RESOURCES MANAGEMENT PLAN

FOR

BIG BEND NATIONAL PARK

Prepared by : Big Bend National Park Staff

Reviewed by: Southwest Regional Offices of Natural Resources, History, Archeology, Environmental Compliance, Planning, Maintenance and Interpretation.

Recommended by: James W. Carrico

Superintendent, Big Bend National Park

10/6/88

Date

Approved for Implementation by:

Regional Director
Southwest Regional Office

11/8/88

Date

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OVERVIEW

BIG BEND NATIONAL PARK

PROJECT PRIORITIES

			R	M/M
1.	BIBE-N-001	Air Quality	X	X
2.	BIBE-N-004	Endangered Species: Peregrine Falcon	X	X
3.	BIBE-M-001	Trails Maintenance and Rehabilitation		X
4.	BIBE-N-012	Mountain Lion Study, Management and Monitoring	X	X
5.	BIBE-W-001	Geohydrological Study (Oak Spring - Chisos Basin)	X	
6.	BIBE-W-008	Maverick Entrance Water Potential	X	
7.	BIBE-W-003	Persimmon Gap Water Potential	X	
8.	BIBE-N-010	Basin Fuel Reduction		X
9.	BIBE-N-005	Endangered Species: Big Bend Gambusia	X	X
10.	BIBE-N-020	Resource Basic Inventory: Harte Ranch	X	X
11.	BIBE-H-001	Preserve/Protect Historic Structures	X	X
12.	BIBE-N-018	Geographic Information Syatem	X	X
13.	BIBE-A-003	Preserve/Protect Archeological Resources	X	X
14.	BIBE-N-003	Endangered Species: Cacti		X
15.	BIBE-N-007 BIBE-N-008	Exotic Species	X	X
16.	BIBE-N-002 BIBE-N-011	Vegetation Analysis & Vegetation Management Plan	X	X
17.	BIBE-N-009	Water Resources Profile	X	
18.	BIBE-W-002	Water Quality Monitoring		X
19.	BIBE-A-001	Archeological Site Survey	X	X
20.	BIBE-N-014	Endangered Species: Black-capped Vireo	X	X
21.	BIBE-N-021	Assess Backcountry Use and Impacts	X	X
22.	BIBE-N-006	River Use and Management Plan	X	
23.	BIBE-W-004	Water Source Survey (5 year cyclic)		X
24.	BIBE-N-013	Integrated Pest Management		X
25.	BIBE-N-017	Inventory/Monitor Deer and Javelina	X	X
26.	BIBE-N-019	Endangered Species: Mexican Long-nosed Bat	X	X
27.	BIBE-H-002	Graphic Documentation of Historic Resources	X	X
28.	BIBE-W-006	Flood Plain Mapping	X	
29.	BIBE-H-004	Special Studies - Oral History		X
30.	BIBE-A-002	Archeological Investigation of Burro Mesa	X	X
31.	BIBE-W-005	Analyze Historic River Flow and Current Flow	X	X
32.	BIBE-W-007	Analyze Historic Water Use, Developed Areas	X	X
33.	BIBE-H-003	Special Studies in History	X	
34.	BIBE-N-016	Survey Maderas del Carmens/Chisos	X	
35.	BIBE-H-005	Administrative History	X	
36.	BIBE-N-015	Update of Geologic Base Map and Information	X	

WATER QUALITY

Statement: Big Bend National Park may, in the near future, have to utilize the Rio Grande as a source of potable water for both Castolon and Rio Grande Village Developed areas. Heavy metals and pesticides both occur in the Rio Grande and the presence of pesticides may be contributing to possible egg shell thinning in the Endangered Peregrine falcons nesting along the river.

Needs: An analysis of past water quality data is needed to delineate parameters of possible detrimental elements and chemicals transported through the park in the Rio Grande. An intensive water quality monitoring program is necessary to document levels of elements and chemicals and frequency of occurrences.

Proposed Program: Big Bend National Park will seek funding to (a) Analyze past water quality data to determine extent of reported constituents and periodicity parameters. (b) Develop a systematic intensive water quality sampling/monitoring program to determine periodicity of constituents and (c) develop a long term water quality monitoring program.

	89	90	91	92	93
Research	50	50			
Monitoring/Maint.			30	30	30

AIR QUALITY

Statement: Big Bend National Park is a Class 1 air quality area and is currently involved in a complex monitoring program--(a) automated camera system, (b) NADP (National Atmospheric Deposition Program), (c) particulate sampling system (IMPROVE) and (d) a soon to be installed transmissometer system. Big Bend National Park currently experiences visibility of less than 12 miles approximately 3 days/yr. (1%); visibility of approximately 56 miles to occur about 100 days/yr. (30%); and visibility of up to 236 miles to occur only about 20 days/yr. (6%).

Needs: Data needs to be analyzed and correlated with climatic parameters and integrated on a systematic basis.

Proposed program: Big Bend National Park will continue to monitor the current and expanded system until such time as the program is no longer funded or a more sophisticated remote system becomes available so that on site systems are no longer required.

	89	90	91	92	93
Research			25	25	50
Monitoring/Maint.	3.2	3.2	3.2	3.2	3.2

VEGETATIVE ANALYSIS

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

Needs: (a) complete the vegetation mapping program, (b) complete the species specific analysis program, (c) update the plant list, (d) update herbarium, (e) develop a key to the vegetation of the park, and (f) complete slide file of plants.

Proposed program: The proposed program will integrate mapping, species occurrence and relative abundance by vegetation association. (1) complete mapping, (2) complete vegetation analysis, (3) complete updating of the plant list, (4) update herbarium, (5) develop a key to the parks vegetation, and (6) complet a slide file of the plants of the park. Develop a new position.

	89	90	91	92	93
Reserach		30			
Monitoring/Maint.	3.2	3.2	30	30	30

RIVER USE AND MANAGEMENT PLAN

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

Needs: Since the addition of the Rio Grande Wild and Scenic River to the management function of Big Bend National Park, several factors need to be considered in the development of a Management Plan: (1) visitor use trends, (2) impact delineation and analysis, (3) development of a "carrying capacity" system.

Proposed program: Develop long-term trend data concerning river use (continue issuing permits); assess impacts generated by use; develop a "carrying capacity" system; develop a River Management Plan.

	89	90	91	92	93
Research	25	25	15	14	
Monitoring/Maint.	3,2	3.2	3.2	3.2	3.2

ENDANGERED SPECIES

Statement: There are four endangered species : Peregrine falcon, Big Bend gambusia, Mexican Long-nosed Bat and the Black-capped vireo, and three threatend species: Neolloydia mariposensis, Coryphantha ramillosa and Echinocereus richenbachii chisoensis in Big Bend National Park.

Peregrine falcon

Statement: There were six active eyries documented within Big Bend National Park and the Rio Grande Wild and Scenic River which fledged seven young in 1988.

Needs: Eyrie histories and portfolios need to be updated annually and developed for new eyries. Recent requests for trail closures and visitor use restrictions have complicated the parks monitoring program resulting in a Peregrine falcon Action Plan which is evaluated and updated annually.

Proposed program: The Action Plan will be evaluated annually and changes initiated as manpower and funding will permit.

	89	90	91	92	93
Research	18	18	18		
Monitoring/Maint.	18.6	18.6	18.6	18.6	18.6

Big Bend Gambusia

Statement: This fish is found in three habitats in the Rio Grande Village developed area: (1) Spring #1, an artificially maintained refugium; (2) Spring #4 outflow pond; and (3) The Rio Grande Village Nature Trail area in association with the common mosqito fish, Gambusia affinis. A small population is also maintained at the Dexter National Fish Hatchery in New Mexico.

Needs: Vegetation management is required periodically along with periodic monitoring of the populations. The Spring #4 water available to the fish in the outflow needs long term monitoring to determine water availability.

Proposed program: Big Bend personnel will continue to monitor the habitats and perform needed vegetation management on a day-to-day basis. The park will assist in "periodic sampling" of populations to determine "purity" of populations and the continued existence of Gambusia gaigei in the nature trail habitat.

	89	90	91	92	93
Research			10		
Monitoring/Maint.	3.2	3.2	3.2	3.2	3.2

Black-capped Vireo

Statement: The Black-capped vireo was recently listed as endangered. The population needs to be censused annually and the cowbird population will continue to be reduced in the panther Junction and Chisos Basin. Funds for status and population trends will be sought.

Needs: Census population annually and continue to reduce cowbird population until at least 1992. Research need to ne initiated to determine status and trends.

Proposed program: The Black-capped vireo habitat will be censused annually in May to determine population status and cowbirds will be trapped in the Basin and Panther Junction. The monitoring program needs considerable expertise to be carried out correctly.

	89	90	91	92	93
Research			30	30	
Monitoring/Maint.	3.2	3.2	3.2	3.2	3.2

Mexican Long-nosed Bat

Statement: The Mexican long-nosed bat is soon to be listed as endangered.

Needs: The population will need to be monitored annually and a method of habitat protection devised.

Proposed program: The habitat will be monitored annually if the necessary expertise can be located. Other habitat may exist in the park and will be assessed at some future date.

	89	90	91	92	93
Research Monitoring/Maint.	1.5	1.5	5 1.5	1.5	1.5

Plants

Statement: There are three threatened cacti and 21 category 2 plant species reported to occur in the park.

Needs: Monitoring and status delineation is needed for the threatened and category 2 plants respectively.

Proposed program: The park is setting up monitoring programs for the three threatened species of cacti. The park will assist and support in the development of status reports for the remaining category 2 plants.

	89	90	91	92	93
Research Monitoring/Maint.	3.2	3.2	3.2	3.2	3.2

EXOTIC SPECIES

Statement: The park has serious problems with trespass livestock from Mexico, Tamarisk, Russian thistle and Johnsongrass.

Needs: Research, monitoring and control programs are needed for all exotic problems, although the resurgence of the River Rider program appears to be helping the trespass livestock problem.

Proposed program: The park will monitor probles as manpower and funding allows and will initiate control programs when manpower and funding allows.

	89	90	91	92	93
Research		30	30	30	
Monitoring/Maint.	25	25	25	25	25

WATER RESOURCES MANAGEMENT PROFILE

Statement: This profile is being prepared by the Office of Water Resources in Fort Collins, Colorado and will be utilized as an addendum to this plan or as a proposed Action Plan. Projects concerning water quality and data bases will be handled in a detailed manner. See Project BIBE-N-009 for a short synopsis of current water related projects.

CULTURAL RESOURCES

Archeological

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

Needs: A parkwide survey is sorely needed to document the range of sites and to develop base-line programs. Increased funding for project work is needed to keep abreast of the continuing development programs.

Proposed program: Big Bend National Park will continue to document sites as they are located. The park will initiate a data search to locate collections. More funding is needed to keep abreast of development projects. The park will attempt to locate funding for a major site survey.

	89	90	91	92	93
Research	20	320	260	260	70
Monitoring/Maint.	23.2	23.2	23.2	23.2	23.2

Historical

Statement: The LCS currently lists 54 structures for Big Bend National Park. All but two are listed as National Register Properties. A 1983 cursory survey recorded an additional 376 structures but gathered insufficient data for adequate management planning. Other histroic sites are known but have not been officially recorded. These structures, dating back into the 1800's collectively represent early frontier settlement, military expeditions, calvary occupation, candelilla wax making, mining, and farming and ranching-- a great diversity of human activity in the Big Bend region. Each structure possesses varying levels of historic or architectural significance. The SWRO has eliminated all of these various structures from consideration for National Register status until additional information surfaces which supports their significance. Oral interviews with surviving historic personalities and their decendants, archival research, and additional sites surveys may illuminate levels of historical or architechual significance which necessitates reconsideration of National Register eligibility.

Needs: Periodicallly conduct systematic inspections and cyclic maintenance and repairs of LCS structures as needed. Coduct HABS level III graphic documentation of primary historic resources. Develop a historic preservation plan for LCS structures. Resurvey the unlisted structures and sites and gather sufficient documentation to enable preservation management strategy that complies with preservation regulations and guidelines.

Conduct special history studies of the identified poorly understood historic topics and conduct oral interviews to gather data which may illuminate historical significance of park resources.

Proposed program: The first step toward a comprehensive preservation maintenance plan for historic structures is being developed through coordination of the Maintenance Management System and Resource Management preservation goals. Maintenance of the currently listed structures is scheduled on an annual basis and monitored through periodic inspections.

	89	90	91	92	93
Research	53.2	13.2	70.0	53.2	10.3
Monitoring./Maint	61.4	55.4	82.4	48.4	52.5

SRP NOT ADDESSED IN THIS 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 primarilly surveillance or enforcement problems and may be reduced by "presence" along the boundary or backcountry. The park has initiated aircraft overflights to monitor activity along the boundaries, but with light backcountry presence, we are meeting less than minimum standards in resource protection.

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 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 changeing 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 the 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 guideleines with which, as best as possible, to preserve the natural, and cultural resources of the park.

2. As a set of prioritized projects and objectives designed to obtain critical management and interpretive information with which to protect park resources.

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 (NEPA EA or EIS needed).

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

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

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 as well as many other Acts and Presidential Proclamations.

BIBE-N-001 **Air Quality**

Statement of Problem

Big Bend National Park is designated as a mandatory Class I air quality area as well as being a "Man and the Biosphere" area. As such, the delineation of standards from which air quality deterioration can be ascertained must be obtained. 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 teleradiometer readings and photographs to measure visual range and visibility was initiated in late 1978. The data has indicated periods of significantly impaired visibility to the extent that additional monitoring systems have been established. Current data indicate visibility of less than 12 miles to occur approximately three days/year per year (30%) and visibility of up to 236 miles to occur about 20 days/year (6%).

Current Management Action

The teleradiometer was removed in mid-1986 and replaced with an automated camera system. Film is changed every 10 days and the system is checked twice weekly to verify correct system operation. The NADP (National Atmospheric Deposition Program) has been in operation for over five years. Samples are taken weekly and forwarded to Champaign, Illinois, for analysis. A computer printout is received periodically, but no formal analysis has been accomplished to date.

An SFA 500 particulate sampler was installed in May, 1982, and replaced with an IMPROVE unit in June, 1987. Filters are changed weekly and forwarded to the Air Quality Group, University of California at Davis. 1982-1985 data was utilized in a report concerning visibility at Big Bend National Park (Johnson, current publications).

Legal Authority

Amendments to the Clean Air Act of 1977.

Current Publications

Johnson, C.E. and Malm, W.C. 1986. Identifying Visibility Reducing Pollution Sources Using Principle Component Analysis. Unpublished Typewritten Report to the Office of Natural Resources, National Park Service, Santa Fe, New Mexico. 13 pp.

Derrick, M.R. et. al. 1984. Aerosol and Precipitation Chemistry Relationships at Big Bend National Park. Water and Soil Pollution, 21, 171-181.

Alternative Actions and Probable Impact

1. No Action: This action implies nonconformance to the amendments of the Clean Air Act of 1977, whereby Class I areas must develop base line standards. As a Class I area, deterioration of air quality is a "significant resource problem." This alternative is considered to be unacceptable.

2. Continue Current Management Action: This action would entail the continuation of the current monitoring program:

   A. Maintain the automated camera system. Change film and monitor operation, one hour per week.

   B. Continue to monitor the NADP equipment three hours per week year round.

   C. Continue to monitor the IMPROVE particulate sampler, one hour per week year round.

   Approximately $3200/year is necessary to carry out this monitoring program at the park level.

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. NADP operation.

   B. IMPROVE particulate sampler.

   C. Automated Camera System.

Recommended Course of Action

As long as funding and manpower remains sufficient, alternative 2 (continue current management action) should continue for a minimum of 3-5 years.

Any air quality related research should receive support from the park in the form of housing, logistics or other non-funded associated support.

DATE 11/28/88

RESOURCE MANAGEMENT PLAN

DISTRIBUTION

FROM: PPE-SWRO, LINDA DANSBY, DIVISION OF PLANNING, DESIGN AND ENVIRONMENTAL COORDINATION, SWR (FTS 476-1856, 505-988-6856)

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We were unable to reproduce pgs. 205, 229, 230 & 231 containing brochures:
1986-87 Research Newsletter
Bird Checklist
Mammals Checklist &
Amphibians & Reptiles Checklist

ENCLOSED FOR YOUR FILES IS THE RESOURCE MANAGEMENT PLAN FOR

Big Bend National Park,

APPROVED ON 11/8/88.

Further data analysis needs to be undertaken to better delineate the extent of air quality degradation and the parameters of causative agents.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

4/88

BIBE-N-002 Vegetation Analysis and Mapping for Natural Resource Basic Inventory

Statement of Problem

There is no integrated vegetational base line informational system for Big Bend National Park. There is an urgent need to correlate information concerning the vegetative formations/communities/associations and individual species into a usable data base. This project would alleviate a "significant resource problem" of long standing: the park's limited in-house knowledge and understanding of the vegetative component of the park's resources.

Background Information

1. Mapping: The most current vegetative map of the park was completed in 1970 by Warnock and Kittams for the park's master plan. Vegetative schemes by Wauer (1980) and McDougall and Sperry (1951), and the map by Warnock and Kittams (1970) either are too broad in scale, not mapped at a usable scale or lack park wide supportive data. Leopold and Krausman (1983) presented a mapping scheme for the area of the park below 3500 feet elevation, but only a rough copy exists in the park. The remote sensing shop in the Denver Service Center attempted to complete a vegetation map from multi-spectral data over the period of 1980-1985 but finally conceded defeat because of an initial poor quality controlled data base.

2. Plant List: Warnock (1967) developed a plant list of the park's herbarium representatives. Fleming updated the list in 1982 and Waggoner included the list in NPFLORA in 1983 but utilized Smithsonian nomenclature. Evans and Fleming put together the current plant list in 1983 based on the taxonomic treatment of Correll and Johnston (1979). The current list is approximately 85% complete.

3. Basic Data Concerning Individual Plant Series: No integrated system concerning individual plant species or correlation of ecological parameter associated with the vegetative resources currently exists. Dr. Powell (Sul Ross State University, Alpine, Texas) has been extremely helpful in plant identification problems but logistics severely curtail this activity. Dr. Warnock also has been extremely helpful in plant identification and assisting in training the interpretive staff of the park.

Current Management Action

1. Mapping: A vegetation map of the park is currently being developed by Dr. Gregg Plumb, currently instructing at the University of Oklahoma. The Office of Natural Resources in Santa Fe has supported this project through the acquisition of Landsat data. The Denver Service Center, remote sensing shop

has assisted by making data available for use and will do the actual mapping of data supplied by Dr. Plumb. Mapping at 1:100,000 is scheduled for completion in late 1988 and a final product should be available in mid-1989. 1:24,000 quad maps should also be available by mid-1989.

2. Plant List: The plant list by Evans and Fleming (1983) is currently the best available plant list. Considerable work is yet needed, particularly concerning exotic species. This project should be completed in early 1990.

3. Basic Data Concerning Individual Plant Species: The Office of Resource Management has contracted with Dr. Bonnie Amos of San Angelo State University to develop an individual plant species data base. This section should be completed in early 1990.

Current Publications:

Correll, D.S. and Johnston, M.C. 1979. Manual of the Vascular Plants of Texas. Texas Research Foundation, Renner, Texas, 1881 pp.

Evans, D. and Fleming, C.M. 1983. Plant list for Big Bend National Park. Typewritten list available through park headquarters. 22 pp.

Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press. College Station, Texas. 653 pp.

Gould, F.W. 1975. Texas Plants - A Checklist and Ecological Summary. MP-585/Revised. Texas Agriculture Experimental Station, Texas A&M University, College Station. 121 pp.

Heil, K.D., Brack, S. and Porter, J.M. 1985. The Rare and Sensitive Cacti of Big Bend National Park. Typewritten report to Office of Natural Resources, National Park Service, Santa Fe, New Mexico. 41 pp.

Leopold, B.D. and Krausman, P.R. 1983. Plant Communities of the Lower Desert Shrubland in Big Bend National Park, Texas. Draft, Typewritten report on file in Office of Resource Management, Big Bend National Park, Texas. 41 pp.

National Park Service. 1979. Final Environmental Statement for Master Plan, Big Bend National Park, Texas. FES79-32. Denver Service Center. 231 pp. (Vegetation Map by Warnock and Kittams, 1970, on page 33).

Powell, A.M. 1988. Trees and Shrubs of Trans-Pecos Texas - Including Big Bend and Guadalupe Mountains National Parks. Big Bend National History Association, Big Bend National Park, Texas. 536 pp.

Warnock, B.H. 1970. Wildflowers of the Big Bend Country, Texas. Sul Ross State University, Alpine, Texas. 157 pp.

Wauer, R.H. 1980. Naturalist's Big Bend. Texas A&M University Press, College Station, Texas. 149 pp.

Alternative Actions and Probable Impacts

1. No Action: This action would involve remaining at the status quo: little or no basic integrated vegetation information; incomplete and unacceptable vegetational mapping; and reliance on an outdated and incomplete plant list.

2. Complete Mapping of Vegetation Associations: Map associations at the 1:100,000 and 1:24,000 scales. Failure to complete this aspect of the vegetative analysis will hinder completion of the information needed concerning the individual species data base.

3. Complete Plant List: Failure to complete the plant list and update it annually will result in incomplete data available to park staff and researchers.

4. Develop Individual Plant Species Data Files: Develop data base for each plant species containing the following basic information:

   A. Taxonomy (family, genus, species, common name) after Correll and Johnston (1979).
   B. Occurrence by association/community/formation.
   C. Relative abundance of each species by association.
   D. Occurrence by Texas vegetational zones after Gould (1975).
   E. Annual or perennial.
   F. Life form (tree, shrub, forb, grass, other).
   G. Flowering information (showy, color, dates, etc.).
   H. Reference page numbers (Correll and Johnston, 1979); grasses (Gould, 1975); trees, shrubs and vines (Vines, 1976).
   I. Comments (exotic, threatened, endangered, category 1 or 2, tolerance to fire, medicinal value, food value, spiny, etc.).

Failure to develop an individual species data base file will result in a lack of a meaningful digitized plant information system.

5. Correlate species with presence in herbarium and slide files: Failure to do so will result in continued identification problems.

Recommended Action and Time Frames

1. Complete the Plant List and annually update for corrections and additions. Estimated completion date: end of year 1.

2. Complete mapping as soon as possible. 1:100,000 highest priority; 1:24,000 second priority. Year 1 - 2.

3. Arrange for usable/replicable/available maps. Year 1 - 2.

4. Develop data base file for individual species. This phase has been contracted for and is scheduled for completion in early 1990.

5. Computerize the species data base. Year 2.

6. Develop keys to the park's vegetation; both overall and by life form. Year 2 - 3.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-003 Endangered Species: Plants

Statement of Problem

Permanent monitoring plots need to be established along with periodic monitoring programs for the threatened and category 1 species of plants in Big Bend National Park. Whereas some of the listed category 2 plants have been investigated, there remain eighteen yet in need of determination of status.

Background Information

The listing of threatened (2), category 1 (2), and category 2 (25) plants of the September, 1985, Federal Register identified a number of plants which possible occur in Big Bend National Park. Recent status reports and correspondence with the U.S. Fish and Wildlife Service have modified the 1985 listings to some extent (see Appendix I for recent update).

Current Publications

Benson, L. 1982. The Cacti of the United States and Canada. Stanford University Press, Stanford, California. 1044 pp.

Evans, D.B. 1986. Survey of Chisos Pitaya (Echinocereus reichenbachii chisoensis). Report of Status. Typewritten report on file at the Office of Resource Management, Big Bend National Park, Texas. 17 pp.

Heil, K.D., Brack, S. and Porter, J.M. 1985. The Rare and Sensitive Cacti of Big Bend National Park. Typewritten report of Office of Natural Resources, National Park Service, Santa Fe, New Mexico. 41 pp.

Howell, D.J. 1986. Status Reports on Castilleja elongata; Coryphantha strobiliformis durispina; Euphorbia perennens and Hexalectris nitida. Typewritten reports to the Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service. 1985. Endangered and Threatened Wildlife and Plants: Review of Plant Taxa Listed as Endangered or Threatened Species; Notice of Review. 50 CFR, Part 17. Federal Register, Park IV, Friday, September 27, 1985. 39586.

Weniger, D. 1984. Cacti of Texas and Neighboring States--A Field Guide. The University of Texas Press, Austin, Texas. 353 pp.

Alternative Actions and Probable Impacts

1. No Action: Not a viable alternative in that the National Park Service is required by law to protect endangered, threatened and category 1 plant species.

2. Consolidate Known Data: Photos, descriptions, locations and relative abundance of threatened and category 1 plants within the park. Failure to accomplish this task will continue to make monitoring of these species next to impossible as a vase majority of the park's personnel (Protection, Resource Management, and Interpretation) could not identify them if found in the field or in a visitor's possession.

3. Develop a Monitoring System/Program for each threatened and category 1 plant. This task is a high priority to develop base line data and a comprehensive monitoring system. Failure to accomplish this task will result in the park being unable to document losses.

4. Consolidate Known Data and Determine Status of Category 2 Plants in the park. The need for this information is lower in priority than alternatives 2 and 3 as some of the species may be dropped from further consideration based on abundance. These could be made high priority species for project BIBE-N-002.

Recommended Time Frames

1. Consolidate known information concerning alternative 2 in a timely manner. Year 1.

2. Develop a comprehensive monitoring program/system (alternative 3). Year 2 -3, high priority.

3. Monitor those species set up in alternative 3 on a quarterly basis. Year 2 - 3 and quarterly thereafter.

4. Continue to develop information on listed category 2 species. Year 1 - 5. Try to assist in determining the status of at least two plants per year.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-004 Endangered Species: Peregrine Falcon

Statement of Problem

Big Bend National Park and the Lower Canyons (RIGR) in conjunction with the states of Coahuila and Chihuahua, Mexico, provided habitat for eight active documented peregrine falcon eyries in 1985 and 1986. The eyries produced 12 young in 1985; 10 young in 1986; 7 young in 1987 (McKinney, 1985, 1986, 1987); and 7 young in 1988 (Hogan, 1988). To monitor the eyries and obtain production information requires considerable knowledge of the species, great patience, and a considerable expenditure of time and manpower to overcome logistical complications.

Background Information

Studies conducted over the past several years have indicated that the nesting success, number of nesting pairs, and the number of fledged young can be quite variable. DDT has been suggested as being the causative agent for this species decline, but variance in the bird's production from year to year within the park has not been explained. Weather, climbers, aircraft, noise from above, and noise from below all have been suggested as possible factors adversely affecting individual eyries at one time or another.

The difficulty in obtaining specific information on the eyries' location has been well documented, as has the difficulty in obtaining information on activity and production. The logistics, critical time frames, and relative inaccessibility of the eyries, once located, make for an extremely difficult monitoring system. The use of park funds and manpower can at best only augment an overall monitoring program because of manpower and monitoring restraints which need to be addressed during the park's heaviest visitor use season, the spring.

Current Management Action

1. An action plan was initiated in the 1988 season which addressed the following:

   A. Closures: motorboats, climbers, trails.
   B. Signing.
   C. Training.
   D. Monitoring, both overall and site intensive.
   E. Responsibilities.
   F. Visitor awareness and education.
   G. Interagency cooperation and coordination.
   H. Reports and evaluation of program.

2. A revised action plan will then be formulated for the following nesting/activity season by December 31, annually.

Current Publications

Enderson, J.H. 1985. Peregrine Survey - 1985, Big Bend National Park and the Rio Grande. Typewritten report on file at the Office of Resource Management, Big Bend National Park. 17 pp.

Hogan, K.M. 1988. Peregrine Falcon Monitoring Program of Historic Eyries, Big Bend National Park and Rio Grande Wild and Scenic River. Typewritten report on file at the Office of Resource Management, Big Bend National Park. 50 pp.

McKinney, B.R. 1987. The Status of Falco peregrinus in the Big Bend Region of Texas, 1987. Typewritten report prepared for the Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, New Mexico, under contract #14-16-0002-86-26.

U.S. Fish and Wildlife Service. 1984. American Peregrine Falcon Recovery Plan (Rocky Mountains/Southwest Populations). Prepared in Cooperation with the American Peregrine Falcon Recovery Team. U.S. Fish and Wildlife Service, Denver, Colorado. 105 pp.

Alternative Actions and Probable Impacts

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

2. Revise, update and carry out action plan: Current activities include evaluation of the plan in October and revision in place by December 31 annually. Failure to carry out the action plan program will jeopardize the parks ability to respond to the public concerning the parks knowledge of the status of the peregrine falcon with the park.

3. Initiate a comprehensive water quality monitoring program on the Rio Grande: Failure to initiate a comprehensive water quality monitoring program will only forestall the park's ability to make rational statements as to the effects that water quality plays in the well being of the peregrine falcon in the park.

4. Initiate research into the relationship between peregrine falcons and other birds of prey: Failure to examine the interrelationships between peregrine falcons and other raptors, particularly the great horned owl and the golden eagle will only continue lack of knowledge concerning the interrelationships of these groups.

5. Investigate the feasibility of initiating a climbing ban: The period from February through July is critical not only to the

peregrine falcon, but to many other rock face nesters as well. Failure to initiate a parkwide ban on climbing within the park during the spring will only jeopardize those nesters which may be unduly harassed through the unknowing or uneducated visitor seeking self satisfaction.

6. Investigate feasibility of cooperative venture with Mexico in peregrine falcon management: Failure to initiate cooperative efforts will only force the park to carry the burden of monitoring and not gain knowledge of important areas of recruitment.

Recommend Action and Time Frames

1. Continue alternative 2 as scheduled.

2. Initiate alternatives 3 and 5 as soon as possible. High priority.

3. Initiate alternatives 4 and 6 in a timely manner.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

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BIBE-N-005 Endangered Species: Big Bend Gambusia

Statement of Problem

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

Background Information

The main fish population is currently maintained in an artificial habitat with warm water being pumped from Spring 1 into a pond with an overflow drainage. The continued flow of warm water is extremely important in periods of cold weather because of the danger of the fish freezing. Population 2 was established by transplanting 50 fish from the refugium (fed by Spring 1) to the outflow area of Spring 4 in August, 1984. Population 3 was accidently found along the Rio Grande nature trail the same day as the 50 fish were transplanted into Spring 4. The water along the nature trail is fed by seepage from under the berm which retains Spring 4 outflow. Currently all three populations are being monitored.

Current Management Action

The Spring 1 pump system is checked daily and the spring box water fluctuations are monitored by a Stevens water level recorder. Fish populations from both the refugium and its outflow are checked daily. Cattails are removed from the refugium as needed (root systems), and the outflow is checked three times a week to determine the presence of fish and the condition of outflow. (Beaver have been a minor problem).

The berm retaining Spring 4 outflow is cleared of regrowth vegetation as necessary and three small pools have been opened up behind the berm. Fish are collected from both Spring 4 and from the nature trail to verify the presence of G. gaigei in the nature trail habitat, and the absence of G. affinis in the Spring 4 habitat. Collections are made twice a year.

Recent Publications

Hubbs, C., Hoddenbach, G. and Fleming, C.M. 1986. An Enigmatic Population of Gambusia gaigei. The Southwestern Naturalist. Vol. 31 (1). 121-123.

Hubbs, C. et. al. 1977. Fishes inhabiting the Rio Grande, Texas-Mexico, between El Paso and the Pecos confluence. In: Importance, Preservation and Management of Riparian Habitat. A Symposium, U.S.D.A., forest Service, General Technical Report, RM-43. R. Roy Johnson and Dale Jones (Eds.). 91-97.

Hubbs, C. and Williams, J.G. 1979. A Review of Circumstances Affecting the Abundance of Gambusia gaigei, an Endangered Fish Endemic to Big Bend National Park. In: Proceedings, First Conference on Scientific Research in the National Parks, Vol. 1, Robert Linn (Ed.). 631-635.

Moore, G. 1980. Aquifer Test of Geothermal Spring 4, Rio Grande Village, Big Bend National Park. National Park Service, Water Resources Report #80-8. Southwest Regional Office, Santa Fe, New Mexico.

U.S. Fish and Wildlife Service. 1984. Big Bend Gambusia Recovery Plan. U.S. Fish and Wildlife Service, Office of Endangered Species, Albuquerque, New Mexico. 43 pp.

Alternative Actions and Probable Impacts

1. No Action: Not a viable alternative. Failure to keep the current system active and monitored (at a minimum Spring 1 and Spring 4) could result in the loss of fish to freezing weather. The failure to remove emergent vegetation periodically could result in gradual succession of the pond to the point where Gambusia gaigei could no longer survive.

2. Continue Current Management Action at Spring 1: Monitor spring box and pump system closely and keep emergent vegetation at a reasonable level. Failure to do so could result in the loss of G. gaigei.

3. Monitor Spring 4 System: Monitor system and keep vegetation at reasonable levels. Failure to monitor fish population, vegetation levels, and beaver activity could result in the loss of G. gaigei.

4. Initiate a Feasibility Study into Future Use of the Rio Grande as a Potable Water Source for Rio Grande Village: Failure to initiate this alternative will postpone proposed future development plans for the Rio Grande Village area.

5. Update and Revise Current (1985) G. gaigei Recovery Plan: Failure to update the recovery plan will result in misinformation being distributed concerning the current status of G. gaigei.

6. Initiate a Feasibility Study into the Introduction of G. gaigei into Other Hot or Warm Springs along the Rio Grande in Both the U.S. and Mexico: Failure to accomplish this alternative will only continue to restrict the population levels of G. gaigei.

7. Monitor Outflow of Spring 4: Failure to initiate this alternative will result in postponing future development

actions at Rio Grande Village because of lack of knowledge of the amount of water available to the fish in the outflow.

8. Monitor Beaver Activities: Failure to monitor beaver activities could result in major shifts in water availability to the lower trail habitat. Major shifts in water availability in either Spring 4 outflow area or the lower nature trail habitat could result in the loss of G. gaigei from those habitats.

9. Develop Stream Habitat below Spring 4 Outflow in Vicinity of Nature Trail: Failure to develop stream habitat will postpone the recommendations of the current recovery plan.

10. Install a Boardwalk over the Swampy Portion of the Rio Grande Nature Trail: Failure to carry out this alternative will result in the trail continuously being flooded and having to be continuously drained for visitor access.

11. Reassess the Rio Grande Nature Trail and Parking Area: Failure to initiate this program will result in the trailhead being only accessible to campers during the busy season. This action is needed for long range planning.

12. Develop an Action Plan for Day to Day Operations: Failure to complete this alternative will result in lack of continuity when personnel changes occur.

Recommendations and Time Frames

1. Continue alternatives 2 and 3 on a continuing basis.

2. Initiate alternative 10 as soon as possible (year 1).

3. Initiate alternative 12 (year 1).

4. Initiate alternative 7, 8 and 9 (year 1 - 2).

5. Initiate alternative 11 (year 1 - 2).

6. Initiate alternative 4 (year 2 - 3).

7. Initiate alternative 6 (year 3 - 4).

8. Initiate alternative 5 (year 3 - 4).

This project is categorically excluded from NEPA requirements as the project is neither significantly controversial nor will it significantly effect the environment.
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BIBE-N-006 River Use and Management Plan

Statement of Problem

Use of the Rio Grande for recreational purposes is expected to increase over the next five years. Currently this use, like general backcountry use, tends to be concentrated during the periods of heavy visitation such as Easter, spring break, Fourth 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: A. The addition of the Rio Grande Wild and Scenic River to the management function of Big Bend National Park; B. Periods of heavy visitation; C. Areas of abnormally heavy impact; and D. An expected increase in river recreational use. All indicate an increased need for (1) development of long term trend data concerning river use; (2) an assessment of impacts generated through use; (3) a future consensus of the carrying capacity and; (4) the development of a river management plan for river use which will provide for 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 safety and environmental requirements.

Current Publications

Ditton, R.B., Graefe, A.R. and Mertens, T.J. 1977. River Road Camping in Big Bend National Park: A Survey and Analysis. Typewritten Report to the Office of Natural Resources, National Park Service, Southwest Regional Office, Santa Fe, New Mexico. 74 pp.

Ditton, R.B. and Bobbitt, J.S. 1982. An Analysis of Backcountry Use at Big Bend National Park: 1980-1981. Typewritten Report on file with the Office of Resource Management, Big Bend National Park, Texas. 93 pp.

Schmidly, D.J. and Ditton, R.B. 1977. A Survey and Analysis of Recreational and Livestock Impacts on the Riparian Zone of the Rio Grande in Big Bend National Park. Typewritten Report to the Office of Natural Resources, National Park Service, Southwest Regional Office, Santa Fe, New Mexico. Contract #70050442.

U.S.D.A. Forest Service. 1982. National River Recreation Study: Summary Tables. Typewritten Report on file in Office of Resource Management, Big Bend National Park, Texas. 65 pp.

U.S.D.A. Forest Service. 1984. National River Recreational Study: Summary Tables. Typewritten Report on File in the Office of Resource Management, Big Bend National Park, Texas. 63 pp.

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 result in a break in the current data system.

3. Designate High Impact Areas and Type of Impacts: Failure to accomplish this task will result in not developing the necessary mitigating measures to alleviate impacts.

4. Determine Carrying Capacities based on impact information. Failure to do so will place the park in the situation of failing to meet congressional mandates.

5. Explore the Feasibility of Converting to a Concessioner System of commercial river use. Failure to do so will result in all possibilities available for river management not being explored.

6. Complete a Comprehensive River Management Plan for Big Bend National Park and Wild and Scenic River.

Recommend Actions and Time Frames

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

2. Complete alternative 3 and 5 (year 1).

3. Complete alternative 4 (year 2 - 3).

4. Complete alternative 6 (year 4 - 5).

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

4/88

BIBE-N-007 Exotic Species: Flora

Statement of Problem

To date there have been fifty-three species of plants designated as exotic or introduced which have been documented as occurring in the park. (See Appendix J). Further plant work will probably add additional species to the list.

Currently there are three introduced genera considered as high priority and listed a serious resource problems: (1) Tamarix species; these plants are invading upper water courses and springs within the park, resulting in the reduction of available water for wildlife, particularly during periods of little rainfall. (2) Salsola; this plant invades disturbed areas and little is known about its life history or response to control actions. The major problem concerns the introduction of the plant along the newly reworked road sections. (3) Sorghum; the common Johnson grass is rapidly invading into disturbed roadsides and water ways. This species will most likely require the use of an herbicide followed by burning to eventually bring it under control.

Tamarix species have invaded springs and water courses throughout the park and now threaten the existence of free water for wildlife. A medium sized tree can transpire up to 200 gallons of water per day and presents a seed source for further invasion in to yet uninfested water sources. Today, approximately one half of the 200+ water sources (excluding riverine habitat) are infested. The extent of Salsola infestation has yet to be ascertained but is perceived to be increasing. The extent and severity of Sorghum infestation has yet to be ascertained but is perceived to be increasing. As yet control strategies have not been developed for Salsola or Sorghum.

Current Management Action

The park has completed an update of Tamarix occurrence at water sources and an update of priority control areas has been completed. A supply of Garlon 3A herbicide is on hand and a crew will be working during the month of September, 1988. Some control of Salsola and Sorghum along Route 13 has been initiated as trial control areas.

Current Publications

Feeley, B. and Connor, J. 1977. The Use of Tamarisk by the Mexican Beaver in Big Bend National Park, Texas. Typewritten Report on file in the Office of Resource Management, Big Bend National Park, Texas. 7 pp.

Horton, J.S. 1964. Notes on the Introduction of Deciduous Tamarisk. Incomplete Reference on file in the Office of Resource Management, Big Bend National Park, Texas. 7 pp.

Howarth, V. 1976. Water Source Inventory and Survey, Big Bend National Park, Texas. Five Volumes. On file at the Office of Resource Management, Big Bend National Park, Texas.

Neill, W.M. 1988. Control of Tamarisk by Stump-Cut Herbicidal Treatment. Typewritten Report on file in the Office of Resource Management, Big Bend National Park, Texas.

National Park Service. 1986. Update of Water Source Inventory and Survey, Big Bend National Park, Texas. Five Volumes. On file in the Office of Resource Management, Big Bend National Park, Texas.

Alternative Actions and Possible Impacts

1. No Actions: This alternative will only result in increased infestations of Tamarix, Salsola, and Sorghum within the park.

2. Develop Guidelines for Efficient and Effective Management of Tamarix, Salsola, and Sorghum: Failure to accomplish this alternative will only add to the ineffective and inefficient control and management actions currently being carried out.

3. Develop and IPM Program for Tamarix, Salsola, and Sorghum: This alternative is viable and failure to carry out this action will only prolong the current inefficient and ineffective management and control actions being utilized.

4. Continue the Use of Garlon 3A as a Cut-Stump Application for Tamarix: Failure to continue this alternative will only insure an increase in the amount of Tamarix for future control/management efforts.

Recommended Actions and Time Frames

1. Continue alternative 4 using Neill's guidelines (continuing).

2. Develop a comprehensive action plan for implementation should funding and manpower become available. Year 1 (Tamarix control).

3. Develop IPM plan for Tamarix control and management. Year 1 - 2.

4. Develop IPM plan for Salsola control and management. Year 2 - 3.

5. Develop IPM plan for Sorghum control and management. Year 3 - 4.

6. Continue roadside removal of Salsola and Sorghum as necessary along Route 13.

7. Initiate control and management program for Salsola and Sorghum. Year 4 - 5.

This project is categorically excluded from NEPA requirements as the proposed is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-008 Exotic Species: Fauna

Statement of Problem

There are several introduced faunal species within the park, but other than trespass livestock, aoudad, and to some extent park and concessioner stock, they constitute only a minor problem at this time. (See Appendix K).

The grazing of livestock within the park has resulted in severe impacts and is considered a significant resource problem. To a lesser extent, stock use in the upper Chisos Mountains has contributed to some severe erosional problems, particularly on the heavier used trails.

Background Information

Schmidly and Ditton (1977) quantified livestock impacts along the Rio Grande within the park and estimated that impacts would be similar along the other park boundaries. The majority of trespass stock is Mexican in origin. The adjoining ranchers in the United States still continue to exhibit a lack of aggressiveness in building and/or maintaining fences. The possibility always exists that trespass stock may take up residence in the park and become feral. Twenty-five miles of new fence was constructed along the west, north and east boundaries in 1984/1985, but additional fencing is still needed.

Whitson (1974) alluded to several adverse effects of the use of stock in the Chisos Mountains. Erosion and introduction of exotic species are but two impacts mentioned by Dr. Whitson concerning stock use in the Chisos Mountains. Concession stock use of the Pinnacles trail to the Colima cutoff trail was discontinued in the early to mid-1960's.

Aoudads continue to be reported infrequently by park visitors and staff. To date only adults have been reported and one large male was killed by a lion in the Sierra Quemadas.

Current Management Action

Trespass stock are rounded up as manpower and access permit. The river rider program has been re-established with cooperation from the U.S.D.A. Overflights are utilized to document stock location but generally poor access along the river precludes an aggressive trespass livestock program. Roundups are expensive in both manpower and equipment allocation. The reinstitution of the river rider program has substantially reduced the immediate trespass problems, particularly in the vicinity of the local villages. Only time and a continued effort will maintain the problem at a relatively low ebb.

The aoudad, to the best of our knowledge, has yet to make inroads into developing into a serious problem. Park rangers are

presently authorized to remove these animals on an opportunistic basis. To date none have been removed.

Current Publications

Schmidly, D.J. and Ditton, R.B. 1977. A Survey and Analysis of Recreational and Livestock Impacts on the Riparian Zone of the Rio Grande in Big Bend National Park. Typewritten report for ONR, SWRO, Santa Fe, New Mexico. Contract #CX 70050442. 159 pp.

Whitson, P.D. 1974. The Impact of Human Use Upon the Chisos Basin and Adjacent Lands. NPS Scientific Monograph, SEries #4. Superintendent of Documents, #1-29:80:4. 92 pp.

Alternative Actions and Probable Impacts

Trespass Livestock

1. No Action: This alternative is not acceptable and would only increase the already severe livestock trespass impacts, particularly along the river and at nearby springs.

2. Direct Reduction: This alternative is unacceptable under the current good neighbor policy maintained by the park. The use of this alternative as a last ditch effort would severely strain relations with the inhabitants of the small villages in Mexico.

3. Reactivate the U.S.D.A. River Rider Program: This program was re-established in late 1988 and appears to have temporarily reduced the longstanding impact problem. This program has proven to be the most effective program utilized within the park over the past ten years.

4. Continue to Monitor and Document Trespass Livestock: This alternative needs to be continued as funds are available. This program serves as the eyes for the river rider program. Failure to continue this program will only place more burden on ground personnel to locate stock.

5. Continue an Aggressive Livestock Control Program: This alternative is a vital necessity if the river rider is to be effective. The park must support this program as money and manpower permits to assist in the overall impact reduction effort. Failure to support the program will result in the possible loss of the river rider and a reversion back to little or no control effort.

6. Continue to Work With Park Neighbors on Fencing: When funding permits, fence additional problem areas to reduce trespass problems and delineate boundary lines. Failure to develop a fencing program along the east, north and west boundaries will only result in future trespass problems.

7. Continue to Patrol the Park Boundary: Both current and potential problem areas are located in this manner. Failure to patrol boundaries regularly will only result in the possibility of a serious problem going unnoticed for a relatively long time.

8. Investigate Species Specific Tranquilizing System: The use of a capture gun in isolated instanced to reduce problems associated with recalcitrant stock would result in less damage to equipment and reduce potential injury to both stock and riders. Failure to investigate this alternative could result in damages to equipment and possible injury to stock and riders.

Park and Concession Stock

1. No Action: This alternative is unacceptable in that the Chisos Mountain trails will only deteriorate further if not brought up to a relatively high standard.

2. Continue to Bring the Trail System up to a High Standard: This alternative is a high priority option which will require a major effort both in the allocation of funds and manpower with the necessary associated expertise in trail construction and maintenance. Failure to carry out an aggressive trails rehabilitation program will only result in the continued deterioration of the heavily used trails.

3. Reduce Stock Use During Periods of High Potential Trail Impact: Identify areas of trails which are highly erodible or damaged during periods of wet weather. Then, either harden the trail or consider the exclusion of stock while the trail remains susceptible to impact. Failure to consider the restriction of stock use during periods of wet weather will only result in continued trail erosion until the trail can be hardened or brought up to standard.

4. Remove the Horse Concessioner from the Basin and Relocate Elsewhere: This alternative was recommended in the 1975 Development Concept Plan for the Basin and is also addressed in the park's master plan. Failure to consider this option in the long range planning process will result in continued trail impact, water use, horse-hiker interactions, manure removal problems and continued summer fly problems.

Aoudads

1. Continue to Assess the Status of the Population: This alternative is a viable alternative and will become more important as time goes by. Migration of these animals from adjoining lands has a potentially high impact probability if allowed to continue unchecked. Failure to assess the status

of these animals within the park will only prolong and make more difficult the removal of the animals.

2. Continue Removal of This Exotic on an Opportunistic Basis: Failure to consider this alternative could result in the continued existence of animals which could have been removed.

Recommended Actions and Time Frames

Trespass Livestock

1. Continue alternatives 4, 5 and 7 on a day to day basis to keep abreast of potentially serious problems. Year 1-5.

2. Support alternative 3 to the maximum possible. Year 1-5.

3. Continue alternative 6 and fund fencing as possible. Year 1-5.

4. Investigate the feasibility to initiate alternative 8. Year 2-3.

Park and Concession Stock

1. Continue alternative 2 as manpower and funding permits. Year 1-5.

2. Consider the use of alternative 3 during periods of wet weather. Year 1-5.

3. Consider alternative 4 in the long range planning process. Year 3-5.

Aoudads

Continue alternatives 1 and 3 on a continuing basis. Year 1-5.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

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BIBE-N-009 Water Resources Management Profile

Statement of Problems

The Office of Water Resources, Ft. Collins, CO., is currently compiling a Water Resources Management Profile to be utilized as an appendix to this Resources Management Plan.

Background Information

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

BIBE-W-001 Hydrogeologic Study (Chisos Basin - Oak Spring)

Sewage effluent from the Basin developed area could possibly, over time, contaminate a key water source for the Basin. Ideally, a tertiary treatment sewage system in the Basin to re-cycle effluent and remove the need for sewage lagoons would alleviate the current potential problem. Funding levels preclude this alternative at this time. The U.S.G.S. is currently under NPS contract to complete a study delineating the parameters of the potential for contamination. The study is scheduled for completion in FY 89.

BIBE-W-002 Water Quality

The Rio Grande serves as one of the major attractions to the Big Bend area. The potential for using river water for potable water is very high when viewing the Castolon water problem, as well as the potential need for an alternative water source at Rio Grande Village, when considering the endangered species Gambusia gaigei which currently resides in the Spring 4 outflow. The river is used by float parties, fishermen, swimmers, and as a scenic attraction. As the use of the river increases, so will the concern about pollution. The Higher number of potentially adverse influences from developments, agriculture, stock use, and other land use practices, stress the need for a comprehensive water quality monitoring program. Pesticides, heavy metals, and more commonly measured parameters need to be monitored periodically, systematically and deligently over a long period of time to ascertain seasonality and the possible sources and extent of problems.

BIBE-W-003 Persimmon Gap Water Potential

Water is currently transported from Panther Junction via tank truck to Persimmon Gap developed area. Future development may call for an entrance station and/or possibly more housing. Alternatives must be developed to supply water to Persimmon Gay through wells, pipelines form adjacent ranches or from a pipeline from the Harte Ranch (a recent acquisition).

BIBE-W-004 Water Source Inventory (Springs)

An initial survey and inventory or approximately 180 water sources, consisting of tanks, seeps, springs, and tinajas, was completed 1976. An update of the water sources was completed in 1986 by park staff and the number of water sources now numbers over 200. 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 free water because of vegetation encroachment, particularly by Tamarix species. Critical wildlife an visitor use water sources need to be evaluated for potential development as key water sources. Each water source should be re-visited on a five year cyclic program. Only through such a program will long term trends become evident and short term changes noted.

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 on the Rio Grande and Rio Conchos drainages have resulted in flows that bear little resemblance to the historical river flows. The Rio Grande, between Presidio and El Paso is almost non-existent because of water diversion above and below El Paso. The Rio Conchos, flowing out of Mexico, supplies almost all the water to the Rio Grande flowing through Big Bend National Park. The Rio Conchos is controlled through three major impoundments in Mexico and while having some flood control capacity, their major function is to provide water for agriculture. This system of impoundments has vastly altered the river flow. One example of abnormal river flow occurred in October, 1978, when after an extended dry period, the impoundment were filled. Additional rains came and the threat of impoundment failure caused Mexico to release a massive outflow. The water reached 23.5' at Rio Grande Village and remained above 12 feet for a month. Normal flows at this time would have been 2-5 feet. Closely associated with this project would be one of Flood Plain Mapping. Historic, current and proposed flows need to be ascertained, particularly in light of the possibility of a third dam on the Rio Grande on the Texas-Mexico border.

BIBE-W-006 Flood Plain Mapping

The Flood Plain Management and Wetlands Protection Executive Order of 1978 mandates that flood plain mapping in national wetlands be carried out. Some mapping has been initiated by the Office of Water Resources but much remains to be done.

BIBE-W-007 Historic Water Use at the Developed Areas

The water use records need to be consolidated and analyzed to develop trends and ratios of water use/rate per developed areas to ascertain the effect of increased development on water use.

BIBE-W-008 Maverick Entrance Water Potential

Water will be required when the Maverick Entrance Station is put on line in F 89. Water will have to be supplied via transport from Panther Junction, wells, or pipeline from within or outside the park.

Recent Publications

1. Water Aquifer Study - Panther Junction Area (1982-1984).

   a. Abbott, C.L. 1983. Bedrock Aquifer Geometry in the Panther Junction Area of Big Bend National Park, Texas. M.S. Thesis, Texas A&M University, College Station, Texas 113pp.

   b. Cross, B.D. 1984. Application of Remote Sensing to the Groundwater Hydrology Study of Big Bend National Park, Texas. M.S. Theisi, Texas A&M University, College Station, Texas 80pp.

   c. Gibson, J.L. 1983. Ground-water Hydrology of the PAnther Junction Area of Big Bend National Park, Texas. M.S. Thesis, Texas A&M University, College Station, Texas. 110pp.

   d. Sepulveda, H.J.L. 1984. Environmental Isotope and Geochemical Investigation of Ground-water in Big Bend National Park, Texas. M.S. Thesis, Texas A&M University, College Station, Texas. 107pp.

   e. Wilson, M.P. and Schroeder, M.C. 1984. Ground-water Investigation in an Area of Big Bend Park, Texas. Typewritten Final Report, Texas A&M University, College Station, Texas: for The Office of Water Resources, NPS, SWRO, Santa Fe, New Mexico. 22pp.

2. Christensen, P.K. 1981. Hydrogeolic Reconnaissance of the Rosillos Mountains, Brewster, CO. Texas. Water Resources Report 81-3. NPS, SWRO, Santa Fe, New Mexico. 19pp.

3. Henry, C.D. 1979. Geologic Setting and Geochemistry of Thermal Water and Geothermal Assessment,. Trans-Pecos, Texas. Report of Investigation #96. Bur. of Econ. Geol. University of Texas at Austin. 48pp.

4. Howarth, V. 1976. Water Source Survey and Inventory, Big Bend National Park, Texas. 5 vol. on file at the Office of Resource Management, Big Bend National Park, Texas.

5. Leggett, E.R. Et. Al. 1968. Results of Water Resources Investigations at Big Bend National Park. Phase II. Typewritten Report, NPS, SWRO, Santa Fe, New Mexico. 15pp.

6. Lind, O.T. and Bane, C.A. 1975. A Limnological Survey of the Aquatic Resources of the Rio Grande Valley Between Hot Springs and Boquillas Canyon. Typewritten Report for ONR, SWRO, Santa Fe, New Mexico. 117pp.

7. Robert J.L. 1987. A Historical Water Quality Analysis of the Rio Grande from Presidio, Texas to Dryden, Texas. Typewritten Report to the Office of Resource Management, Big Bend National Park, Texas. 359pp.

8. Saunders, G.P. 1987. Analysis of Streamflow on the Rio Grande, Big Bend National Park, Brewster, Co., Texas. Typewritten Report to the Office of Resource Management, Big Bend National Park, Texas. 55pp.

9. Twichell, T. 1966. Results of Phase I, Water Resources Investigations, Big Bend National Park. Typewritten Report, Geol. Surv. Water Resources Division, Austin, Texas. 6pp.

10. Moore, G. 1980. Aquifer Test of Geothermal Spring 4, Rio Grande Village, Big Bend National Park. Water Resources Report 80-8, NPS, SWRO, Santa Fe, New Mexico. 26pp.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

9/88

BIBE-N-010 Fire Management (Basin Developed Area)

Statement of Problem

Increased fuel (brush and grass) in the Basin developed area threaten human life and property unless the current system of fuel breaks are maintained through the use of manual fuel reduction, prescribed fire, or both.

LaSala, (1976), in a trip report, stated that an extreme fire hazard situation existed in the Basin developed area. $7,500.00 was allocated from Regional reserves resulting in some work being accomplished in the 1970's. The Laguna Meadow fire of March 1980 emphasized the vulnerability of the Basin to wildfire. A draft hazard fuel reduction plan was completed in May 1980 but was never brought to fruition.

A year of heavy rainfall in 1981 again stimulated fuel buildup around the Basin developed area. A fact finding trip by Mike Warren in 1981 reached the following conclusion:

> "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 plain was completed in April, 1982 and 1983 but neither were implanted because of inclement weather. The fuel problem has since been ameliorated by a program of manual fuel reduction and prescribed burning of the fuel breaks. Burning and/or manual fuel reduction must be undertaken annually to maintain the fuel break system currently in place.

Current Management Action

Prescription burning and/or manual fuel reduction (suppression of shrub regrowth) must be accomplished annually to maintain the fuel break system. Burns will be accomplished on an opportunistic basis as weather and manpower permit. If burning is not accomplished, a manual reduction program will be initiate during the spring and summer to stress brush to the maximum. A four man fuel reduction crew was utilized during the summer of 1988 at a cost of $18,000.00

Current Publications

1. Griese, D.W. and Warren, M.C. 1980. Fire Use Plan and Report for Boot Canyon Plot 4 Research Burn. Typewritten Report on

File in the Office of Resource Management, Big Bend National Park, Texas. 26pp.

2. Kittams, W.H. 1979. Effect of Fire on Vegetation of the Chihuahuan Desert. Proc. Ann. Tall Timbers Fire Ecology Conf. pp.427-444.

3. Meents, J.K. and Moir, W.H. 1982. Fire Ecology of Desert Grasslands, Big Bend National Park, Texas: Description of Experimental Plots, Evaluation of Natural Burn and Literature Review. CDRI Cont. 120, 30 pp.

4. Moir, W.H. 1980. Forest and Woodland Vegetation Monitoring, Chisos Mountains, Big Bend National Park, Texas. Baseline - 1978, CDRI Cont. 83, 60 pp.

5. Moir, W.H. and Meents, J.K. 1981. Fire Ecology Study of the Chisos Mountains, Big Bend National Park, Texas. Phase II: Effect of a Prescribed Burn in Boot Canyon and Description of two new Reference Plots. CDRI, Cont. 117. 29pp.

6. Moir, W.H. 1982. A Fire History of the High Chisos, Big Bend National Park, Texas. The Southwestern Naturalist. 27(1) pp. 87-98.

7. N.P.S. 1980. Fire Management Plan, Big Bend National Park, Texas. Typewritten Report on file in the Office of Resource Management, Big Bend National Park, Texas.

Alternative Actions and Probable Impacts

1. No Action: This alternative will only increase the problem over time and within three growing seasons the brush will once again become a serious threat to life and property in the Basin developed area.

2. Mechanical Removal of Brush Regrowth and/or Prescribed Fire: This alternative provides for a flexible management option and is currently being used. This option involves a commitment of manpower over a long time frame.

3. Expand the Burn Program: This alternative is a viable option and will be utilized under very controlled conditions. The possibility of an adverse situation occurring is high and extra manpower and expertise will need to be available before this option is exercised.

4. Develop and Action Plan for the Annual Fuel Reduction Program: This alternative needs to be addressed as soon as possible or past work may not be documented thus resulting in lost data concerning past treatment to specific sections of fuel breaks.

5. Herbicide Application; A last stand alternative to be used only when all else fails and approval can be obtained.

6. Update the Fire Management Plan: The Plan is in need of updating to address the Basin Developed area and the Chisos Mountains. Current reaction is to suppress all fires which "Threaten" the Chisos.

Recommended Action and Time Frames

1. Prescribed burning and/or use of mechanical reduction of shrub regrowth must be implemented annually as weather and manpower permits. No fuel break should go more than two years without late spring/early summer and manual brush regrowth reduction. Fall and winter burns are recommended to stimulate grass reproduction. Year 1-5.

2. Develop a documentation program to periodically record the status of the fuel breaks. This could include an Annual Action Plan. Year 1-2.

3. Update the Fire Management Plan. Year 1-2.

4. Investigate the feasibility of expanding the burn program to areas outside the existing fuel breaks. Year 2-3.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

9/88

BIBE-N-011 Vegetation Management Plan

Statement of Problem

There are numerous actions associated with the vegetative component of Big Bend National Park. Many projects are undertaken with little or no planning effort resulting in unfavorable results or unexpected results over time. Road construction and maintenance, fuel reduction programs, fire management, historic preservation, research, monitoring, exotic species, and U.S. Fish and Wildlife listed species all contribute to the need for an overall vegetation management plan which would serve as an umbrella to coordinate the various programs affecting the vegetative component of the park.

Background Information

The parkwide operations evaluation conducted in October, 1987, stated that Big Bend National Park was in need of an overall vegetation management plan which would serve as an umbrella document to coordinate the various programs and projects affecting the park's vegetation component. The diverse, interdivisional complex vegetational management projects and programs have been dealt with as individual components or projects with little cross referencing to other projects.

Current Management Action

The park currently is involved with many vegetation projects such as: roadside maintenance, major roadway rehabilitation, research on the vegetation, fire management, exotic species management, endangered species monitoring and management, habitat management, trails rehabilitation, etc.

Alternative Actions and Probable Impacts

1. No Action: This alternative is not a viable alternative in that the various projects and programs area becoming so intertwined and interwoven as to have the potential to impact seriously endangered species, or to add to the already increasingly difficult exotic species problem.

2. Develop an Umbrella Vegetation Management Plan: This alternative is viable and should be initiated as soon as possible, at least in an outline format to delineate the various projects and programs which have a potential to impact the vegetative component of the park.

3. Initiate Ground work to Establish a Vegetation Resource Management Specialist Position: This is a viable alternative and will require either a reallocation of FTE and funds or an increase in the park's FTE and funding level.

Recommended Actions and Time Frames

1. Initiate alternative 2 as soon as possible. Year 1 - 2.

2. Initiate alternative 3 as soon as possible. Year 1 - 2.

3. Have both alternative 2 and 3 in place by year 3.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-012 Mountain Lion Study, Monitoring and Management

Several incidents of lion/human interactions, coupled with a relatively high number of lion sightings (600+) since 1952 would indicate a serious need for the park to develop a monitoring/management program, as well as develop basic information concerning lion/human interactions and what causes serious confrontations.

Background Information

McBride (1976), estimated the park's mountain lion population to be between 10-20 lion at any one point in time. Leopold (1983), estimated a population of between 14-16 adult lions utilizing in the park at any one time. Since these two estimates, the Texas Parks and Wildlife Department initiated a five year predator removal program for the Black Gap Wildlife Management Area adjacent to the Park's eastern boundary and to date have removed 26+ lions. Pence, Et. Al. (1987) estimated 10 adult lions utilized the park in 1985. Pence, Et. Al. (1987) reported on population levels, travel routes, sex ratios, and suggested several management actions in dealing with problem lions. McBride and Ruth, in progress, are currently analyzing the effects of changes in visitor use on Mountain Lions within the high Chisos Mountains.

Current Management Action

The park maintains an observation/incident file on mountain lions which is consolidated monthly as part of the general lion data base for the park. There are currently seven lions being monitored on a day-to-day basis. The park must make a decision soon as to what extent in-house monitoring can continue and what research is needed to assist in the management program for problem lions. The results of McBride and Ruth work will be available in late October and should be important in the determination of the next step.

Current Publications

1. Anderson, A.E. 1983. A Critical Review of Literature on Puma (Felis concolor) Special Report #54. Colo. Div. of Wildlife.

2. Fleming, C.M. 1988 Lion-Human Interactions in Big Bend National Park. Paper Presented at the 2nd, Social Science Symp. at the University of Il. 12pp.

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

4. McBride, R.T. and Ruth, T.K. In Progress. Mountain Lion behavior in Response to Visitor Use in the Chisos Mountains of

Big Bend National Park, Texas. Contract #7130-7-0002, Big Bend National Park, Texas.

5. Pence, D.B., Warren, R.J., Waid, D. and Davin, M.J. 1987. Aspects of the Ecology of Mountain Lions (Felis concolor) in Big Bend National Park. Typewritten Report to the Office of Natural Resources, NPS, SWRO, Santa Fe, New Mexico. 81pp.

6. Smith, T.E.; Et. Al. 1985. Mountain Lions (Felis concolor) in the Vicinity of Carlsbad Caverns National Park, New Mexico and Guadalupe Mountains National Park, Texas. An Ecological Study. Final Typewritten Report for ONR, SWRO, NPS, Santa Fe, New Mexico. 137pp.

Alternative Actions and Probable Impacts

1. No Action: This is not a viable action because of the relatively high numbers of documented lion sightings and the relatively recent unusual lion/human incidents. Three lions removed from the population since 1984 because of unusual behavior.

2. Maintain Observation Card File: This option is necessary to continue to document lion/human incidents. This system is in place and the data is updated monthly and added to the growing data base.

3. Develop a Monitoring Program: This alternative is basic to a lion management program and will prove to be long-term in nature, labor intensive, and expensive. This facet is necessary if the park is to keep abreast of the situation at any point in time. This alternative requires the presence of a monitor; aircraft overflights; radio telemetry and associated equipment and collaring capability.

4. Develop an Emergency Action Plan: A semblance of this is in place but needs to be formalized with concurrence from management.

5. Develop a Sensitivity Program to Instill Fear/Respect for Humans: This is a very viable alterative but one which will require considerable thought before the initiation of a technique. It has become evident that certain techniques may not adversely affect some lions.

6. Develop an Educational Program: This is a viable option and is necessary so that park visitors can be informed of step up activities concerning lion/human incidents.

7. Remove Known Lion Population: This alternative is not acceptable based on the mission of the National Park Service.

8. Establish a Position to Monitor Wildlife Populations: A viable alternative which would require a allocation of FTEs and funding, or the addition of an FTE and funding.

9. Support Future Lion Research: This alternative is necessary to develop the necessary data so that management can better anticipate future problem situations and take immediate action to preclude serious lion/human interactions.

Recommended Actions and Time Frames

1. Continue Alternative #2 on a day-to-day basis with monthly consolidation. Year 1-5.

2. Develop Alternatives #4 and #6. Year 1-2.

3. Carry Out Alternative #3 as money and manpower permit. Year 1-5.

4. Initiate Alternative #9 and keep abreast of Interested parties. Year 1.

5. Initiate Alternative #8 as may be possible. Year 1-2.

6. Initiate Alternative #5 as long range program. Year 2-5.

This project is categorically excluded from NEPA requirements a the proposed project is neither significantly controversial nor will it significantly effect the environment.

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 Concessioner and private residence commercial pesticide programs; the training of pesticide program managers for application and certification; and finally, the maintenance of a meticulous record system to document pesticide use.

Background Information

The National Park Service reduced it's level of pesticide use by approximately 80% in FY 1983 as a result of adopting a very restrictive pesticide use program. IPM requires a much more sophisticated approach to pest management which, in turn, requires increased skills and knowledge in pest management by individuals involved in pest management programs.

Current Management Action

There is currently a certified, non-commercial, pesticide applicator on the park staff who is State certified for Forest weed/brush and insect/disease control and Department of Defense certified for the following categories: 2, Forest Pest; 3, Ornamental and Turf; 5, Aquatic; 6, Right of Way; 7, Industrial, Institutional and Structural; and 8, Public Health. The park currently has no one State certified for structural pest control.

The park currently has approval for several pesticides to manage individual specific pest problems and is developing an IPM 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 maintains a restricted access pesticide storage system and maintains pesticide use logs.

Current Problems/Programs Requiring IPM

1. Problem Javelina in the Panther Junction Developed area.
2. Flies in the developed areas, particularly around corral operations.
3. Poisonous snakes in the developed areas.
4. Brush (Fuel Reduction Program, Basin developed area) and Panther Junction developed area.
5. Vegetation removal along roadsides and around signs and historic structures.

6. Brown-headed Cowbird/Black-capped Vireo interaction.
7. Structural Pests (cockroaches, mice, termites, wasps, skunks, ants).
8. Beaver/Gambusia gaigei habitat interaction.
9. Tamarix species/backcountry water source interaction.
10. Salsola species/new construction sites and roadways.
11. English Sparrow/Bats/Barn Swallows around structures in developed areas.
12. Mountain lion monitoring, particularly around the developed areas.
13. Trespass livestock along park boundaries.

Alternative Actions and Probable Impacts

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

2. Consolidate Information on Specific Pest Problems: Develop a priority system for developing IPM programs. Failure to develop such a system will result in continuing the current hodgepodge of programs.

3. Develop a Level of Expertise and Certification among NPS Concession Employees: A certification program for structural application is sol\rely needed for in house structural pest problems within Concessions, Resource Management and Maintenance. A certification program for pesticide use other than structural is needed likewise. Failure to develop in house certification programs will only delay some projects.

4. Develop an IPM Program to Address Concessioner Pest Control Concerns: In house NPS and concession expertise is needed to comply with current NPS IPM Policy. Modification of the current commercial pesticide program is likewise needed to comply with current policy. Failure to develop expertise to modify current commercial program will only prolong NPS compliance to current NPS IPM policy.

5. Develop an Overall Pesticide/IPM Annual Program for the Park: Failure to accomplish this task only delays developing a framework for the parks overall pesticide program.

Recommended Action and Time Frames

1. Complete alternative #2 as soon as possible. Year 1-2.

2. Complete alternative #3. Year 2-4.

3. Complete alternative #4 and implement. Year 2-5.

4. Complete alternative #5 and implement. Year 2-4.

This project is categorically excluded from NEPA requirement as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-014 Endangered Species: Black-capped Vireo

Statement of Problem

Marshall (1985), reported that the Black-capped Vireo, Vireo atricapillus, was being severely impacted by loss of habitat and nest parasitism by cowbirds and should be listed as an endangered species. The species was listed as endangered by the U.S. Fish and Wildlife Service in the October 6, 1987 edition of the Federal Register.

Background Information

Wauer (1985) reported finding nests and young Black-capped Vireos up until 1973 but in very small numbers. Marshall (1985) Located six singing males in the park in the park in May, 1985, all of which wee located in relatively isolated areas. The park has an active cowbird population encouraged by developments and corral operations, primarily at Panther Junction and the Basin. It is currently suspected that the Black-capped Vireo population is being parasitized by cowbirds to the point of jeopardy.

Current Management Action

The park currently traps cowbirds and annually censuses Black-capped Vireos. The park constructed a cowbird trap in the Basin in the vicinity of the Chisos Remuda in 1986 and removed over 200 cowbirds from the Basin area. Over 400 cowbirds were removed from the Basin are in 1987. A new trap was installed at the Panther Junction corral are in 1988.

The 1986 spring census documented four singing males (McKinney, 1986) and the 1987 census documented nine singing males with in the park and one singing male outside the park (McKinney, 1987). An annual Black-capped Vireo census will be conducted along with removal of cowbirds from both the Panther Junction and Basin corral areas until at least the fall of 1990, at which time the program should be re-assessed.

Current Publications

1. Marshall, J.T. and Clapp, R.B. 1985. Status Report: Vireo atricapollius Woodhouse, Black-capped Vireo. Typewritten Report to the Office of Endangered Species, USF&WS, Albuquerque, N.M.. 55pp.

2. Waure, R.H. 1985. A Field Guide to Birds of the Big Bend. Texas Monthly Press, Austin, TX. 283 pp.

3. McKinney, B. 1986. Brown-headed Cowbird (Molothrus ater) trapping Program in Big Bend National Park, Texas. Typewritten Report submitted to the Office of Endangered Species, UFS&WS, Albuquerque, N.M. 7 pp.

4. Scott, P. and McKinney, B. 1986. A Survey of Black-capped Vireos in Big Bend National Park, TX. Filed field notes in the Office of Resource Management, Big Bend National Park, TX.

5. Davin, M. and McKinney, B. 1987. Report on Brown-headed Cowbird trapping in Big Bend National Park. Typewritten Report in file in the Office of Resource Management, Big Bend National Park, TX

6. McKinney, B.R. 1987. Population Status of Vireo atricappillus Woodhouse in the Big Bend Region of Texas -- 1987. Typewritten Report to the Office of Endangered Species, USF&WS, Albuquerque, N.M. 27 pp.

Alternative Actions and Probable Impacts

1. No Action: Not a viable alternative since the species has been listed as endangered and the park maintains a "suspected" artificially high cowbird population in the developed areas of the park.

2. Census Black-capped Vireo population: A viable alternative which should be carried out annually.

3. Trap Cowbirds: A viable alternative. Continue to trap cowbirds from both Panther Junction and the Basin through the spring of 1990.

4. Analyze Effect of Cowbird Removal Program: Failure to undertake this alternative will result in a missed opportunity.

5. Develop an Action Plan: This alternative is crucial to the continuation of the Vireo/cowbird program in place.

6. Document all Black-capped Vireo Sightings: Failure to do so will result in loss of valuable data.

7. Encourage M.S. Thesis Candidate: This project would provide an excellent opportunity for graduate work.

Recommended Action and Times Frames

1. Initiate alternative #2,3, and 6 annually; year 1-5.

2. Initiate alternative #5 ASAP prior to the spring of year 2.

3. Initiate #7 ASAP; year 1-2.

4. Initiate #4; prior to fall/winter of 1990.

This project is categorically excluded from NEPA requirement as the proposed project is neither significantly controversial nor will it significantly effect the environment.

8/88

BIBE-N-015 Update of Geological Base Map and Information Base

Statement of Problem

The current geological map of the park was completed in 1966 at a scale of 1:62,500 and is in need of updating and revision.

Background Information

Maxwell's geologic map has served the park and researchers as "the geologic map" for 20 years. The park is currently using the scales of 1"24,000 and 1:100,000 as base map scales. There have been a multitude of geologic studies completed over the past 20 years and the "geology" of Big Bend National Park needs updating to include new findings.

Current Publications

Maxwell, R.A., Lonsdale, J.T., Hazzard, R.T. and Wilson, J.A. 1967. Geology of the Big Bend National Park, Brewster County, Texas. University of Texas at Austin, Bureau of Economic Geology, Publ. 6711.

See Bibliography for numerous publications since 1967.

Alternative Actions and Probable Impacts

1. No Action: Not a viable option. The longer the park has to depend on the outdated and off-scale map the longer the wait for park base map standardization.

2. Consolidate Geologic Information: This alternative is sorely needed so that the new base maps can be compiled at current base map scales.

3. Photographically Enlarge/Reduce Current Map: This alternative is at best only a stop-gap solution.

Recommended Action and Time Frames:

1. Initiate alternative 2 during years 2-5.

There has been a standing offer from the Bureau of Economic Geology that they would possibly match funds to the tune of $25,000 if this project could be funded and the Bureau selected to do the work.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

4/88

BIBE-N-016 Survey Maderas del Carmen Mountains for Base Line Data for Data Base Comparison to the Chisos Mountains

Statement of Problem

Little is known about the Maderas del Carmen Mountains of Mexico, particularly about how they compare to the High Chisos from a natural history standpoint.

Background Information

There has been interest for many years to develop a companion park across from Big Bend National Park. Recent discussions have centered on the Maderas del Carmen Mountains near Boquillas, Mexico, as a potential companion park area, particularly in light of Big Bend National Park being a Biosphere Reserve. Base line data is skimpy at best concerning the Maderas del Carmens. A cooperative joint effort to study the area is needed to survey for endemics, geology, climate and the natural history and how the data may relate to the High Chisos Mountains within the park.

Current Management Action

The park has supported the concept of a companion park and has been involved in several meetings with various Mexican officials concerning the establishment of a companion park area.

Publications

Taylor, W.P. et. al. 1946. The Sierra del Carmen in Northern Coahuila. Texas Geographic Magazine. Vol. 10, pp. 11-22.

Alternative Actions and Probable Impacts

1. No Action: This alternative is not a preferred alternative due to the Biosphere designation of Big Bend National Park and the long standing interest in the development of a companion park. This alternative is, however, a viable alternative, particularly if Mexico chooses not to support the concept.

2. Initiate a Unilateral Base Line Research Project: A viable alternative but will require Mexican permits and possible funding of Mexican assistance.

3. Initiate a Bilateral Base Line Study: This alternative, unless totally U.S. funded, would probably not be openly received in Mexico at this time because of current economic difficulties.

Recommended Actions and Time Frames

1. Initiate alternative 2 as soon as possible so that the data acquisition can begin. Year 1-3.

2. Initiate alternative 3 when Mexico can feasibly match funding for such a project. Year 3-5.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-017 Inventory System for Deer and Javelina

Statement of Problem

There is no current population estimate for javelina. The last mule deer estimate was by Leopold (1984), and he hedged his final estimate by not delineating any specific numbers. Pence, et. al. (1986) estimated the white-tailed deer population at 500 +/- 20%. Recent findings by Cook (in progress) indicate that without good base line surveys of mule deer populations transect data can be highly inaccurate.

Background Information

Mountain lion food habits have changed over the past decade, reflecting an increase in the use of javelina over deer. Old timers reflect that there area fewer mule deer in the park than there were a decade ago. Leopold indicated a drastic reduction in the mule deer population in the park since the 1970's. To the best of our knowledge, there have been no base line surveys of javelina, mule deer or white-tailed deer populations on a park wide basis. All previous work utilized transect data. Recent work on the Black Gap Wildlife Management Area by Cook (in progress) indicates that mule deer populations cannot be accurately monitored through only transect data, but must be periodically surveyed.

Current Management Action

The park currently runs a ten mile night spotlight census route (Route 14) twice a month and has accumulated data for approximately five years. The Texas Parks and Wildlife Department runs a night spotlight count during September on Route 15 as a control data base for a study on the Black Gap WMA. At this time there is little known about the current status or trend in the deer or javelina populations in the park other than it appears that the mule deer population is down from the 1970's and that the white-tailed deer population appears to be stable.

Current Publications

Atkinson, D.E. 1976. Population Dynamics and Predator-Prey Relationship of the Carmen Mountain White-Tailed Deer. M.S. Thesis, Texas A&M University, College Station, Texas.

Bissonette, J.A. 1982. Ecology and Social Behavior of the Collared Peccary in Big Bend National Park. NPS Scientific Monograph #16.

Krausman, P.R. 1976. Ecology of the Carmen Mountain White-Tailed Deer. PhD. Dissertation. University of Idaho, Moscow, Idaho.

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

Leopold, B.D. and Krausman, P.R. 1986. Diet of Three Predators in Big Bend National Park, Texas. The Journal of Wildlife Management, 50 (2).

Pence, D.B., Warren, R.J., Waid, D. and Davin, M.J. 1986. Aspects of the Ecology of Mountain Lions (Felis concolor) in Big Bend National Park. Final Report to the Office of Natural Resources, Southwest Regional Office, National Park Service, Santa Fe, New Mexico.

Alternative Actions and Probable Impacts

1. No Action: This is not a viable option, as the park is expected to keep abreast of changing population trends.

2. Survey All Three Populations Using the Best Technology Available: The preferred option, but also the most expensive as it requires considerable aircraft use. Failure to accomplish this alternative will only result in a continued lack of current information on population status.

3. Survey Individual Populations Using the Best Technology Available: A viable option but one which will require more time and be more expensive in the long run. Failure to initiate this alternative will result in the lack of current information on population trends.

4. Set up a Series of Areas to Survey Intensely and Extrapolate Data: A viable option but one which leaves a large margin for potential error in the data base. This alternative could serve as a basis for trend data.

5. Encourage the Private/University Sector to Accomplish the Program: A viable option but not a realistic answer to the problem. This alternative will probably result in the work not being accomplished.

6. Continue Spotlight Data System Currently in Place: A viable option which will result in a continuation of data.

Recommended Action and Time Frames

1. Continue alternative 6. Year 1-5.

2. Initiate either alternative 2 or 3 as soon as possible and place on a five year cyclic program as a minimum. Year 2 and 7.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-018 Geographic Information System

Statement of Problem

Big Bend National Park is rapidly building a data base which is in dire need of digitization for use in a mapping system. Basic data currently include 1:24,000 quadrangle maps; 1:100,000 park base map; soils map; geology map; archeological sites; historical sites; water sources; lion home range data; endangered species data; vegetation association information, etc.

Background Information

A cooperative agreement is in effect to work with Texas A&M University through the Cooperative Parks Study Unit to develop an initial base line data geographic information system for Big Bend National Park.

Current Management Action

The park has been developing various data bases over the past ten years and has reached the point where the data has outstripped human capability to work with the tremendous amount of data on hand.

Current Publications

Graham, L.A. and Coulson, R.N. 1988. A Plan for Providing Work Stations and Data Base Development and Support for Big Thicket National Preserve, Big Bend National Park and Padre Island National Seashore. A Cooperative Proposal between the K.E.L.; Department of Entomology; Texas A&M University; and National Park Service, SWRO, Santa Fe, New Mexico. 35 pp.

Alternative Actions and Probable Impacts

1. No Action: Not a viable option as the information base has grown beyond human capabilities to integrate and overlay various data bases.

2. Contract out Basic Data Base Compilation: A highly viable option which is probably the best option to get into the GIS business.

3. Attempt to develop GIS in House: A viable option but one that would require an inordinate devotion of manpower and time for questionable results.

Recommended Action and Time Frames

1. Initiate alternative 2 as soon as possible.

This project is categorically excluded from NEPA requirement as the proposed project is neither significantly controversial nor will it significantly effect the environment.

8/88

BIBE-N-019 Endangered Species; Mexican Long-nosed Bat (+ Bat Re-Survey)

Statement of Problem

The Mexican long-nosed bat (Leptonycteris nivalis) will be listed as either endangered or threatened by the U.S. Fish and Wildlife Service before the end of FY 1988. Other than that the bat resides in one cave in the park and that its numbers appear "relatively stable" to date, little is known about the bat and the ecological relationships within the park during its warm season residency. The same is true about many of the other 18 species of bats which occur in the park.

Background Information

The Mexican long-nosed bat overwinters in Mexico and this is apparently where it is heavily impacted by the loss of habitat, loss of food sources and outright loss of life. One colony has been reported from the United States within Big Bend National Park s a summer resident population. Easterla (1972) estimated the population at approximately 10,000 individuals within the park in the early 1970's, whereas Wilson, et. al. (1984) reported only 1,000 bats within the park. A recent survey by Howell (in press) reports approximately 5,000+ bats in the park in 1988.

Current Management Action

The habitat of the bats is closed to visitor use only through word of mouth at this time. The area is not signed nor is it monitored for use. A survey of the population was completed this past summer and should be completed annually in the future.

Recent Publications

Easterla, D.A. 1972. Ecological Aspects of the 18 Species of Chiroptera at Big Bend National Park, Texas. PhD. Dissertation, Purdue University, Lafayette, Indiana.

Howell, D. In Press. Survey of Mexican Long-nosed Bat (Leptonycteris nivalis) in Big Bend National Park. Typewritten report for the Office of Resource Management, Big Bend National Park, Texas.

Wilson, et. al. 1984. Bats from Northeastern Mexico, with a Checklist of Species. Status Report on Leptonycteris nivalis funded by the Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Alternative Actions and Probable Impacts

1. No Action. This option is not a viable alternative as this species is to be listed in a very short time.

2. Continue to Monitor the Population and Take Steps to Insure Protection of Habitat. This is a preferred option in that if steps are not taken to monitor population and insure habitat protection we could inadvertently lose the bat from the park.

3. Resurvey All the Bat Species in the Park with Special Emphasis on the Spotted Bat (Euderma maculatum). This is a viable option.

4. Develop an Action Plan for the Management of Leptonycteris nivalis. This is a viable option and failure to carry out this alternative could lead to the loss of the bat in the park.

Recommended Actions and Time Frames

1. Initiate alternative 2 as soon as possible. Year 1.

2. Initiate alternative 4. Year 2.

3. Carry out alternative 2. Year 2 - 3.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-020 Harte Ranch - Resource Basic Inventory

Statement of Problem

A recent donation of 57,125 acres adjacent to the northwest boundary of the park will require consolidation of available resources information and some basic field work to develop base line data concerning resources.

Background Information

Congress authorized the acquisition of the Harte Ranch (67,125 acres) on December 22, 1987. Although the deed transfer from the Nature Conservancy to the National Park Service has yet to take place, the transfer is imminent and basic resource information needs to be consolidated and documented.

Current Management Action

The park has acquired aerial photography (1985) and mylars of the 7.5 minute quadrangle maps of the area. Some data currently exists and other projects area underway through the Nature Conservancy and the State of Texas. A range management plan exists through the Soil Conservation Service and the final boundaries will be verified in the deed. The park will staff a full time permanent position upon final transfer of the property.

Current Publications

Wulfkule, V.A. 1984. The Buttrill Ranch Complex, Brewster County, Texas: Evidence of Early Ranching in Big Bend. Typewritten Report. Texas Historical Commission, Austin, Texas. 140 pp.

Alternative Actions and Probable Impacts

1. No Action: Not a viable option. Failure to obtain basic resources information will result in the loss of data.

2. Locate and Acquire Basic Information which is Currently Available: A viable option. Failure to undertake this task will result in information loss.

3. Develop a Systematic Data Base on Soils, Geology, Vegetation, Fauna, History and Archeology for the Area. A highly recommended option. Failure to systematically acquire data will result in data gaps.

4. Tie Data Bases into Overall Park Data Base. A viable option. The sooner this task is accomplished the better.

Recommended Actions and Time Frames

1. Initiate alternative 2 as soon as possible. Year 1.

2. Initiate alternative 3 as soon as possible. Year 1 - 5.

3. Initiate alternative 4. Year 1 - 3.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-N-021 Assess Backcountry Use and Impacts

Statement of Problem

Recent changeover in the High Chisos Mountains from zone use to designated site camping has resulted in fewer "perceived" impacts and violations from camper use in the High Chisos. Little is known about the desert zones and the Mesa de Anguila. These areas need basic assessment work to determine the impacts from backcountry camping use.

Background Information

The changeover in the backcountry use system in the High Chisos has resulted in fewer "perceived" impacts and fewer violations concerning camping. Consideration of the use of designated sites parkwide has resulted in questions being raised concerning the need to change from zone to designated sites along the river and in the desert areas.

Current Management Action

The park continues to utilize the zone system throughout the desert and river areas. Little or no on-site assessment has been made except for the river and the Mesa do Anguila, which receives heavy use, particularly in the spring. No assessment program, except for video taping in the High Chisos, is in effect.

Current Publications

Custis, K.A. and Wells, J.F. 1985. An Inventory and Impact Assessment of the campsites in Sub-zones 01 and 02 of the Mesa de Anquila. Typewritten Report on file with the Office of Resource Management, Big Bend National Park, Texas.

Ditton, R.B. and Bobbitt, J.S. 1982. An Analysis of Backcountry Use at Big Bend National Park: 1980-1981. Department of Recreation and Parks. Texas A&M University, College Station, Texas. 93 pp.

Ditton, R.B., Graefe, A.R. and Mertens, T.J. 1977. River Road Camping in Big Bend National Park; A Survey and Analysis. Department of Recreation and Parks. Texas A&M University, College Station, Texas. 74 pp.

Schmidly, D.J. and Ditton, R.B. 1976. A Survey and Analysis of Recreational and Livestock Impacts on the Riparian Zone of the Rio Grande in Big Bend National Park. Department of Recreation and Parks. Texas A&M University, College Station, Texas. 159 pp.

Alternative Actions and Probable Impacts

1. No Action: A viable action but one which will only result in a lack of knowledge and understanding about degrees of impacts in the desert zone.

2. Re-survey the Mesa de Anguila to Compare 1985 data to 1990 Status: A viable option and highly recommended for implementation. Failure to accomplish this option will result in a lost opportunity.

3. Begin a Systematic Zone by Zone Survey of the Desert Zones to Document Use and Impacts: A viable option but would be a major undertaking. Failure to initiate such a project will result in a poor understanding of the current impacts to the resources associated with camping.

4. Re-survey and Write Up a Report on the High Chisos Conversion from Zone to Designated Site Camping: A high priority project. Failure to carry out this task will result in a continuation of uncertain results.

Recommendations and Time Frames

1. Implement alternative 2 in 1990. Year 2.

2. Implement alternative 4. Year 1.

3. Initiate alternative 3. Year 3 - 5.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-M-001 Trails Maintenance

Statement of Problem

The trails program at Big Bend National Park has suffered from poor planning, lack of funding and lack of manpower for an extended period of time. Along with the added factors of erosion and use, this has resulted in a trail system requiring major rehabilitation.

Background Information

A set of trail standards has been developed and a basic inventory has been completed. A recent trail study (May, 1988) indicated a need for $1,179,000 to bring the park's trails up to standards set for trail type. There has been no consensus within the park staff on how best to attack the trails problem. The use of heavy mechanized equipment by inexperienced personnel has resulted in unnecessary vegetation damage. The use of barrow material has resulted in scars which take a relatively long tine to heal. And, the inordinate amount of rock work, while aesthetically pleasing, requires much time and effort. These points of disagreement along with poorly thought out vegetative rehabilitation work has lead to a major crisis, both internally and externally.

Current Management Actions

An inadequately staffed, trained and experienced trail crew is attempting accomplish major reconstruction and moderate and light trail maintenance on the following trail system:

Trail Designation	# of Trails	# of Miles
Interpretive, self-guiding	10	6.6
Special Use	6	4.2
Foot-stock/Developed	5	12.85
Foot intensive/Developed	3	8.5
Foot-stock/Primitive	8	36.8
Primitive	12	66.47
Primitive Way	8	69.2
	52	204.62

The trail crew has attempted to bring the Chisos Mountain trails up to standard for the past 5 to 7 years. They have yet to complete the major upgrading necessary to place the trails into a light/moderate trails maintenance category.

This past FY (88) the Resource Management and Visitor Protection Division assisted the trail crew with light maintenance to enable the crew to address more serious needs. A major thrust will yet be required to make headway in the continuing deterioration of the trail system.

Recent Publications

Berry, B. 1988. Park Wide Trail Study, Trail Inventory and Condition. A Typewritten synopsis on file in the Office of the Chief of Maintenance, Big Bend National Park, Texas. 4 pp.

Cox, A. 1987. Action Plan for Light Trail Maintenance of the Chisos Mountain Trails. Typewritten Action Plan for FY 88 Fee Enhancement Funding. On file in the Office of Resource Management, Big Bend National Park, Texas. 5 pp.

Leons, J. 1986. Trail Standards for Big Bend National Park. Typewritten publication on file with the Office of the Chief of Maintenance, Big Bend National Park, Texas.

Alternative Actions and Probable Impacts

1. No Action: This alternative is not acceptable. Failure to bring the trail system up to standard will only add to future costs. Major rehabilitation and reconstruction will be needed once the tails deteriorate to the point of becoming safety hazards.

2. Continue Current Program: The current program is understaffed, underfunded and appears to be slowly but surely losing ground. This alternative will only result in substandard work and the gradual deterioration of the trail system.

3. Contract Out Major Trail Reconstruction: A viable option which will be extremely expensive an require constant oversight.

4. Expand Current Trail Program to Enable Major Trail Reconstruction: A viable option which will require FTEs and considerable funding over the next 2 to 5 year period. The program would be reduced at a future point.

5. Restrict Stock Use on Trails During Periods of Wet Trail Conditions: This is a viable option but one which will adversely impact the horse concessioner.

6. Selectively Harden Highly Erodible/Impacted Trail Sections Used by Stock: A viable option which would only suffice as a "holding" action and continue to add to the hodge-podge current program.

7. Initiate a Systematic, Multi-Faceted Program of Contract Construction/Moderate and Light Trail Maintenance: A viable option, but one which will require teamwork, FTEs and additional funding to make it jell and realize overall progress.

8. Remove Heavy Trail Equipment from the Backcountry Trail System: This is a viable option which would be required if a wilderness situation prevailed. This should be the overall goal of the trails program.

Recommended Actions and Time Frames

1. Initiate alternative 3 & 4. Year 1.

2. Initiate alternative 7. Years 2-5.

3. Initiate alternative 6. Year 1.

4. Initiate alternative 5. Years 2-5.

5. Initiate alternative 8. Year 5.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

A SYNOPSIS OF THE CHRONOLOGICAL FRAMEWORK FOR THE ARCHEOLOGICAL RESOURCES OF BIG BEND NATIONAL PARK

To the casual visitor, Trans-Pecos Texas, especially the Big Bend region, presents a face of harsh desolation--austere panoramas-open expanses of cactus and scrub brush broken by rugged exposures of rocky terrain, towering pinnacles and deeply etched canyons. The concept of the Big Bend as "despoblado" or unpopulated, is difficult to dispel, but when one considers the archeological record of this region, the fact emerges that Trans-Pecos Texas has been more or less continually occupied by man for thousands of years. The record of man's prehistoric activities in the Trans-Pecos is poorly understood at best, limited by the paucity of available research data. Although the archeological record is incomplete, it does reveal that earlier inhabitants developed a nomadic hunting and gathering lifestyle so successful that it remained virtually unchanged for several thousand years.

An understanding of the prehistoric past is dependent upon interdisciplinary research in such studies as paleontology, geomorphology, paleobotany, and palynology. Although data from these various disciplines do not always concur,an emerging pattern of a gradually changing environment is evident. At the close of the Pleistocene, a cool, moist climate prevailed. Widespread woodlands containing primarily ponderosa pine and Douglas fir occurred at higher elevations and a pinyon-juniper-oak woodland extended to as low as 2000 feet above sea level. Since about 9000 B.C. an overall gradual warming and drying trend has brought about an upward displacement of woodland biotic communities and a spread of xerophytic Chihuahuan desert species. Additionally, potable water sources such as springs, have become more scarce during the recent Holocene (Mallouf 1981).

This gradually changing environment was exploited by prehistoric human inhabitants in a variety of ways. Generally speaking, throughout the period from 10,000 B.C. into the Historic period, the archeological record reveals a gradual shift from a hunting based economy centered around large game, to one which effectively combined a nomadic seasonal gathering of a variety of plant foods, supplemented by hunting for small game.

Many chronological schemes have been suggested which attempt to organize the existing archeological data into meaningful temporal sequences. Although these chronological sequences often conflict, six broad categories are more commonly accepted: Late Paleo-Indian, Early Archaic, Middle Archaic, Late Archaic, Late Prehistoric, and Historic. Until further definitive information is available, the duration of each period and the time of transition from one period to the next remains speculative (Mallouf 1985).

Late Paleo-Indian Period (ca. 8000-6500 B.C.)
Virtually nothing is known about regional lifeways of the people during this time period. Generally speaking, this period is marked by a nomadic, plains oriented, large game hunting economy; there is some evidence for the possible early development of a hunting and gathering based economy in the southern portion of the Trans-Pecos region. Evidence of Paleo-Indian activity has been recorded in the park but no specific studies have been conducted which explain local human adaptation and use during this period (Mallouf 1985).

Early Archaic Period (ca. 6500-3000 B.C.)
Again,there is a lack of substantive data concerning the Early Archaic culture. A major technological change in projectile point manufacturing occurred during this period which involved a shift from lanceolate to stemmed dart points. Subsistence was limited by the carrying capacity of the land. Post Pleistocene woodlands were giving way to xerophytic plant communities at lower elevations and cultural adaptation involved a shift toward a hunting and gathering based economy (Mallouf 1985).

Middle Archaic Period (ca. 3000-500 B.C)
This period is characterized by a strong dependence on plant foods, a more structured social organization, and a stronger territorial orientation. A refined exploitation of the environment is also evident. By this time, the people inhabiting the Big Bend had developed a rich material culture involving the intensive use of available plant and animal parts. The latter part of the Middle Archaic was a slightly wetter period during which cultural patterns changed slightly. A sudden profusion of Central Texas dart points in eastern Trans-Pecos sites indicates a possible influx of hunters and gatherers from that region (Mallouf 1985).

Late Archaic Period (ca. 500 B.C.-A.D. 1000)
A climatic shift back to arid conditions necessitated cultural readaptation to a subsistence economy based upon the use of desert succulents, with hunting as a secondary activity. A higher density of Late Archaic sites indicates a more efficient adaptation and more numerous population. An expansion of the Jornada Mogollon into extreme west Texas occurred at the close of the Late Archaic (Mallouf 1985). There is a preponderance of Late Archaic period sites in the park.

Late Prehistoric Period (ca. A.D. 1000-1500)
This period is marked by major technological changes: ceramics, the bow and arrow, and agriculture to varying degrees across the region. The influence of the Jornada Mogollon, with its ceramics, agriculture, and sedentary lifestyle, is evident in the north and western Trans-Pecos. In most areas to the east, the Late Archaic hunting and gathering lifeway persisted into the Historic period. The

intrusion of ceramics from the plains and east Texas into eastern Trans-Pecos sites indicates an increase in interregional trading (Mallouf 1985). Only a handful of ceramic sherds have been recorded as coming from the park. A survey along the Rio Grande by the Texas Historical Commission did however, record a possible agricultural site along the river at the southern edge of the park on which was found an entire ceramic vessel.

During the Late Prehistoric Period a pre- and proto-historic group of people comprising the Cielo Cultural Complex occupied a large portion of Trans-Pecos Texas, including the park. This cultural group constructed circular houses consisting of semi-subterranean, dry-laid, stacked-stone walls and a superstructure of locally available framing and thatching materials. The structures were inhabited on a repeated seasonal basis by extended family groups or small bands. Cielo sites occur in specific topographic situations and are quite numerous within the park. The significance of the Cielo Complex peoples lies in their contemporaneity and possible association with Apache and other Plains-Indian intrusions into the Trans-Pecos during the Late-Prehistoric. These sites are crucial for interpreting the presence and movements of these later Plains intrusions into the Big Bend.

Historic Period (ca. A.D. 1500-present)

The intrusion of people from the Old World brought about major changes in aboriginal lifeways. Alien world-views, technologies, social practices, religions, and disease soon wrought major changes in native populations. Slavery, land usurpation, religious conversion, and resocialization were the new order. Historic Period documents reveal very scanty references to native populations in the Big Bend region.

Briefly, the historic period, as manifest in the park,is characterized by small, isolated ruins and clusters of ruins, level areas where farming was done to varying degrees, remains of historic fence lines, and a network of old roads which interconnect these historically used areas. Also, several locations containing evidence of military occupation occur. Most often, these historic structures and use areas are placed to take advantage of the available water sources throughout the park.

The increasing desertification which has occurred since the last glacial period has forced the inhabitants of this region to pattern their movements and activities in a fashion that advantageously utilized the naturally occurring plant and animal foods and water sources. Prehistoric habitation was increasingly centered around springs and streams. Historic inhabitants likewise settled near springs, producing a historic occupation overlay at numerous sites in the park. Current park use also creates additional cultural overlay, often at the expense of the physical evidence of the previous inhabitants.

Since the study of man's past is totally dependent upon what material items remain after his passing, the preservation of those artifacts is of utmost importance. Stone tools are resistant to the effects of exposure in the environment. Perishable items such as basketry and wooden and bone artifacts are preserved only where they have been discarded inside dry shelters and caves and are, therefore, very rare. Vandalism by relic collectors has resulted in the loss and destruction of much evidence of the past. Any alteration of an archeological site or the artifacts and cultural features within that site destroys the information which could otherwise be obtained through scientific investigation.

The significance of archeological resources at Big Bend National Park is dependent upon the potential of those resources to yield scientific information. Scanty research into the archeology of Trans- Pecos Texas and the interior of the Big Bend specifically, has left many gaps in the archeological record. Therefore, almost every archeological site has the potential to yield scientific information about human lifeways in the past.

Therefore, it is imperative that the park should strive for the highest degree of sensitivity toward its cultural resources. Of primary concern throughout management issues should run the philosophy that protection and preservation of the resource takes precedence over the right of the visitor to access an area. Otherwise, use that disregards preservation may render the resource useless for the future. To quote the Cultural Resources Management Guidelines, NPS-28, Chapter 2, page 18, Standards for Managing Archeological Sites,

> It should be remembered that these are irreplaceable resources which cannot be duplicated elsewhere, and that the park is a sanctuary for the protection of these archeological sites. Similar sites outside of Service areas have already been or are rapidly being destroyed.Consequently, the NPS sites become more important to our understanding of the prehistory of North America. These sites should not be sacrificed to development, and scientific evaluation must be carefully planned.

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LEGISLATION AND COMPLIANCE

Cultural resources are governed by a larger body of legislation than any other park resource. Primarily, the laws, regulations, and policies regarding cultural resources include the Organic Act of 1916, The Antiquities Act of 1906, Historic Sites Act of 1935, National Historic Preservation Act of 1966, National Environmental Policy Act of 1969, Executive Order 11593, Archeological and Historical Preservation Act of 1974, Archeological Resources Protection Act of 1979, Title 36, Code of Federal Regulations, Part 2.1, Cultural Resources Management Guidelines, NPS-28, and Management Policies, Chapter V.

In accordance with the above legislation, all construction activities or permits for construction activities within the park's boundaries must be approved pursuant to required archeological surveys. Mitigation of adverse impacts to cultural resources must comply with applicable legislation. Any in-house actions (eg., maintenance construction, campsite relocation, trails modification or cairning, etc.) which have not received previous clearance for cultural resources, must have prior approval through the required channels. Concurrent with these surveys is the requirement that cultural properties be evaluated for significance according to National Register criteria. Section 106 of the National Historic Preservation Act of 1966 requires review by and consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Officer if an action may have an effect on Federal properties that are listed on or may be eligible for listing on the National Register. The Park Superintendent should notify the Southwest Cultural Resources Center in the Southwest Regional Office upon learning that construction activities are planned which may affect the park resources.

BIBE-A-001 ARCHEOLOGICAL SITE SURVEY

Statement of Problem

Executive Order 11593, issued on May 13, 1971, made it mandatory that the Park Service locate and inventory all cultural resources under its jurisdiction or control, and nominate all sites, buildings, districts, and objects that appear to qualify for listing on the National Register of Historic Places. The 1930's and 1960's surveys were directed at cataloguing site types and locations. Data available from those surveys is unusable for management planning in that it does not quantify or specify the condition of the site, the degree and nature of impact, the potential for further scientific study, and particularly, the significance of the resource by National Register standards.

There are currently only token attempts to interpret the archeological resources of the park to the public. Dynamic interpretation depends upon a thorough understanding of park resources. Archeologically speaking, the Big Bend area of Texas is imperfectly understood. Professional work throughout this portion of Texas has been done sporadically. Prehistoric cultural dynamics, environmental adaptation, and resultant technological, social, and demographic changes can only be understood through thorough research efforts. A clear understanding of the resources can be achieved through research that has been designed using the knowledge provided by a comprehensive park survey. The park cannot manage or interpret the resources for which it has no information.

An Archeological Assessment of Big Bend National Park was completed by Southern Methodist University in 1974. The recommendations of that report are reflected in the following list of management alternatives.

Although project related surveys can be conducted by park staff, the time spent on completion of field work and reporting takes personnel away from critical management related duties. These in-house duties include such activities as studies which collect base-line data from earlier surveys, relocating and assessing the known sites for current condition, and conducting surveys of high impact areas. More importantly, park staff could be free to develop strategies for resource preservation, research designs for future studies, and educational and interpretive programs for the park visitors.

Background information and current management strategy

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 allotted 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. Much of the site specific data and locational information from these surveys is incomplete and sketchy. Of the 628 total sites, only 375 locations are presently known. Over 1000 artifacts collected from 324 sites during the 1930's were lost when a fire destroyed the C.C.C. museum which housed them. Data from the manuscript report of the Campbell survey is minimally useful for management purposes in that the current physical state can not be determined except by revisiting each site to assess its state of preservation.

Recent archeological surveys have been associated with Section 106 clearance for numerous construction and maintenance projects. The quality of site specific data recovery required for such clearance is necessarily high and specifically includes the current site condition, an evaluation of research potential, and protective measures to insure mitigation of impact to and preservation of the resource. Consequently, the knowledge gained through these surveys provides the kind of data which yields a better prehistoric perspective and is fundamental to adequate resource management.

Baseline maps of archeological sites have been drafted and sites not previously listed are added as they are recorded. Data from previous archeological discoveries and studies are being acquired and consolidated as comprehensive base data to assist future archeological investigations. Current project archeological documentation includes graphic documentation and recordation of the existing and potential impacts to the resource.

Alternatives and Probable Impacts

1. No action: This alternative is invalidated by numerous federal mandates.

2. Phase 1: Initiate a comprehensive literature and collection search. All available field notes, site reports, excavation reports and artifact collections from previous archeological research should be acquired and organized into a comprehensive compendium of up-to-date information on the known archeological resources of the Park. This data is a valuable prerequisite when developing a research design for future fieldwork. Failure to initiate Phase 1 would violate one of the basic principles of project development.

3. Phase 2: Concurrent with field surveys, analyze the latest color infrared aerial photography and low altitude natural color photography in an attempt to delineate the extent and location of possible archeological sites. Failure to utilize all available sources of information would be a major oversight in 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 park resources.) Failure to initiate and complete phase 3 will result in loss of cultural resources through park development, vandalism or unauthorized artifact collecting, and impact from visitor use.

5. Phase 4: Conduct literature and field studies that reassess the sites recorded in the 1930's and '60's with the goal of producing sketch maps of each site and records of current site conditions, documented at a level of quality that is sufficient to enable adequate management planning.

6. Phase 5: Because of the large size of Big Bend National Park, a 100% survey of the park would prove extremely costly as a single survey project. A 25% stratified sample of the area within each micro-environment was suggested by the Archeological Assessment report as one sampling strategy. A 20% to 30% comprehensive survey should be started immediately as an initial step toward the ultimate goal of a 100% inventory and assessment. Failure to initiate an overall sampling strategy for the park will result in an inability to adequately manage a poorly understood resource.

7. Phase 6: Limited site testing in the form of excavations or surface artifact collections at selected sites would greatly enhance the survey by answering many of the questions raised by the survey. Failure to conduct testing would limit the predictive capabilities which are needed when designing field survey strategies and which would be helpful when designing future studies.

8. Contract out project related surveys so that park staff can be free to deal specifically with resource management issues and problems.

<u>Recommended Action</u>

1. Initiate item 8 as soon as possible.

2. Following item 8, phases 1, 2, 3, and 4 may be completed by park staff. Phase 3 should begin immediately to reduce the imminent damage to park resources. Phase 2 can be done with phases 3, 4, and 5. Phase 4 would be a long-term project which could be done concurrently with phase 5.

3. Initiate Phases 4 and 5 concurrently, beginning in year 3 and continuing through year 5.

4. Initiate Phase 6 immediately following Phase 5.

This project is categorically excluded from NEPA requirements as the project is neither significantly controversial not will it significantly effect the environment.

BIBE-A-002 ARCHEOLOGICAL INVESTIGATIONS AT BURRO MESA

Statement of Problem

The Burro Mesa National Register Archeological District consists of an area encompassing a very large chert quarry and its associated lithic workshop areas, a series of three small rock shelters, and two extensive open campsites. The district also contains two historic structures, a stone masonry house and a large stone corral. Many other unidentified prehistoric sites occur in the vicinity which remain to be studied in detail. Archeological investigations of the Burro Mesa site complex is necessary because of increased backcountry use of the area and subsequent vandalism and "pothunting", and also because management and interpretive planning depend upon a thorough knowledge of the resource.

Background Information

The Burro Mesa National Register Archeological District and associated site complex is of regional significance primarily because the material from this area has apparently been in use for the past 10,000 years. The popularity of the stone material from this quarry is reflected by its abundant presence on archeological sites throughout the park and an undetermined surrounding area. A thorough study of the chert to determine its distinguishing characteristics will enable additional study to concentrate on determining prehistoric trade patterns which disseminated the material around Trans-Pecos Texas and northern Mexico. An increased interest in pre-Columbian artifacts has led to vandalism and loss of valuable data from these sites. While passive site preservation is preferred, the present situation may warrant active retrieval of archeological data. Research is certain to yield nationally significant information from this archeological district.

Current Management Action

The majority of Burro Mesa is closed to overnight backcountry camping. Day hiking is permitted via a self-registration system established at the main trail to Apache Canyon. The system reflects visitor use only to the degree that voluntary registration is successful. It only reflects use along the designated trail, not from access from other cross-country routes. The system restricts use of the area to the degree of honesty of the visitor and fails to restrict illegal use. Other than attempting to discourage use of this area, nothing is actively being done to protect it.

Alternative Actions and Probable Impacts

1. No Action: The site has shown continued loss of data through vandalism, pothunting and surface artifact collection at an undetermined rate. The park is unable to interpret the

resource to the public because of insufficient understanding. Interpretation through visitor access can not be encouraged until site data collection has been completed. This is not a viable alternative.

2. Close Off the Area to the Public: Due to the evidence of vandalism and disturbance to this area, this would appear to be a viable option, although in closing the area, there is a good chance of drawing greater attention to a nebulous but "obviously valuable" entity, thus increasing the potential for disturbance by unscrupulous collectors.

3. Intensively Study the Area: This option is the most desirable in that a great amount of information could be gleaned which could augment the park's interpretive program as well as recover data before it is permanently lost.

Recommended Action and time frame

Alternative 3 should be implemented as soon as possible. While the study is in operation, initiate alternative 2 until the study is complete.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-A-003 PRESERVATION OF ARCHEOLOGICAL RESOURCES

Statement of the problem

Recent archeological surveys have recorded a number of archeological sites which have been subjected to severe impacts from both human and non-human origins. Human impact occurs in the forms of vandalism, relic collecting, and unintentional impact from camping and park development. Non-human impact occurs in various forms of natural erosion.

The loss of cultural remains has occurred in an alarming number of sites throughout the park. This gravity of this loss is compounded by the awareness that virtually all archeological sites have National Register standard significance. This is because criterion D of the NR standards, the potential to yield scientifically valuable information, applies to the vast majority of prehistoric campsites in the park. The potential of those resources to yield scientific information is important but, the availability of extant data is critical to determining what constitutes "significance" in Big Bend archeology. Scanty research into the archeology of Trans-Pecos Texas and the interior of the Big Bend specifically, has left many gaps in the archeological record. Therefore, the loss of site data through human or non-human impact is of grave concern.

Background information

Non-human natural impact

The desert climate is characterized by seasons of dry weather broken by intermittent period of heavy rainfall, massive wasting of soil by sheet wash erosion, and deep entrenchment of intermittent stream channels which progressively advance upslope by head-cutting gullies and arroyos. Loss of sites or site features through natural erosion is a potential problem in the park.

Most preservation procedures tend to be temporary in that they only slow down the natural deterioration process. Erosion can be mitigated through the use of water diversions to rechannel rainfall runoff. A more expensive and less desirable alternative in site preservation involves capping the site with fill material that is contrastingly different in color and texture than the soil at the site. Both of these procedures is impractical in the more remote backcountry. Where sites or site features are threatened by erosion, and preservation is not possible, salvage excavation is a viable alternative to loss of site data. It too, is often impractical in the backcountry and is nearly always an expensive alternative.

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 site, 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. A number of sites, such as lithic scatters, may have no depth but may simply occur as lithic debris strewn about the ground surface. Technically speaking, these sites are always in a state of natural deterioration.

As a result of recent surveys by the park archeologist, numerous sites have been found to contain intact and/or partially eroded hearth features. These features are potentially very important to archeological research for two reasons. First, very little is known about the temporal affiliation of open campsites that have been stripped of their surface artifacts by either natural erosion or artifact collectors. Hearths can be utilized for dating purposes through C14 (radiocarbon), thermoluminescence, or archeomagnetic dating methods. When coupled with subsurface testing or excavation to retrieve artifacts, the date obtained from the hearth can provide much needed temporal association for the artifacts (not to mention that it provides a date for the site occupation itself). Secondly, there is apparently, a distinct variation in hearth size and style. Some hearths are circular and more or less one meter in diameter, while others are larger, oval-shaped in plan view. Some have distinct depressed centers while others are generally flat in profile. Comparison of intrasite hearth variety, coupled with the above dating, can yield information which may indicate cultural variation through time or may indicate external cultural influence at a point in time.

This kind of information is extremely important in interpretation of Big Bend and Trans-Pecos archeology, mainly because of the paucity of such data, but also because part of the park's purpose is to interpret regional prehistory to the public.

Human impact

All sites, regardless of natural conditions and exposure, are subject to human impact. Human impacts occur as vandalism, relic collecting, and unintentional destruction consequent to other activities. The location of public camping areas on or adjacent to an archeological or historic site will significantly contribute to site destruction. Vandalism to rock art sites occurs as graffiti and outright theft of the rock. Vandalism also occurs when relic collectors remove artifacts from the ground surface and dig into subsurface cultural deposits. Historic records indicate that numerous prehistoric burials have been removed from cemetery sites in the park. Caves and rockshelter sites are extremely valuable scientifically because of the excellent protection they provide for perishable materials such as bone, wood, and plant fiber. A number of such sites have been disturbed in the park. Human impacts can be expected to increase wherever visitation in the park is increased.

Casual artifact collecting by the park visitor poses a serious threat to surface artifacts but, a more destructive human impact occurs in the form of careless oversight on the part of park managers who fail to fully consider the "worst possible scenario" in the management planning stages, whether during the process of formulating a planning document or when planning an in-house construction project.

Special preservation concerns

The possibility of threat to cultural resources through inadvertent acts by the NPS are addressed herein. The archeological information confidentiality clause contained in ARPA pertains only to the Federal land manager overseeing the resources. It has become increasingly evident that park resources can become threatened by acts of persons and organizations outside the service. It should therefore, be stated that the park must act through appropriate channels to address the threat of loss of cultural resources because of concessioner tours, commercial tours, or other private sector actions that divulge site locations or site specific information to the public, which might lead to such loss.

The park also, has no control over the distribution of professional publications dealing with park resources. However, these publications can create additional need for protection of special cultural resources. Therefore the NPS must be prepared to take emergency protective measures as necessary to insure that special resources are as free from external threat as possible.

Current management action

Recent archeological surveys have been associated with Section 106 clearance for numerous construction and maintenance projects. The data from these surveys is actively used to mitigate impact from construction projects and to determine a preservation strategy for each site. Mitigation of impacts has been accomplished in the planning stages by relocating development facilities to avoid significant sites and site features. In some instances, salvage excavation has recovered site data prior to construction. The preferred mitigation is avoidance of the resource by construction activity and preservation in-place. Capping has been considered at various times but measures such as capping, permanent fencing, water diversions, etc. tend to be expensive alternatives.

Alternatives and probable impacts

1. No Action: This avenue has been followed in the past and has resulted in continued loss of valuable resources.

2. Increase Law Enforcement Patrols Into Areas of Known Resource Sensitivity: Failure to adequately patrol sensitive park resources will continue to result in their loss.

3. Continue to Conduct Section 106 Clearance Surveys as Required by Law: This is a mandated action.

4. Develop a Long-range Preservation Plan: Develop a long-range preservation plan for proper documentation and protection of archeological resources in priority order and with funding considerations identified.

5. Initiate Protective Measures as Required: Priorities for protection are first, rockshelters and caves, second, rock art sites, third, cemeteries and burials, fourth, stratified campsites.

6. Initiate an Interpretive Effort Directed at Encouraging a Sensitivity in the Visitor to Park Resources: Visitor awareness is one of the best means of protecting the resource.

Recommendations and time frames

1. Continue Section 106 surveys (# 3), protective measures for site stabilization, preservation, or protection (# 5 & #2) as required.

2. Initiate a long-range preservation plan for proper documentation and protection of archeological resources (# 4) during FY 89.

3. Initiate an interpretive effort to encourage visitor awareness and sensitivity of archeological resources (# 6) in FY 89. This should be followed by active interpretive effort to ensure a continually evolving and integrated visitor education program.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

HISTORICAL RESOURCES

Ecological Background

At the end of the last ice age, the climate was much cooler and wetter, and a widespread woodlands covered the Big Bend. Since about 9000 B.C. the climate has gradually become warmer and drier, and there has been a gradual influx of heat and drought adapted plants. This gradually changing environment was exploited by prehistoric human inhabitants in a variety of ways. Generally speaking, throughout the period from 10,000 B.C. into the Historic period, the archeological record reveals a gradual shift from a hunting based economy centered around large game, to one which effectively combined a nomadic seasonal gathering of a variety of plant foods, supplemented by hunting for small game. The increasing desertification which has occurred since the last glacial period has forced the inhabitants of this region to pattern their movements and activities in a fashion that advantageously utilized the naturally occurring plant and animal foods and water sources. Prehistoric habitation was increasingly centered around springs and streams.

The Prehistoric Era (9000 B.C.-1535 A.D.)

The archeological record reveals that earlier inhabitants developed a nomadic hunting and gathering life style so successful that it remained relatively stable for about 7500 years. By the Late Prehistoric period (1000 A.D.) the Big Bend had come under the influence of agricultural groups to the northwest. Agricultural villages existed near present-day Presidio, Texas, and there is evidence that some limited agriculture was practiced by Indian groups in the area of the park.

The Historic Era (1535 A.D.-Present)

The historic period is characterized by an intrusion of people from the Old World which brought about major changes in aboriginal lifeways. Alien world-views, technologies,social practices, religions, and disease soon wrought major changes in native populations. Slavery, land usurpation, religious conversion, and resocialization were the new order. Historic period documents reveal very scanty references to native populations in the Big Bend region.

Briefly, the historic period, as manifest in the park vicinity, is characterized by small, isolated ruins and clusters of ruins that are associated with ranching and farming, remains of mining and prospecting activity, and a network of old roads which interconnect these historically used areas. Evident also, are several locations of military occupation. South of the Rio Grande, 18th Century Spanish Colonial occupation is represented by Presidio San Vicente and Presidio San Carlos. Most often,

these historic structures and use areas are placed to take advantage of the available water sources throughout the park.

The Indians During the Historic Period

During the early historic period several Indian groups were recorded as inhabiting the Big Bend. The Chisos Indians were a loosely organized group of nomadic hunters and gathers who probably practiced limited agricultural on a seasonal basis. The origin of the Chisos Indians is not known. Linguistically, they were associated with the Conchos Indians of northern Chihuahua and northwestern Coahuila. Their language group spoke a variation of Uto-Aztecan, a language whose speakers ranged from central Mexico to the Great Basin of the U. S. It is possible that the Chisos traded with another cultural group called the Jumanos. Around the beginning of the 18th century, the Mescalero Apaches began to invade the Big Bend region. Their depredations along the border destroyed villages and displaced the native nomadic populations. The last Indian group to use the Big Bend was the Comanche, who passed through the park along the Great Comanche Trail on their way to and from periodic raids into the Mexican interior. These raids continued into the last half of the nineteenth century.

The Spanish (1535-1850 A.D.)

The Historic Era begins roughly 1535 A.D. with the first Spanish Explorations into this portion of North America. The expedition of Alvár Nuñez Cabeza de Vaca passed near the Big Bend, and was followed by other expeditions in the search for gold and silver, farm and ranch land, and Indian slaves. In an attempt to increase the efficacy of protection of the northern frontier of Mexico, the line of "presidios" or mission/forts, was reestablished closer to the Nueva España heartland during the late 1700's. The Presidio de San Vicente was built at present-day San Vicente, Coahuila, and the Presidio de San Carlos was built near present-day Manuel Benavides, Chihuahua, both in Mexico. These presidios were soon abandoned, however, because of financial difficulties and because they could not effectively control the northern frontier.

The Mexicans and Anglos (1850-Present)

Very little study has been made of the early Mexican settlement of the Big Bend following the abandonment of the Presidios. The small community of Altares existed approximately 25 miles south of the park in 1805 and Mexican families lived in the area when Anglo settlers began moving in during the late 1800's. It is probable that some Mexican settlement occurred within the area of the park during the early 1800's. There is no doubt that at least some of the hispanic residents were descendants of mixes between Spanish and Native Americans. Following the war between Mexico and the United States which ended in 1849, the Treaty of Guadalupe-Hidalgo transferred all lands north and east of the Rio

Grande to the United States. The local Mexican/Indian population continued to move back and forth across the river, however. Beginning in the 1850's the American military made survey expeditions to chart the unknown land of the Big Bend. Military forts and outposts were established across Trans-Pecos Texas to protect migrating settlers from the Indians. Around 1870, trappers and ranchers began to migrate into the Big Bend, and by 1900 sheep, goat, and cattle ranches occupied a majority of the landscape. Native populations of wildlife underwent radical shifts under the influence of man's activities.

During this same period, the Rio Grande flood plain was being farmed. Settlements developed with names like San Vicente, Pantera, Coyote, and Castolon. These were often no more than clusters of families living and farming in the same area, and they were successful only to the degree that the land was able to support them.

In the 1930's many people who loved the Big Bend country saw that it was a land of unique contrast and beauty that was worth preserving for future generations. The State of Texas passed legislation to acquire land in the area which was to become the Texas Canyons State Park. In 1935 the Federal government passed legislation that would enable the acquisition of the land for a National Park. The State of Texas deeded the land that they had acquired to the Federal government, and on June 12, 1944, Big Bend National Park became a reality.

The park is rich in both prehistoric and historic habitation sites. Because of the increasing desertification, prehistoric habitation became successively centered around springs and streams. Historic inhabitants likewise settled near water sources, producing a historic occupation overlay at numerous sites in the park. These sites are extremely valuable for both prehistoric and historic archeological study. Current park use also creates additional cultural overlay, often at the expense of the physical evidence of the previous inhabitants.

As a Man and the Biosphere reserve, Big Bend National Park is obligated to maintain a baseline cultural inventory and evaluation which encompasses man's role in the local and regional environment. Although an appreciable amount of information has been accumulated, the cultural resources have not been completely inventoried. The level of documentation for most individual structures is insufficient for developing an efficient strategy for management on a structure by structure basis.

Cultural resources are finite and non-renewable. Of primary concern throughout management issues should run the philosophy that use which disregards preservation may render the resource useless for the future. To quote the Cultural Resources Management Guidelines, NPS-28, Chapter 2, page 18, Standards for Managing Archeological Sites,

It should be remembered that these are irreplaceable resources which cannot be duplicated elsewhere, and that the park is a sanctuary for the protection of these archeological sites. Similar sites outside of Service areas have already been or are rapidly being destroyed. Consequently, the NPS sites become more important to our understanding of the prehistory of North America. These sites should not be sacrificed to development, and scientific evaluation must be carefully planned.

BIBE-H-001 PRESERVATION OF HISTORIC STRUCTURES

Statement of problem

The LCS currently lists 54 structures (16 category B, 37 category C, and 1 category D) for Big Bend. All but two are listed as National Register properties. There are no category A listings. A cursory survey in 1983 recorded an additional 376 structures but gathered insufficient data for adequate management planning. Other historic sites are known but are not officially recorded. The SWRO has eliminated all of these various structures from consideration for National Register status until additional information surfaces which supports their significance. A resurvey and evaluation is needed for the structures recorded by the 1983 survey, and a management strategy must be devised to assure compliance with preservation regulations.

The LCS is in need of updating. LCS management categories no longer accurately reflect the management priorities and goals of the park. The Barker house, Daniel's ranch house, and the Neville Spring cavalry outpost recently have been nominated for the National Register at the regional NPS level. Review and determination of eligibility at the WASO level has not been completed. SWRO has a contract pending for field documentation of Neville Springs cavalry outpost and Glenn Springs. A prioritization is needed for structures and sites which may be considered for future nomination.

The staffing of maintenance personnel to carry out the day-to-day upkeep of the structures has been accomplished by training an existing staff maintenance person in current historic preservation methods. This person is base funded and no support funding is provided by SWRO. The assurance of keeping such a person on staff and continuation of such training is a high priority.

There is also the need to develop a comprehensive preservation maintenance plan for each classified structure by management category. In addition to the Maintenance Management System, an in-house program has been initiated which delineates preservation maintenance treatment for individual LCS structures in conjunction with preparation of 10-237's and 10-238's (see the following section entitled CURRENT PRESERVATION MAINTENANCE APPROACH FOR NATIONAL REGISTER HISTORIC DISTRICTS, AND INDIVIDUAL STRUCTURES). This is a step toward developing a structure by structure preservation plan. This planning framework must remain flexible in order to incorporate changing priorities and an increase in the number of historic structures and sites which may result from future National Register nominations.

Background information

The inventory, evaluation, and planning for historic resources in Big Bend National Park has undergone several stages of evolution:

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

(2) The National Historic Preservation Act of 1966, (Public Law 89-665), Section 106, provided certain procedures to be followed by federal agencies in the event of a proposal that might have an effect on National Register properties, and defined the term "historic preservation" as the protection, rehabilitation, restoration, and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, or culture.

(3) 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.

(4) Executive Order 11593, May 13,1971 (36 F.R. 8921), specifically directed all federal agencies to "locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, districts, and objects under their jurisdiction or control that appear to qualify for listing on the National Register of Historic Places."

(5) In 1972, 1973, and 1974 the staff of the Division of History, SWRO, 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 Springs
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, was not placed on the Register. Accordingly, the Daniels Farm was removed from the List of Classified Structures.

Also, the Berkeley Cottage was not 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 was not nominated to the National Register as it was deemed to not have historical significance.

(6) The Statement for Management for Big Bend National Park, approved, February, 1976, listed the above properties and further stated that the following properties may be considered for nomination pending further survey and evaluation: Terlingua Abaja, Johnson Ranch, Ore Tramway, Glenn Springs, McKinney Springs Ranch, and La Noria.

(7) Public Law 94-422,September 28, 1976 amended Section 106 of NHPA to apply to properties eligible for inclusion in the National Register.

(8) In 1977 the SWRO Division of History made recommendations for the protection of individual structures in Big Bend.

(9) In the BIBE Resources Management Plan approved, January, 1983, the above 1977 recommendations were included under Appendix N of the plan.

(10) During 1983, an in-house inventory of historic structures located and identified 376 historic structures within the park, in addition to those previously identified.
(11) During 1984-'85, a historical study of the park by Art Gomez of the SWRO uncovered documentation which prompted the nomination of the Barker house and the Daniel's ranch house to the National Register.

(12) In a landmark case, (Boyd v. Roland, No. 85-44478, May 14, 1986), regarding the Advisory Council on Historic Preservation, the United States Fifth Circuit Court of Appeals reaffirmed the council's interpretation of the application of Section 106 to eligible properties. The court stated:

> "...we conclude that eligible property is not restricted to property that has been officially determined eligible for inclusion in the National Register."(emphasis is the court's)

All cultural properties within Big Bend National Park should be treated as though they may be eligible for nomination until they have been surveyed and evaluated for eligibility by the park and SWRO, and determined otherwise.

(13) The 1986 revision of the Statement for Management, prepared by the park, included the Neville Spring Cavalry

Outpost in the list of historic sites which may be considered for nomination to the National Register in the future.

The evaluations and subsequent nominations to the National Register constitute a further refinement of the 1964 Inventory, the 1968 Historic Resources Management Plan, the SWRO 1977 recommendations for historic structure protection, and the 1983 Resources Management Plan, and those structures included on the Register, as noted above, need preservation funds.

An adequate survey is still needed for the 376 structures recorded in 1983, that provides sufficient documentation to evaluate them as directed by the National Historic Preservation Act and Executive Order 11593. Subsequent surveys will initially need to obtain sufficient information to make a determination of eligibility possible.

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Current management action

Several structures have undergone serious deterioration over the past three to five years and need considerable work. The Alvino house (a listed NR property) and Daniel's ranch house (under nomination to the NR) are in need of extensive repair. Due to funding priorities, there has been no support from SWRO for their preservation. The park is looking into alternative funding and personnel sources to ensure the preservation of these primary resources.

A routine maintenance strategy is being developed for the 54 structures listed on the LCS. Routine maintenance of LCS structures is being accomplished by trained maintenance staff on a cyclic basis. Additional funding is necessary to support in-house preservation maintenance efforts, for occasional emergency stabilization, and to ensure that the park can retain maintenance staff trained in current preservation maintenance methods.

Alternative actions and probable impacts

1. No Action: This alternative is made invalid by numerous federal mandates.

2. Update LCS: Evaluate and reclassify the management category of each LCS listing so that it reflects the management priorities and goals of the park. The LCS should be revised as needed for it to remain a flexible part of the process of resource evaluation and management. Failure to update the LCS will only stagnate future management prioritization.

3. Survey and Evaluate Additional Structures: Resurvey the 376 sites recorded by the 1983 cursory survey, collecting quality data that will enable an accurate evaluation of historical significance according to National Register standards. The resurvey should also enable an accurate assessment of the preservation needs of each individual structure or site. This action is in accordance with the NHPA and Executive Order 11593. A failure to collect this information will obstruct the understanding of historical and structural significance or resource integrity and prohibit effective management.

4. Increase Funding for Trained Staff to Meet Preservation Maintenance Needs: Ensure the staffing of trained maintenance personnel to accomplish the needed preservation maintenance of park resources. Labor and materials are subject to burgeoning inflation and the current work load exceeds the available

trained work force. Failure to increase funding for trained staff will limit the ability of the park to adequately maintain historic resources.

5. Increase Preservation Maintenance Budget: Elevate the historic preservation maintenance budget to a realistic equilibrium with park needs. Failure to increase the budget will prohibit the park from meeting maintenance needs and will result in further loss of primary park resources.

6. Develop a Comprehensive Preservation Maintenance Plan: Develop a plan that centers upon the management objective and preservation needs for each structure. Failure to do so will stagnate future preservation planning and funding, and will fail to fulfill NPS management policies.

7. Prioritize Future Nominations to the National Register: The SWRO has categorically eliminated structures recorded by the 1983 survey from eligibility for NR nomination. Future evaluation of sites and structures not currently listed must be based upon the unique qualities and historical and structural integrity possessed by each structure. Failure to consider the individual merits constitutes a biased management approach.

8. Update 10-237's and 10-238's as Need Arises: The rate of resource attrition is always subject to natural fluctuation. Planning must remain flexible to these changing needs. Failure to update these planning documents constitutes an unrealistic management approach.

Recommendations and time frames

1. Develop a comprehensive Preservation Maintenance Plan (# 6) which includes an update of the LCS (# 2) and an update of 10-237's and 10-238's (# 8) to reflect the preservation goals during FY 1989. Make the plan flexible to include future additions.

2. Increase preservation maintenance budget (# 4) and funding for trained staff (# 5) to meet the badly needed routine maintenance of primary park resources.

3. Resurvey the sites and structures recorded by the 1983 survey over a five year period (# 3), evaluating them individually by NR standards (# 7), and systematically incorporate them into the Preservation Maintenance Plan.

This project is categorically excluded from NEPA requirements as it is neither significantly controversial nor will it significantly effect the environment.

BIBE-H-002 GRAPHIC DOCUMENTATION OF HISTORIC RESOURCES

Statement of problems

Very few of the National Register properties and LCS structures have received HABS standard graphic documentation. A basic inventory of historic structures was undertaken by the Resource Management Office of the Park in 1983 which recorded 376 historic structures in addition to those covered by existing management plans. The level of documentation is brief, generalized, and does not include the historical use of the structure or the connection with historic personages. The documentation does not contain descriptive detail necessary for an accurate evaluation of local, regional, or national cultural significance. In most cases the documentation alone is insufficient for preservation and management planning purposes. Additional documentation according to the Regional Structures and Sites Graphic Documentation Plan is necessary to fulfill the NHPA and Executive Order 11593.

Background information

The basic inventory of historic structures undertaken in 1983 recorded 376 historic structures in addition to those covered by existing management plans. The documentation for each structure consists of a single page containing a brief, written description of the site location, generalized exterior dimensions of each structure, and in some cases, basic construction materials. Most often the study did not include the historical use of the structure or the connection with historic personages. Each record includes a single 4"x5" black and white photograph.

Current management action

Documentation of cultural sites is being done on a project by project basis for Section 106 clearance only. The level of documentation includes a six-page written site data form, sketch drawings of the site layout, and limited details about the vertical elevation profile. Color slides constitute the photographic documentation.

Alternative actions and probable impacts

1. No Action: This alternative would result in the loss of valuable physical data through natural attrition.

2. Complete Level III Graphic Documentation on all Known Historic and Prehistoric Structures: According to the Regional Structures and Sites Graphic Documentation Plan, this is the minimum recommended level of documentation for all of the Region's sites and structures. Failure to properly inventory and document all cultural resources will not fulfill federal mandate and will result in loss of physical data from the sites through natural attrition and pilfering.

Recommendations and time frames

1. The priority for accomplishing level III graphic documentation should be:

   1. National Register structures and sites
   2. LCS structures not listed on the National Register 3. Structures and sites not listed on the National Register or the LCS.

This documentation should begin in FY 89 and systematically continue until all known sites and structures are documented.

This project is categorically excluded from NEPA requirements as it is neither significantly controversial nor will it significantly effect the environment.

BIBE-H-003 SPECIAL HISTORY STUDIES, SPECIFIC TOPIC RESEARCH

Statement of problems

Existing studies of the historic resources of Big Bend National Park have been done sporadically and are generally unrelated. A comprehensive historical study which evaluates the resources in their regional context was initiated in a report by Art Gomez of the SWRO. The Gomez study should be followed with a progressive strategy of integrated data acquisition and management. As new historic information comes to light, some physical resources will gain significance, warranting their reevaluation according to NHPA regulations.

Future studies should research the available historic documentation on the following topics and develop a comprehensive research design for each as an individual research project.

a. Ethnographic ties of Native Americans to the Big Bend
b. Economic development of the Big Bend including historic Indian subsistence, floodplain farming subsistence, Mining development, trading posts, and ranching.
c. Mexican demography and settlement ca. 1800 to present
d. Early community development; Boquillas, Santa Elena, San Vicente, Coyote, Pantera, and Terlingua Abaja.
e. McKinney Springs Ranch
f. Other specific ranch studies
g. Border relations and the border conflict of the early twentieth century
h. Cultural interactions between Indians, Mexicans, and anglos
i. The Great Comanche Trail
j. CCC activities
k. Glenn Springs community and Cavalry Outpost
l. La Noria Cavalry Outpost
m. Neville Springs Cavalry Outpost
n. The Old Ore Road

Current management action

Historic roads, sites, structures, and cemeteries are recorded as they are discovered and as time permits. No other active research is being conducted within the park. The Center for Big Bend Studies, Sul Ross State University, has proposed a comprehensive research project encompassing the historical development of the Castolon area.

Alternative actions and probable impacts

1. No Action: This alternative is negated by various federal mandates.

2. Synthesize and Evaluate Existing Studies and Reports and Develop A Research Design for Historical Studies: Failure to understand the existing data base inhibits the development of a comprehensive action plan.

3. Conduct Research on Specific Topics: Some topics may be combined into a comprehensive research study. Failure to research and evaluate these resources and their historic and cultural significance will result in them passing into obscurity, will impede accurate interpretation of the park resources.

4. Encourage Research Through the Cooperative Park Studies Unit. Continue to encourage the participation of state universities in historical research through the Cooperative Park Studies Unit. Failure to use the existing NPS framework is counterproductive.

5. Seek Alternative Funding Sources. Seek matching grants and other alternative funding sources as interim financial support for research until program funds are available. To not search for alternative funding sources limits the effectiveness of a research design and delays accomplishing research goals.

Recommendations and time frames

1. Synthesize and evaluate the existing historical studies and reports and develop research designs for future special topic studies by FY 90.

2. Establish the goal of initiating at least one special topic study (# 3) per year beginning in FY 89.

3. Continue to seek out all potential sources for funding and conducting special topic studies including the CPSU (# 4) and other alternative sources (# 5).

This project is categorically excluded from NEPA requirements as it is neither significantly controversial nor will it significantly effect the environment.

BIBE-H-004 SPECIAL STUDIES IN ORAL HISTORY

Statement of the problem

A number of pre-park residents and their descendants still reside within a short distance of the park. Many of these individuals, particularly hispanics, have never been interviewed. The park has approximately 107 oral interview tapes of varying quality. The few transcriptions that have been done are not of archival quality. Many were recorded on substandard or poor quality recording tape and are losing clarity. A number are in spanish and need translation as well as transcription. The entire collection needs to be transcribed and duplicated.

Current management action

Historic persons are only interviewed at fortuitous and sporadic occasions. The park has no active program to translate and transcribe the tape collection.

Alternative actions and probable impacts

1. No Action: This alternative would result in the loss of valuable historic and ethnographic data through the death of living history and through deterioration of the existing collection.

2. Evaluate the Existing Collection and Develop Priorities for Oral History Studies: Review the existing data base and develop a prioritized action plan for data acquisition. Failure to synthesize the existing data base will inhibit the development of a comprehensive action plan and will retain the uncoordinated and ineffective system now in effect.

3. Conduct Systematic Oral Interviews: Establish a priority for acquisitions that includes:
    1. very elderly persons who have not been interviewed or who should be interviewed again.
    2. persons who have never been interviewed.
    3. additional interviews to gather information not included in the original interviews.

4. Duplicate, Translate, and Transcribe the Existing Collection: Make duplicate sets of the existing collection on archival quality tape. Translate spanish tapes into english and make verbatim transcriptions of archival quality.

Recommendations and time frames

Note: The one critical priority is to conduct interviews with elderly persons before they are no longer available for interview.

1. During FY 89, conduct oral interviews of very elderly persons who have not been interviewed or who should be interviewed again.

2. Review the existing data base and develop a prioritized action plan for data acquisition and management. Failure to synthesize the existing data base will inhibit the development of a comprehensive action plan and will retain the inadequate system now in use, FY 89-90

4. Duplicate, translate, and transcribe the existing collection by archival standards, FY 90.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

BIBE-H-005 ADMINISTRATIVE HISTORY

Statement of problem

The only study related to an administrative history is a graduate thesis written by J. R. Jameson in 1974 entitled Big Bend National Park of Texas: A Brief History of the Formative Years, 1930-1952. There is no single information source that encompasses the entire administrative history of the park.

Alternative Actions and Probable Impacts

1. No Action: This alternative is negated by management policy.

2. Initiate the Writing of an Administrative History: Failure to write an administrative history fails to meet management policy.

Recommendations and time frames

1. Initiate the writing of an administrative history for the park during FY 89.

This project is categorically excluded from NEPA requirements as the proposed project is neither significantly controversial nor will it significantly effect the environment.

CURRENT PRESERVATION MAINTENANCE APPROACH FOR NATIONAL REGISTER HISTORIC PROPERTIES AND LCS STRUCTURES

Homer Wilson Ranch

The Homer Wilson Ranch is currently listed on the National Register of Historic Places and the LCS and has high interpretive potential. It represents the early ranching period in the Big Bend and the attempts of settlers to "make do" with what was available in the remote and sometimes hostile frontier. The site consists of a ranch house, utility building, wooden corral, and a dipping vat and chute. The ranch house and utility building reflect a unique functionally eclectic choice of construction materials and design. There is a need for a HABS level III graphic documentation of the various structures. A Historic Structures Report and a Preservation Guide is programmed for these structures. Until such time as these documents are ready, this site will be inspected regularly for deterioration and will be kept in good condition, with preservation maintenance being performed as detailed in the following Structure Information and Five-year Programming Sheets.

The Mariscal Mine District

The Mariscal Mine district is an isolated complex of at least 26 structures currently on the National Register of Historic Places and the LCS. Numerous other historically related structures are found in the area but are not listed. The site represents early 20th century mining in the Big Bend and contains excellent examples of innovative and functionally eclectic architectural design. This mining complex has been identified as one of the best examples of mining engineering in the nation.

A Historic Structures Report and a Preservation Guide are programmed for these structures. Preparatory to this, there is need for a HABS level III documentation of the various structures. Until such time as these documents are available, these structures will be managed as follows. Unfortunately, because of the site's remoteness and the logistical impracticality of restoration or intensive and active preservation, the management practices have been allowed the Mariscal Mine complex to deteriorate naturally. These structures should be inspected frequently for hazardous conditions. Many of the open mine shafts have been sealed for visitor safety. Some are presently in need of repair. Warning signs and fencing should be inspected and maintained on a regular basis. Preservation maintenance should be done as detailed in the following Structure Information and Five-year Programming Sheets.

The Luna Jacal

This restored one-room structure is on the National Register of Historic Places and the LCS. It is a primary example of vernacular house construction during the early farming period.

It was originally a partial dugout structure, with a sod roof and wood, stone, and adobe mortar walls. Its restoration included replacing the sod roof with concrete. The remote location of this structure on the Maverick road makes it subject to vandalism, and should this become a problem, extra precautions to prevent it may have to be implemented. There is a need for a HABS level III graphic documentation. The structure should be inspected regularly and preservation maintenance performed according to the following Structure Information and Five-year Programming Sheets.

The Rancho Estelle District

The Rancho Estelle District is on the National Register of Historic Places with five of its structures listed on the LCS. These consist of stone and adobe structures all unroofed except for BBH-13 (Farm Hand's Casita). The site is associated with floodplain farming along the Rio Grande. Numerous dugout "jacals" located nearby, relate to earlier habitations at the ranch but are not listed. A HABS level III graphic documentation is needed for the site and for some of the Rancho Estelle structures. A Historic Structures Report and a Preservation Guide are programmed for these structures. Until such time as these documents are ready, the LCS structures will be routinely inspected and preservation maintenance will be performed as detailed in the following Structure Information and Five-year Programming Sheets.

The Hot Springs Historic District

Hot Springs is currently listed on the National Register and the LCS. The site is centered around the J. O. Langford hot springs resort and the development which arose around it. The LCS listing includes the resort motel and bathhouse facility and the store/post office. The ruins of the original and later Langford houses, the Hot Springs bath house, the Livingston house and the postmaster's house are not listed but lie within the district boundary. A HABS level III graphic documentation is needed. The Hot Springs NR District will be routinely inspected and preservation maintenance will be performed as detailed in the following Structures Information and Five-year Programming Sheets.

The Castolon Historic District

The Castolon Historic District is currently listed on the National Register of Historic Places and the LCS. The site is representative of early 20th century floodplain farming along the Rio Grande and a short-term military occupation that occurred in response to the early 1900's border conflict. Old Castolon is represented by three structures. The military occupation of Castolon is represented by 6 structures. The later commercial episode of Castolon history is represented by the 6 buildings comprising the Cavalry camp plus four other structures. It is

ironic that the troops stationed at the Cavalry camp were withdrawn before they could use most of the structures. The oldest known adobe structure in the park, the Alvino House, is an excellent example of local evolutionary adobe construction. Its present state of deterioration speaks poorly of the National Park Service in its fulfillment of its mission to conserve the history of the area. Several structures and building foundations which historically relate to the district are not listed on the LCS or National Register.

There is a recognized need for the development of a long range strategy for preservation, development and use, and interpretation of the Castolon Historic District. Most of the structures are presently managed for adaptive use. There is still a need for a HABS level III graphic documentation of most district structures. A Historic Structures Report and a Preservation Guide are programmed for these structures. Until such time as these documents are available, the structures will be routinely inspected and preservation maintenance will be accomplished as detailed in the following Structure Information and Five-year Programming Sheets.

Daniel's Ranch

Daniel's Ranch is currently under nomination to the National Register of Historic Places. It is representative of early settlement and development of floodplain farming along the Rio Grande. It is located in a highly visibile area and is of interpretive value. Its present state of deterioration speaks poorly of the National Park Service in its fulfillment of its mission to conserve the history of the area. Hence, its preservation maintenance is detailed in the following Structure Information and Five-year Programming Sheets.

PRESERVATION OF HISTORIC SITES AND STRUCTURES NOT LISTED ON THE NATIONAL REGISTER OR LCS

Scattered throughout the park are several hundred sites and man-made structures dating back into the 1800's, which relate to early frontier settlement, military expeditions, cavalry occupation, candelilla wax processing, mining, farming, and ranching. These historic remains speak of the great diversity of human activity in the Big Bend region. Park visitors are constantly inquiring about their age, historic use, and connection with historic persons. Each possesses varying levels of historic or architectural significance. These structures are in various states of decay, and include rock corrals, stone alignments, building foundations, collapsed and standing walls, wells and windmill towers, aerial tramway towers, candelilla wax processing vats and fire boxes, and other kinds of structural remains. The SWRO has eliminated all of these various structures from consideration for National Register status until additional information surfaces which supports their significance. When allowed to remain in a natural state where they may be casually encountered by the visitor these structures can add much to the aesthetic enjoyment of the park. They possess great interpretive value and there should be continued attempts should to obtain information regarding these structures and their place in local history.

Barker Lodge

Barker Lodge is currently under nomination to the National Register of Historic Places. It is located in a high visibility area and is presently being used as housing for researchers and special guests who may be working in the park. It is being maintained as an adaptive use structure.

Berkeley Cottage

During the early 1970's the Texas SHPO opposed the nomination of Berkeley Cottage and there is presently no interest in renomination. Berkeley Cottage has been used for housing one of the maintenance workers at Rio Grande Village. It is being maintained as an adaptive use structure.

Glenn Springs Wax Factory and Cavalry Outpost

The Glenn Springs area is currently under nomination for the National Register of Historic Places. The only surviving structures are a few house ruins in "Mexican" Glenn Springs on the west side of Glenn Draw, the foundations of the houses and wax factory that existed on the east side of the draw, and remains of the cavalry outpost structures, parade grounds, and perimeter defensive fortifications (rifle pits and stone wall). It is significant as a historic archeological site.

Neville Springs Cavalry Outpost

The Neville Springs cavalry outpost contains the oldest known historic structure within the park. The site was occupied by a company of Seminole-negro Indian Scouts between 1885 and 1891. It is currently under nomination to the National Register of Historic Places. The only structures are one stone foundation, and one ruin in desperate need of stabilization.

Cemeteries and Grave sites

Currently there is a base map of known graves and cemeteries in the park. There is also other historic documentation on specific individuals associated with specific graves. The park currently maintains a grave site inventory file and base map. On a sporadic or fortuitous basis the park documents any new discoveries of previously unknown graves and information regarding individuals known to be buried in the park. These graves should be monitored for deterioration and necessary steps taken to maintain their integrity.

Current management action

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

a. When it has become apparent that a structure has become unsafe, measures will be taken to correct such conditions.
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 a regular basis.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Old Castolon - Shed

BIBE # 616 LCS # 12049 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Vacant Proposed Use Interpretive walks

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate Ø Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo
HRMP - 1968, Needs immediate rehabilitation (Cane ceiling was incorrectly restored in 1962 - laid on wrong axis).

Region Recommendation (1977):

Recent comprehensive preservation treatment under direction of DSC.
1. Inspect semi-annually.
2. Minor repair when required.
3. Report other than routine repairs to SWRO.

Park Recommendation (1988):

New 10-238 package (roofing, plaster repair, vigas, etc.)
1. Inspect at least semi-annually and photograph at least annually.
2. Remove vegetation from around buildings.
3. Grade to keep water from around walls.
4. Minor repairs as needed.
5. Triple XXX on other than routine needs.
6. Sweep out regularly until bat-proofed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Old Castolon-Cafe-Residence

BIBE # 617 LCS # 12048 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Vacant Proposed Use Interpretive walks

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo
HRMP - 1968, Needs immediate rehabilitation - broken major beam.

Region Recommendation (1977):

Recent comprehensive preservation treatment under direction of DSC.
1. Inspect semi-annually.
2. Minor repairs.
3. Report other than routine needs to SWRO.

Park Recommendation (1988):

New 10-238 package (roofing, plaster repair, vigas, etc.)
1. Inspect at least semi-annually and photograph at least annually.
2. Remove vegetation from around buildings.
3. Grade to keep water from around walls.
4. Minor repairs as needed.
5. Triple XXX on other than routine needs.
6. Sweep out regularly until bat-proofed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Old Castolon - Store

BIBE # 618 LCS # 00070 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Vacant Proposed Use Special programs, Interpretive walks

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo
HRMP - 1968, Apparently one of the oldest buildings in the Castolon area and needs to be saved and utilized.
Photographed by Mogart, SWR, 1/83.

Region Recommendation (1977):

Recent comprehensive preservation treatment under direction of DSC.
1. Inspect semi-annually.
2. Make minor repairs as needed.
3. Report other than routine needs to SWRO.

Park Recommendation (1988):

New 10-238 package (roofing, plaster repair, vigas, etc.)
1. Inspect at least semi-annually and photograph at least annually.
2. Remove vegetation from around buildings.
3. Grade to keep water from around walls.
4. Minor repairs as needed.
5. Triple XXX on other than routine needs.
6. Sweep out regularly until bat-proofed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Castolon Store (Barracks)

BIBE # 600 LCS # 12117 Management Category B

Ownership NPS-fee simple Management Agreement Concession Contract

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Other (Store/quarters) Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 20,000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 24,000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo
HRMP - 1968, Continue adaptive use.
HABS drawings 1985.
Controversy concerning ramada in 1984; SWRO overrode park decision to remove ramada.

Region Recommendation (1977):

Electric outlets to be installed in 77/78, comprehensive restructuring done to store.
1. Complete minor repairs.
2. Refer major problems to SWRO.

Park Recommendation (1988):

Continue cyclic repairs as delineated by semi-annual inspections.
1. See specific items in 10-238 package #187.
2. Remove vegetation from around walls.
3. Keep ramada, replace safety hazards in kind and rethatch with cane.
4. Install vehicle barriers around all ramadas.
5. Develop interior furnishing plan.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Army Utility Building

BIBE # 601 LCS # 00072 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Storage/Fire Cache Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 5,000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 4,000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Adaptive use, workshop/storage.

Region Recommendation (1977):

None.

Park Recommendation (1988):

1. See 10-238 package #187.
2. Semi-annual inspection and photograph annually.
3. Grade and keep water away from walls.
4. Remove vegetation away from walls.
5. Carry out routine repairs.
6. Triple XXX on major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Army Latrine

BIBE # 602 LCS # 12056 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Other (Visitor Restroom) Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 1000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, No specific comments.

Region Recommendation (1977):

None.

Park Recommendation (1988):

1. See 10-238 package #187.
2. Semi-annual inspection and photograph annually.
3. Continue routine maintenance.
4. Grade and keep water away from walls.
5. Remove vegetation away from walls.
6. Improve water system.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Officer's Quarters (5 room)

BIBE # 603 LCS # 12055 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Lodging Proposed Use Bunkhouse

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommends continuation of use a residence.
Used as a residence until 1983; has received intermittent use over past three years. In need of major work.

Region Recommendation (1977):

None.

Park Recommendation (1988):

See 10-238 (rehab structure for alternative use).
1. Inspect semi-annually and photograph annually.
2. Keep vegetation and water from around walls.
3. Perform routine minor maintenance.
4. Triple XXX major problems to SWRO.
5. Scope of work completed - work will be completed as manpower and funding allow.
6. Priority 3 for major rehabilitation.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Officer's Quarters (4 room)

BIBE # 604 LCS # 12054 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Lodging Proposed Use Bunkhouse

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommends continuation of use a residence.
Used as quarters until 1983.
HABS drawings, 1985.

Region Recommendation (1977):

None.

Park Recommendation (1988):

See 10-238 (rehab structure for alternative use).
1. Inspect semi-annually and photograph annually.
2. Keep vegetation and water from around walls.
3. Perform routine minor maintenance.
4. Triple XXX major problems to SWRO.
5. Scope of work completed - work will be completed as manpower and funding allow.
6. Priority 2 for major rehabilitation.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Magdalena House

BIBE # 605 LCS # 12053 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Interpretive exhibits Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Called for repair and stabilization.
Used as Ranger Station/visitor contact from 1957-1985.
Stabilized and repaired in 1963 by ruins stabilization unit.
Major work completed in 1984-1985 and converted to exhibits.

Region Recommendation (1977):

None.

Park Recommendation (1988):

1. Continue routine minor maintenance.
2. Keep vegetation and water from around walls.
3. Triple XXX major problems to SWRO.
4. Install vehicle barriers around ramada.
5. Gate or sign side road to reduce traffic to Garlic House.
6. Install walkway to Garlic House along east side of structure.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Garlic House

BIBE # 606 LCS # 12052 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Visitor contact, Ranger Station Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Adaptive Preservation

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 13000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, reported stabilization work.
Converted to Ranger Station/Visitor Contact Station in 1985.
To be reroofed in FY 86.
Major work completed in 1980-1985. Quality of work caused considerable strife between Texas Historical Commission/SWRO/ BIBE.

Region Recommendation (1977):

Not mentioned specifically.

Park Recommendation (1988):

See 10-238 package #187 (recurring maintenance and replastering).
1. Inspect semi-annally and photograph annually.
2. Keep vegetation and water from around walls.
3. Install weatherstripping to keep out bats and insects.
4. Continue minor routine repairs.
5. Triple XXX major problems to SWRO.
6. Replace swamp cooler with heat/air pump.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Alvino House

BIBE # 607 LCS # 12051 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use None Proposed Use Storage and Interpretive Special Walks

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 29000 Level C By Whom SWR 1/78

Park History: HABS drawing completed FY 1985.
HABSI - 1964, Reported in partial ruins and in need of stabilization and rehabilitation.
HRMP - 1968, Reported a cement/soil cap applied by SW Archeological Center.
SWRO team pulled the west wall in in FY 1984.
SWRO team applied partial roof repair and partial wall veneering in FY 1985.
SWRO, in FY 1986, declared structure to be treated with benign neglect and pulled $90,000 slated for rehabilitation.

Region Recommendation (1977): Reported recent emergency repairs and structure still needed additional repairs to walls and roof urgently.
Structure to be inspected quarterly to insure against excessive roof leakage, rodent damage, vandalism, etc.
Comprehensive preservation work needed.

Park Recommendation (1988): 1. Rehab structure-interior and exterior; Structure to be used for storage and special interpretive walks/programs.
2. Park C. estimate $125,000 (field). See 10-238.
3. Consider structure #1 rehab priority.
4. Inspect quarterly and photograph quarterly.
5. Keep vegetation and water away from walls.
6. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION

FY-89

Area BIBE Name of Structure/Area Granary

BIBE # 608 LCS # 12050 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Wood Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use Hay/Lumber Storage Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 2500 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Called for immediate stabilization and quick restoration.

Region Recommendation (1977):

Structure needs oiling and preservation treatment.

Park Recommendation (1988):

See 10-237 package #187 (recurring maintenance).
1. Develop 10-238 package for fire protection (sprinklers).
2. Inspect semi-annually and photograph annually.
3. Make routine repairs as required.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Daniel's Farm Hand's Casita

BIBE # 442 LCS # 12073 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Undetermined Date Entered on Register NA

Current Use No potential use Proposed Use Same

Stabilization Responsibility Other than NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 0 Level C By Whom SWR 1/76

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, No mention.

Region Recommendation (1977):

Advanced state of decay.
Check periodically.
Allow to disintegrate naturally.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Triple XXX major safety hazards to SWRO.
3. Allow to deteriorate.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Daniel's Farm House

BIBE # 443 LCS # 12074 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Undetermined Date Entered on Register NA

Current Use No potential use Proposed Use Interpretive contact

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 3000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 0 Level C By Whom SWR 1/76

Park History:

HABSI - 1964, Narrative and photo; reported soil cement capping roof and wall repairs.
HRMP - 1968, Recommended preservation and restoration when needed.
Photos by Mogart, SWR, 3/83.
Park pushed for repairs in 1984/1985 but SWR only resubmitted structures to National Register; Status currently unknown.

Region Recommendation (1977):

1. Is in park's interest to maintain.
2. Maintain walls and roof and leave wire screening on doors and windows.
3. Structures not to be nominated to National Register.

Park Recommendation (1988):

1. Could be used for interpretive contact and displays.
2. Inspect semi-annually and photograph annually.
3. If roof is not repaired soon, we will lose it and the structure.
4. Keep water and vegetation away from walls.
5. New 10-238.
6. Priority 4 for major rehab work.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Cabins (Hot Springs)

BIBE # 080 LCS # 12058 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/17/74

Current Use Vacant Proposed Use None

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommended placing a wagon at the store; installing a pump and windmill in front of store and move parking lot west of store and access site via foot bridge. Building needs minor repair (leaky roof, part of roof and side patio should be restored).
Parking lot moved and access is currently via foot bridge.

Region Recommendation (1977):

Inspect semi-annually.
Perform required minor maintenance.
Contact SWRO if major problems arise.

Park Recommendation (1988):

1. 10-238 (new package) (recurring, etc.).
2. Inspect semi-annually and photograph annually.
3. Keep vegetation and water away from walls.
4. Perform minor maintenance as required.
5. Triple XXX major problems to SWRO.
6. Sweep periodically until bat-proofed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Store/Post Office (Hot Springs)

BIBE # 082 LCS # 00071 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/17/74

Current Use Vacant Proposed Use None

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 4000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, See structure information on BIBE-080 (cabins).
Store apparently stabilized twice previously but still needs further stabilization and rehabilitation.

Region Recommendation (1977):

Store and motor court recently underwent preservation treatment.

1. Inspect semi-annually.
2. Perform required minor maintenance.
3. Contact SWRO if major problems arise.

Park Recommendation (1988):

1. 10-238 (new package) (recurring, etc.).
2. Inspect semi-annually and photograph annually.
3. Keep vegetation and water away from walls.
4. Perform minor maintenance as required.
5. Triple XXX major problems to SWRO.
6. Sweep periodically until bat-proofed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Luna Jacal

BIBE # 168 LCS # 12057 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 11/8/74

Current Use Other Proposed Use Interpretive exhibit

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommended moving wagon to Castolon - ask for rehabilitation.
SWR sent crew to repair major hail damage; Photos 3/83 by Mogart, SWRO.

Region Recommendation (1977):

1. Routine maintenance; replace in kind.
2. Control runoff.
3. Contol vegetation.
4. Report major problems to SWRO.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Replace in kind with minor maintenance.
3. Keep vegetation and water away from walls.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Ranch House (Wilson's Ranch)

BIBE # 016A LCS # 12070 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 4/14/75

Current Use Vacant Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 7000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 25000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, States several needs; repair/restoration, stabilization and clearing away of encroaching brush.
Major roof and chimney work completed by SWR preservation crew 3/83, see Mogart photos 3/83.

Region Recommendation (1977):

1. Inspect regularly.
2. Repair major problems (walls, corral, shed, etc.) through use of preservation crew.
3. Consider adaptive use for seasonal housing.
4. Clear away vegetation.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Perform routine/minor repairs as necessary.
3. Keep vegetation and water away from walls.
4. Clear vegetation away from structures.
5. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Corral (Wilson's Ranch)

BIBE # 016B LCS # 12071 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Wood Structure Type Other

Natl. Register Status Entered Date Entered on Register 4/14/75

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 1000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and rough drawing.
HRMP - 1968, Recommends repair of corral (it is apparently very similar to one at Teddy Roosevelt).

Region Recommendation (1977):

1. Repair corral and remove vegetation.
2. Routine maintenance and repairs as needed.
3. Inspect regularly.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Perform routine/minor repairs as necessary.
3. Clear vegetation away from posts and from inside corral.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Dipping Vat and Chute

BIBE # 016C LCS # 12118 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Concrete Structure Type Other

Natl. Register Status Entered Date Entered on Register 4/14/75

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 0 Level C By Whom SWR 1/76

Park History:

HABSI - 1964, Narrative and rough sketch.
HRMP - 1968, Needs to be fenced; fence holding pens; and clear away brush.

Region Recommendation (1977):

1. Inspect regularly.
2. Remove vegetation.
3. Perform routine maintenance.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Clear away vegetation.
3. Perform minor maintenance as necessary.
4. Triple XXX major problems to SWRO as needed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Bunk House (Wilson Ranch)

BIBE # 016D LCS # 12072 Management Category B

Ownership NPS (fee simple) Management Agreement None

Structure Composition Fabric Structure Type Building

Natl. Register Status Entered Date Entered on Register 4/14/75

Current Use Vacant Proposed Use Storage

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 1000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 0 Level C By Whom SWR 1/76

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, States need for repair/restoration/stabilization, and clearing away of vegetation.

Region Recommendation (1977):

1. Inspect regularly.
2. Repair minor maintenance problems.
3. Contact SWRO on major problems.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Perform minor maintenance as necessary.
3. Keep water and vegetation away from walls.
4. Triple XXX major problems to SWRO as needed.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Dorgan Residence (Sublett Farm)

BIBE # 139 LCS # 12066 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/3/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility NPS

Routine Maintenance Responsibility NPS

Approved Ult. Treatment Responsibility NPS

Current Approved Treatment Preservation

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommended stabilizing ruins and replacing missing beams; put in bench seats.
Photos by Mogart, 4/83.

Region Recommendation (1977):

1. Routine maintenance as required.
2. Periodic inspections.
3. Keep vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation away from walls.
3. Check for safety hazards.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Farm House (Sublett Farm)

BIBE # 012 LCS # 00073 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/3/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Preservation

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo; reports soil/cement capping having been replaced on standing walls.
HRMP - 1968, Recommends stabilization of walls and exterior restoration only.

Region Recommendation (1977):

1. Inspect regularly and maintain shoring in safe manner.
2. Routine maintenance.
3. Keep water and vegetation away from walls.
4. Refer major problems to SWRO.

Park Recommendation (1988):

1. Since the building is almost melted to the ground:
   Inspect semi-annually and photograph annually.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Hand's Casita (Sublett Farm)

BIBE # 013 LCS # 12069 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/3/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Preservation

Stabilization Estimate 4000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:
HABSI - 1964, Narrative and photo (both pre- and post-1962 rehabilitation.
HRMP - 1968, Recommended that additional capping is necessary, then reduce to walls and interpret as ruins.
1985 rehabilitation by SWRO because of safety request and completed paperwork. Controversy over use of asphalt brick and whether the structure was ever plastered on the exterior. Park preferred to put money into Alvino House but was overruled by SWRO. To be roofed in FY 86.

Region Recommendation (1977):
1. Inspect regularly.
2. Routine maintenance as required.
3. Clear vegetation from around building.
4. Clean and inspect drainage system.

Park Recommendation (1988):
1. Inspect semi-annually and photograph annually.
2. Keep vegetation and water away from walls.
3. Replaster interior of structure.
4. Make minor repairs as required.
5. Triple XXX major problems to SWRO.
6. Cow-proof structure.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Adobe Shed (Sublett Farm)

BIBE # 014 LCS # 12068 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/3/74

Current Use None Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Preservation

Stabilization Estimate 1000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 4000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Refers to shoring.

Region Recommendation (1977):

1. Inspect regularly.
2. Maintain shoring if needed.
3. Correct drainage problems.
4. Routine maintenance.
5. Clean vegetation away from walls.
6. Inspect and clean sub-surface drain.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation in close proximity to walls.
3. If an evident safety hazard exists, clear through Office of Resource Management and Chief of Maintenance.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Stone Farm House (Sublett Farm)

BIBE # 015 LCS # 12067 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/3/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Preservation

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Recommend to let deteriorate after minor maintenance or safety problems are corrected.

Region Recommendation (1977):

1. Inspect regularly.
2. Routine minor maintenance as needed.
3. Refer major problems to SWRO.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Keep water and vegetation away from to walls.
3. Make minor repairs as necessary.
4. Triple XXX major problems to SWRO.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Processing Plant-Mariscal Mine

BIBE # 010A LCS # 12065 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo. Recommends cleaning up hazards and closing mine shafts.
HRMP - 1968, Safety check and minor stabilization.
Mine shaft status report - 1982.
Mine shafts closed in 1984.

Region Recommendation (1977):

1. Inspect frequently for safety problems.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Make minor repairs as necessary.
4. Need HABS crew to document structures and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Processing Building-Mariscal

BIBE # 010B LCS # 12064 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 3000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Safety check and minor stabilization.

Region Recommendation (1977):

1. Inspect frequently for safety problems.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document buildings and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Processing Building-Mariscal

BIBE # 010C LCS # 12064 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 3000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Safety check and minor stabilization.

Region Recommendation (1977):

1. Inspect frequently for safety problems.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document buildings and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Paymaster's Office (Mariscal)

BIBE # 010D LCS # 12062 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 3000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Safety check and minor stabilization.

Region Recommendation (1977):

1. Inspect frequently for safety problems.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document buildings and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Employees' Residences (7)

BIBE # 010 E-K LCS # 12061 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Concrete Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 7000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo; recommended minor clean up.
HRMP - 1968, Check for safety concerns.

Region Recommendation (1977):

1. Inspect frequently.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document buildings and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Superintendent's House-Mariscal

BIBE # 010 M LCS # 12099 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 0 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 0 Level C By Whom SWR 1/76

Park History:

HABSI - 1964, Narrative and photo; structure should be stabilized.
HRMP - 1968, Structure should be reduced to walls - the roof has been removed, but date of removal is unknown.

Region Recommendation (1977):

1. Structure should be allowed to deteriorate naturally.
2. Inspect frequently.
3. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Allow to deteriorate.
4. Need HABS team to document buildings and area.

STRUCTURE INFORMATION **FY-89**

Area BIBE Name of Structure/Area Company Store (Mariscal)

BIBE # 010 N LCS # 12060 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Concrete Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo. Recommended clean up and recovering roof.
HRMP - 1968, Recommended removal of roof and reduction to walls. Roof was removed; date unknown.

Region Recommendation (1977):

1. Structure should be allowed to deteriorate naturally.
2. Inspect frequently.
3. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document buildings and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Employees' Huts (Mariscal)

BIBE # 010P LCS # 12059 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 8000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo. Recommended that one of each type be stabilized.
HRMP - 1968, Reduce to walls for safety.

Region Recommendation (1977):

1. Structure should be allowed to deteriorate naturally.
2. Inspect frequently.
3. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document structures and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Barracks (Mariscal)

BIBE # 010Q LCS # 12098 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 5000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 3000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Remove roof and reduce to walls.

Region Recommendation (1977):

1. Structure should be allowed to deteriorate naturally.
2. Inspect frequently.
3. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document structures and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Brick Kiln (Mariscal)

BIBE # 010R LCS # 12097 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Eng. Structure

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 2000 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 2000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Basically sound; needs minor stabilization.

Region Recommendation (1977):

1. Structure should be allowed to deteriorate naturally.
2. Inspect frequently.
3. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document structure and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Stone ruins (Maricsal)

BIBE # 010S LCS # 12096 Management Category C

Ownership NPS (fee simple) Management Agreement None

Structure Composition Stone Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/13/74

Current Use No potential use Proposed Use Same

Stabilization Responsibility NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment Neglect

Stabilization Estimate 2500 Level C By Whom SWR 1/76

Approved Treatment Cost Est. 2000 Level C By Whom SWR 1/78

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Safety check and minor stabilization.

Region Recommendation (1977):

1. Inspect frequently for safety problems.
2. Remove vegetation away from walls.

Park Recommendation (1988):

1. Inspect semi-annually and photograph annually.
2. Remove vegetation from around walls.
3. Need HABS team to document structure and area.

STRUCTURE INFORMATION FY-89

Area BIBE Name of Structure/Area Derrick Residence

BIBE # 111 LCS # 00075 Management Category D

Ownership NPS (fee simple) Management Agreement None

Structure Composition Adobe Structure Type Building

Natl. Register Status Entered Date Entered on Register 9/6/74

Current Use No longer exists Proposed Use Removed by flood

Stabilization Responsibility Other than NPS

Cyclic Maintenance Responsibility Other than NPS

Routine Maintenance Responsibility Other than NPS

Approved Ult. Treatment Responsibility Other than NPS

Current Approved Treatment NA

Stabilization Estimate NA Level NA By Whom NA

Approved Treatment Cost Est. NA Level NA By Whom NA

Park History:

HABSI - 1964, Narrative and photo.
HRMP - 1968, Building was in use by USDA. Allow to deteriorate upon becoming vacant.
Building was removed by 1978 flood.

Region Recommendation (1977):

Not mentioned.

Park Recommendation (1988):

None; house was lost in 1978 flood.

RESEARCH

ACTIVITIES AND 5-YEAR PROGRAMMING SHEETS

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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 10-238 10-237
	1	N-001	Air Quality				25	25	SWR Submittals
	2	N-004	Endangered Species Peregrine falcon	18	18	18			
	4	N-012	Mountain Lion Research	30	15	15			Graduate Assistant Florida Behavior
	5	W-001	Geohydrologic Study Oak Springs/Basin	50					USGS Contract
	6	W-008	Maverick Entrance Water Potential		35				Exploratory Drilling
	7	W-003	Persimmon Gap Water Potential		35				Exploratory Drilling
	9	N-005	Endangered Species Big Bend Gambusia			10			Update Recovery Plan
	10	N-020	Resource Basic Inventory, Harte R	25	25	25	25	25	67,000 acre addition
	11	H-001	Preserve/Protect Hist. Structures	40					HABS Documentation Mariscal Mine
	12	N-018	Geographic Information System	30					Project Start Up
	13	A-003	Preserve/Protection Archeological Res.	20	20	20	20	20	New Site Analysis Report/Documentation
	15	N-007 N-008	Exotic Species		30	30	30		Tamarix, Salsola Sorghum, Aoudad, Etc.
	16	N-002 N-011	Vegetation Mgmt.		30				RBI and expanded Veg. Mgmt. Plan
	17	W-009	Water Resources Profile	16					Water Resources Br.
	18	W-002	Water Quality Monitoring	50	50				
	19	A-001	Archeological Site Survey		300	150	150		NPS & Sate of Texas

RESEARCH

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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 10-238 10-237
	20	N-014	Endangered Species Black-capped Vireo			30	30		Habitat Research
	21	N-021	Assess Backcountry Use and Impacts	23	23	23			Mesa de Anguila. & Desert sites.
	22	N-006	River Use Mgmt. Plan	25	25	15	14		Lajitas to Dryden
	25	N-017	Inventory/Monitor Deer Javelina		50	50			Develop system
	26	N-019	Endangered Species Long-nosed Bat			5			Mgmt. Plan
	27	H-002	Graphic Documention Historic Resources			30	30		Re-survey & Update
	28	W-006	Flood Plain Mapping			25	25	25	
	29	H-004	Special Studies Oral History	3.2	3.2	30	3.2	3.2	Annual transcribing & major thrust.
	30	A-002	Archeological Invest. Burro Mesa			90	90	50	
	31	W-005	Analyze Historic River flow data				30		
	32	W-007	Analyze historic water use, Developed.			30			
	33	H-003	Special Studies in History	10	10	10	10	10	
	34	N-016	Survey Maderas del Carmens / Chisos				150	150	
	35	H-005	Administrative History				10		
	36	N-015	Update the Geologic Basemap				30		

MAINTENANCE AND/OR MONITORING

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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.	Year 1 $1000	Year 2 NPS cost/ M.Y.	Year 2 $1000	Year 3 NPS cost/ M.Y.	Year 3 $1000	Year 4 NPS cost/ M.Y.	Year 4 $1000	Year 5 NPS cost/ M.Y.	Year 5 $1000	Date Submitted 10-238 10-237
	1	N-001	Air Quality	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Park Monitoring
	2	N-004	Endangered Species Peregrine falcon	.42	9.2 9.4	.42	9.2 9.4	.42	9.2 9.4	.42	9.2 9.4	.42	9.2 9.4	Park Moniyoring Contract Monitoring
	3	M-001	Trails Mainenance & Rehabilitation	4.0 1.8	109.5 32.0 60.9	4.0 1.8	109.5 32.0 106.7	4.0 1.8	109.5 32.0 96.0	4.0 1.8	109.5 32.0 21.0	4.0 1.8	109.5 32.0 125.0	Base Trails Funding 88 Fee Enhancement Special Projects SWR
	4	N-012	Mountain Lion Study and Monitoring	.5	20.0	.5	20.0	.5	20.0	.5	20.0	.5	20.0	Some overflights/rad collaring/monitorin
	8	N-010	Basin Fuel Reduct.	1.0	18.0	1.0	18.0	1.0	18.0	1.0	18.0	1.0	18.0	Manual & Burn Prog.
	9	N-005	Endangerd Species Big Bend Gambusis	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Park Monitoring
	10	N-020	Harte Ranch RBI	.5	15.0	.5	15.0	.5	15.0	.5	15.5	.5	15.5	
	11	H-001	Preservation of Historic Resources	1.0	21.3 38.0	1.0	26.3 27.0	1.0	21.3 59.0	1.0	21.3 25.0	1.0	21.3 29.0	Park Maintenance Special Projects SWR
	12	N-018	Geographic Information System	.3	6.4	.3	6.4	.3	6.4	.3	6.4	.3	6.4	Park Staff Input
	13	A-003	Preserv/Protect Arch. Resources	.5	20.0	.5	20.0	.5	20.0	.5	20.0	.5	20.0	Data Analysis/Reports Seasonal for Surveys
	14	N-003	Endangered Species Cacti	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Park Monitoring
	15	N-007 N-008	Exotic Species	1.5	25.0	1.5	25.0	1.5	25.0	1.5	25.0	1.5	25.0	Crew + Permanents
	16	N-002 N-011	Vegetation Analysis Veg. Mgmt. Plan	.15	3.2	.15	3.2	1.0	30.0	1.0	30.0	1.0	30.0	New Position Year 3
	18	W-002	Water Quality Monitoring					.1	30.0	.1	30.0	.1	30.0	Contract/Oversight

MAINTENANCE AND/OR MONITORING

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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 10-238 10-237
	19	A-001	Archeological Site Survey	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	New Site Documentaic
	20	N-014	Endangered Species Black-capped Vireo	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Contract Monitoring Cow-bird Trapping
	21	N-021	Assess Backcountry Use & Impacts	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Mesa de Anguila & Desert Sites
	22	N-006	River Use and Management Plan	.5	20.0	.5	20.0	.5	20.0	.5	20.0	.5	20.0	Permit System for River Use
	23	W-004	Water Source (5 yr) Inventory	.5 .15	20.0 3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Overall re-survey Annual Key Update
	24	N-013	Integrated Pest Management	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	
	25	N-017	Inventory/Survey Deer & Javelina					.15	3.2	.15	3.2	.15	3.2	
	26	N-019	Endangered Species Long-nosed Bat		1.5		1.5		1.5		1.5		1.5	Contract Monitor
	27	H-002	Graphic Document-Historic Resources	.1	2.1	.1	2.1	.1	2.1	.1	2.1	.1	2.1	New Site Documentation
	31	W-005	River Flow, Now & Historic	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Daily flow readings
	32	W-007	Historic Water Use Developed Areas	.15	3.2	.15	3.2	.15	3.2	.15	3.2	.15	3.2	Water Use Records

APPENDIX A

Research Status

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APPENDIX B

Scope of Collection Statement

BIG BEND NATIONAL PARK
COLLECTION POLICY STATEMENT

Big Bend National Park was established to protect and preserve the natural, historic, scenic and recreational values of the park. The establishment of Big Bend National Park was authorized by an Act of the 74th Congress (49 Stat. 393) on June 20, 1935.

Collection policies will conform to these objectives, the Statement of Management, and other documents covering the operations of the park. These policies include the following:

To collect or acquire as appropriate:

Natural history specimens (paleontological, biological and geological) representative of the park area. Endangered and/or protected species will not be collected. All persons doing field collections will have an approved collecting permit.

Archeological specimens recovered from locations inside Big Bend National Park, along with any notes, photographs, maps, plans, profiles, or other documentation of the data recorded during archeological projects within the park. Specimens representative of types associated with cultures that once existed within the park, but from outside the park or of unknown provenience, will be acquired only if needed for specifically identified interpretive or research purposes.

Historic objects with documented association with the park and relating to the Spanish Period (1536-1821), the Mexican Period (1821-1836), Texas Independence (1836-1845), or the Anglo-American Period (post-1845), and to exploration and transportation, military activities, farming, ranching and mining as well as minor industries such as the making of candelilla wax.

Art and photographs relating to the interpretive themes of the park. All original historic negatives and one copy of all historic photographs to be deposited with an appropriate archive.

Oral history tape recordings of interviews with persons having knowledge relating to park interpretive themes.

To exclude from the collection:

Objects that needlessly duplicate materials already collected or that do not relate to the park interpretive themes.

Original documents, interview tapes, photographs, and/or other historical sources. All such materials will be deposited with an archival institution capable of providing for their care.

To maintain:

A library and reference file adequate to meet most needs for interpretation and for documenting collections.

Copies of photographs needed for interpretive purposes, for use in publications, and other similar needs.

The museum collection is currently used primarily as a study collection for the park staff and visiting researchers. On September 15, 1988, it contained 5318 catalogued items of the following categories:

A. Archeological - approximately 1400 specimens that were collected in the field prior to the area becoming a National Park. Many items were later acquired by donation. the archeological section contains numerous arrowheads, spear points, manos, metates, abraders, digging sticks, pottery fragments, and baskets fragments.

B. Botanical - approximately 2500 herbarium specimens representing 125 families.

C. Geological - approximately 150 specimens of igneous, sedimentary and metamorphic origin.

D. Historical - approximately 450 items that include store ledger records, books, diaries, flags, manuscripts, maps, tombstone floral designs, horse/mule shoes, belt buckles, eating utensils, household tools, cartridges, dolls, animal traps, bottles, etc.

E. Paleontological - approximately 250 specimens which include protozoa, crustacea, gastropoda, and vertebrata (reptiles and mammals).

F. Zoological - approximately 300 bird study skins, 1900 mammal study skins, 125 preserved reptiles/amphibians, 50 fish, and numerous insects.

Location: The museum collection is housed in the Naturalists' workshop located at Park Headquarters. Due to a shortage of work space, the workshop is also used for the storage of the color slide files, oral history tapes, audio-visual equipment, and darkroom supplies. The workshop is also used for interpretive programs, development, and training.

The museum items are handled according to the Museum Handbook Standards. An accession book, catalogue cards and the source of accession files are kept up-to-date.

The museum items are stored and secured in NPS approved steel museum cabinets. The workshop area and the storage cabinets are kept secured and closely supervised by the

Chief Park Interpreter and Assistant Chief Park Interpreter. The workshop is kept clean and the proper temperature/humidity factors are monitored and controlled. The museum cabinets are inspected for fungal growth and the replacement of moth cakes.

Accessibility/Control: The collection is available at any time to park personnel, visiting researchers and interested visitors. All persons requiring to see or use the museum collection must check with the Chief Park Interpreter or the Assistant Chief Park Interpreter. No items will be allowed on display without the proper approval.

Maintenance/Cost/Year:

1 GS-025-05 salary $8/hour x 20 hours/pp x 26 pp =	$4160
Miscellaneous costs	500
	$4660

Summary:

The main purpose of the museum collection at Big Bend National Park is to acquire needed historic and/or biotic specimens that can be utilized in museum exhibits, research and interpretive programs.

All personnel assigned to supervise or work with the museum collection will follow closely all policies and guidelines specified in the Statement for Management, the Scope of Collection Policy Statement, and the Museum Handbook.

All park personnel, visiting researchers, HFC exhibit planners, and interested visitors will be allowed access to the collection with prior approval of the Chief Park Naturalist.

APPENDIX C

Specific Management Plans

Specific Management Plans

1. Statement for Management

This document was updated in 1986 and is available from either Big Bend National Park or The Southwest Regional Office in Sante Fe, New Mexico.

2. Historic Resources Management Plan

The 1968 Plan was updated by the Office of Cultural Resources in Sante Fe in 1977, but has never received formal management approval. Copies of both documents may be obtained through the same locations as #1. The information basically has been updated and incorporated in this edition of the Resource Management Plan.

3. Fire Management Plan

Completed in 1980, this document is in need of updating and is tentatively scheduled for such in FY 1989. The fuels reduction program for the Basin developed area is in place and is currently in a maintenance mode, ie, either through prescribed fire, manual reduction or a combination of both.

4. Backcountry Management Plan

This plan was updated and approved in 1986. This major revision initiated a major change in the backcountry camping program for the Chisos Mountains.

5. Big Bend Gambusia Recovery Plan

This plan was updated in 1984 but is in need of revision due to new populations established/found since its publication. This plan will be updated within the next two years to reflect major advancements.

6. Action Plan for the Monitoring of Peregrine Falcons in Big Bend - National Park, 1988.

This plan was initiated in the spring of 1988 and evaluation and revisions will be scheduled annually for October.

7. General Management Plan, Master Plan, March 1981.

This plan is currently out of date and is in need of revision and updating.

PLANS YET TO BE COMPLETED

1. River Management Plan.

2. Aquatic Resources Management Plan.

3. Vegetation Management Plan

APPENDIX D

Pesticides

OK D.J. 6/23/88

PESTICIDE PROGRAM
WASO Approved for 1988 YEAR
Gerald D. McCrea 24 June 1988
for INITIALS Gary Johnston
DIVISION: SW
State: TX
Region - OK

FORM 10-21A (SEPT. 1973)

UNITED STATES DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE
PEST CONTROL PROGRAM REPORT

PERSON TO CONTACT Carl M. Fleming
(915) 477-2251

ORGANIZATION: Big Bend Ntaional Park
ORGANIZATION CODE:7130

PROJECT NUMBER: BIBE-88-03

PURPOSE :Tamarix spp. control

TARGET PEST(S) :Tamarix spp.

PRODUCT NAME :Garlon 3A

EPA REG. NUMBER :464-546

FORM APPLIED :Liquid

ACTIVE INGREDIENT(S)	% OR LBS/GALLON OF A.I. IN PRODUCT	STRENGTH OR MIX OF 100% ACTIVE INGR.	LBS/ACRE OR OTHER RATE OF 100% ACTIVE INGR.
Triclopyr (3,5,6-Trichloro-2-Pyridinyloxy acetic acid) as the Triethylamine salt	44.4%	3 Lbs/gallon	
Inert Ingredients	55.6%		
Acid Equivalent (Trichopyr	31.6%		

MIX OF PRODUCT WITH DILUENT : None, applied full strength

PRODUCT USAGE RATE : 1 - 10 ml/stump

PRODUCT AMOUNT USED PER APPLICATION : 1 - 10 ml/stump

METHOD OF TREATMENT : Stump application, brushed on

AREA OR UNITS TO BE TREATED : 1 - 500 plants/site

NUMBER OF SITES : Approximately 140

DESCRIPTION OF SITES : Plants adjacent to springs, seeps, and water courses.

NO. OF APPLICATIONS : One

SEASON OR PERIOD OF APPLICATION(S) : Spring, summer, fall

AREAS TO BE AVOIDED : none

AREAS TO BE TREATED WITH CAUTION : All sites

PRECAUTIONS : Latex gloves and goggles to be worn by applicator

USE OF TRAINED OR CERTIFIED PERSONNEL : 1 certified (TX-254); 1 private applicator.

MONITORING : 3 mo/ 6 mo/ 1 yr/ 2 yr.

OTHER REMARKS : Treated stumps will be covered with black plastic trash bags when feasible.

INV. 9570-79

OK

PESTICIDE PROGRAM
WASO Approved for 1988. YEAR
Gene Hoff for D. McCrea INITIALS for Gary Johnston
REGION: SW State: DATE 24 June 1988

FORM 10-21A (SEPT. 1973)

UNITED STATES DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE
PEST CONTROL PROGRAM REPORT

PERSON TO CONTACT Carl M. Fleming
(915) 477-2251

ORGANIZATION: Big Bend National Park
ORGANIZATION CODE: 7130

PROJECT NUMBER: BIBE-88-04

PURPOSE : Employee health

TARGET PEST(S) : Wasps

PRODUCT NAME : PT515 Wasp Freeze

EPA REG. NUMBER : 499-153-ZB

FORM APPLIED : Aerosol

ACTIVE INGREDIENT(S)		% OR LBS/GALLON OF A.I. IN PRODUCT	STRENGTH OR MIX OF 100% ACTIVE INGR.	LBS/ACRE OR OTHER RATE OF 100% ACTIVE INGR.
Tetrachloroethylene		32.0%		
Trichloromonofluromethane		20.0%		
Dichlordifluromethane		20.0%		
Petrolium Distillate		13.75%		
Methylene chloride	Other Cube Resins	11.0%	28.0%	
Pine Oil	Pyrethrim I & II	2.80%	.05%	
Rotenone		12.0%		

MIX OF PRODUCT WITH DILUENT : None

PRODUCT USAGE RATE : Approximately 7 - 14 oz./application

PRODUCT AMOUNT USED PER APPLICATION : Approximately 7 - 14 oz.

METHOD OF TREATMENT : Aerosol spray

AREA OR UNITS TO BE TREATED : Nests around utility meters, underneath trailers; and around structures

NUMBER OF SITES : 100 +

DESCRIPTION OF SITES : Meter boxes, structure eaves, beneath trailers

NO. OF APPLICATIONS : One

SEASON OR PERIOD OF APPLICATION(S) : Spring/summer/fall

AREAS TO BE AVOIDED : Potable water

AREAS TO BE TREATED WITH CAUTION : Enclosed areas

PRECAUTIONS : Keep out of reach of children

USE OF TRAINED OR CERTIFIED PERSONNEL : Yes, trained personnel

MONITORING : None

OTHER REMARKS : Should be used in combination with nest removal.

→ Wear protective equipment including goggles

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K
D.G. 6/23/88

PESTICIDE PROGRAM

WASO Approved for 1988 YEAR

Gerald D. McCreadie for 24 June 1988
INITIALS REGION: SW DATE
Mary Lee Johnson State: TX

FORM 10-21A (SEPT. 1973)

UNITED STATES DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE
PEST CONTROL PROGRAM REPORT

PERSON TO CONTACT Carl M. Fleming
(915) 477-2251

ORGANIZATION: Big Bend National Park
ORGANIZATION CODE: 7130

PROJECT NUMBER: BIBE-88-01

PURPOSE : Livestock Protection

TARGET PEST(S) : Stable Flies (biting); False Stable Flies; Gnats, Houseflies, Mosquitoes.

PRODUCT NAME : Wipe V

EPA REG. NUMBER : 270-37

FORM APPLIED : Liquid wipe

ACTIVE INGREDIENT(S)	% OR LBS/GALLON OF A.I. IN PRODUCT	STRENGTH OR MIX OF 100% ACTIVE INGR.	LBS/ACRE OR OTHER RATE OF 100% ACTIVE INGR.
Pyrethrins	0.20%		
Piperonyl Butoxide Technical	0.50%		
Di-n-propyl isocinchomeronate	1.00%		
Oil of Citronella	2.00%		
Butoxy polypropylene Glycol	20.00%		
Inert Ingredients	76.30%		

MIX OF PRODUCT WITH DILUENT : Applied full strength

PRODUCT USAGE RATE : Not to exceed 2 oz/application

PRODUCT AMOUNT USED PER APPLICATION : Approximately 1 fluid oz.

METHOD OF TREATMENT : Liquid Wipe

AREA OR UNITS TO BE TREATED : 7 park and up to 45 Concession horses

NUMBER OF SITES : N.A.

DESCRIPTION OF SITES : N.A.

NO. OF APPLICATIONS : 1 fl.oz./horse/wk as needed

SEASON OR PERIOD OF APPLICATION(S) : Yearround

AREAS TO BE AVOIDED : Areas of open water

AREAS TO BE TREATED WITH CAUTION : Areas around eyes, nose, mouth and ears.

PRECAUTIONS : For ani,al use only; Avoid human skin contact

USE OF TRAINED OR CERTIFIED PERSONNEL : 1 trained, 3 untrained

MONITORING : None

OTHER REMARKS : Used sparingly to give stock some relief from biting insects. There is currently a fly trapping and manure management program in effect

INT: 8879-88

FORM 10-21A (SEPT. 1973)

UNITED STATES DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE
PEST CONTROL PROGRAM REPORT

PERSON TO CONTACT Carl M. Fleming (915) 477 2251

REGION SW

ORGANIZATION: Big Bend National Park
ORGANIZATION CODE: 7130

PROJECT NUMBER: BIBE-88-005

PURPOSE : To establish a lethal barrier to temites

TARGET PEST(S) : Subterranean termites

PRODUCT NAME : Dursban TC

EPA REG. NUMBER : 464-562

FORM APPLIED : Liquid emulsion

ACTIVE INGREDIENT(S)	% OR LBS/GALLON OF A.I. IN PRODUCT	STRENGTH OR MIX OF 100% ACTIVE INGR.	LBS/ACRE OR OTHER RATE OF 100% ACTIVE INGR.
Chlorpyrifos [0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate[	42.8%		
	4 lbs.of chlorpyrifos/gal.	NA	NA

MIX OF PRODUCT WITH DILUENT : 1% (2 gal of Dursban TC in 98 gal H2O)

PRODUCT USAGE RATE : 4 gal of 1% emulsion/10 linear ft.

PRODUCT AMOUNT USED PER APPLICATION : Approximately 90 gallons

METHOD OF TREATMENT : Rodding and trenching around exterior; drill slab along interior walls at source of infestation.

AREA OR UNITS TO BE TREATED : 1 House (residence 313)

NUMBER OF SITES : 1

DESCRIPTION OF SITES : 3 bedroom cement block on slab foundation

NO. OF APPLICATIONS : 1 (currently unoccupied)

SEASON OR PERIOD OF APPLICATION(S) : Summer

AREAS TO BE AVOIDED : water and sewer pipes

AREAS TO BE TREATED WITH CAUTION : areas near kitchen and bathroom

PRECAUTIONS : Wear protective clothing

USE OF TRAINED OR CERTIFIED PERSONNEL : PCO; certified commercial structural

MONITORING : to be inspected by Facility Manager

OTHER REMARKS : telephonic approval obtained from Gary Johnston, WASO on 07/19/88 at 0830 hrs

PESTICIDE PROGRAM
WASO Approved for 1988 YEAR
INITIALS
DATE

OK D.J. 6/23/88 Gary — Don't know if these in?
Gary G

PESTICIDE PROGRAM
WASO Approved for 1988 YEAR
Gerald D. McCrea 24 June 1988
INITIALS for Gary Johnston DATE
REGION SW
State: TX

FORM 10-21A (SEPT. 1973)

UNITED STATES DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE
PEST CONTROL PROGRAM REPORT

PERSON TO CONTACT Carl M. Fleming
(915) 477-2251

ORGANIZATION: Big Bend National Park
ORGANIZATION CODE: 7130

PROJECT NUMBER: BIBE-88-002

Reg — ok

PURPOSE : To control weed in pavement cracks in developed areas

TARGET PEST(S) : Perennial weed species

PRODUCT NAME : Roundup

EPA REG. NUMBER : 524-308 AA

FORM APPLIED : Spray/Liquid wick application.

ACTIVE INGREDIENT(S)	% OR LBS/GALLON OF A.I. IN PRODUCT	STRENGTH OR MIX OF 100% ACTIVE INGR.	LBS/ACRE OR OTHER RATE OF 100% ACTIVE INGR.
Isopropylamine Salt of Glyphosate	41.0%		
Inert Ingredients	59.0%		

MIX OF PRODUCT WITH DILUENT : 2 oz./gallon of water

PRODUCT USAGE RATE : .45 gal./500 sq. ft.

PRODUCT AMOUNT USED PER APPLICATION : Wick application or spot application of approx. 1-3 gal. of diluted mixture/application.

METHOD OF TREATMENT : Wick or pressurized hand sprayer.

AREA OR UNITS TO BE TREATED : Cracks in and along walks, curbs, and pavement in Developed areas.

NUMBER OF SITES : 4 developed areas

DESCRIPTION OF SITES : Pavement, walks, curbs, retaining walls (cracks)

NO. OF APPLICATIONS : As needed

SEASON OR PERIOD OF APPLICATION(S) : Growing season; March - October

AREAS TO BE AVOIDED : Water sources, foodstuffs, desirable plant spp.

AREAS TO BE TREATED WITH CAUTION : Areas away from paved surfaces

PRECAUTIONS : Avoid eye or skin contact; Store, mix and apply only in stainless steel, aluminum, plastic-lined or fiberglass containers

USE OF TRAINED OR CERTIFIED PERSONNEL : Trained park personnel.

MONITORING : performed for non-target effect.

OTHER REMARKS : Will be used only as a spot treatment.

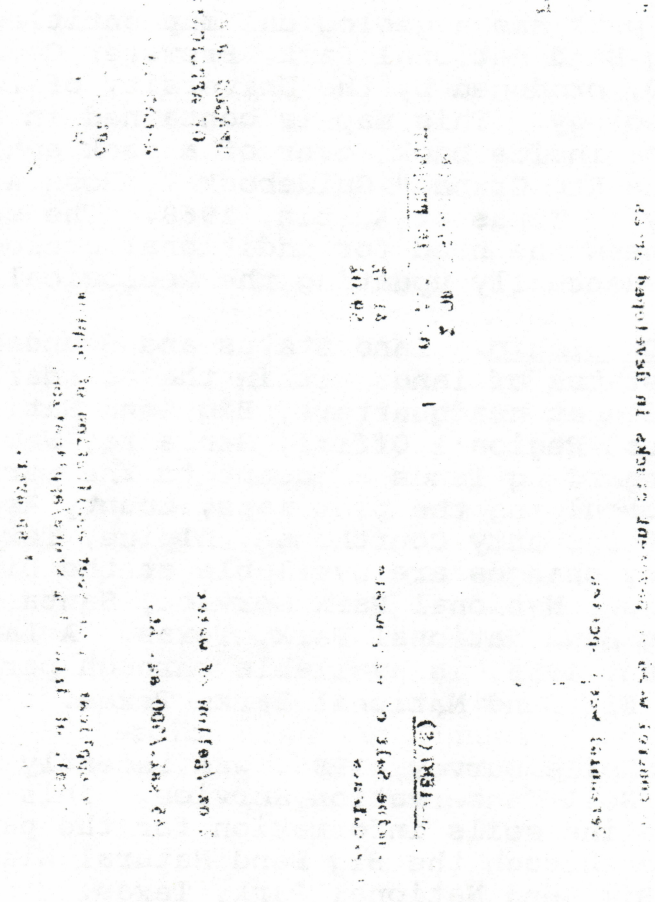
Wear protective equipment including goggles

INT: 8570-79

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APPENDIX E

Information Base Checklist



BASIC THEMATIC MAP FILE

Regional Features

- Population Centers
- Political Subdivisions
- Land Use
- Outdoor Recreation Facilities
- Transportation, Communication, Utilities
- Land Ownership

PARK SPECIFIC FILE

Topography. There is a U.S.G.S. map, No. N2900-W12040, 30 x 80, NPS dated 1969, scale 1:130,000 of Big Bend National Park, Texas, available at Park headquarters, Panther Junction and Southwest Regional Office, Santa Fe, 1:100,000 is available through National Park Concessions, Chisos Basin, and Big Bend Natural History Association, Panther Junction; Big Bend National Park, Texas. U.S.G.S. quadrangle maps, Series V882, scale 1:24,000, dated 1971 are available through National Park Concessions, Chisos Basin and Big Bend Natural History Association, Panther Junction; Big Bend National Park, Texas.

Geology. The park has a 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 a 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. The section on geology addresses the need for additional geological research and eventually updating the Geological Map.

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, New Mexico. 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, New Mexico and Big Bend National Park, Texas. A Land Protection Plan, 1986, is available through park headquarters, Big Bend National Park, Texas.

Soils. A new Soils Survey, 1985, was recently completed by the U.S.D.A., Soil Conservation Service. This information serves as baseline soils information for the park. Copies area available through the Big Bend Natural History Association, Big Bend National Park, Texas.

Hydrology. Most of the hydrogeological features of the park may be discerned from the U.S.G.S. quadrangle maps of the park. A detailed hydrogeological map, 1969, is contained in "A Report of the Progress of the Investigation of Water Resources of Big Bend National Park, Brewster County, Texas" by E.R. Leggett, U.S.G.S. Copies are on file at the Southwest Regional Office and at Big Bend National Park headquarters. A water source survey was completed in 1976 and re-surveyed at least every five years on a cyclic basis. Maps of spring locations are on file at Big Bend National Park, Texas.

Vegetation. A vegetation map compiled by Dr. Barton Warnock, Sul Ross State University and Walter H. Kittams, National Park Service, in 1970 is available at park headquarters, Big Bend National Park. A revision including the park road system was completed in 1977 by Bill Jones, NPS. On file at park headquarters is a map of rare plants occurring in the park, completed by Dr. Warnock. A systematic vegetation mapping system is sorely needed as well as species specific information concerning the vegetative component of the park (See BIBE-N-002).

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 (mountain lions, coyotes, javelina, deer). Copies of the research reports area on file at park headquarters, Big Bend National Park, Texas.

Cultural. A large schematic map showing archeological sites is included in Dr. T.N. Campbell's report on archeological investigations within Big Bend National Park and is on file at park headquarters, Big Bend National Park. An update of the status of archeological work in the park can be found under the archeological section of the Resource Management Plan. A recent history survey by Mr. Art Gomez, 1986, along with the updated historical section of the Resource Management Plan, serves as the current historical background for the park.

Recreation, Development, and Support Facilities. Maps of these facilities are included in approved development concept plans for various developed areas within the park. Future development has been programmed for Rio Grande Village, Castolon, Panther Junction and the Chisos Basin. Each development plan is to be consistent with an approved Statement for Management, available at park headquarters, Big Bend National Park.

NARRATIVE FILE

Climate. Detailed weather information including temperature and rainfall averages by month, season and year is available at park headquarters. Summary sheets are mailed out to interested persons on request.

Socio-economic Environment. Socio-economic factors were considered in the Chisos Basin Development Concept Plan and such studies will be utilized for future planning documents for other park areas.

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

Land Ownership and Use. A recent Land Protection Plan, 1986, details the park's position on land acquisition and ownership status. This document is available through park headquarters, Big Bend National Park.

Soils. The Soil Survey, 1985, by the Soil Conservation Service contains narrative soil descriptions as well as maps of the park. This document is available through the Big Bend Natural History Association, Big Bend National Park.

Hydrology. The Office of Water Resources, Fort Collins, Colorado, is developing a Water Resources Profile for Big Bend National Park.

Vegetation. There are numerous scientific papers, reports and books discussing the vegetation of Big Bend National Park, available in the library and for sale by the Big Bend Natural History Association. Notable among them are: "Plants of Big Bend National Park," by Dr. Barton Warnock; "Naturalist's Big Bend," by Roland H. Wauer, and "Plants of Big Bend" by McDougall and Sperry. A systematic analysis is sorely needed. (See also Project BIBE-N-002).

Wildlife. As with the vegetation of Big Bend, there area numerous scientific papers, research reports and books discussing the wildlife. Many are lengthy dissertations on individual species, others are general and/or inclusive. All are available at park headquarters, Panther Junction. In the "general" category, the following are noteworthy: "Ecological Survey of the Big Bend Area," Texas A&M College, K.L. Dixon; "Preliminary Report of an Ecological Survey of Big Bend National Park," mimeographed report for

National Park Service by W.P. McDougall and W.B. Davis; "Ecological Survey of the Big Bend Area," administrative report to the Texas Game and Fish Commission, by C.C. Wallmo, D.O. Dixon and W.G. Degenhardt; "Vegetation and Wildlife," a typed report by R. Wauer, National Park Service. In addition, an extensive card file of wildlife sightings is maintained by park staff and is located in the park's library.

Cultural Values. The Archeological and Historical (Cultural Resources) sections of this plan contain considerable narrative information. Copies of the "Archeological Assessment of Big Bend National Park," by C. Britt Bousman and Margaret Rohrt, Southern Methodist University, are available at park headquarters and the Office of Cultural Resources, National Park Service, Southwest Regional Office, Santa Fe, New Mexico. Historical reports and studies are also available; particularly notable is Art Gomez's Historical Survey, 1986.

ANNOTATED BIBLIOGRAPHY

Bissonette, J.A. and Ault, J.W. 1985. Big Bend National Park Biosphere Reserve: A History of Scientific Study, Vol. II, Bibliography. U.S. Man and the Biosphere Program, U.S. MAB Report No. 10, Maine Cooperative Wildlife Research Unit, University of Maine, Orono, Maine, 04469. 849 pp.

APPENDIX F

Cave Information and Recommendations

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 northwest face of Mt. Emory, is of particular interest since it contains one of two known colonies of the Mexican Long-nosed 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 (Coleoptera) 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 ventilation, 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 Horse 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 Peak 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 dual 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

General Information (Animals)



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 of the park. 25 species are reported from the park and another 13 species have been recorded from near-by areas and are suspected to occur in the park. Little or no data is available on the 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. Tamulipas 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	Ictulurus furcatus
25. *Flathead Catfish	Pylodictis olivaris
26. American Eel	Anguila rostrata
27. Zebra Killifish	Fundulus zebrinus
28. Big Bend Mosquitofish	Gambusia gaigei
29. *Rio Concho Mosquitofish	Gambusia senilis
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 not yet documented.

APPENDIX H

Endangered Species

ENDANGERED, THREATENED AND PERIPHERAL SPECIES

(FAUNA)

(U.S.F.& W.S. DESIGNATED)

1. Gambusia gaigei - Big Bend Mosquitofish (Endangered). A Recovery Plan (USF&WS, 1984) is available but already outdated. There are currently three populations verified (Spring #1 Refugium; Spring #4 outflow; and along the Rio Grande Nature Trail near the base of the berm retaining Spring #4 outflow). (See project BIBE-N-005).

2. Falco Peregrinus anatum - Peregrine Falcon (Endangered). This species occupied four documented eyries along the Rio Grande and two eyries in the high Chisos Mountains within the park. Seven young were produced this past season (Hogan, 1988). See Project BIBE-N-004).

3. Vireo atricapillus - Black-capped Vireo (Endangered). This species occurs in small numbers in remote drainages within the park. We are currently trapping Brown-headed Cowbirds from the Chisos Basin and Panther Junction Developed areas to reduce nest parasitism. (See project BIBE-N-014).

4. Leptonycteris nivalis - Mexican Long-nosed Bat (Proposed Endangered). This species is found in the park during the summer and a recent status check disclosed approximately 5000 bats utilizing at least one cave. (Howell, 1988).

5. Felis pardalis - Ocelot (Endangered). Considered accidental within the park as this species has only been reported twice from the park.

6. Felis yagouaroundi - Jaguarundi (Endangered). Considered accidental within the park as this species has only been reported once from within the park.

7. 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. There have been only two sightings over the past seven years.

8. Canis lupus - Mexican Wolf (Endangered). Very few records of this species exist for the park, none within the past ten years. This species would currently be considered as a transient.

STATE LISTED SPECIES OF FAUNA

1. Notropis chihuahua - Chihuahua Shiner (Threatened). Has been reported from the Rio Grande.

2. Campostoma ornatum - Mexican Stoneroller (Threatened). This species has been reported to nest/spawn at the mouth of Tornillo Creek near Hot Springs.

3. Coleonyx reticulatus - Big Bend Gecko (Threatened). This species has been reported from the park.

4. Phrynosoma cornutum - Texas Horned Lizard (Threatened). Listed as extremely rare within the park.

5. Trimorphodon biscutatus - Texas Lyre Snake (Threatened).Listed as extremely rare from within the park.

6. Buteogallus anthracinus - Common Black Hawk (Threatened). Listed as a rare migrant for the park.

7. Buteo nitidus - Gray Hawk (Threatened). Listed as rare, winter, summer and migrant within the park.

8. Buteo albonotatus - Zone-tailed Hawk (Threatened). Listed as uncommon Summer along Riverine and Mountain Habitats; uncommon migrant.

9. Euderma maculatum - Spotted Bat (Threatened). Reported as rare from the park.

10. Ursus americanus - Black Bear (Endangered). No permanent resident bears have been reported. Nearly all are considered transient from Mexico. A Sow and cub were reported and videotaped in 1988.

ENDANGERED, THREATENED, CATEGORY 1 AND CATEGORY 2 (PLANTS)

(U.S.F.& W.S. DESIGNATED)

1. Coryphantha ramillosa - Threatened - Relatively stable population along the Rio Grande from Mariscale Mt. to the Lower Canyons.

2. Neolloydia mariposensis - Threatened - Relatively stable population along the Deadhorse Mts.

3. Echinocereus reichenbachii chisoensis - Threatened - Relatively stable population.

Category 1 Species

1. Castilleja elongata - Highly visible when blooming. Highly variable numbers depending on climatic conditions.

2. Coryphantha strobiliformis durispina - Relatively stable population within the Park. Subject to taking in the Terlingua/Lajitas area.

3. Quercus hinkleyi - Only from fossil pack rat middens in the Dead Horse Mts., shafter and the Solitarion.

4. Suaeda duripes - Possibly extinct.

Category 2 Species

1. Agave glomerulifera - (Basin, Upper Green Gulch).
2. Batesimalva violacea - (Oak Canyon).
3. Bonamia ovalifolia - (Boquillas Canyon).
4. Brongniartia minutifolia - (Water courses E. of Mariscal Mt.).
5. Cereus greggii - (not yet found in the Park, over past 10 years).
6. Eriogonum suffruticosum - (Shale outcrops, probably in Park).
7. Euphorbia fendleri triligulata - (limestone cliffs).
8. Euphorbia golondrina - (Boquillas Canyon).
9. Festuca ligulata - High Chisos Mts.).
10. Genistidium dumosum - (limestone soils near Terlingua).
11. Hexalectris nitida - (Pine Canyon).
12. Lycium berberiodoides - (N½ of Park to Nine Point Mesa).
13. Opuntia imbricata argentea - (Mariscal Mt.).
14. Ostrya chisosensis - (High Chisos Mts.).
15. Perityle bisetosa scalaris - (possibly in the Dead Horse Mts.).
16. Poa involuta - Chisos Mts.).
17. Quercus tardifolia - (Muller, 1951; Warnock, 1955).
18. Streptanthus cutleri - (Dead Horse Mts. to Tunnel).

APPENDIX I

Re-establishment of Extirpated Species

RE-ESTABLISHMENT OF EXTIRPATED SPECIES

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

Current Status

1. Pronghorn: Pronghorn 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 principle 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 1950s in two separate locations within the park. Recent sightings indicate a small group of approximately thirteen animals holding their own in the Tornillo Flats area of the park. No further re-introductions are anticipated at this time or in the near future.

2. Desert Bighorn: This species is occasionally reported within the park but most observations turn out to be Barbary Sheep. A Bighorn Sheep project was in place on the Black Gap Wildlife Management Area until 1979, when the project was abandoned after apparent failure. The last verified sighting in the park occured in 1981. No attempt at re-introduction of this species should be considered until feasibility studies are carried out. In the spring of 1987, a small herd of Desert Bighorn were re-introduced in the Elephant Mountain Wildlife Management Area south of Alpine, Texas, and under management of the Texas Parks and Wildlife Department.

3. Black Bear: This large carnivor is still reported from the park but is generally thought to be a transient species. During the summer of 1986 and 1988 brears frequented the Basin, Green Gultch and the High Chisos. Recent sightings (1988) were of a sow and yearling cub. No re-introduction is currently anticipated and a feasibility study should precede such a move.

4. Mexican Wolf: There have been several unverified reports of the Mexican Wolf in the park over the past 20 years, but this species should not be considered as a resident species. The rarity of this species, coupled with the strong local feelings about large carnivors, would prove to be very challenging for consideration of re-introduction .

5. Black-tailed Prairie Dog and Opossum: Both animals need additional study prior to a re-introduction program. An Opossum was observed on the Basin road on several occasions in 1985.

6. Montezuma Quail: A small population of Mentezuma Quail were re-introduced in upper Pine Canyon in January of 1973. This re-introduction was not successful but in light of recent success in Dog Canyon in the Guadalupe Mountains National Park, perhaps the park should reconsider another re-introduction.

APPENDIX J

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 the lower developed areas.

Starling - This species is listed as a rare migrant and does not yet 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 is heavily infested with this species, and the carp has been documented from Terlingua Creek within the Park. Control efforts of this species would prove extremely difficult.

Barbary Sheep - Occasional sightings continue to be reported. To date, no young animals have been reported. This species needs to be removed as the opportunity presents itself.

Trespass Livestock - These animals continue to significantly impact the riverine resource, but the re-instatement of the USDA River River program will reduce these impacts.

Domestic Dogs and Cats - These animals present few problems as long as restrictions are met and enforced. The park has no information concerning the effect of pets on native wildlife populations.

INTRODUCED SPECIES

Agrostis semiverticillata	Prostrate Pigweed	forb
Alternanthera sessilis	Water Bentgrass	grass
Amaranthus blitoides	N.C.N.	forb
Arundo donax	Giant Reed	grass
Bothriochloa ischaemum	King Ranch Bluestem	grass
Caesalpina gilliesii	Bird of Paradise	shrub
Cenchrus ciliaris	Buffelgrass	grass
Centaurea melitensis	Tocalote	forb
Cerastium glomeratum	Chickweed	forb
Chenopodium album	Lambsquarter	forb
Chenopodium ambrosioides	Mexican Tea	forb
Commelina erecta	Hierba del Pollo	forb
Cynodon dactylon	Bermuda Grass	grass
Digiteria sanguinalis	Hairy Crabgrass	grass
Echinochloa colonum	Junglerice	grass
Echinochloa crusgalli	Barnyard Grass	grass
Echonichloa cruspavonis	N.C.N.	grass
Eragrostis lehmanniana	Lehmann Lovegrass	grass
Eragrostis cilianensis	Stickgrass	grass
Ficus carica	Common Fig	shrub
Ipomoea hederifolia	Scarlet Creeper	forb
Ipomoea purpurea	Morning Glory	forb
Lappula redowskii	Stickseed	forb
Malva parviflora	Little Mallow	forb
Marrubium vulgare	Common Horehound	forb
Medicago sativa	Alfalfa	forb
Melilotus albus	White Sweetclover	forb
Melilotus officianalis	Yellow Sweetclover	forb
Mentha piperita	Peppermint	forb
Mentha spicata	Spearmint	forb
Merium oleandra	Oleander	shrub
Nicotiana glauca	Tree Tobacco	shrub
Persicaria vulgaris	Maco de Guajolote	forb
Petunia parvifolia	Wild Petunia	forb
Phoenix sp.	Date Palm	tree
Physalis philadelphica	Tomatillo	forb
Pluchea purpurascens	Canela	forb
Polygonum convolvulus	Black Bindweed	forb
Punica granatum	Pomagranet	shrub
Rumex crispus	Curly Dock	forb
Salsola kali	Russian Thistle	forb
Setaria italica	Foxtail Millet	grass
Setaria viridis	N.C.N.	grass
Sisymbrium irio	Rocket Mustard	forb
Solanum sisymbrifolium	Sticky Nightshade	forb
Sonchus oleraceus	Common Sowthistle	forb
Sorghum bicolor	Sorghum	grass
Sorghum halapense	Johnson Grass	grass
Tamarix apylla	Athel	tree
Tamarix gallica	Salt Cedar	tree
Tragus berteronianus	Spike Burgrass	grass
Tribulus terristrio	Puncture Vine	forb
Xanthium spinosum	Spiny Cockleburr	forb

APPENDIX K

Significant Resource Problems

SIGNIFICANT RESOURCES PROBLEMS

Problem: Water Quality -- Rio Grande

Research & Planning: Develop a River Management Plan to include the monitoring or water quality and flow at no less than four sites; At least for that stretch of the river within the park. Plan for possible use of river water for potable water systems for Castolon and Rio Grande Village.

Public Relations: Inform public of findings; recommend treating all untreated water.

Interpretation: Discuss water quality during programs and in brochures.

Law Enforcement: Enforce littering and pollution laws.

Preservation and Maintenance: Determine effects of water disposal systems employed by adjacent developments as well as villages/industry along the river.

Curatorial Preservation: NA

Training: Train personnel in proper sampling techniques and storage when program is implemented.

Land Use Planning: Work with neighboring developments on water concerns.

Land Acquisition and Boundaries: Monitor potential problems along boundary and watercourses. Consider the acquision of additional water rignts.

Inter-Agency Communications: EPA, Texas State Health Department, IWBC, Mexican State Governments of Coahuila and Chihuahua, Texas Water Commission.

New Law Needs: NA

Management Policy and Action Needs: Mitigate external threats once identified.

Comments: See project statements BIBE-N-006 and BIBE-N-009 (BIBE-W-002 and BIBE-W-005).

SIGNIFICANT RESOURCES PROBLEMS

Problem: Air Quality, Acid Rain, Visibility Degredation, Etc.

Research & Planning: A complex monitoring system is in place and will soon be expanded oto include a transmissometer. The park will support research thrusts to the extent that funds and manpower will permit.

Public Relations: Inform public of problems. The recent addition of an interpretive display at the entrance to the visitor center at Park headquarters is excellent. Make more use of data through interpretaion.
Interpretation: Inform public about air quality related values. More interpretaive programs should include air quality information.

Law Enforcement: Random check for presence of catalytic converters and pollution control devices.

Preservation and Maintenance: Maintain monitoring equipment in a timely manner.

Curatorial Preservation: Keep Resource Management air quality files up to date.

Training: Continue to train personnel as needed to keep the monitoring program in operation with a minimum of data loss.

Land Use Planning: Keep abreast of new heavy industry proposals, particularly in Mexico.

Land Acquisition and Boundaries: NA

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

New Law Needs: Consider Class I or II designation for RIGR; Consider the banning of diesel-powered vehicles in National Parks.

Management Policy and Action Needs: The park needs to continue to identify air quality related impacts.

Comments: See project BIBE-N-001 Air Quality

SIGNIFICANT RESOURCES PROBLEMS

Problem: Peregrine Falcon Disturbance (Endangered Species)

Research & Planning: Evaluate and update the Action Plan annually.

Public Relations: Inform public of need for restrictions/closures in the vicinity of peregrine eyries and good potential habitat.

Interpretation: Discuss restrictions at evening programs and guided walks; carry an article in the late winter/spring/early summer El Paisano.

Law Enforcement: Enforce regulations during courtship/nesting seasons; be alert for climing activities/boaters/campers near known eyries.

Preservation and Maintenance: Maintain signing in good shape.

Curatorial Preservation: Need to build up slide collection.

Training: Hold ½-1 hr. training sessions for park employees and local commercial Outfitters.

Land Use Planning: Discourge overnight visitor use near falcon eyries during late winter/early spring. Restrict/discourage access above eyrie sites.

Land Acquisition and Boundaries: NA

Inter-Agency Communications: Continue communication with USF&WS, Texas Parks and Wildlife Department, CDRI, and interested birding groups.

New Law Needs: Work up a system to work with Mexican authorities concerning common endangered species enforcement.

Management Policy and Action Needs: Internal and external threat mitigation. Climbers/rafters/boaters/aircraft/campers/etc.

Comments: See project BIBE-N-004.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Water Demand and Sewage Management in the Chisos Basis.

Research & Planning: Review and update overall Master Plan and Basin Development Concept Plan. Evaluate the need to either increase the water and sewage capacity or reduce visitor use/facilities. This situation will be most pronounced during periods of relatively low rainfall.
Public Relations: Piecemeal development may preclude adverse reactions in the short run, but "creeping development" is not consistent with the current Master Plan.
Interpretation: Continue emphasis on water conservation.

Law Enforcement: NA

Preservation and Maintenance: Water/sewage systems are being strained to capacity during heavy use periods. Water transport system is old and in need of replacement.

Curatorial Preservation: NA

Training: NA

Land Use Planning: Master Plan update should set long term overall needs for water/sewage in the future.

Land Acquisition and Boundaries: NA

Inter-Agency Communications: Permit has been obtained for sewage discharge down oak creek.

New Law Needs: NA

Management Policy and Action Needs: Update Master Plan and Basin Development Concept Plan. Tabulate past water use and sewage treated.

Comments: See projects BIBE-N-004 (Peregrine falcon use of the lagoons), BIBE-N-009 (BIBE-W-001.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Exotic Animal Species; Trespass Livestock, Barbary Sheep. Pets.

Research & Planning: Develop comprehensive control plan for trespass livestock. Develop monitoring program to ascertain trend in increase in Barbery Sheep.

Public Relations: Continue to keep public informed on pet policies and continue to request reports of unusual sightings.

Interpretation: Inform public through walks, talks and one-on-one persona; contacts anout pets, trespass livestock and Barbary Sheep.

Law Enforcement: Continue aggressive trespass livestock control program and enforce pet policies.

Preservation and Maintenance: Continue cooperative agreement with USDA on the River Rider program.

Curatorial Preservation: NA

Training: Train personnel in stock handling; tracking, trapping and immobilization techniques.

Land Use Planning: External threats due to increase in the introduction of exotic game animals, particularly Barbary Sheep.

Land Acquisition and Boundaries: Monitor boundaries for trespass livestock and fence critical areas as money becomes available.

Inter-Agency Communications: U.S.D.A., Texas Parks and Wildlife Department, USF&WS, Soil Conservation Service, Texas General Land Office.

New Law Needs: Ranches introducing exotic species should be held accountable for controlling possible dispersal to other lands.

Management Policy and Action Needs: Internal and external threat.

Comments: See projects BIBE-N-006; BIBE-N-008; BIBE-N-013.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Exotic Plant Species: Tamarix, Salsola and Sorghum.

Research & Planning: Document and prioritize areas for control. Develop an IPM program for each species. Confront the Federal Highways program with problem of re-seeding.

Public Relations: Inform public of problem through evening programs, walks and talks.

Interpretation: Utilize exotic (alien) plant species in programs to stimulate interest in IPM and inform public about "weed Problems".

Law Enforcement: NA

Preservation and Maintenance: Implement an agressive program of IPM. Develop a short program for presentation to park employees.

Curatorial Preservation: Add specimens and photos to collections for identification and program purposes.

Training: Develop a short program (slide show) discussing IPM concerns of these three genera.

Land Use Planning: Keep disturbances to a minimum and cease the use of exotic species in landscaping.

Land Acquisition and Boundaries: Monitor boundaries and inholdings for these exotic species.

Inter-Agency Communications: Communicate with USDA, SCS, and other land management agencies to develop control methodologies.

New Law Needs: NA

Management Policy and Action Needs: Region wide - possibly nation-wide problem. Both an internal and external threat.

Comments: See project BIBE-N-007 and BIBE-N-013.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Off Road Vehicle Use.

Research & Planning: Document and monitor impact areas for future mitigation.

Public Relations: Initiate a program of public contact in metropolitan areas and major off-road magazines. Local contact needed, particularly along boundaries and small communities.
Interpretation: Emphasize illegality of off-road vehicle use to river-road users and backcountry road users. Increase public contact in the back-country.
Law Enforcement: Aggressively enforce regulations, parlicularly along River Road during periods of heavy use. Increase backcountry presence during periods of heavy use.
Preservation and Maintenance: Keep signs maintained.

Curatorial Preservation: NA

Training: Insure permit issuers are well informed to educate the visiting public.

Land Use Planning: Continue to fence boundaries near communities to discourage off-road vehicle use.

Land Acquisition and Boundaries: Monitor boundaries for signs of off-road vehicle use.

Inter-Agency Communications: Texas Parks and Wildlife Department.

New Law Needs: NA

Management Policy and Action Needs: Internal and External threat.

Comments: See BIBE-N-006; There is a major need for increased presence in the backcountry and along the River Road and boundary during periods of heavy visitation. The activation of entrance stations for initial visitor contact will help situation.. Aircraft surveillance would prove helpful.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Fire Management

Research & Planning: Update Fire Management Plan

Public Relations: Continue to inform public of the park's fire management program and fuel reduction program.

Interpretation: Inform visitors of fire management concerns on a timely basis (prescription burns, class 5 fire days, regulations etc.).

Law Enforcement: Enforce regulations, particularly during heavy visitor use periods which occur during severe fire danger.

Preservation and Maintenance: Maintain trailhead signs and backcountry roadside camping signs.

Curatorial Preservation: NA

Training: Hold S-130 and S-190 courses as needed to maintained a trained cadre of firefighters.

Land Use Planning: Update Fire Management Plan.

Land Acquisition and Boundaries: Develop and maintain a cooperative zone.

Inter-Agency Communications: Texas Air Control Board, Texas Forest Service, Local Volunteer Fire Departments.

New Law Needs: Examine possibility of using International Cadre of fire-fighters during "National Emergency " situations. At least three 20 man crews could probably be put together from our neighboring Mexican villages.
Management Policy and Action Needs: Update Fire Management Plan.

Comments: See project BIBE-N-010.

SIGNIFICANT RESOURCES PROBLEMS

Problem: Illegal Camping/Campfires.

Research & Planning: Document and delineate specific problem areas to focus enforcement efforts more efficiently.

Public Relations: Continue to discourage campfire use and push for low impact camping parkwide.

Interpretation: Inform campers of regulations and continue to push low impact camping.

Law Enforcement: Aggressively enforce camping/campfire regulations in the backcountry.

Preservation and Maintenance: Maintain signs at trailheads.

Curatorial Preservation: NA

Training: Continue to train permit issuers in regulations and low impact camping.

Land Use Planning: Re-evaluste Backcountry Management Plan annually with a maximum interval of five years for major up-dates.

Land Acquisition and Boundaries: Monitor boundaries for illegal camping and campfires.

Inter-Agency Communications: NA

New Law Needs: NA

Management Policy and Action Needs: We may wish to consider the banning of open campfires along the River.

Comments: This is primarily an enforcement/education issue. See BIBE-N-006.

APPENDIX L

Annual Review, Changes and Dates

ANNUAL REVIEW, CHANGES AND DATES

The Resource Management Plan will be reviewed annually and revised and updated at two year intervals so as to remain current. Major revisions/reprintings will occur at a minimum of once every five years.

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

Park Resources Management Specialist _____ Date _____

Park Superintendent _____ Date _____

Regional Resources Management Plan Coordinator _____ Date _____

Regional Director _____ Date _____

Park Resources Management Specialist _____ Date _____

Park Superintendent _____ Date _____

Regional Resources Management Plan Coordinator _____ Date _____

Regional Director _____ Date _____

Park Resources Management Specialist _____ Date _____

Park Superintendent _____

Regional Resources Management Plan Coordinator _____ Date _____

Regional Director _____ Date _____