peaks was evidently used as an Indian shelter.

A cave on the Mesa de Anguila has been found and mapped, as well as some rare minerals identified from the Mariscal Mountain Cave.

All of this merely points out the pressing need for cave inventory, mapping, exploration and scientific investigation on cave resources in Big Bend.

5. Classification and Inventory.

A duel system of cave classification and inventory has been developed by the National Park Service, the Bureau of Land Management, and the U.S. Forest Service, and is in use in several states, including Arkansas and New Mexico. The classification and rating system is rather bulky, and is not included in this document. It may be obtained at the park headquarters or at the Division of Natural Resources Management at the Regional Office in Santa Fe, New Mexico.

APPENDIX G

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BIBLIOGRAPHY

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APPENDIX H

GENERAL INFORMATION (FAUNA)

GENERAL INFORMATION (FAUNA)

MAMMALS

There are seventy-four (74) species of mammals discussed in the Field Checklist of Big Bend National Park Mammals. Information concerning these species is necessary to augment basic resource information and for interpretation.

The Park will continue to encourage research projects on the mammalian components of the Park. The Park will also continue to maintain and keep the observation card file current as well as maintain liaison with Texas Parks and Wildlife personnel.

Current Status

66 species present.
7 species reported as having previously occurred.
1 species listed as possibly occurring.

18 of the 66 species are common in occurrance.
27 are uncommon.
20 are rare.
1 status is unknown.

1. Opossum	Didelphis virginiana	E
2. Desert Shrew	Notiosorex crawfordi	P (R)
3. Ghost-faced Bat	Mormoops megalophylla	P (U)
4. Mexican Long-nosed Bat	Leptonycteris nivalis	P (U)
5. Yuma Myotis	Myotis yumanensis	P (U)
6. Cave Myotis	Myotis velifer	P (U)
7. Fringed Myotis	Myotis thysanodes	P (U)
8. Long-legged Myotis	Myotis volans	P (R)
9. California Myotis	Myotis californicus	P (U)
10. Small-footed Myotis	Myotis leibii	P (R)
11. Western Pipistrelle	Pipistrellus hesperus	P (C)
12. Big Brown Bat	Eptesicus fuscus	P (U)
13. Red Bat	Lasiurus borealis	P (?)
14. Hoary Bat	Lasiurus cinereus	P (U)
15. Spotted Bat	Euderma maculatum	P (R)
16. Townsend's Big-eared Bat	Plecotus townsendii	P (C)
17. Pallid Bat	Antrozous pallidus	P (C)
18. Brazilian Free-tailed Bat	Tadarida braziliensis	P (C)
19. Pocketed Free-tailed Bat	Tadarida femorosacca	P (R)
20. Big Free-tailed Bat	Tadarida macrotis	P (U)

21.	Western Mastiff Bat	Eumops perotis	P (R)
22.	Blacktail Jackrabbit	Lepus californicus	P (C)
23.	Eastern Cottontail	Sylvilagus floridanus	P (U)
24.	Desert Cottontail	Sylvilagus audubonii	P (C)
25.	Rock Squirrel	Spermophilus variegatus	P (U)
26.	Mexican Ground Squirrel	Spermophilus mexicanus	P (R)
27.	Spotted Ground Squirrel	Spermophilus spilosoma	P (U)
28.	Texas Antelope Squirrel	Ammospermaphilus interpres	P (U)
29.	Botta's Pocket Gopher	Thomomys bottae	P (C)
30.	Yellow-faced Pocket Gopher	Pappogeomys castanops	P (C)
31.	Merriam's Pocket Mouse	Perognathus merriami	P (U)
32.	Desert Pocket Mouse	Perognathus penicillatus	P (C)
33.	Nelson's Pocket Mouse	Perognathus nelsoni	P (C)
34.	Ord's Kangaroo Rat	Dipodomys ordii	P (R)
35.	Merriam's Kangaroo Rat	Dipodomys merriami	P (C)
36.	Beaver	Castor canadensis	P (U)
37.	Western Harvest Mouse	Reithrodontomys megalotis	P (U)
38.	Fulvous Harvest Mouse	Reithrodontomys fulvescens	P (R)
39.	Cactus Mouse	Peromyscus eremicus	P (C)
40.	Deer Mouse	Peromyscus maniculatus	P (R)
41.	White-footed Mouse	Peromyscus leucopus	P (R)
42.	Brush Mouse	Peromyscus boylii	P (U)
43.	White-ankled Mouse	Peromyscus pectoralis	P (U)
44.	Rock Mouse	Peromyscus difficilis	P (R)
45.	Southern Grasshopper Mouse	Onychomys torridus	Ps(R)
46.	Southern Plains Wood Rat	Neotoma micropus	P (U)
47.	White-throated Wood Rat	Neotoma albigula	P (C)
48.	Mexican Wood Rat	Neotoma mexicana	P (R)
49.	Hispid Cotton Rat	Sigmodon hispidus	P (U)
50.	Yellow-nosed Cotton Rat	Sigmodon ochrognathus	P (U)
51.	House Mouse	Mus musculus	P (I) (R)
52.	Porcupine	Erethizon dorasatum	P (R)
53.	Black Bear	Ursus americanus	P (R)
54.	Raccoon	Procyon lotor	P (R)
55.	Coati	Nasua nasua	P (R)
56.	Ringtail	Bassariscus astutus	P (U)
57.	Long-tailed Weasel	Mustela frenata	P (R)
58.	Badger	Taxidea taxus	P (U)
59.	Western Spotted Skunk	Spilogale gracilis	P (R)
60.	Striped Skunk	Mephitis mephitis	P (C)
61.	Hooded Skunk	Mephitis macroura	E (R)
62.	Hog-nosed Skunk	Conepatus mesoleucus	P (U)
63.	Coyote	Canis latrans	P (C)
64.	Mexican Wolf	Canis lupus	E (R)
65.	Kit Fox	Vulpes macrotis	P (R)
66.	Gray Fox	Urocyon cinereoargenteus	P (U)
67.	Mountain Lion	Felis concolor	P (U)

68. Ocelot	Felis pardalis	E (R)
69. Bobcat	Lynx rufus	P (U)
70. Javelina	Dicotyles tajacu	P (C)
71. Mule Deer	Odoccileus hemionus	P (C)
72. White-tailed Deer	Odocoileus virginianus	P (C)
73. Pronghorn	Antilocapra americana	P (R)
74. Desert Bighorn Sheep	Ovis canadensis	Ps(R)

Ps = Possibly occurs
E = Previously reported to have once occurred
P = Present
C = Common
U = Uncommon
R = Rare
I = Introduced

AVIFAUNA

The bird checklist for the Park (Peter Scott,1978) includes information on abundance, habitat preferences, and time of year for 361 species of birds and lists 37 species as hypothetical (generally not a verified sighting).

The Park will encourage research in the field of avifauna and will continue to maintain an active observation card system and Christmas bird count.

Current Status — Number of species

	Summer	After Breeding	Winter	Migratory
Common	60	6	64	75
Uncommon	24	11	33	65
Rare	22	36	34	77
Sporodic	4	5	27	4
Accidental	1	16	21	38
	111	74	179	229

REPTILES AND AMPHIBIANS

The annotated checklist of Amphibians and Reptiles for the Park lists 10 species of amphibians, 55 species of reptiles plus 6 species of hypothetical occurrence. The Park will continue an active observation card system and encourage research in the field of reptiles and amphibians.

Current Status

	Frogs & Toads	Salamanders	Turtles	Lizards	Snakes
Possible (Ps)	2	1	1	0	3
Rare (R)	1	0	1	5	11
Uncommon (U)	4	0	3	5	13
Common (C)	4	0	0	11	6
	11	1	5	21	33

1.	Tiger Salamander	*Ambystoma tigrinum*	Ps
2.	Bullfrog	*Rana catesbeiana*	Ps
3.	Couch's Spadefoot	*Scaphiopus couchi*	C
4.	Western Spadefoot	*Scaphiopus hammondi*	R
5.	Madrean Cliff Frog	*Syrrhophus guttilatus*	U
6.	Canyon Tree Frog	*Hyla arenicolor*	U
7.	Green Toad	*Bufo debilis*	U
8.	Red-spotted Toad	*Bufo punctatus*	C
9.	Texas Toad	*Bufo speciosus*	C
10.	Woodhouse's Toad	*Bufo woodhousei*	R
11.	Leopard Frog	*Rana pipiens*	C
12.	Great Plains Narrow-mouthed Toad	*Gastrophryne olivacea*	U
13.	Texas Tortoise	*Gopherous berlandieri*	Ps
14.	Yellow mud turtle	*Kinosternon flavescens*	U
15.	Big Bend Slider	*Chrysemys gaigeae*	U
16.	Western Box Turtle	*Terrapene ornata*	R
17.	Spiny softshell	*Trionyx spinifera*	U
18.	Mediterranean Gecko	*Hemidactylus turcicus*	R
19.	Texas Banded Gecko	*Coleonyx brevis*	C
20.	Reticulated Gecko	*Coleonyx reticulatus*	R
21.	Greater Earless Lizard	*Cophosaurus texanus*	C
22.	Collared Lizard	*Crotaphytus collaris*	U

23. Leopard Lizard	Crotophytus wislizeni	R
24. Texas Horned Lizard	Phrynosoma cornutum	R
25. Round-tailed Horned Lizard	Phrynosoma modestum	C
26. Desert Spiny Lizard	Sceloporus magister	C
27. Canyon Lizard	Sceloporus merriami	C
28. Crevice Spiny Lizard	Sceloporus poinsetti	C
29. Eastern Fence Lizard	Sceloporus undulatus	C
30. Side-blotched Lizard	Uta stansburiana	C
31. Tree Lizard	Urosaurus ornatus	U
32. Short-lined Skink	Eumeces brevilineatus	U
33. Great Plains Skink	Eumeces obsoletus	U
34. Little Striped Whiptail	Cnemidophorus inornatus	U
35. Rusty-rumped Whiptail	Cnemidophorus scalaris	C
36. Checkered Whiptail	Cnemidophorus tesselatus	R
37. Western Whiptail	Cnemidophorus tigris	C
38. Texas Alligator Lizard	Gerrhonotus liocephalus	U
39. Texas Blind Snake	Leptotyphlops dulcis	U
40. Western Blind Snake	Leptotyphlops humilis	R
41. Glossy Snake	Arizona elegans	U
42. Ringneck Snake	Diadophis punctatus	U
43. Great Plains Rat Snake	Elaphe guttata	R
44. Common Rat Snake	Elaphe obsoleta	R
45. Trans-pecos Rat Snake	Elaphe subocularis	U*
46. Western Hook-nosed Snake	Ficimia cana	R
47. Night Snake	Hypsiglena torguata	C
48. Common (Sonora) Kingsnake	Lampropeltis getulus	R
49. Gray-banded Kingsnake	Lampropeltis mexicana	R*
50. Milk Snake	Lampropeltis triangulum	R
51. Coachwhip	Masticophis flagellum	C
52. Striped Whipsnake	Masticophis taeniatus	U
53. Plain-bellied Water Snake	Natrix erythrogaster	R
54. Bullsnake	Pituophis melanoleucus	U
55. Long-nosed Sanke	Rhinocheilus lecontei	U
56. Big Bend Patch-nosed Snake	Salvadora deserticola	U
57. Mt. Patch-nosed Snake	Salvadora grahmiae	U
58. Western Ground Snake	Sonora semiannulata	U
59. Mex. Black-headed Snake	Tantilla atriceps	C
60. Red Black-headed Snake	Tantilla rubra	R
61. Black-necked Garter Snake	Thamnophis cyrtopsis	C
62. Checkered Garter Snake	Thamnophis marcianus	U
63. Lyre Snake	Trimorphodon biscutatus	R
64. Copperhead	Ankistrodon contortrix	R
65. W. Diamondback Rattlesnake	Crotalus atrox	C
66. Rock Rattlesnake	Crotalus lepidus	U
67. Black-tailed Rattlesnake	Crotalus molossus	C
68. Mojave Rattlesnake	Crotalus scutulatus	U
69. Prairie Rattlesnake	Crotalus viridis	R
70. W. Hognose Snake	Heterodon nasicus	R
71. Plains Black-headed Snake	Tantilla nigriceps	R

* These snakes are much sought after by snake collectors and may retail for hundreds of dollars.

FISHES

Further verification of density and occurrence is necessary, but not of high priority at this time. Baseline data for fish in the Park is sufficient for the present and immediate future.

Current Status

Dr. Clark Hubbs, from the University of Texas at Austin, developed a tentative checklist of fishes in the Park. 25 species are reported from the Park and approximately 13 species have been recorded from near-by areas and are suspected to occur in the Park. Little or no data is available on relative abundance of these species.

1. *Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
2. Longnose Gar	*Lepisosteus osseus*
3. Gizzard Shad	*Dorosoma cepedianum*
4. Banded Tetra	*Astyanax fasciatus*
5. Blue Sucker	*Cycleptus elongatus*
6. Small-mouth Buffalo	*Ictiobus bubalus*
7. River Carpsucker	*Carpiodes carpio*
8. *Gray Redhorse	*Moxostoma congestum*
9. Carp	*Cyprinnus carpio*
10. Speckled Chub	*Hybopsis aestivalis*
11. *Longnose Dace	*Rhinichthyes cataractae*
12. Rio Grande Shiner	*Notropis jemezanus*
13. *Bluntnose Shiner	*Notropis simus*
14. *Texas Shiner	*Notropis amabilis*
15. Chihuahua Shiner	*Notropis chihuahua*
16. Tamaulipas Shiner	*Notropis brayoni*
17. Redhorse shiner	*Notropis lutrensis*
18. *Proserpine Shiner	*Notropis proserpinus*
19. Roundnose Minnow	*Dionda episcopa*
20. Plains Minnow	*Hybognathus placita*
21. Fathead Minnow	*Pimephales promelas*
22. Mexican Stoneroller	*Campostoma ornatum*
23. *Channel Catfish	*Ictalurus punctatus*
24. Blue Catfish	*Ictalurus furcatus*
25. *Flathead Catfish	*Pylodictis olivaris*
26. American Eel	*Anguilla rostrata*
27. Zebra Killifish	*Fundulus zebrinus*
28. Big Bend Mosquitofish	*Gambusia gaigei*
29. *Rio Concho Mosquitofish	*Gambusia senillis*
30. Common Mosquitofish	*Gambusia affinis*
31. *Largemouth Bass	*Micropterus salmoides*
32. Warmouth	*Chanobryttus gulosus*

33. *Green Sunfish	Lepomis cyanellus
34. Red-ear Sunfish	Lepomis microlophus
35. Bluegill	Lepomis macrochirus
36. *Longear Sunfish	Lepomis megalotes
37. Freshwater Drum	Aplodinotus grunniens
38. *Rio Grande Chichlid	Chichlasoma cyanoguttatum

* Species suspected to occur within the Park but have not yet been documented.

APPENDIX I

ENDANGERED SPECIES

ENDANGERED, THREATENED AND PERIPHERAL SPECIES (FAUNA)
(U.S.F.AND W. DESIGNATED)

1. Gambusia gaigei - Big Bend Gambusia (Endangered) - A specific habitat management plan was written in 1977 but is now in need of updating. A rough draft of a Recovery Plan is to be available by the end of CY 1982. This plan will be available at Park Headquarters and the Southwest Regional Office. This species appears to be holding its own in an artificially maintained habitat.

2. Falco Peregrinus anatum - Peregrine Falcon (Endangered) - This species has at least four active eyries in canyons along the Rio Grande River, as well as an active eyrie in the Chisos Mountains. This species appears to be holding its own in the Park.

3. Haliaectus leucocephalus - Bald Eagle (Endangered) - This species is recorded as being an accidental winter visitor to the Park and does not nest in the Park.

4. Canis lupus - Mexican Wolf -(Threatened) - Very few records of this species occuring within the Park. This species would have to be considered as a transient.

5. Peripheral species are:

a.	Felis pardalis	Ocelot
b.	Campostoma ornatum	Mexican Stoneroller
c.	Notropis chihuahua	Chihuahua Shiner
d.	Buteo albonotatus	Zone-tailed Hawk
e.	Buteogallus anthracinus	Black Hawk
f.	Buteo nitidus	Gray Hawk
g.	Vermivora orissalis	Colima Warbler

ENDANGERED, THREATENED, CATEGORY 1 AND CATEGORY 2 (PLANTS)
(U,S,F,AND W. DESIGNATED)

1. Ancistrocactus tobuschii - (Endangered) - There appears to be some controversy as to this species occurance in the Park.

2. Coryphantha ramillosa - (Threatened) - Relatively stable population anlong the river from Mariscal Mountain to the Lower Canyons.

3. Neolloydia mariposensis - (Threatened)- Relatively stable population along the North west portion of the Park.

4. Category 1. species:

a. Andrachne arida
b. Brongniartia minutifolia
c. Coryphantha duncanii
d. Coryphantha strobiliformis var. durispina
e. Echinocereus chloranthus var. neocapillus
f. Echinocereus reichenbackii var. chisosensis
g. Echinocereus russanthus
h. Euphorbia fendleri var. triligulata
i. Euphorbia golondrina
j. Genistidium dumosum
k. Hechtia texensis
l. Lechea mensalis
m. Poa involuta
n. Quercus graciliformis

5. Category 2 species:

a. Agave chisosensis
b. Batesimalva violaceae
c. Brickellia brachyphylla var. terlinguensis
d. Brickellia shineri
e. Castilleja elongata
f. Cereus greggii
g. Cirsium turneri
h. Coryphantha dasyacantha var. varicolor
i. Crypthantha crassipes
j. Epithelantha bokei
k. Euphorbia perennans
l. Heimia longipes
m. Hexalectris grandiflora

n. Justicia warnockii
o. Lycium berberiodes
p. Neolloydia warnockii
q. Opuntia imbricata var. argentea
r. Ostrya chisosensis
s. Perityle parryi
t. Prunus havardii
u. Quercus tardifolia
v. Sedum robertsianum
w. Strepthanthus carinatus
x. Strepthanthus cutleri

APPENDIX J

RE-ESTABLISHMENT OF EXTIPATED SPECIES

RE-ESTABLISHMENT OF EXTIPATED SPECIES

Historical records indicate that several species which are now found in minimal numbers or not at all were part of the native fauna. Amoung these species were Pronghorn (Antelocapra americana) Desert Bighorn (Ovis canadensis), Black Bear (Ursus americana), Mexican Wolf (Canis lupus baileyi) Black-tailed Prairie Dog (Cynomys mexicana), Oppossum (Didelphis virginiana),and the Harlequin or Montezuma Quail (Cytonyx montezumae).

CURRENT STATUS:

1. Pronghorn: They were present in the Park according to early writings and there is speculation that their reduction in numbers is due to the decline of a priciple food species, Tobosa Grass (Hilaria mutica), as a result of overgrazing in pre-Park days. Observations still indicate a small remnant population, probably the result of a re-introduction in the mid 1950's in two separate locations within the Park. Just recently, fall 1982, a group of 12 were seen just north of the Tornillo Bridge. No further re-introductions are anticipated in the near future.

2. Desert Bighorn: An animal is still occasionally sighted within the Park and are thought to be due the the movement of sheep from the Black Gap Wildlife Management Area, adjacent to the Park , where a restoration program was carried on until 1979, when the program was abandoned after apparent failure. Within the Park, much of the prime habitat best suited for Bighorn lies between the South rim of the Chisos Mountains and the Rio Grande River, where poaching of all types of wildlife is still a serious problem.The last sighting in the Park occured in late 1981. No attempts of re-introduction of this species should be undertaken until feasibility studies are carried out.

3. Black Bear: This large carnivore is still sighted on occasion, but is not considered a year-round resident. During late 1978 and early 1979, a sow and two cubs were seen numerous times in the Chisos Mountains. In July of 1980, several sightings of a single Bear were made. A single sighting in 1981 occured on the Black Gap Management area. No re-introduction is currently anticipated and a feasibility study would have to preceed such a move.

4.Mexican Wolf: There have been several unverified sightings of the Mexican Wolf in the Park over the past ten years, but the animal should not be considered a resident of Big Bend. Because of the rarity of the species and the local feelings about large carnivors a re-introduction of this species would have minimal success.

5. Black-footed Prairie Dog, and Oppossum: Both animals need additonal study prior to a re-introduction. An Oppossum was observed on the road near the Basin turn off in the summer of 1982

6. Montezuma Quail: A small population of Montezuma Quail was re-introduced in the Park in Upper Pine Canyon in January, 1973. Subsequent monitoring of the birds revealed several individuals in the area through the spring of 1975. Attempts to locate the birds in 1976 and 1977 were unsuccessful. It is speculated that the birds may have moved from Pine canyon. An attempt to re-intoduce more birds was attempted in 1979 but capturing operations were unsuccessful.No immediate re-introduction of this species is planned at this time.

APPENDIX K

INTRODUCED SPECIES

INTRODUCED SPECIES (FAUNA)

The following are introduced fauna within the Park:

1. English Sparrow
2. Starling
3. House Mouse
4. Carp
5. Barbary Sheep
6. Trespass Livestock
7. Domestic Dog
8. Domestic Cat

Current Status

English Sparrow - This species is listed as a fairly common summer and winter resident, usually found in developed areas.

Starling - This species is listed as a rare migrant and apparently does not nest in the Park.

House Mouse - There are few records of this species occurring in the Park. This species would normally be expected around the developed areas.

Carp - The Rio Grande River is heavily infested with this species. Control of this fish would prove to be most difficult.

Barbary Sheep - One speciman of this species was found dead in the Sierra Quemadas this past year. Hopefully there are no more.

Trespass Livestock - These animals continue to be a Significant Resource Problem, particularly along the River.

Domestic dogs and cats - These animals present few problems as long as the restrictions are met and enforced.

INTRODUCED SPECIES (FLORA)

Arundo donax	Giantreed	grass
Bromus unioloides	Rescuegrass	grass
Caesalpina gilliesii	Bird of Paradise	shrub (small tree)
Cerastium glomeratum	Chickweed	forb
Chenopodium album	Lambsquarter	forb
Cynodon dactylon	Bermudagrass	grass
Digitaria sanguinalis	Hairy crabgrass	grass
Echinochloa colonum	Junglerice	grass
Echinochloa crusgalii	Barnyardgrass	grass
Eragrostis cilianensis	Stinkgrass	grass
Eragrostis lehmanniana	Lehmann Lovegrass	grass
Ficus carica	Common Fig	shrub
Malva parviflora	Little Mallow	forb
Marrubium vulgare	Common horehound	forb
Medicago sativa	Alfalfa	forb
Mentha spicata	Spearmint	forb
Nerium oleander	Oleander	shrub
Nicotiana glauca	Tree Tobacco	shrub (small tree)
Petunia parvifolia	Wild Petunia	forb
Phoenix spp.	Date Palm	tree
Polygonum convolvulus	Dillseed cornbind	forb
Punica granatum	Pomagranet	shrub
Salsola kali	Russian Thistle	forb
Setaria italica	Foxtail millet	grass
Sisymbrium irio	Rocketmustard	forb
Sonchus oleraceus	Common Sowthistle	forb
Sorghum halapense	Johnsongrass	grass
Tamarix spp.	Saltcedar	tree
Tragus berteronianus	Spike Burgrass	grass
Tribulus terristrio	PunctureVine	forb
Xanthium spinosum	Spiny Cockleburr	forb

These are but a few of the introduced species in the Park. Project BIBE-N-002 will identify may others. Several additional plant species such as Live Oak, Common Honeylocust, Sycamore, Eastern Cottonwood and Cow tongue Prickly Pear do not occur naturally in the Park. There will, no doubt, be several more such transplants added to the list in the future.

APPENDIX L

SIGNIFICANT RESOURCES PROBLEMS (CONDENSED)

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Air Quality, Acid rain, Visibility degrdation, ect.

Research & Planning - Class I area, Complex Monitoring system in place. See also request for monies to fund interdici-planary research team (proposal Sept. 1982).

Public Relations - Inform public of problems. DSC Air Quality group has produced a display for BIBE.

Interpretation - Inform public about Air Quality related problems.

Law Enforcement - NA

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - Continue to train personnel as needed to keep up monitoring program

Land Use Planning - NA

Land Acquisition & Boundaries - NA

Inter-Agency Communications - EPA, State Department, Mexican Government, State of Texas, Texas Air Control Board.

New Law Needs - Consider Class designation for RIGR.

Management Policy & Action Needs - Need to locate external source of Threat.

Comments - See project BIBE-N-001 Air Quality

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Trespass Grazing, resulting in plant damage

Research & Planning - Some severe Impacts See Scmidly, 1977

Public Relations - Inform public concerning problem

Interpretation - Inform public of succession results

Law Enforcement - Maintain an agressive trespass control program.

Preservation and Maintenence - Is there any posibility of fencing in Mexico?

Curatorial Preservation - NA

Training - Since thr Park has no "Wrangler" Stock use and care training is needed to assit in stock roundups.

Land Use Planning - Should consider possibility of arranging reduced livestock use at popular sites in the lower canyons.

Land Acquisition & Boundaries - Control trespass grazing along boundaries

Inter-Agency Communications -USDA, SCS, IB&WC.

New Law Needs - NA

Management Policy & Action Needs - Generally an external threat.

Comments - See Project BIBE-N-008, Exotic Species

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Exotic Species, Plants and Animals

Research &Planning - Need comprehensive control plan for Tamarisk.
Keep up agressive Trespass Livestock program

Public Relations - Inform public of problems

Interpretation - Inform public of contol results

Law Enforcement - Maintain an agressive trespass livestock program

Preservation and Maintenence - Imliment control programs

Curatorial Preservation - NA

Training - Train personnel in pesticide use and stock handling

Land Use Planning - NA

Land Acquisition & Boundaries - Monitor boundaries

Inter-Agency Communications - USDA, SCS,

New Law Needs - NA

Management Policy & Action Needs - Internal and External threat

Comments - See projects BIBE-N-007 and BIBE-N-008

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Visitor Impacts, Trampling, Roads & Utility corridors, poaching

Research & Planning - Monitor and deliniate impact areas for future mitigation

Public Relations - Initiate program for public contact in Midland/ Odessa area. Source of many problems.

Interpretation - River users and backcountry users, Particularly River Road area. Increase public contact in backcountry.

Law Enforcement - Increase river and backcountry patrols and visitor contacts, particularly along River Road during heavy use periods.

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - Insure permit issuers are well informed to educate the visitor

Land Use Planning - NA

Land Acquisition & Boundaries - Monitor boundaries for off road vehicle use

Inter-Agency Communications - USF & WS, Development of carrying capacity

New Law Needs - NA

Management Policy & Action Needs - Internal and External

Comments - See BIBE-N-006, also major need for increased presence in backcountry and along river and river road during heavy use periods. The possibility of activating Entrance Stations for initial visitor contact should be considered.

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Nearby development, Lajitas, Terlinqua Ranch.

Research & Planning - Needs monitoring along boundary and common water courses.

Public Relations - Keep close contact with developers and local neighbors.

Interpretation - Inform public of asthetic impacts anong boundaries

Law Enforcement - Monitor boundaries for adverse activities.

Preservation and Maintenence - ay want to consider fencing some areas

Curatorial Preservation - NA

Training - NA

Land Use Planning - Work with nearby county planners and developers and ranchers. Acess, zoning, fencing, asthetic enhancement

Land Acquisition & Boundaries - Keep abrest of changes along boundary

Inter-Agency Communications - Local County Governments, State health agency, Texas Railroad commission.

New Law Needs - NA

Management Policy & Action Needs - External Threat

Comments - Currently a public relations need and a constant monitoring of boundary and close contact and rapor with adjacent neighborsand county officials.

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Depletion of backcountry biomass by campfire use.

Research & Planning - Need to deliniate impact areas particularly along River.

Public Relations - Inform public of impacts and regulations

Interpretation - Inform public of impacts and regulations

Law Enforcement - Agressively enforce campfire regulations in backcountry and along River.

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries - NA

Inter-Agency Communications - NA

New Law Needs - We should consider the banning of open camp fires along the River.

Management Policy & Action Needs - Internal, consider restricting the use of wood fires further, ie, along River

Comments - Primarily an enforcement and education problem, See also BIBE-N-006.

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Erosion, overgrazng, Off Road Vehicles.

Research & Planning - Impact study along River.

Public Relations - Initiate program of awareness in the Midland/ Odessa area.

Interpretation - Inform the public of problems and regulations

Law Enforcement - Keep an agressive program of backcountry presence in the backcountry and along major roads during heavy use periods.

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries - Actively patrol boundaries

Inter-Agency Communications - NA

New Law Needs - NA

Management Policy & Action Needs - Internal Threat

Comments - See project BIBE-N-006. also see Research project by Ludwig and Moir, MAB Study on erosion.

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Fire Management, Forest pests & Diseases

Research &Planning - Basin Burn for Fuels reduction, a combination of fire and manual fuel reducton.

Public Relations - A program is needed to inform the public prior to burn, as well as after burn

Interpretation - Inform visitors of planned burn during evening programs, use programs to discuss fire management.

Law Enforcement -NA

Preservation and Maintenence- impliment fire management program and basin fuel reduction program

Curatorial Preservation - NA

Training - Hold a basic fire training program as needed to keep a cadre of red-carded individuals available for control actions.

Land Use Planning - Fire Management

Land Acquisition & Boundaries - Develop, cooperative zone

Inter-Agency Communications - Texas Air control board, Texas Forest Service, U S. Forest Service.

New Law Needs - NA

Management Policy & Action Needs - Internal threat

Comments - See project BIBE-N-006

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Water Quality degredation and flow.

Research &Planning - Monitor water quality of Rio Grande and flows. Also develop system to monitor qality of flows coming into Park from developed areas.

Public Relations - Inform Public of findings. Recommend treating all untreated water.

Interpretation - Discuss water quality during programs

Law Enforcement - enforce littering and pollution laws

Preservation and Maintenence - Determine waste disposal sytems employed by adjacent developments as well as villasges across the River.

Curatorial Preservation - NA

Training - NA

Land Use Planning - Work with neighboring developments on water concerns

Land Acquisition & Boundaries - Monitor potential problems along common watercourses

Inter-Agency Communications - EPA, Texas State Health Depts. County officials, Mexican Govt. State Dept.

New Law Needs - NA

Management Policy & Action Needs - External threat.

Comments - See project BIBE-N-009 for discussion of water related projects

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Wildlife harrassment, Particularly Peregrine Falcon

Research & Planning - See Project BIBE-N-004

Public Relations - Inform public for need of closures

Interpretation - Discuss canyon closures at evening programs.

Law Enforcement - Enforce no motor regulations during nesting season in major canyons

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - Hold ½ day training session for Park field staff in Peregrine identification

Land Use Planning - Discourage overnight use near falcon eyries during nesting season.

Land Acquisition & Boundaries - NA

Inter-Agency Communications - USF & WS

New Law Needs - NA

Management Policy & Action Needs - Internal & External threats

Comments - See project BIBE-N-004

SIGNIFICANT RESOURCES PROBLEMS (NATURAL)

Problem - Mineral survey, extraction and exploitation

Research &Planning - NA

Public Relations -Keep abreast of activities along boundaries

Interpretation - NA

Law Enforcement - NA

Preservation and Maintenence - Maintain boundary monitoring program

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries -Keep an active patrol posture

Inter-Agency Communications - Texas Railroad Commisssion, County officials, Mexican Govt.

New Law Needs - NA

Management Policy & Action Needs - External threat

Comments - Not specifically addressed.

SIGNIFICANT RESOURCES PROBLEMS (Natural)

Problem - Cacti poaching and illegal collecting

Research &Planning - NA

Public Relations - Inform public of effects and problem

Interpretation - Discuss problem in evening programs and hikes

Law Enforcement - Agressively enforce collection regulations. Maintain presence in backcountry and along roads during heavy use periods

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries - NA

Inter-Agency Communications - NA

New Law Needs - NA

Management Policy & Action Needs - Internal threat

Comments - See Projects BIBE-N-003, & BIBE-N-002.

SIGNIFICANT RESOURCES PROBLEMS (CULTURAL)

Problem - Archeological survey, update LCS

Research & Planning - Study and update needed

Public Relations - NA

Interpretation - Mention of illegality to disturb sites.

Law Enforcement - Agressively enforce regulations concerning collecting artifacts and disturbing sites.

Preservation and Maintenence - NA

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries - Monitor sites along boundaries

Inter-Agency Communications - State Historical Commission

New Law Needs - NA

Management Policy & Action Needs - Internal Threat

Comments - See projects BIBE-C-001 & BIBE-C-004.

SIGNIFICANT RESOURCES PROBLEMS (CULTURAL)

Problem - Visitor impcts, vandalism

Research &Planning - NA

Public Relations - Make illegality of artifact and site disturbance known

Interpretation - Discuss problems at evenong programs and hikes

Law Enforcement - Agressively enforce regulations and present a presence during heavy use periods.

Preservation and Maintenence - Monitor key sites

Curatorial Preservation - NA

Training - NA

Land Use Planning - NA

Land Acquisition & Boundaries - Monitor key sites during heavy use periods

Inter-Agency Communications - NA

New Law Needs - NA

Management Policy & Action Needs - Internal Threat

Comments - not dirctly discussed in RMP, Enforcement problem

SIGNIFICANT RESOURCES PROBLEMS

Problem - Preservation of Historic Structures

Research &Planning - Update LCS and develop inspection and maintenence guides.

Public Relations - Explore possibility of outside funding for particular projects.

Interpretation - NA

Law Enforcement - NA

Preservation and Maintenence - Develop guides and train personnel

Curatorial Preservation - NA

Training - Train maintenance person in routein maintenance program for historic structures

Land Use Planning - NA

Land Acquisition & Boundaries - NA

Inter-Agency Communications - Texas State Historical Commission

New Law Needs - NA

Management Policy & Action Needs - Internal Threat

Comments - See projects BIBE-C-003 & BIBE-C-004

APPENDIX M

LIST OF CLASSIFIED STRUCTURES

NATIONAL PARK SERVICE - HIST ARCHITECTURE DIVISION
LIST OF CLASSIFIED STRUCTURES

SOUTHWEST REGION

BIG BEND NP

7130

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE	PERIOD APPROVED / INTERIM DATE-COST ESTIMATE	COMPOSITION AND TYPE OF STRUCTURE / MANAGEMENT CATEGORY	LCS ID #
7130	BIG BEND NP		TEXAS		
BBH139	DORGAN RESIDENCE (SUBLETT FARM) ADOBE & NATIVE STONE REMAINS,ROOF & ONE WALL GONE PARTIAL RESTORATION	1978 $3,000	HISTORIC 1976	ADOBE BUILDING CATEGORY C MAY BE PRESERVED $5,000	12066
C10A	PROCESSING PLANT (MARISCAL MINE) CINNABAR COMPLEX OF 4 STRUCTURES,BRICK FURNACE PRESERVATION	1978 $3,000	HISTORIC 1976	STONE BUILDING CATEGORY C MAY BE PRESERVED $5,000	12065
C10B	PROCESSING BUILDING (MARISCAL MINE) ONE OF TWO SIMILAR LIMESTONE BLDGS; SEE BBH10C PRESERVATION	1978 $3,000	HISTORIC 1976	STONE BUILDING CATEGORY C MAY BE PRESERVED $3,000	12064
C10C	PROCESSING BUILDING (MARISCAL MINE) ONE OF TWO SIMILAR LIMESTONE BLDGS; SEE BBH10B PRESERVATION	1978 $3,000	HISTORIC 1976	STONE BUILDING CATEGORY C MAY BE PRESERVED $3,000	12063
D10D	PAYMASTER'S OFFICE (MARISCAL MINE) LIMESTONE BLDG,WALLS FAIRLY STABLE,ROOF GONE PRESERVATION	1978 $3,000	HISTORIC 1976	STONE BUILDING CATEGORY C MAY BE PRESERVED $3,000	12062
D10E-K	EMPLOYEE'S RESIDENCE (MARISCAL MINE) CONCRETE REMAINS OF 7 ONE-ROOM STRUCTURES PRESERVATION	1978 $3,000	HISTORIC 1976	CONCRETE BUILDING CATEGORY C MAY BE PRESERVED $7,000	12061

NATIONAL PARK SERVICE - HIS , ARCHITECTURE DIVISION
LIST OF CLASSIFIED STRUCTURES

SOUTHWEST REGION

BIG BEND NP

7130

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE	PERIOD / APPROVED MANAGEMENT CATEGORY / INTERIM DATE-COST ESTIMATE	COMPOSITION AND TYPE OF STRUCTURE	LCS ID #
010M	SUPERINTENDENT'S HOUSE (MARISCAL MINE) ADOBE & STONE RUBBLE REMAINS OF 4-ROOM STRUCTURE		HISTORIC CATEGORY C	ADOBE BUILDING MAY BE PRESERVED	12099
	PRESERVATION	1976 $0	1976 $0		
010N	COMPANY STORE (MARISCAL MINE) 1-ROOM CONCRETE STRUCT,LACKS ROOF WINDOWS & DOOR		HISTORIC CATEGORY C	CONCRETE BUILDING MAY BE PRESERVED	12060
	PRESERVATION	1978 $3,000	1976 $2,000		
010P	EMPLOYEE'S HUTS (MARASCAL MINE) REMAINS OF 8 SINGLE STORY LIMESTONE HUTS		HISTORIC CATEGORY C	STONE BUILDING MAY BE PRESERVED	12059
	PRESERVATION	1978 $3,000	1976 $8,000		
010Q	BARRACKS (MARISCAL MINE) 1-STORY STRUCTURES,ROOFS IN DIF STAGES DISREPAIR		HISTORIC CATEGORY C	ADOBE BUILDING MAY BE PRESERVED	12098
	PRESERVATION	1978 $3,000	1976 $5,000		
010R	BRICK KILN (MARISCAL MINE) LIMESTONE KILN REMAINS,PART OF PROCESSING APPARAT.		HISTORIC CATEGORY C	STONE OTHER MAY BE PRESERVED	12097
	PRESERVATION	1978 $2,000	1976 $2,000		
010S	STONE RUINS (MARISCAL MINE) LIMESTONE RUINS BEHIND MAIN PROCESSING PLANT		HISTORIC CATEGORY C	STONE BUILDING MAY BE PRESERVED	12096
	PRESERVATION	1978 $2,000	1976 $2,500		
012	FARM HOUSE (SUBLETT FARM) 1-STORY RUIN;ALSO KNOWN AS RANCHO ESTELLE		HISTORIC CATEGORY C	ADOBE BUILDING MAY BE PRESERVED	C0073
	PRESERVATION	1978 $3,000	1976 $2,000		

NATIONAL PARK SERVICE - HI[illegible]IC ARCHITECTURE DIVISION
LIST OF CLASSIFIED STRUCTURES

7130 SOUTHWEST REGION BIG BEND NP

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE	PERIOD / APPROVED MANAGEMENT CATEGORY / INTERIM DATE-COST ESTIMATE	COMPOSITION AND TYPE OF STRUCTURE	LCS ID #
013	HAND'S CASITA (SUBLETT FARM) 2-ROOM STABILIZED RUIN OF ADOBE CAPPED WITH STONE		HISTORIC CATEGORY C	ADOBE BUILDING MAY BE PRESERVED	12069
	PRESERVATION	1978 $3,000	1976 $4,000		
014	ADOBE SHED (SUBLETT FARM) LINEAR,1-ROOM STRUCT,WALL PART. STANDING,NO ROOF		HISTORIC CATEGORY C	ADOBE BUILDING MAY BE PRESERVED	12068
	PRESERVATION	1978 $4,000	1976 $1,000		
015	STONE FARM HOUSE (SUBLETT FARM) REMAINS OF NATIVE STONE BUILDING ON SOIL MORTAR		HISTORIC CATEGORY C	STONE BUILDING MAY BE PRESERVED	12067
	PRESERVATION	1978 $3,000	1976 $5,000		
Ketchel Ranch House Not 016	RANCH HOUSE (WILSON RANCH) 1-STORY OF NATIVE STONE,FLAGSTONE FLOOR LOG,CEILNG		HISTORIC CATEGORY B	STONE BUILDING SHOULD BE PRESERVED	12070
	PRESERVATION	1978 $23,000	1976 $7,500		
? 016B	CORRAL (WILSON RANCH) CORRAL,45' DIAMETER,VERTICAL POLES;SNUBBING POST		HISTORIC CATEGORY B	WOOD OTHER SHOULD BE PRESERVED	12071
	PRESERVATION	1978 $3,000	1976 $1,000		
? 016C	DIPPING VAT AND CHUTE (WILSON RANCH) 20' LONG DIPPING CHUTE WITH CONCRETE APRON		HISTORIC CATEGORY B	CONCRETE OTHER SHOULD BE PRESERVED	12118
	PRESERVATION	1976 $0	1976 $0		
? 016D	BUNK HOUSE (WILSON RANCH) NO INFORMATION AVAILABLE AS OF 3-25-75		HISTORIC CATEGORY B	BLANK BUILDING SHOULD BE PRESERVED	12072
	PRESERVATION	1976 $0	1976 $1,000		

NATIONAL PARK SERVICE - HI IC ARCHITECTURE DIVISION
LIST OF CLASSIFIED STRUCTURES

7130 SOUTHWEST REGION BIG BEND NP

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE	PERIOD APPROVED / INTERIM	COMPOSITION AND TYPE OF STRUCTURE / MANAGEMENT CATEGORY	LCS ID #
080	CABINS (HOT SPRINGS) 1-STORY LIMESTONE MOTEL TYPE UNIT;BUILT 1927 PRESERVATION	1978 $3,000	HISTORIC CATEGORY C 1976 $0	STONE BUILDING MAY BE PRESERVED	12058
082	STORE AND POST OFFICE (HOT SPRINGS) 1-STORY,1-ROOM,LIMESTONE-CEMENT MORTAR;BUILT 1927 PRESERVATION	1978 $4,000	HISTORIC CATEGORY C 1976 $0	STONE BUILDING MAY BE PRESERVED	00071
Remove from List 111	DERRICK RESIDENCE 1920'S,1 STORY, CONCRETE FLOOR, METAL ROOF,PORCH PRESERVATION	1977 $20,000	HISTORIC CATEGORY D 1977 $0	ADOBE BUILDING MAY BE REMOVED	00075
? 168	LUNA JACAL RANDOM LIMESTONE & SANDSTONE;RESTORED BY NPS PRESERVATION	1978 $3,000	HISTORIC CATEGORY B 1976 $5,000	STONE BUILDING SHOULD BE PRESERVED	12057
442	DANIEL'S FARM HAND'S CASITA 1-ROOM,STONE FOUN,ROOF MISSING,WALLS ERODED PRESERVATION	1976 $0	HISTORIC CATEGORY C 1976 $2,000	ADOBE BUILDING MAY BE PRESERVED	12073
443	DANIEL'S FARM HOUSE 2-ROOM;ROCK FOUN;EMERGENCY STABL BY NPS IN 1963 PRESERVATION	1976 $0	HISTORIC CATEGORY C 1976 $3,000	ADOBE BUILDING MAY BE PRESERVED	12074
600	STORE (CASTOLON) 1-STORY,3-ROOM;FRONT RAMADA-1956;BUILT 1920 PRESERVATION	1978 $24,000	HISTORIC CATEGORY B 1978 $20,000	ADOBE BUILDING SHOULD BE PRESERVED	12117

168

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE	PERIOD / APPROVED MANAGEMENT CATEGORY / INTERIM DATE-COST ESTIMATE	COMPOSITION AND TYPE OF STRUCTURE	LCS ID #
601	ARMY UTILITY BUILDING (CASTOLON) 1-STORY,2-ROOM,STABILIZED WITH STEEL CABLES;1920 PRESERVATION	1978 $4,000	HISTORIC CATEGORY B 1976 $5,000	ADOBE BUILDING SHOULD BE PRESERVED	00072
602	ARMY LATRINE (CASTOLON) CEMENT-PLASTERED,CONC FLOOR;BUILT 1919-20 BY ARMY PRESERVATION	1978 $3,000	HISTORIC CATEGORY B 1976 $1,000	ADOBE BUILDING SHOULD BE PRESERVED	12056
603	OFFICERS' QUARTERS (CASTOLON) 1-STORY,5-ROOM,GABLE ROOF;BUILT 1919-20 BY ARMY PRESERVATION	1978 $3,000	HISTORIC CATEGORY B 1976 $2,000	ADOBE BUILDING SHOULD BE PRESERVED	12055
604	OFFICERS' QUARTERS (CASTOLON) 1-STORY,4-ROOM,ASBESTOS SHINGLE GABLE ROOF;1920 PRESERVATION	1978 $3,000	HISTORIC CATEGORY B 1976 $2,000	ADOBE BUILDING SHOULD BE PRESERVED	12054
605	MAGDALENA HOUSE (CASTOLON) 1-STORY,2-ROOM,GABLE ROOF;BUILT BETWEEN 1921 & 25 PRESERVATION	1978 $3,000	HISTORIC CATEGORY B 1976 $2,000	ADOBE BUILDING SHOULD BE PRESERVED	12053
606	GARLICK HOUSE (CASTOLON) 1-STORY,4-ROOM,WALLS DETERIORATED;CA. EARLY 1900'S ADAPTIVE RESTORATION	1978 $13,000	HISTORIC CATEGORY B 1976 $5,000	ADOBE BUILDING SHOULD BE PRESERVED	12052
607	ALVINO RESIDENCE (CASTOLON) 1-STORY,RUBBLE STONE FOUN,SOD ROOF,SOD &CONC FLOOR PRESERVATION	1978 $29,000	HISTORIC CATEGORY C 1976 $5,000	ADOBE BUILDING MAY BE PRESERVED	12051

NATIONAL PARK SERVICE - HISTORIC ARCHITECTURE DIVISION
LIST OF CLASSIFIED STRUCTURES

7130 SOUTHWEST REGION BIG BEND NP

STRUCTURE #	STRUCTURE NAME / COMMENT / PROPOSED TREATMENT	TREATMENT DATE-COST ESTIMATE		PERIOD APPROVED / INTERIM DATE-COST ESTIMATE		COMPOSITION AND TYPE OF STRUCTURE / MANAGEMENT CATEGORY	LCS ID #
608	GRANARY (CASTOLON) 2-ROOM,CONCRETE POST FOOTINGS;BUILT 1920 BY ARMY			HISTORIC CATEGORY	B	WOOD BUILDING SHOULD BE PRESERVED	12050
	RESTORATION	1978	$3,000	1976	$2,500		
616	SHED (OLD CASTOLON) 1-ROOM;INCORRECTLY RESTORED 1962-ON WRONG AXIS			HISTORIC CATEGORY	B	ADOBE BUILDING SHOULD BE PRESERVED	12049
	PRESERVATION	1978	$3,000	1976	$0		
617	CAFE-RESIDENCE (OLD CASTOLON) 1-STORY;WALLS ERODED,ROOF & CEILING INTACT & LEAK			HISTORIC CATEGORY	B	ADOBE BUILDING SHOULD BE PRESERVED	12048
	PRESERVATION	1978	$3,000	1976	$0		
618	STORE (OLD CASTOLON) 1-STORY,1-ROOM,ATTIC,PITCHED ROOF-CORRUGATED METAL			HISTORIC CATEGORY	B	ADOBE BUILDING SHOULD BE PRESERVED	00070
	PRESERVATION	1978	$3,000	1976	$0		

PARK TOTALS BIG BEND NP

TOTAL NUMBER OF STRUCTURES	PROPOSED TREATMENT COSTS	INTERIM COSTS
38	$194,000	$121,500

APPENDIX N

RECOMMENDATIONS FOR PROTECTION OF HISTORIC STRUCTURES, (SWRO, 1977)

Richard W. Williams
July 1977

BACKGROUND

Evaluation of historic structures in Big Bend National Park and planning for these structures has undergone several stages of evolution:

(1) In 1964, William E. Brown, historian with the Southwest Regional Office, completed the Inventory of Historic Structures for Big Bend National Park.

(2) In 1968, William E. Brown and Roland H. Wauer completed the Historic Resources Management Plan. This document prescribed, in general terms, treatment for the most significant of the structures included in the 1964 Inventory. The document divided the inventoried structures into three levels of significance: primary structures, to receive major preservation, development and interpretive efforts; secondary structures, to be retained and maintained unless compelling administrative reasons dictate otherwise; and tertiary structures, to be scheduled for obliteration or allowed to disintegrate naturally.

(3) In 1972, '73, and '74 the staff of the Division of History, Southwest Regional Office, reevaluated the structures in terms of National Register criteria, and subsequently prepared several nominations. Those properties which were entered on the National Register include:

A. The Castolon Historic District

B. Hot Sorings

C. Mariscal Mine

D. Rancho Estelle

E. Homer Wilson Ranch

F. Luna Jacal

The Daniels Farm was not approved for National Register status, and on the basis of lack of integrity and significance will not be placed on the Register. Accordingly, the Daniels Farm will be removed from the List of Classified Structures.

Also, the Berkely Cottage will not be nominated to the National Register. The State Historic Preservation Office opposed the nomination of this property and the decision was made in the Regional Office not to continue with the nomination.

The Barker Lodge will not be nominated to the National Register as it does not have sufficient historical significance.

The evalutions and subsequent nominations to the National Register constituted a further refinement of the 1964 Inventory and the 1968 Historic Resources Management Plan; and those

structures or groups of structures included on the Register, as noted above, will receive preservation funds for needed work.

With the historical surveys done in 1964 and 1968 and the subsequent evaluations resulting in nominations of six sites to the National Register, there is no need for additional surveys of historic sites in Big Bend National Park. The completed surveys are sufficient for compliance with E. O. 11593.

Project: Preservation of Homer Wilson Ranch.

The Homer Wilson Ranch is on the National Register and is of the third level of significance. Located near the Castolon highway, the site has considerable interpretive potential.

Action: A Historic Structures Report and a Preservation Guide and programmed for these structures. Until such time as these documents are ready, this site will be managed as follows.

The ranch house will be inspected regularly for deterioration and will be kept in good condition, with the roof being repaired and the walls chinked and other minor maintenance being performed on an as-needed basis. The dipping chute, the barbeque fireplace, the cistern and the one-room building adjacent to the ranch house will also be inspected regularly for deterioration, and minor maintenance performed as needed. The collapsed sections of the corral will be repaired, and other minor maintenance performed as needed. The sites of the outhouse and small shed should be maintained as needed for the purpose of safety. The above work should be performed under the general guidance of the Regional Preservation Architect. In the future, much of the vegetation may be

cleared from the area inorder to present the site somewhat like it looked historically. For the present, however, regular inspections will be made to keep the foundations clear from vegetation.

Once preserved, the Wilson Ranch may then be considered for use as quarters by a seasonal park employee. Such use would further aid in the protection of these structures, which, left vacant, are vulnerable to vandalism. Any treatment of these structures preparatory to their use as seasonal quarters should be performed under the guidance of the Regional Preservation Architect, and would be subject to the procedures to the Advisory Council on Historic Preservation (36 CFR 800).

Project: Preservation of Mariscal Mine

The Mariscal Mine is an isolated complex of numerous structures which has been placed on the National Register. It is of the third level historical signifance. The remains of this complex consist of core materials, primarily brick, stone, and concrete. Left unattended these structures may linger for centuries. The very high cost of stabilizing these structures and establishing an effective, on-going maintenance program is not warranted by their significance.

Action: A Historic Structures Report and a Preservation Guide are programmed for these structures. Until such time as these documents are ready, this site will be managed as follows. For the most part, the structures at Mariscal Mine should be allowed to deteriorate naturally, unretarded by preservation efforts. When safety problems develop, such as, for instance, the threat of collapsing walls, corrective measures should be taken under the supervision of the Regional Preservation Architect to make the particular structure safe once again, and to assure that the integrity of the site is impaired as little as possible by this action.

These structures should be inspected frequently for hazardous conditions. They should also be inspected for possible vegetative growth that may be damaging the foundations. Such vegetation should be removed.

The long range goal should be to seal the mine shafts. Until such time as they are sealed, the protective covers should continue to be maintained. The inspection of these covers should be regular, as well as rigorous and close, for without these covers the shafts would be extremely dangerous. Warning signs and fencing should be maintained around the shafts as necessary, and should be inspected and maintained on a regular basis.

The above prescribed actions on this National Register property will be subject to the procedures of the Advisory Council on Historic Preservation (36CFR 800).

Project: Preservation of the Luna Jacal

This restored one-room structure is on the National Register and the LCS. It is a partial dugout structure, with a sod roof and adobe and wood walls, which make it somewhat fragile.

Action: Routine maintenance consisting of replacement in kind of deteriorated material, control of surface rainwater drainage that might tend to erode the structure, and vegetation control should adequately protect the structure. Preservation problems other than routine maintenance, if they occur, shall be referred to the Regional Preservation Architect for recommendation and, where required technical assistance.

The remote location of this structure on the Maverick road may make it subject to vandalism, and should this become a problem, extra precautions to prevent it may have to be implemented.

Project: Preservation of Rancho Estelle Historic District

The Rancho Estelle District is on the National Register and Lists five structures on the LCS. These consist of stone and adobe structures all unroofed except for BBH-B (Farm Hand's Casita).

Action: A historic structures Report and Preservation Guide are programmed for those structures. In the meantime, these structures will be managed as follows:

These structures shall be inspected regularly for deterioration and will be kept in good condition. Where required, shoring will be maintained in a safe and adequate manner. Conditions regarding action other than routine maintenance shall be referred to the Regional Preservation Architect. Every effort to correct drainage problems at the Sublette warehouse will be undertaken in Fall 1977, money and manpower permitting.

Routine maintenance will consist primarily of clearing vegetation from immediate proximity to the walls, canales repaired controlling surface rainwater drainage to ensure it is carried away from the building and periodic inspection and cleaning of subsurface drains where they exist.

Project: Preservation of Hot Springs

Hot Springs is on the National Register and the LCS. It contains structures of the 3rd order of significance.

Action: The store and motor court, which recently underwent preservation treatment, shall be inspected semi-annually and minor repair and required maintenance performed as required. Needed repairs of other than a routine nature shall be reported to the Regional Preservation Architect for specific instructions. A Preservation Guide for these structures has been programmed; it will provide more specific information for their continued preservation. The two structures west of the parking lot remain untreated at this time. They should be inspected semi-annually to assure that no safety hazards exist, and shall be kept clean and free of debris. No structural fabric shall be removed, however, without prior consultation with the Regional Preservation Architect.

Project: Preservation of the Castolon Historic District

The Castolon District is on the National Register and the LCS. It contains structures of both the 2nd and 3rd order of significance. It is the primary historic resource contained within the Park.

Action: An Historic Structures Report and a Preservation Guide are programmed for these structures. Until such time as these documents are complete, this district will be managed as follows.

The "Old Castolon" structures, which recently underwent comprehensive Preservation treatment under the direction of DSC, shall be inspected semi-annually and minor repair and required maintenance performed as required. Needed repairs of other than a routine nature shall be reported to the Regional Preservation Architect for specific instructions.

Those structures at "New Castolon" being used for adaptive purposes shall continue existing maintenance procedures. Repairs of a major nature shall be referred to the Regional Preservation Architect for assistance or clearance to proceed. The Southwest Cultural Resources center has in the past few years, effected some

comprehensive repairs to some of the structures at "New Castolon". Among these repairs have been the re-structuring of the Castolon Store and some emergency repairs to the Alvino House. Several of these structures are still in need of extensive work, however, additional electrical circuits are scheduled to be installed in The Castolon Store during Winter '1977 or Spring '1978. Additional repairs to walls and roofs are urgently needed for The Alvino House and The Gorlick House. Wooden out buildings such as The Gravery are in need of oiling and preservative treatment. Such work will be completed by SCRC personnel as funds become available.

The Alvino House shall be inspected at least quarterly to ensure against excessive roof leakage, rodent damage, vandalism, etc. which might further damage this structure until such time as comprehensive preservation work can be completed.

Upon completion of all comprehensive work on each structure, more specific preservation guidelines will be supplied.

Project: Restoration of Historic Environment - Castolon Historical District

When the "Castolon Army Compound" buildings were constructed, and for many years before and after, the Rio Grande flood plain above and below the site was under cultivation. The vista along the Rio from the bluff on which the buildings stand was one of open fields. Since the establishment of the Park and subsequent discontinuation of agricultural activity in the area, the vegetation, both exotic and native, has encroached over the entire scene.

Castolon, the main focus for historical interpretation in the park, should be preserved as an historical entity - the total environment as well as the structures.

Action:

1. Remove the tree and brush vegetation, with the exception of the areas surrounding the campground, and restore the vista of open fields.

2. Perpetuate a cleared area, for the entire distance between the paved road, and the river, from Castolon to Santa Elena Canyon, through a special use permit for crop production.

3. Provide for expansion of campgrounds and development of other visitor facilities, as per the Big Bend Master Plan, through vegetation clearing and special use permit limitations.

   These plans will be subject to the procedures of the Advisory Council on Historic Preservation (36CFR 800).

Project: Preservation of historic sites not listed on the National Register. Scattered throughout the park are dozens of man-made structures which relate to the history of the area, although each in a minor way. These structures are in various states of decay, and include rock corrals, building foundations, standing walls, ore tramway towers and other types of structural remains. A partial list of these would include the following structural remains at:

La Noria

Grapevine Ranch

McKinney Spring Ranch

San Vicente

Terlingua Abaja

Johnson Ranch

Ore Tramway

There are in addition many more individual structures and groups of structures located throughout the park. The surveys of historic structures conducted in the park eliminated all of these various structures from further consideration for National Register status. As a result, these minor structures will not be nominated to the Register. However, allowed to remain in the area so they will be encountered randomly by the visitor,

these structures will add much to the enjoyment of the park. For this reason these structures deserve minor maintenance.

Action: For the most part, these structures will be allowed to deteriorate naturally. However, on an as-needed basis, two procedures should be carried out.

A. When it is apparent that a structure has become unsafe, measures will be taken to correct such conditions. This might involve action such as toppling an unstable wall, or reducing a wall in height by removing the upper portion.

B. Where the roots of bushes and shrubs endanger the foundations of structures, this vegetation will be cleared away to allow the structure to have greater longevity.

Structures readily accessible to the public will be checked for the above conditions on an annual basis.

Project: Maintenance of Daniel's Farm House, Casita and Shed.

These structures do not have National Register significance and therefore will not be nominated. However, they have some interpretive value, especially given their location at the Rio Grande village Campground, hence it is in the interest of the Park to maintain them.

Action: The Farm House should receive maintenance on its walls and roof to assure its safety and retain its general historical appearance. The wire screening should remain on the doors and windows.

An alternative to these measures would be to leave the roof on until it becomes unsafe, at which time it can be removed. The walls can then be reduced to stubs about 6 feet high and subsequently allowed to deteriorate natrually, with regular inspection to correct any safety problems that might develop.

The Casita and Shed are both in an advanced state of decay. They should be checked periodically for

structural weaknesses that could result in safety problems. Whenever such problems are encountered they should be corrected as necessary, with safety factors taking priority over preservation. Otherwise, these structures should be allowed to disintegrate naturally.

Project: Maintenance of Barker Lodge and Berkeley Cottage. The Barker Lodge and the Berkeley Cottage have historical interest but their significance (as structures primarily representative of the life styles in the area in the decades before establishment of the park) is not of National Register caliber. These structures have been adapted for use according to management needs. They should continue to be used in the present manner or in some similar way so as to preserve the structures general exterior appearance.

Action: Continue maintenance of both buildings on an as-needed basis in a manner that will assure their safety and continuing usability, while preserving their general exterior appearance.

Project: Protection of Glenn Springs

Glenn Springs is subjected to minor vandalism when automobiles go off the road and drive through the site. Also, visitors leave trash in the area.

Action: Large boulders should be placed along the road at intervals close enough to prevent automobiles from going onto the site. The area should also be policed at regular intervals to clean up the trash (contemporary trash only).

Project: Care of cemeteries and individual graves

Surveys have been conducted in the park to locate and identify as many graves as possible. These sites are scattered throughout the park with many of the graves being isolated.

Action: No action. The graves and grave markers will not be disturbed. They will be allowed to deteriorate naturally.

APPENDIX O

Annual review, changes and dates

ANNUAL REVIEW, CHANGES AND DATES

The Resources Management Plan will be reviewed annually and revised and updated at two year intervals so as to remain current.

Reviews will be by the Park Superintendent and the Regional Resources Management Plan Coordinator. Necessary changes will be initiated at the Park area for approval by the Superintendent and the Regional Director.

Richard R. Waldenbach 29 Nov 1982

Resources Management Plan Coordinator — Date

APPENDIX P

ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL ASSESSMENT

The following is a review of all actions proposed within the Big Bend National Park Resources Management Plan and outlines to four categories described in the Plan.

I. THOSE ACTIONS WHOSE IMPLIMENTATION WILL HAVE A SIGNIFICANT AND MEASURABLE AFFECT ON THE ENVIRONMENT OR ARE HIGHLY CONTROVERCIAL.

Natural Resource Projects that will require an environmental assessment when the research is completed remains to be only one project: River Use and Management Plan. This project is discussed in the body of the Resources Management Plan. All other projects included in th Plan were considered on their own merits and, in every case, those actions planned do not have a significant or measureable effect on the environment.

II. THOSE ACTIONS WHICH WILL CONTINUE EXISTING MAINTENANCE OR WHICH WILL INITIATE NEW MAINTENANCE.

Projects BIBE-N-002,003,004,005,006,007,008,009,and 010 along with Projects BIBE-C- 001 and 004 will all entail maintenance either ongoing or new. Some of these projects entail monitoring programs and others only associated rotein work.

III. THOSE ACTIONS WHICH WILL ENTAIL RESEARCH.

Projects BIBE-N-002, 003, 004, 005, 006, 007, 008, 009, and BIBE-C-001,002,003 and 004 fall into this category. These projects all include investigations into various phases of the area's systems prior to development of further Management determinations. Some of those determinations will require an action plan that will be added Appendix C and may require an environmental assessment.

DETERMINATION: Unless discussed in section I of this assessment, all projects included in the Big Bend National Park Resources Management Plan and outlined above, are research or maintenance in nature and do not significantly affect the environment or cause controversy.

The various projects are categorically excluded from NEPA coverage pursuant to 516 DM6 and appendix 7 to 516 DM6, the Department of Interior"s and NPS's regulations implimenting the National Environmental Policy Act. They are not interactive and will not result in cumulative impacts that hold the potential for significantly affecting the quality of the human or natural environment. Consequently, no further NEPA documents will be prepared.

NO ENVIRONMENTAL ASSESSMENT WILL BE PREPARED

Recommended by: M. Fletcher 12/2/82
~~C~~hief, Natural Resources, Southwest Region Date

Recommended by: Richard W. Sellars 1/17/83
Chief, Southwest Cultural Resources Center Date

Concurred By: Jack Neuhuh 1/17/83
Associate Regional Director, Park Operations Date

Approved By: Robert Stanton 1/18/83
Regional Director, Southwest Region Date

BIBE-N-012 MOUNTAIN LION STUDY, MONITORING AND MANAGEMENT

Statement of Problem:

Little is known concerning the size, structure, and behavior of the mountain lion population in Big Bend National Park. Because of a very recent serious incident involving a young boy and a lion in the park which received national attention, coupled with a relatively high number of lion observations (500+) since 1952 (77 observations in 1983 alone), the park must develop a monitoring program and lion management plan to insure the safety of park visitors while protecting the lion population.

Background Information:

McBride (1976) estimated a lion population for the park of approximately 18-20 animals at any point in time, whereas Leopold's (1983) estimate was 14-16 resident adult lions. Since these two estimates, the Texas Parks & Wildlife Department has initiated a 5-year predator removal project for the Black Gap Wildlife Management Area adjacent to the park's eastern boundary and has removed 15 lions from the area between March 1, 1982, and February 28, 1983 (Cook, 1983).

Current Management Action:

The park maintains an observation/incident file on mountain lions which is consolidated on a monthly basis as part of the general lion data base for the park.

A study (Waid, 1984a & 1984b) of populations, sex ratios, travel routes, and other salient characteristics of the mountain lions in the park is in progress and being conducted by a Ph.D candidate from Texas Tech University. The park has supported this project by supplying lodging and some logistical support. The SWR, ONR has supported the project financially with some telemetry equipment and assistance in lion capturing.

Funding is critically needed to complete the second field season of capturing lions, aircraft telemetry, and associated field work. Funding will also be required to develop and carry out a long-term monitoring program and to develop the overall long-range lion management plan.

Alternative Actions and Time Frames:

1. Do nothing: This is not a viable alternative because of the relatively high number of documented lion sightings and lion/human interaction.

2. Maintain observation card file to document sightings/incidents: This alternative is currently in place and monthly summaries are analyzed and added to the data base. Long-term commitment.

3. Support basic mountain lion research: Texas Tech University has a Ph.D candidate in the park, and the park is providing housing and some logistical support. The Southwest Regional Office has been supportive through some financial assistance for telemetry equipment acquisition and capturing costs. A substantial financial assistance program for the second year of this basic ecological study is needed to complete the field portion of this project, as well as to assist in the management plan development stage of the project. (Major support first FY - minor support for management plan and for annual field monitoring.)

4. Develop a monitoring program: This alternative is basic to a lion management strategy and will prove to be a long-term, labor-intensive need if the park is to keep abreast of the current lion situation at any point in time: movements--ingress/egress, resident/non-resident. This alternative will necessitate telemetry work from both ground and air.

5. Develop an emergency action plan for instant response to serious lion/human incidents: This is a high priority alternative which the park will develop and have in place by late CY 84.

6. Develop a sensitivity program to instill fear/respect for humans: This is a viable alternative but will require a considerable amount of thought/advice before initiation of a technique or techniques.

7. Develop an educational program for the public with a step-up program during problem situations: This is a high priority alternative and will hopefully be in place by early spring of CY 85.

8. Remove known lion population and keep population at a minimum: This is not a viable option based on the mission of the National Park Service--to preserve and protect for future generations.

Recommended Action and Time Frames:

1. Support alternatives #3 immediately through financial assistance over the next two FY's (1985 and 1986).

2. Continue alternative #2 on a monthly/annual basis.

3. Complete alternative #5 by late CY 84.

4. Complete alternative #7 by early Spring CY 85.

5. Initiate sensitivity program in FY 86 based on Waid recommendations.

6. Initiate alternative #4 upon completion of Waid's field work and recommendations probably in FY 87.

Publications cited.

Cook, J. L. 1983. Big Game Investigation, Job No. 49: Mule Deer Predation. Performance Report, Federal aid Project No. W-109-R-6 Texas Parks and Wildlife Department, Austin, Texas. 11 pp.

Leopold, B. D. 1984. Ecology of the Desert Mule Deer in Big Bend National Park, Texas. Unpublished Dissertation. University of Arizona, Tucson, Arizona. 176 pp.

McBride, R. T. 1976. The Status and Ecology of the Mountain Lion (Felis concolor stanleyana) of the Texas-Mexico Border. MS thesis. Sul Ross State University, Alpine, Texas. 160 pp.

Waid, D. 1984. Ecology of Mountain Lions in Big Bend National Park. 1st Quarterly Report. Unpublished typewritten report submitted to NPS,SWR,ONR. Santa Fe, New Mexico. 10 pp.

Waid, D. 1984. Ecology of Mountain Lions in Big Bend National Park. 2nd Quarterly Report. Unpublished typewritten report submitted to NPS,SWR,ONR. Santa Fe, New Mexico. 12 pp.

BIBE-N-013 INTEGRATED PEST MANAGEMENT PROGRAM DEVELOPMENT

Statement of Problem:

The National Park Service's relatively recent change in policy toward a somewhat more restrictive use of pesticides has necessitated the following: the development of IPM (Integrated Pest Management) programs for specific pests; oversight of Concessionaires and private residence commercial pesticide programs; the training of pesticide program managers for applications and certification; and finally requires the maintenance of a meticulous record system to document pesticide use.

Background Information:

The National Park Service reduced its level of pesticide use by approximately 80% in CY 1983 as a result of adopting a very restrictive pesticide use program. IPM requires a much more sophisticated approach to pest management which requires increased skills and knowledge in pest management by individuals involved in pest management in the field.

Current Management Action:

There is currently a certified, non-commercial pesticide applicator on the park staff who has been certified for Forest weed/brush and insect/disease control. The park currently has no one certified for structural pest control.

The park currently has approval for several pesticides to manage individual specific pest problems and is developing an IPM program for flies associated with corral operations within the park.

A major concern has developed resulting from the restriction of several pesticides currently being used by private commercial pest control operators in Concessions and private residence pest control programs.

The park currently has a restricted access pesticide storage system and maintains pesticide use logs.

Alternative Actions:

1. No Action: This alternative may or may not be a viable alternative depending on the specific problem to be addressed.

2. Consolidate information on specific pest problems and develop a priority system for developing IPM programs.

3. Develop a level of expertise and certification in both Resources Management and Maintenance to address both structural and non-structural IPM planning and project implementation.

4. Develop an IPM program to address concessionaire pest control concerns by developing in-house NPC expertise and certification; NPS expertise and certification and/or by modifying the current commercial pesticide operators program to coincide with current IPM programs and NPS restrictions.

5. Develop an overall pesticide/IPM annual program for the park which will serve as the framework for the park's overall Pest Management Program.

Recommended Action and Time Frames:

1. Complete alternative #2 as soon as possible (3-6 months).

2. Complete alternative #3 within one year.

3. Complete alternative #4 and implement within 2 years.

4. Complete alternative #5 and implement within 2 years.

NATURAL RESOURCES

Research and Maintenance

ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

Pkg No.	Area Priority	RMP Ref. No.	Project Title	Year 1 NPS cost/ M.Y. $1000	Year 2 NPS cost/ M.Y. $1000	Year 3 NPS cost/ M.Y. $1000	Year 4 NPS cost/ M.Y. $1000	Year 5 NPS cost/ M.Y. $1000	Date submitted 10-237 10-238
	5	N-012	Mountain Lion Research, Monitoring and Management	30(a)	30(a)	30(a)	10(b)	10(b)	
	8	N-013	Integrated Pest Management Program Development		7(c)	7(c)	7(c)	5(b)	

(a) = .3 Research
.3 Management
.4 Monitoring

(b) = .2 Management
.8 Monitoring

(c) = .6 Research
.2 Management
.2 Monitoring

BIBE-N-012 MOUNTAIN LION STUDY, MONITORING AND MANAGEMENT

Statement of Problem:

Little is known concerning the size, structure, and behavior of the mountain lion population in Big Bend National Park. Because of a very recent serious incident involving a young boy and a lion in the park which received national attention, coupled with a relatively high number of lion observations (500+) since 1952 (77 observations in 1983 alone), the park must develop a monitoring program and lion management plan to insure the safety of park visitors while protecting the lion population.

Background Information:

McBride (1976) estimated a lion population for the park of approximately 18-20 animals at any point in time, whereas Leopold's (1983) estimate was 14-16 resident adult lions. Since these two estimates, the Texas Parks & Wildlife Department has initiated a 5-year predator removal project for the Black Gap Wildlife Management Area adjacent to the park's eastern boundary and has removed 15 lions from the area between March 1, 1982, and February 28, 1983 (Cook, 1983).

Current Management Action:

The park maintains an observation/incident file on mountain lions which is consolidated on a monthly basis as part of the general lion data base for the park.

A study (Waid, 1984a & 1984b) of populations, sex ratios, travel routes, and other salient characteristics of the mountain lions in the park is in progress and being conducted by a Ph.D candidate from Texas Tech University. The park has supported this project by supplying lodging and some logistical support. The SWR, ONR has supported the project financially with some telemetry equipment and assistance in lion capturing.

Funding is critically needed to complete the second field season of capturing lions, aircraft telemetry, and associated field work. Funding will also be required to develop and carry out a long-term monitoring program and to develop the overall long-range lion management plan.

Alternative Actions and Time Frames:

1. Do nothing: This is not a viable alternative because of the relatively high number of documented lion sightings and lion/human interaction.

2. Maintain observation card file to document sightings/incidents: This alternative is currently in place and monthly summaries are analyzed and added to the data base. Long-term commitment.

3. Support basic mountain lion research: Texas Tech University has a Ph.D candidate in the park, and the park is providing housing and some logistical support. The Southwest Regional Office has been supportive through some financial assistance for telemetry equipment acquisition and capturing costs. A substantial financial assistance program for the second year of this basic ecological study is needed to complete the field portion of this project, as well as to assist in the management plan development stage of the project. (Major support first FY - minor support for management plan and for annual field monitoring.)

4. Develop a monitoring program: This alternative is basic to a lion management strategy and will prove to be a long-term, labor-intensive need if the park is to keep abreast of the current lion situation at any point in time: movements--ingress/egress, resident/non-resident. This alternative will necessitate telemetry work from both ground and air.

5. Develop an emergency action plan for instant response to serious lion/human incidents: This is a high priority alternative which the park will develop and have in place by late CY 84.

6. Develop a sensitivity program to instill fear/respect for humans: This is a viable alternative but will require a considerable amount of thought/advice before initiation of a technique or techniques.

7. Develop an educational program for the public with a step-up program during problem situations: This is a high priority alternative and will hopefully be in place by early spring of CY 85.

8. Remove known lion population and keep population at a minimum: This is not a viable option based on the mission of the National Park Service--to preserve and protect for future generations.

Recommended Action and Time Frames:

1. Support alternatives #3 immediately through financial assistance over the next two FY's (1985 and 1986).

2. Continue alternative #2 on a monthly/annual basis.

3. Complete alternative #5 by late CY 84.

4. Complete alternative #7 by early Spring CY 85.

5. Initiate sensitivity program in FY 86 based on Waid recommendations.

6. Initiate alternative #4 upon completion of Waid's field work and recommendations probably in FY 87.

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BIBE-N-013 INTEGRATED PEST MANAGEMENT PROGRAM DEVELOPMENT

Statement of Problem:

The National Park Service's relatively recent change in policy toward a somewhat more restrictive use of pesticides has necessitated the following: the development of IPM (Integrated Pest Management) programs for specific pests; oversight of Concessionaires and private residence commercial pesticide programs; the training of pesticide program managers for applications and certification; and finally requires the maintenance of a meticulous record system to document pesticide use.

Background Information:

The National Park Service reduced its level of pesticide use by approximately 80% in CY 1983 as a result of adopting a very restrictive pesticide use program. IPM requires a much more sophisticated approach to pest management which requires increased skills and knowledge in pest management by individuals involved in pest management in the field.

Current Management Action:

There is currently a certified, non-commercial pesticide applicator on the park staff who has been certified for Forest weed/brush and insect/disease control. The park currently has no one certified for structural pest control.

The park currently has approval for several pesticides to manage individual specific pest problems and is developing an IPM program for flies associated with corral operations within the park.

A major concern has developed resulting from the restriction of several pesticides currently being used by private commercial pest control operators in Concessions and private residence pest control programs.

The park currently has a restricted access pesticide storage system and maintains pesticide use logs.

Alternative Actions:

1. No Action: This alternative may or may not be a viable alternative depending on the specific problem to be addressed.

2. Consolidate information on specific pest problems and develop a priority system for developing IPM programs.

3. Develop a level of expertise and certification in both Resources Management and Maintenance to address both structural and non-structural IPM planning and project implementation.

4. Develop an IPM program to address concessionaire pest control concerns by developing in-house NPC expertise and certification; NPS expertise and certification and/or by modifying the current commercial pesticide operators program to coincide with current IPM programs and NPS restrictions.

5. Develop an overall pesticide/IPM annual program for the park which will serve as the framework for the park's overall Pest Management Program.

Recommended Action and Time Frames:

1. Complete alternative #2 as soon as possible (3-6 months).

2. Complete alternative #3 within one year.

3. Complete alternative #4 and implement within 2 years.

4. Complete alternative #5 and implement within 2 years.

NATURAL RESOURCES

Research and Maintenance

ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

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	8	N-013	Integrated Pest Management Program Development		7(c)	7(c)	7(c)	5(b)	

(a) = .3 Research
.3 Management
.4 Monitoring

(b) = .2 Management
.8 Monitoring

(c) = .6 Research
.2 Management
.2 Monitoring