

**APPENDIXES,
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PREPARERS,
& INDEX**



Karl Tipple



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APPENDIX A: LEGISLATION

2. Big Bend National Park

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An Act To provide for the establishment of the Big Bend National Park in the State of Texas, and for other purposes, approved June 20, 1935 (49 Stat. 393)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when title to such lands as may be determined by the Secretary of the Interior as necessary for recreational park purposes within the boundaries to be determined by him within the area of approximately one million five hundred thousand acres, in the counties of Brewster and Presidio, in the State of Texas, known as the "Big Bend" area, shall have been vested in the United States, such lands shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people and shall be known as the "Big Bend National Park": *Provided*, That the United States shall not purchase by appropriation of public moneys any land within the aforesaid area, but such lands shall be secured by the United States only by public and private donations. (16 U.S.C. sec. 156.)

Big Bend National Park, Texas.
Establishment.

Area, location, etc.

Proviso.

Lands secured by donation only.

Acceptance of title.

Proviso.

Exclusive jurisdiction required.

SEC. 2. The Secretary of the Interior is hereby authorized, in his discretion and upon submission of evidence of title satisfactory to him, to accept, on behalf of the United States, title to the lands referred to in the previous section hereof as may be deemed by him necessary or desirable for national-park purposes: *Provided*, That no land for said park shall be accepted until exclusive jurisdiction over the entire area, in form satisfactory to the Secretary of the Interior, shall have been ceded by the State of Texas to the United States. (16 U.S.C. sec. 157.)

National Park Service to administer, etc.

SEC. 3. The administration, protection, and development of the aforesaid park shall be exercised under the direction of the Secretary of the Interior by the National Park Service, subject to the provisions of the Act of August 25, 1916 (39 Stat. 535), entitled "An Act to establish a National Park Service, and for other purposes", as amended: *Provided*, That the provisions of the Act of June 10, 1920, known as the "Federal Water Power Act", shall not apply to this park. (16 U.S.C. sec. 158.)

Water Power Act not applicable.
41 Stat. 1063.

Excerpt from An Act of the Legislature of Texas, approved May 12, 1939, authorizing the cession to the United States of exclusive jurisdiction over lands conveyed to the United States for the Big Bend National Park. (Art. 6077e, Vernon's Annotated Revised Civil Statutes of the State of Texas)

The United States Government, through the Secretary of the Interior or any other Agency, is hereby authorized to

II. NATIONAL PARKS — BIG BEND

acquire title, to hold, occupy and possess the area herein defined as the Big Bend National Park and the Governor of the State of Texas is hereby authorized to execute a deed of conveyance to the United States Government covering the area acquired under the terms of this Act as the Big Bend National Park for the use of the public for recreational park purposes, in consideration of the United States Government agreeing to establish and maintain said area as a National Park under an Act of Congress, being Public—No. 157, enacted by the Seventy-fourth Congress of the United States and to cede to the United States jurisdiction over said lands in conformity with the provisions of Article 5247, of the Revised Civil Statutes of Texas, 1925; reserving, however, to the State of Texas, the right to retain concurrent jurisdiction with the United States over every portion of the lands so ceded, so far, that all process, civil or criminal, issuing under the authority of this State or any of the courts or judicial officers thereof, may be executed by the proper officers of the State, upon any person amenable to the same within the limits of the land so ceded as the area for the Big Bend National Park, in like manner and like effect as if no such cession had taken place; and, reserving further, to the State the right to levy and collect taxes on sales of products or commodities upon which a sales tax is levied in this State, and to tax persons and corporations, their franchises and properties, on land or lands deeded and conveyed under the terms of this Act; and reserving also, to persons residing in or on any of the land or lands deeded or conveyed under the terms of this Act to the United States Government the right to vote at all elections within the counties, in which said land or lands are located, upon like terms and conditions and to the same extent as they would be entitled to vote in such counties had not such lands been deeded or conveyed as aforesaid to the United States of America.

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An Act Providing for the appointment of a United States commissioner for the Big Bend National Park in the State of Texas, and for other purposes, approved May 15, 1947 (61 Stat. 91)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That upon the establishment of the Big Bend National Park in the State of Texas pursuant to the provisions of the Act of June 20, 1935 (49 Stat. 393), entitled "An Act to provide for the establishment of the Big Bend National Park in the State of Texas, and for other purposes," the United States District Court for the Western District of Texas shall appoint a commissioner for the said national park. The district court shall prescribe the rules of procedure and practice for the commissioner in the trial of cases and for appeal to the district court. The commissioner shall be paid an annual salary, as appropriated for by the Congress. (See 28 U.S.C. §§ 631, 634 notes.)

Big Bend
National Park,
Texas.
Appointment of
Commissioner.
16 U.S.C.
§§ 156-158.

Salary.

Jurisdiction of
commissioner.

SEC. 2. The commissioner shall have jurisdiction to issue process in the name of the United States for the arrest of any person charged with a violation of any of the rules and regulations made by the Secretary of the Interior in pursuance of law for the government and protection of the park, or with the commission within the park of a petty offense against the law, and to try the person so charged, who, if found guilty, shall be subject to the punishment prescribed by section 3 of the Act of August 25, 1916 (39 Stat. 535; U.S.C., title 16, sec. 3), as amended. For the purposes of this Act, the term "petty offense" shall be defined as in section 335 of the Criminal Code (U.S.C., title 18, sec. 541). In all cases of conviction an appeal shall lie from the judgment of said commissioner to the district court. (See 28 U.S.C. § 632 note.)

"Petty offense."
35 Stat. 1152.

SEC. 3. The commissioner shall have power to issue process in the name of the United States for the arrest of any person charged with the commission within said park of any criminal offense not covered by the provisions of section 2 of this Act, and to hear the evidence introduced. If he is of the opinion that probable cause is shown for holding the person so charged for trial, he

Criminal
offense.

II. NATIONAL PARKS—BIG BEND

shall commit such person for further appropriate action, and shall certify a transcript of the record of his proceedings and the testimony in such case to the district court, which court shall have jurisdiction of the case. (*Ibid.*)

Fees, costs,
expenses, etc.

SEC. 4. All fees, costs, and expenses arising in cases under this Act and properly chargeable to the United States shall be certified, approved, and paid as are like fees, costs, and expenses in the courts of the United States. All fines, fees, costs, and expenses imposed and collected shall be deposited by the commissioner, or by the marshal of the United States collecting the same, with the clerk of the United States District Court for the Western District of Texas. (See 28 U.S.C. § 634 note.)

An Act To authorize the addition of certain lands to the Big Bend National Park in the State of Texas, and for other purposes, approved August 30, 1949 (63 Stat. 679)

Big Bend
National Park,
Tex.
Additional
land.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is authorized to acquire, in such manner as he shall consider to be in the public interest, any land or interests in land situated within sections 15, 22, 27, 34, block 234, Brewster County, Texas, which he shall consider to be suitable for addition to the Big Bend National Park: *Provided, however,* That the aggregate cost to the Federal Government of properties acquired hereafter and under the provisions hereof shall not exceed the sum of \$10,000. Properties acquired pursuant to this Act shall become a part of the park upon acquisition of title thereto by the United States. (16 U.S.C. § 157a.)

An Act To authorize the acquisition by the United States of the remaining non-Federal lands within Big Bend National Park, and for other purposes, approved August 8, 1953 (67 Stat. 497)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, notwithstanding any other provisions of law, the Secretary of the Interior is hereby authorized to procure, in such manner as he may consider to be in the public interest, the remaining non-Federal land and interests in land within the boundaries of Big Bend National Park. (16 U.S.C. § 157b.)

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NATIONAL PARKS

2. Big Bend

94 STAT. 3539

PUBLIC LAW 96-607—DEC. 28, 1980

Public Law 96-607
96th Congress

An Act

Dec. 28, 1980
[S. 2363]

To provide, with respect to the national park system for the establishment of new units; for adjustment in boundaries; for increases in appropriation authorizations for land acquisition and development; and for other purposes.

National Park System, amendment.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

* * * * *

TITLE IV

BIG BEND NATIONAL PARK

16 USC 157c.

SEC. 401. The boundary of the Big Bend National Park in the State of Texas as hereby revised to include the lands and interests therein within the area generally depicted on the map entitled "Big Bend National Park, Boundary Additions", numbered 155/80,019-A and dated June 1980 which shall be on file and available for public inspection in the local and Washington, District of Columbia, Offices of the National Park Service, Department of the Interior. The Secretary is authorized to acquire the lands and interests therein added to the park by this section by donation, purchase with donated or appropriated funds, or exchange, except that lands and interests therein owned by the State of Texas or any political subdivision thereof may be acquired only by donation or exchange. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this section, but not to exceed \$1,500,000 for the acquisition of lands and interests therein.

94 STAT. 3540
Appropriation authorization.

* * * * *

94 STAT. 3549

Approved December 28, 1980.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 96-1024 accompanying H.R. 3 (Comm. on Interior and Insular Affairs) and No. 96-1520 (Comm. of Conference).
SENATE REPORT No. 96-755 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 126 (1980):
May 20, H.R. 3 considered and passed House.
June 5, considered and passed Senate.
June 17, considered and passed House, amended.
Dec. 3, House and Senate agreed to conference report.

APPENDIX B: DEVELOPING THE PREFERRED ALTERNATIVE

To develop a preliminary preferred alternative, the planning team evaluated the four draft alternatives that had been reviewed by the public in newsletter 2. The planning team broke down the alternative concepts, modified them based on public comment and professional input, and developed the actions that would flow from each concept as guided by the policy, park mission, and park significance. After this was completed, it was determined that two of the alternatives were very similar and these were blended to form one alternative. The alternatives were tested against the decision points and issues identified by the public and park to determine their relative advantages.

“GIVENS” AND DESIRED CONDITIONS

First, it is useful to consider the assumptions or “givens” that affected the analysis of the alternatives. These givens are based on the purpose and significance, laws and policies, and public concerns and comments. The givens are listed below in two categories, one representing conditions that must be met by the preferred alternative; the second representing conditions that would be desirable for the preferred alternative to meet.

The actions in the preferred alternative must accomplish the following:

- would not adversely impact threatened and endangered species in ways that could not be mitigated
- would result in no net loss of wetlands
- would meet clean air and water standards
- would allow no loss of cultural resources without complete documentation
- would allow public access
- would provide safe, sustainable, and efficient operations for resource protection and visitor use

The following actions would be desirable in the preferred alternative:

- would result in little or no adverse impact on plants, animals, or soils
- would preserve properties eligible for the National Register of Historic Places
- would allow maximum public access consistent with resource protection and visitor experience goals
- would result in minimum disruption of desired experiences for users

COMPARING THE ALTERNATIVES

The next step was to develop criteria that would be used to compare alternatives. Using the givens presented above and topics that were commonly mentioned by the public in commenting on the alternatives, the team identified four criteria to evaluate the alternatives.

- visitor understanding of the park’s significance
- natural resource stewardship
- cultural resource stewardship
- efficiency of park operations

The team identified the benefits of each alternative for each of the criteria. Alternative B best enhanced the visitor’s understanding of the park’s significance because the increased opportunities and diversity of ways it provided for interpreting the park’s significance to visitors. Alternative A maintains the current range of visitor activities that only provide a limited understanding of the park’s significance. Alternative C reduces the number and types of visitor activities and in so doing reduces opportunities to understand the park’s significance.

Alternative C best supports natural resource stewardship as it provides the greatest reduction in park water use and creates the most wildlife habitat. Alternative A maintains the current water use but upgrades utility systems. Alternative A does not measurably reduce the park water use or create wildlife habitat. Alternative B somewhat reduces water use and creates wildlife habitat.

Alternative B best provides for cultural resource stewardship in that it sets preservation priorities and provides a number of strategies for giving more protection to cultural resources. Alternative C results in the loss of some cultural landscapes and structures. Alternative A would result in limited protection for cultural resources.

Alternative B would best provide for more efficient park operations by creating more functional park facilities and reducing the

number of park personnel in the park. Alternative C would provide for similar benefits, but the removal of park visitor amenities could make this alternative slightly less efficient. Alternative A would continue a number of inefficient activities such as collections and staff being housed in various structures — some not suitable for these purposes.

APPENDIX C: LETTERS REGARDING THREATENED AND ENDANGERED SPECIES



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758

JUL - 6 2000

2-15-00-I-868

Mary Magee (DSC-PDS-RP)
National Park Service, Denver Service Center
Box 25287
Denver, Colorado 80225

Dear Ms. Magee:

This responds to your June 5, 2000 letter, requesting a current list of federally listed or proposed threatened and endangered species and mapped locations of known populations and Critical Habitat that may occur in Terrell and Brewster counties, Texas. It is our understanding this information will assist in the development of a general management, river management planning, and wilderness study to prescribe resource conditions and visitor experiences to be achieved and maintained at Big Bend National Park and Rio Grande Wild and Scenic River over time.

Enclosed is the list of species you requested and a copy of "Threatened and Endangered Species of Texas (Revised June 1995)," a publication that contains general information about the life histories, habitats, and distribution of the federally listed species in Texas. No federally designated Critical Habitat currently exists in Terrell or Brewster counties and, although we are unable to provide you with mapped locations of known listed species' populations, we look forward to working with you to determine when species surveys would be appropriate in an effort to avoid adverse impacts to federally listed or proposed species and their habitats.

We appreciate the opportunity to comment on the proposed management plans and your concern for endangered species and fish and wildlife resources. We look forward to assisting you with this effort and reviewing the Draft Environmental Impact Statement. If we can be of further assistance, please contact Dianne Lee at 512/490-0057, extension 231.

Sincerely,

David C. Frederick
Supervisor

Enclosures

This is your future. Don't leave it blank. - Support the 2000 Census.

Federally Listed as Threatened and Endangered Species of Texas
March 28, 2000

DISCLAIMER

This County list is based on information available to the U.S. Fish and Wildlife Service at the time of preparation, date on page 1. This list is subject to change, without notice, as new biological information is gathered and should not be used as the sole source for identifying species that may be impacted by a project.

Edwards Aquifer species: (Edwards Aquifer County) refers to those six counties within the Edwards Aquifer region. The Edwards Aquifer underlies portions of Kinney, Uvalde, Medina, Bexar, Hays, and Comal Counties (Texas). The Service has expressed concern that the combined current level of water withdrawal for all consumers from the Edwards Aquifer adversely affects aquifer-dependent species located at Comal and San Marcos springs during low flows. Deterioration of water quality and/or water withdrawal from the Edwards Aquifer may adversely affect eight federally-listed species.

Comal Springs riffle beetle	(E)	<i>Heterelmis comalensis</i>
Comal Springs dryopid beetle	(E)	<i>Stygoparnus comalensis</i>
Fountain darter	(E w/CH)	<i>Etheostoma fonticola</i>
Peck's cave amphipod	(E)	<i>Stygobromus (=Stygonectes) pecki</i>
San Marcos gambusia	(E w/CH)	<i>Gambusia georgei</i>
Texas wild-rice	(E w/CH)	<i>Zizania texana</i>
Texas blind salamander	(E)	<i>Typhlomolge rathbuni</i>
San Marcos salamander	(T □w/CH)	<i>Eurycea nana</i>

* The Barton Springs salamander is found in Travis County but may be affected by activities within the Barton Springs Segment of the Edwards Aquifer, which includes portions of Northern Hays County.

Migratory Species Common to many or all Counties: Species listed specifically in a county have confirmed sightings. If a species is not listed they may occur as migrants in those counties.

Least tern	(E ~)	<i>Sterna antillarum</i>
Whooping crane	(E w/CH)	<i>Grus americana</i>
Bald eagle	(T)	<i>Haliaeetus leucocephalus</i>
Piping plover	(T)	<i>Charadrius melodus</i>
Loggerhead shrike	(SOC)	<i>Lanius ludovicianus</i>
White-faced ibis	(SOC)	<i>Plegadis chihi</i>

Brewster County

Black-capped vireo	(E)	<i>Vireo atricapillus</i>
Golden-cheeked warbler	(E)	<i>Dendroica chrysoparia</i>
Northern aplomado falcon	(E)	<i>Falco femoralis septentrionalis</i>
Southwestern willow flycatcher	(E †)	<i>Empidonax traillii extimus</i>
Whooping crane	(E w/CH)	<i>Grus americana</i>
Mexican long-nosed bat	(E)	<i>Leptonycteris nivalis</i>

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Big Bend gambusia	(E)	<i>Gambusia gaigei</i>
Davis' green pitaya	(E)	<i>Echinocereus viridiflorus</i> var. <i>davisii</i> (= <i>E. davisii</i>)
Nellie cory cactus	(E)	<i>Coryphantha</i> (= <i>Escobaria</i> = <i>Mammillaria</i>) <i>minima</i>
Terlingua Creek cats-eye	(E)	<i>Cryptantha crassipes</i>
Bunched cory cactus	(T)	<i>Coryphantha ramulosa</i>
Chisos Mountain hedgehog cactus	(T)	<i>Echinocereus chisoensis</i> (= <i>reichenbachii</i>) var. <i>chisoensis</i>
Hinckley's oak	(T)	<i>Quercus hinckleyi</i>
Lloyd's Mariposa cactus	(T)	<i>Echinomastus</i> (= <i>Echinocactus</i> , = <i>Sclerocactus</i>) <i>mariposensis</i>
Mountain plover	(P/T)	<i>Charadrius montanus</i>
Tall paintbrush	(C)	<i>Castilleja elongata</i>
Guadalupe fescue	(C)	<i>Festuca ligulata</i>
Shinner's tickle-tongue	(C)	<i>Zanthoxylum parvum</i>
Leoncita false foxglove	(SOC)	<i>Agalinis calycina</i>
Texas false saltgrass	(SOC)	<i>Allolepis texana</i>
Ferruginous hawk	(SOC)	<i>Buteo regalis</i>
Baird's sparrow	(SOC)	<i>Ammodramus bairdii</i>
Loggerhead shrike	(SOC)	<i>Lanius ludovicianus</i>
Northern goshawk	(SOC)	<i>Accipiter gentilis</i>
Northern gray hawk	(SOC)	<i>Buteo nitidus maximus</i>
Texas olive sparrow	(SOC)	<i>Arremonops rufivirgatus rufivirgatus</i>
Western burrowing owl	(SOC)	<i>Athene cucularia hypugea</i>
White-faced ibis	(SOC)	<i>Plegadis chihi</i>
Davis Mountain cottontail rabbit	(SOC)	<i>Sylvilagus floridanus robustus</i>
Greater western mastiff bat	(SOC)	<i>Eumops perotis californicus</i>
Presidio mole	(SOC)	<i>Scalopus aquaticus texanus</i>
Spotted bat	(SOC)	<i>Euderma maculatum</i>
Texas horned lizard	(SOC)	<i>Phrynosoma cornutum</i>
Blotched gambusia	(SOC)	<i>Gambusia senilis</i>
Blue sucker	(SOC)	<i>Cycleptus elongatus</i>
Chihuahua shiner	(SOC)	<i>Notropis chihuahua</i>
Conchos pupfish	(SOC)	<i>Cyprinodon eximius</i>
Mexican stoneroller	(SOC)	<i>Campostoma ornatum</i>
Proserpine shiner	(SOC)	<i>Cyprinella proserpina</i>
Rio Grande darter	(SOC)	<i>Etheostoma grahami</i>
Rio Grande shiner	(SOC)	<i>Notropis jemezianus</i>
Blanchards' sphinx moth	(SOC)	<i>Adhemarius blanchardorum</i>
Bonita diving beetle	(SOC)	<i>Deronectes neomexicana</i>
Subtropical blue-black tiger beetle	(SOC)	<i>Cicindela nigrocoerulea subtropica</i>
Big Bend (Desert Mts.) bluegrass	(SOC)	<i>Poa strictiramea</i>
Big Bend hop hornbeam	(SOC)	<i>Ostrya chisosensis</i>
Bigpod bonamia	(SOC)	<i>Bonamia ovalifolia</i>
Bush-pea	(SOC)	<i>Genistidium dumosum</i>
White column cory cactus	(SOC)	<i>Coryphantha albicolumnaria</i>
Bushy wild-buckwheat	(SOC)	<i>Eriogonum suffruticosum</i>
Chaffey's cory cactus	(SOC)	<i>Coryphantha chaffeyi</i>

Appendix C: Letters Regarding Threatened and Endangered Species

Chisos agave	(SOC)	<i>Agave glomeruliflora</i>
Chisos coral-root	(SOC)	<i>Hexalectris revoluta</i>
Chisos pinweed	(SOC)	<i>Lechea mensalis</i>
Cliff bedstraw	(SOC)	<i>Galium correllii</i>
Cox's dalea	(SOC)	<i>Dalea bartonii</i>
Cutler's twistflower	(SOC)	<i>Streptanthus cutleri</i>
Dense cory cactus	(SOC)	<i>Coryphantha dasyacantha</i> var. <i>dasyacantha</i>
Desert night-blooming cereus	(SOC)	<i>Cereus greggii</i> var. <i>greggii</i>
Duncan's cory cactus	(SOC)	<i>Coryphantha duncanii</i>
Glass Mountain coral-root	(SOC)	<i>Hexalectris nitida</i>
Glass Mountain rock-daisy	(SOC)	<i>Perityle vitreomontana</i>
Golden-spine hedgehog cactus	(SOC)	<i>Echinocereus chloranthus</i> var. <i>neocapillus</i>
Golden-spined prickly-pear	(SOC)	<i>Opuntia aureispina</i>
Heather leaf-flower	(SOC)	<i>Phyllanthus ericoides</i>
Hester's cory cactus	(SOC)	<i>Coryphantha hesteri</i>
Hinckley's brickelbush	(SOC)	<i>Brickellia brachyphylla</i> var. <i>hinckleyi</i>
Lateleaf oak	(SOC)	<i>Quercus tardifolia</i>
Little-leaf brongniartia	(SOC)	<i>Brongniartia minutifolia</i>
Long spur columbine	(SOC)	<i>Aquilegia longissima</i>
Many-flowered unicorn plant	(SOC)	<i>Proboscidea spicata</i>
Maravillas milkwort	(SOC)	<i>Polygala maravillasensis</i>
Mary's bluet	(SOC)	<i>Hedyotis butterwickiae</i>
Old blue mock pennyroyal	(SOC)	<i>Hedeoma pilosum</i>
Pale phacelia	(SOC)	<i>Phacelia pallida</i>
Perennial caltrop	(SOC)	<i>Kallstroemia perennans</i>
Purple gay-mallow	(SOC)	<i>Batesimalva violacea</i>
Ripley's senna	(SOC)	<i>Senna ripleyana</i>
Robert's stonecrop	(SOC)	<i>Sedum robertsianum</i>
Silver cholla	(SOC)	<i>Opuntia imbricata</i> var. <i>argentea</i>
Slender oak	(SOC)	<i>Quercus graciliformis</i>
Sonora fleabane	(SOC)	<i>Erigeron mimegletes</i>
Stairstep two-bristle rock-daisy	(SOC)	<i>Perityle bisetosa</i> var. <i>scalaris</i>
Straw-spine glory of Texas	(SOC)	<i>Thelocactus bicolor</i> var. <i>flavidispinus</i>
Swallow spurge	(SOC)	<i>Chamaesyce golondrina</i>
Terlingua brickelbush	(SOC)	<i>Brickellia brachyphylla</i> var. <i>terlinguensis</i>
Texas milkvine	(SOC)	<i>Matelea texensis</i>
Texas wolfberry	(SOC)	<i>Lycium texanum</i>
Three-tongued spurge	(SOC)	<i>Chamaesyce chaetocalyx</i> var. <i>triligulata</i>
Trans-Pecos maidenbush	(SOC)	<i>Andrachne arida</i>
Two-bristle rock-daisy	(SOC)	<i>Perityle bisetosa</i> var. <i>bisetosa</i>
Texas purple spike	(SOC)	<i>Hexalectris warnockii</i>
Wilkinson's whitlow-wort	(SOC)	<i>Paronychia wilkinsonii</i>
Wright's water-willow	(SOC)	<i>Justicia wrightii</i>

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Statewide or areawide migrants are not included by county, except where they breed or occur in concentrations. The whooping crane is an exception; an attempt is made to include all confirmed sightings on this list.

- E = Species in danger of extinction throughout all or a significant portion of its range.
- T = Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- C = Species for which the Service has on file enough substantial information to warrant listing as threatened or endangered.
- CH = Critical Habitat (in Texas unless annotated ‡)
- P/ = Proposed ...
- P/E = Species proposed to be listed as endangered.
- P/T = Species proposed to be listed as threatened.
- TSA = Threatened due to similarity of appearance.
- SOC = Species for which there is some information showing evidence of vulnerability, but not enough data to support listing at this time.
- = with special rule
- ‡ = CH designated (or proposed) outside Texas
- = protection restricted to populations found in the "interior" of the United States. In Texas, the least tern receives full protection, except within 50 miles (80 km) of the Gulf Coast.

County Name Code Designations:

- examples
- Anderson = Arlington Ecological Services (ES) office
- (Bee) = Corpus Christi ES office
- [Galveston] = Clear Lake ES office
- Gillespie = Austin ES office



June 14, 2002

COMMISSIONERS

KATHARINE ARMSTRONG IDSAL
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ROBERT L. COOK
EXECUTIVE DIRECTOR

Mary Magee (DSC-PDS-RP)
Big Bend National Park, Denver Service Center
P.O. Box 25287
Denver, Colorado 80225

Dear Ms. Magee:

This letter is in response to your information request, dated June 5, 2000, and our subsequent telephone conversation May 29, 2002, for potential rare, threatened, and endangered (T&E) species within or near the Big Bend National Park and the Rio Grande Wild and Scenic River. To this end, enclosed are the TPWD county lists of rare, threatened, and endangered species for Brewster and Terrell counties.

Given the small proportion of public versus private land in Texas, the TPWD Biological and Conservation Data System (BCD) does not include a representative inventory of rare resources in the state. Although it is based on the best data available to TPWD regarding rare species, the data from the BCD do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features within your project area. These data cannot substitute for an on-site evaluation by your qualified biologists. The BCD information is intended to assist you in avoiding harm to species that may occur on your site.

Also, printouts of BCD occurrence records for Big Bend National Park and the Rio Grande Wild and Scenic River are included for your planning reference. **Please do not include species occurrence printouts in your draft or final documents. Because, as you are aware, some species are especially sensitive to collection or harassment, these records are for your reference only.**

TPWD would appreciate receiving updates to the enclosed BCD records and any additional records for rare species maintained for the park and river. Please send any new survey data to the attention of Sandy Birnbaum at TPWD, Diversity Program, 3000 South IH-35, Austin, TX 78704.

*Give Thanks for
the Memories...*



Lone Star Legacy.

*Give to the
Lone Star Legacy
Endowment Fund*

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512-389-4800
www.tpwd.state.tx.us

*To manage and conserve the natural and cultural resources of Texas for the
use and enjoyment of present and future generations.*

Ms. Mary Magee
Big Bend National Park and Rio Grande Wild and Scenic River
Page 2

Please contact me if you have any questions or need additional assistance
(512/912-7021).

Sincerely,



Celeste Brancel-Brown, Environmental Review Coordinator
Wildlife Habitat Assessment Program, Wildlife Division
Threatened and Endangered Species

Enclosures

Big Bend National Park
Texas Parks and Wildlife Department, Endangered Resource Branch
Special Species List, Brewster County

Scientific Name	Common Name	Federal Status	State Status	Found in Park	Found in Project Area (3)	Likelihood of being affected by GMP alternatives
<i>Buteo albicaudatus</i>	white-tailed hawk		T			
<i>Buteo albonotatus</i>	zone-tailed hawk		T	X		
<i>Buteo nitidus</i>	gray hawk		T	X	Castolon	unlikely
<i>Buteogallus anthracinus</i>	common black-hawk		T	X	Rio Grande Village	unlikely
<i>Empidonax traillii extimus</i>	southwestern willow flycatcher	E	E			
<i>Falco peregrinus</i>	peregrine falcon	E	E,T	X		
<i>Falco peregrinus anatum</i>	American peregrine falcon		E	X		
<i>Falco peregrinus tundrius</i>	arctic peregrine falcon		T			
<i>Vireo atricapillus</i>	black-capped vireo	E	E	X	Chisos Basin	unlikely
<i>Campostoma ornatum</i>	Mexican stoneroller		T	X		
<i>Cycleptus elongatus</i>	blue sucker		T	X		
<i>Cyprinodon eximius</i>	Conchos pupfish		T			
<i>Gambusia gaigei</i>	Big Bend gambusia	E	E	X	Rio Grande Village	likely
<i>Notropis chihuahua</i>	Chihuahua shiner		T	X		
<i>Amplipterus blanchardi</i>	Blanchards' sphinx moth		SC	X		
<i>Deronectes neomexicana</i>	Bonita diving beetle		SC			
<i>Canis lupus</i> (extirpated)	gray wolf	E	E			
<i>Cynomys ludovicianus arizonensis</i>	black-tailed prairie dog		SC			
<i>Euderma maculatum</i>	spotted bat		T	X		
<i>Eumops perotis californicus</i>	greater western mastiff bat		SC	X		
<i>Leptonycteris nivalis</i>	greater long-nosed bat	E	E	X	Chisos Basin	unlikely
<i>Myotis ciliolabrum</i>	western small-footed bat		SC			
<i>Myotis thysanodes</i>	fringed myotis bat		SC	X		
<i>Myotis velifer</i>	cave myotis bat		SC	X		
<i>Myotis volans</i>	Long-legged myotis bat		SC	X		
<i>Myotis yumanensis</i>	Yuma myotis bat		SC	X		
<i>Lasiurus xanthinus</i>	Western yellow bat		SC			
<i>Nasua narica</i>	White-nosed coati		T	X		
<i>Sigmodon ochrognathus</i>	Yellow-nosed cotton rat		SC	X		
<i>Sylvilagus floridanus robustus</i>	Davis Mountains cottontail		SC	X	Chisos Basin	unlikely
<i>Ursus americanus</i>	Black bear		T	X	Chisos Basin	unlikely
<i>Humboldtiana chisosensis</i>	Chisos Mountains threeband		SC	X		
<i>Humboldtiana texaba</i>	Stockton Plateau threeband		SC			
<i>Coleonyx reticulatus</i>	Reticulated gecko		T	X		
<i>Kinosternon hirtipes</i>	Chihuahuan mud turtle		T			
<i>Phrynosoma cornutum</i>	Texas horned lizard		T	X	Harte Ranch	unlikely
<i>Tantili rubra</i>	Big Bend blackheaded snake		T	X		

APPENDIXES

Scientific Name	Common Name	Federal Status	State Status	Found in Park	Found in Project Area (3)	Likelihood of being affected by GMP alternatives
<i>Trachemys gaigeae</i>	Big Bend slider		SC	X		
<i>Trimorphodon biscutatus</i>	Texas lyre snake		T	X		
<i>Acleisanthes wrightii</i>	Wright's trumpets		SC			
<i>Agalinis calycina</i>	Leoncita false foxglove		SC			
<i>Agave glomeruliflora</i>	Chisos agave		SC	X	Chisos Basin	unlikely
<i>Allolepis texana</i>	Texas false saltgrass		SC	X (2)	Castolon, Cottonwood	unlikely
<i>Andrachne arida</i>	Trans-Pecos maidenbush		SC	X		
<i>Batesimalva violacea</i>	Purple gay-mallow		SC	X		
<i>Bonamia ovalifolia</i>	Bigpod bonamia		SC	X		
<i>Bouteloua kayi</i>	Kay's grama		SC			
<i>Brickellia brachyphylla</i> var <i>hinckleyi</i>	Hinckley's brickellbush		SC			
<i>Brickellia brachyphylla</i> var <i>terlinguensis</i>	Terlingua brickellbush		SC	X (2)		
<i>Brongniartia minutifolia</i>	Little-leaf brongniartia		SC	X		
<i>Cardamine macrocarpa</i> var <i>texana</i>	Texas largeseed bittercress		SC	X		
<i>Castilleja elongata</i>	Tall paintbrush		SC	X (1)		
<i>Peniocereus greggii</i> var <i>greggii</i>	Desert night-blooming cereus		SC	X (2)		
<i>Chamaesyce chaetocalyx</i> var <i>triligulata</i>	Three-tongue spurge		SC	X		
<i>Chamaesyce golondrina</i>	Swallow spurge		SC	X		
<i>Chamaesyce jejuna</i>	Dwarf broomspurge		SC			
<i>Coryphantha albicolumnaria</i>	White column cactus		SC	X		
<i>Coryphantha dasyacantha</i> var <i>dasyacantha</i>	Dense cory cactus		SC	X		
<i>Coryphantha duncanii</i>	Duncan's cory cactus		SC	X		
<i>Coryphantha hesteri</i>	Hester's cory cactus		SC			
<i>Coryphantha minima</i>	Nellie cory cactus	E	E			
<i>Coryphantha ramillosa</i>	Bunched cory cactus a.k.a. Big Bend cory cactus	T	T	X		
<i>Croton pottsii</i> var <i>thermophilus</i>	Leatherweed croton		SC	X		
<i>Cryptantha crassipes</i>	Terlingua creek cat's-eye	E	E			
<i>Dalea bartonii</i>	Cox's dalea		SC			
<i>Echinocereus chisoensis</i> var <i>chisoensis</i>	Chisos Mountains hedgehog cactus	T	T	X		
<i>Echinocereus chloranthus</i> var <i>neocapillus</i>	Golden-spine hedgehog cactus		SC			
<i>Echinocereus viridiflorus</i> <i>correllii</i>	Correll's green pitaya		SC			
<i>Echinocereus viridiflorus</i> var <i>davisii</i>	Davis' green pitaya	E	E			
<i>Erigeron mimegletes</i>	Sonora fleabane		SC	X (2)		
<i>Eriogonum suffruticosum</i>	Bushy wild-buckwheat		SC			
<i>Escobaria chaffeyi</i>	Chaffey's cory cactus		SC	X	Chisos Basin	unlikely

Appendix C: Letters Regarding Threatened and Endangered Species

Scientific Name	Common Name	Federal Status	State Status	Found in Park	Found in Project Area (3)	Likelihood of being affected by GMP alternatives
<i>Festuca ligulata</i>	Guadalupe Mountains fescue	C1	SC	X (1)		
<i>Galium correllii</i>	Cliff bedstraw		SC	Not in park		
<i>Gaura boquillensis</i>	Boquillas lizardtail		SC	X		
<i>Genistidium dumosum</i>	Brush-pea		SC	Not in park		
<i>Hedeoma pilosum</i>	Old blue pennyroyal		SC			
<i>Hedyotis butterwickiae</i>	Mary's bluet		SC			
<i>Hedyotis pooleana</i>	Jackie's bluet		SC			
<i>Hexalectris revoluta</i>	Chisos coral-root		SC	X		
<i>Hexalectris warnockii</i>	Warnock's coral-root		SC	X	Chisos Basin	unlikely
<i>Justicia wrightii</i>	Wright's water-willow		SC	X (2)	Castolon	unlikely
<i>Kallstroemia perennans</i>	Perennial caltrop		SC			
<i>Lechea mensalis</i>	Chisos pinweed		SC	X		
<i>Lycium texanum</i>	Texas wolf-berry		SC			
<i>Matelea texensis</i>	Texas milkvine		SC			
<i>Neolloydia (Sclerocactus) mariposensis</i>	Lloyd's mariposa cactus	T	T	X		
<i>Nesaea longipes</i>	Longstalk heimia		SC	X		
<i>Opuntia aureispina</i>	Golden-spine prickly-pear		SC	X		
<i>Opuntia imbricata</i> var <i>argentea</i>	Silver cholla		SC	X		
<i>Ostrya chisosensis</i>	Big Bend hop-hornbeam		SC	X		
<i>Paronychia wilkinsonii</i>	Wilkinson's whitlow-wort		SC			
<i>Perityle bisetosa</i> var <i>appressa</i>	Appressed two-bristle rock-daisy		SC			
<i>Perityle bisetosa</i> var <i>bisetosa</i>	Two-bristle rock-daisy		SC	X(2)	Rio Grande Village	unlikely
<i>Perityle bisetosa</i> var <i>scalaris</i>	Stairstep two-bristle rock-daisy		SC			
<i>Perityle dissecta</i>	Slimlobe rock-daisy		SC	X	North Rosillos/ Harte Ranch, Chisos Basin	unlikely
<i>Perityle vitreomontana</i>	Glass Mountains rock-daisy		SC			
<i>Phacelia pallida</i>	Pale Phacelia		SC			
<i>Phyllanthus ericoides</i>	Heather leaf-flower		SC			
<i>Poa strictiramea</i>	Desert Mountains bluegrass		SC	X		
<i>Polygala maravillasensis</i>	Maravillas milkwort		SC			
<i>Proboscidea spicata</i>	Many-flowered unicorn-plant		SC			
<i>Prunus murrayana</i>	Murray's plum		SC			
<i>Quercus graciliformis</i>	Chisos oak		SC	X	Chisos Basin	unlikely
<i>Quercus robusta</i>	Robust oak		SC	X		
<i>Quercus tardifolia</i>	Lateleaf oak		SC	X		
<i>Rorippa ramosa</i>	Durango yellow-cress		SC	X(2)		
<i>Sedum harvardii</i>	Harvard's stonecrop		SC	X		
<i>Sedum robertsianum</i>	Roberts' stonecrop		SC			
<i>Selaginella viridissima</i>	Green spikemoss		SC	x		
<i>Senna orcuttii</i>	Orcutt's senna		SC			
<i>Senna ripleyana</i>	Ripley's senna		SC			

APPENDIXES

Scientific Name	Common Name	Federal Status	State Status	Found in Park	Found in Project Area (3)	Likelihood of being affected by GMP alternatives
<i>Streptanthus cutleri</i>	Cutler's twistflower		SC	x		
<i>Thelocactus bicolor</i> var <i>flavidispinus</i>	Straw-spine glory-of Texas		SC			
<i>Zanthoxylum parvum</i>	Shinner's tickle-tongue	C1	SC			

1. Big Bend National Park and the U.S. Fish and Wildlife Service have entered into an Agreement in Lieu of Listing (Conservation Agreement) for these species.
2. Current presence in park uncertain.
3. Chisos Basin, Panther Junction, Rio Grande Village, Castolon, Cottonwood, North Rosillos/Harte Ranch

APPENDIX D: INTERPRETIVE THEMES AND SUBTHEMES AND VISITOR UNDERSTANDING GOALS

Interpretive Themes and Subthemes

1. Big Bend National Park's varied ecosystems — mountain, desert, and river — support an extraordinarily rich biological diversity.
 - Although it appears harsh and barren, the Chihuahuan Desert is home to many plants and animals (some found nowhere else in the world) that use ingenious physical adaptations and behavioral strategies to overcome heat and drought stress.
 - The park's location along a major biological corridor for bird migration on the US-Mexico border enable bird-watchers to see more varieties of bird species than in any other national park, as well as some Mexican species seldom seen anywhere else in the United States.
 - The Chisos Mountains, the only complete mountain range found in a national park, stand as a mountain island surrounded by a desert sea, providing cooler, wetter habitat for species unable to survive in the hotter, drier desert. Relict species found in the Chisos Mountains today indicate what the climate and landscape over a broader area were like thousands of years ago. Many species are not found elsewhere in the United States.
 - Big Bend National Park provides valuable habitat for several endangered and threatened species of plants and animals, and the park's protected status greatly aids in the preservation, study, and recovery of many of these species.
 - The periodic occurrence of fire is a natural process in several of the ecosystems of Big Bend and is a necessary element in maintaining the overall health of these systems.
 - Although they are seldom seen, the animals of the desert have become highly adapted and take full advantage of scarce available resources.
 - The rich plant life in Big Bend represents the diversity of the Chihuahuan Desert and provided food, medicine, clothing, textiles, and tools for people of many cultures who have lived here.
 - The outstanding fossils uncovered in Big Bend National Park make this one of the premier national parks for paleontological discoveries. These fossils continue to provide clues to the past climate, flora, and fauna of this region.
2. Major resource threats such as air and water pollution, intrusive sounds, and the presence of exotic plant and animal species as well as vandalism, graffiti, and the illegal collection of plants and animals, negatively impact both the resources of the park and the visitor experience.
 - Big Bend National Park provides visitors with incredibly clear views of the night sky, unobstructed by light pollution.
 - Through stargazing, visitors learn how early cultures relied on the night sky for critical survival information and about current air and light pollution issues.
 - Big Bend is a mandatory class I air quality area under the Clean Air Act, meaning that very little degradation of air quality is acceptable. Both particulate and visibility aspects of air quality have been monitored since 1978. Big Bend is part of a large-scale air resource protection program to determine the potential impact of local and distant pollutant sources on the area.
 - An important part of the NPS mission is to preserve and/or restore the natural resources of the parks, including the natural soundscapes associated with units of the national park system. Intrusive sounds are also a matter of concern to park visitors. Big Bend is relatively free of intrusive sounds and strives to preserve the natural soundscape.
 - Exotic plants and animals are extremely disruptive to park ecosystems. Efforts to

- prevent the introduction of exotic species and to remove established exotic species are ongoing.
3. Though rarely seen, water constitutes the most important resource in the Chihuahuan Desert environment. Water is the architect of the desert, and its presence or absence affects the desert's appearance, plant and animal life, and the ways that humans can use it.
 - The ruins at Castolon and Rio Grande Village show evidence that the river has historically been a focal point of life in Big Bend.
 - The Rio Grande is a source of life-giving water for the inhabitants of the Big Bend region, but there are also serious threats to its water quality and quantity.
 - Big Bend is a land of limited water. Water conservation, alternatives to mitigate the historic effects of people on the flow regime, evaluation of flood hazards in developed or frequently visited areas, and monitoring and managing water quality for the health and safety of park visitors and ecosystems are underway.
 4. The evidence left behind by different cultural groups over several thousand years, including American Indians, Spanish, Mexicans, Mexican-Americans, and Anglo-American settlers, gives us clues to the past and helps us imagine what life was like for these early inhabitants of Big Bend.
 - Big Bend National Park contains many outstanding archeological and historical sites and provides visitors with the chance to see how early inhabitants and later settlers lived.
 - People engaged in a number of occupations, including farming, ranching, and mining, to make a living.
 - American troops were stationed at several locations at various times throughout what is now the park from the mid-19th century until the conclusion of the Mexican Border Conflict in 1920. These soldiers, including African American Buffalo Soldiers (1885-90), protected settlers from hostile Indians, border raids, and bandits.
 5. How did these various groups adapt to the desert environment, what was their interaction and interdependence, and what was the cumulative effect of the human presence on the developing desert environment?
 5. The Maderas del Carmen Protected Area in Coahuila and the Cañon de Santa Elena Protected Area in Chihuahua are two Mexican federally protected areas adjacent to Big Bend National Park, and Big Bend Ranch State Park. Together with Black Gap Wildlife Management Area, these four areas preserve millions of acres of important habitat, protect biological corridors for wildlife migration, and provide unique opportunities for the United States and Mexico to work together to preserve a common ecosystem.
 6. Big Bend National Park provides an excellent outdoor laboratory for researchers to study the natural world, the interactions that occur within, and the impacts of both natural events and human activity.
 - In addition to the National Park Service, the state of Texas, its citizens, the Civilian Conservation Corps, and other entities were instrumental in the creation and development of Big Bend National Park and in preserving its resources.
 7. The legacy of human impacts on Big Bend National Park's varied environments exhibits changes from past to present, including soil erosion, watershed impairment, grasslands decline, and species reduction.

Visitor Understanding Goals

These goals help establish the desired visitor experiences and serve as a guide for developing a range of management approaches. The National Park Service will provide opportunities for public to

Appendix D: Interpretive Themes and Subthemes and Visitor Understanding Goals

- learn about Big Bend without physically visiting the park
- feel welcome, respected, and able to offer suggestions
- safely enjoy park resources
- experience clean and well-maintained facilities
- visit a park visitor center and talk to a knowledgeable ranger or volunteer
- interact with park employees and other visitors
- have access to differing points of view on issues affecting the park
- learn and practice low-impact uses in the park
- learn about the park by attending interpretive programs
- learn some of the complex natural processes that helped to shape Big Bend
- receive exceptional customer service
- experience solitude
- experience the natural world without the intrusions of modern life
- experience views as far as the eye can see without evidence of humans in the landscape
- see plants and animals in their natural settings
- experience the richness of biological diversity in the park
- visit a historic site and see how early inhabitants of this area lived
- make self-discoveries and establish a connection to park resources
- experience Mexican culture by visiting one of the border towns adjacent to the park
- contemplate their own roles and responsibilities in the stewardship of natural and cultural resources
- enjoy a variety of appropriate recreational opportunities that are compatible with the protection of park resources

APPENDIX E: DRAFT WILDERNESS SUITABILITY ASSESSMENT

DRAFT

L48-(ScRM)

September 14, 2002

MEMORANDUM

From: Regional Director, Intermountain Region

To: Director

Subject: Wilderness Suitability Assessment — North Rosillos area of Big Bend National Park

The Intermountain Regional Office determines that the North Rosillos addition of Big Bend National Park contains roadless and undeveloped Federal lands of sufficient size to make their preservation as wilderness practicable and are therefore suitable as wilderness.

The Wilderness Act of 1964 (16 U.S.C. 1131 et seq.) defines wilderness as “...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation which is protected and managed so as to preserve its natural conditions....” 16 U.S.C. 1131(c).

The Wilderness Act, regulations at 43 CFR 19, Secretarial Order 2920, and Management Policies of the NPS (2001) require that the National Park Service (NPS) review all areas within a park to determine if any meet the criteria laid out in the Wilderness Act and NPS Policies.

The determination applied the following Management Policies criteria:

National Park Service lands will be considered suitable for wilderness if they are at least 5000 acres or of sufficient size to make practicable their preservation and use in an unimpaired condition, and if they possess the following characteristics (as identified in the Wilderness Act):

- The earth and its community of life are untrammelled by humans, where humans are visitors and do not remain;
- The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation;
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable;
- The area is protected and managed so as to preserve its natural conditions, and
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

NPS Management Policies (2001) 6.2.1.1
Primary Suitability Criteria.

I determine that areas within the North Rosillos addition of Big Bend National Park meet the criteria and are, therefore, suitable for wilderness. Significant portions of the North Rosillos area generally appear to have been affected primarily by the forces of nature with minimal evidence of human activity. These areas of the North Rosillos area offer outstanding opportunities for solitude or for primitive and unconfined recreation.

The suitable area is divided into 2 units. The North Rosillos unit and the Nine Point unit fall on opposite sides of the 14 mile Terlingua Ranch road; a permanent, unpaved, county maintained road; and its 3 mile administrative access road leading to an NPS aircraft facility.

The North Rosillos unit contains approximately 23,300 suitable acres. This includes, as suitable for potential wilderness, a 135 acre powerline corridor and 475 acres in non-federal ownership.

The Nine Point unit contains approximately 39,400 suitable acres. The Nine Point unit also includes areas suitable for potential wilderness: 55 acres of powerline corridor, a four-mile unpaved access road to private land, and approximately 900 acres of NPS land in three triangular parcels that lie between the private land access road and NPS boundary corners.

Attached is a draft notice for publication in the Federal Register should you approve this memorandum as the NPS' final wilderness assessment suitability determination.

Sincerely,

APPENDIX F: STATEMENT OF FINDINGS FOR FLOODPLAINS

STATEMENT OF FINDINGS

FOR

EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT

Rio Grande Village Developed Area & Cottonwood Campground

General Management Plan/Environmental Impact Statement

Big Bend National Park

Recommended: John A. King
Superintendent, Big Bend National Park January 14, 2004

Concurred: William Jackson
Acting Chief, Water Resources Division 1-23-2004
Date

Approved: Murdoch
Director, Intermountain Region 1/27/04
Date

In accordance with Executive Order 11988—Floodplain Management and National Park Service guidelines (DO 77-2) for implementing the order, the National Park Service (NPS) has evaluated flooding hazards for the development at Rio Grande Village and Cottonwood Campground and has prepared this statement of findings (SOF). As an integral part of the effort to develop a general management plan (GMP) for the park, the SOF describes the flood hazard, alternatives, impacts, mitigation, and informed decisions for the continued use of the two areas. Additional detail regarding the park, campground, and future plans may be found in the GMP.

USE OF THE FLOODPLAIN

Rio Grande Village is the site of ponds that are the refugium of the endangered fish, *gambusia*. Visitor facilities include a nature trail, visitor center, gas station, store, 100-site campground, and concessioner RV campground. Administrative development is comprised of offices in the orientation and interpretive center, sewage lagoons, six employee residences, and a maintenance area. The entire developed area, including fuel storage tanks at the gas station, maintenance area, and housing area is located within the 100-year floodplain as mapped on Flood Insurance Rate Maps. Also within the 100-year floodplain is an historic adobe house. In the vicinity of Boquillas Canyon are a hot spring that may be subject to inundation during high flows and the historic Barker Lodge that may be damaged by bank erosion.

Cottonwood Campground, 35 sites, is located upriver from Rio Grande Village in the Castolon historic district. This campground, within the 100-year floodplain according to Flood Insurance Rate Maps, is subject to bank loss.

At Rio Grande Village, the preferred alternative in the general management plan would protect fuel storage from the 500-year flood, revegetate 70 acres formerly used for overflow camping, enlarge the concessioner RV campground by up to 40% not to exceed 30 total sites, move some campsites to better protect the endangered fish, add four offices to the visitor center or construct a new building for four offices, construct one fire bay, preserve Barker Lodge for housing, and add four houses if water is available,

At Cottonwood Campground, the preferred alternative of the GMP would relocate 20 campsites away from the river (because of bank cave-ins), construct a new access road (1/2 mile long) further from the river, and add two new 2-stall Romtech vault toilets.

Use of the 100-year floodplain for a campgrounds, residences, and maintenance buildings is a class I action. Storage of toxic materials (gasoline and other fuels) in the floodplain are class II actions.

ALTERNATIVES CONSIDERED

The first alternative, presented to the public in a newsletter, was relocating the campgrounds out of the 100-year floodplain. Responses were that the park service should not impact a new area when the campground is already in place and that responders do not want to camp at a location away from the river. Being next to the river and the large cottonwoods in the riparian area is highly valued by campers.

Alternative C in the GMP would remove all development except the main road, a trailhead with parking and a restroom, and three trails from Rio Grande Village. (The alternative of removing Cottonwood Campground was not considered in any alternative.) This would restore the natural and beneficial values of the floodplain, protect campers and employees from the dangers of flood, and

remove the opportunity for visitors to camp and receive interpretation of park resources at Rio Grande Village. It would eliminate the need for housing staff and having a maintenance facility at Rio Grande Village, and inconvenience those who use the gas station and store.

FLOOD HAZARD FROM IMPLEMENTATION OF THE PREFERRED ALTERNATIVE WITHOUT MITIGATION

In November, 1991, Gary Smillie and Mike Martin of Water Resources Division, National Park Service conducted flood hazard reconnaissance for the major developments at Big Bend. The following information is from the report of that trip.

In general we found the Rio Grande River [*sic*] to be functioning in a manner normal for a large river in a fairly natural setting. There is abundant evidence of erosion on the outside of bends, apparently caused most recently by two fairly large flood events in the past year. Channel instability of this type is a natural process and should not necessarily be considered a man-caused problem. Placement of riprap or other structural stabilization technique would make the Rio Grande function less naturally and may, in fact, cause problems in other locations.

Many of the major developments we visited in BIBE are in the greater floodplain of the Rio Grande, however, they will experience flooding only in extremely large (and rare) events. Furthermore, flow velocities can be expected to be very low because of hydraulic conditions along the river. The gradient of the Rio Grande is low, about 5 feet per mile, and the floodplain is very wide. These factors make rapid and dangerous flooding in the areas of visitor and concession use almost impossible. The largest flood events that occur in the Rio Grande originate from precipitation over a large area and can usually be observed upstream, well in advance of arrival to BIBE. Even a very large tributary flood will result in a much smaller relative event in the main river. For these reasons, flash flooding on the main river is not a great concern.

In conclusion, we believe that park developments located along the Rio Grande are well located from a flood hazard perspective. Bank failure will continue to occur and may eventually lead to the need to relocate certain facilities, for example, Cottonwood Campground. However, if unstable bank areas are clearly marked, they are of little risk to visitors. Bank stabilization such as placement of rip rap in eroding bends, is not recommended at this time. Development of a flood warning system based on upstream flow and weather information may be practical and provide sufficient time to evacuate visitor and concession areas...Additionally, signage and/or pamphlet material explaining flood-related hazards could be made available to visitors.

The fact that the Rio Grande is not subject to flash flooding means that the regulatory floodplain for development associated with Cottonwood Campground and Rio Grande Village would be the 100-year floodplain. The regulatory floodplain for fuel storage, a critical action, is the 500-year floodplain.

In summary, because flooding occurs only in extremely large and rare events, and flood flow velocities are very small, the possibility that visitors could be injured or lose their lives in a flood at Cottonwood Campground or Rio Grande Village is very small. The following section describes measures that will be taken to minimize this already very small risk.

THE PROPOSED ACTION

The National Park Service will continue to operate the campground and all other facilities at Rio Grande Village and the campground at Cottonwood. At Rio Grande Village, it would protect fuel storage tanks at the gas station, maintenance area and housing area from the 500-year flood, restore 76 acres formerly used for overflow camping to more natural conditions, enlarge the concessioner RV campground by up to 40% not to exceed 30 total sites, move some campsites to better protect the endangered fish, add four offices to the visitor center or construct a new building for four offices, construct one fire bay, preserve Barker Lodge for housing, and add four houses if water is available. All fuel storage tanks would be protected by constructing berms that reached above the level of the 500-year flood, and securing the fuel storage tanks to the berms. At Cottonwood Campground, the preferred alternative of the GMP would relocate 20 campsites away from the river (because of bank cave-ins), construct a new access road (1/2 mile long) further from the river, and add two 2-stall Romtech vault toilets.

The National Park Service will develop a campground operational plan for Cottonwood Campground and a campground and developed area plan for Rio Grande Village to address flooding threats. The plans would address the following points:

- A decision tree for park staff to minimize the threat to life by clear planning choices
- Closure conditions: seasonal, watershed saturation, and storm event priorities
- Notification protocols for park staff, visitors, and campers
- Training staff, campground hosts, and volunteers in the implementation of the plan
- Preparation of informational and warning signs, brochures
- Establishment of formal notification/warning procedures between the park and the National Weather Service
- Heightened awareness periods during monsoon rain months of June, July, August and September, especially when the watershed is saturated by previous rains
- Preemptive night camping closure of the campground using the decision tree
- Formalization of evacuation routes and mobilization sites for rescue
- Review and revision of the plan elements every two to three years.

Some of these points related to flows on the Rio Grande are already included in the 1996 *Water Resources Management Plan, Big Bend National Park, Texas*:

- Educate public on low-flow and flood hazards through information leaflet distribution and with posted warning signs at boat launch sites and popular recreation areas.
- Take nonstructural and low-cost structural measures to protect flood-prone high use areas.
- Monitor National Weather Service severe weather and flood warning broadcasts for Amistad Reservoir and use as an early warning system for the park.
- Train park personnel for flood contingency.
- Use U.S. Geological Survey National Water Information System data from telemetered stations upstream of the park (as far as the Rio Conchos) in conjunction with studies of flood wave propagation along the park boundary to correlate water levels and corresponding discharges at key gauging stations between Presidio and Rio Grande Village.

The proposed action does not represent a new impact upon natural resource, cultural resource, or park infrastructure floodplain values in the park. Because of the restoration of 76 acres to more natural conditions, even with the addition of four offices, four employee housing units, and a fire bay, it does not represent an expansion of impacts on natural resource or park infrastructure floodplain values. It does represent an informed decision concerning the continuation of risk to human life that is

minimized by the mitigation contained in the campground and developed area operation plans. The risk to human life in the campgrounds and developed area cannot be eliminated entirely.

If the campground is damaged by future flooding or, as additional camping facilities and are developed outside the park, the park staff will consider closing the campgrounds on a seasonal or year-round basis, or converting them to day use picnicking only.

SUMMARY

The National Park Service will continue to operate the 35-site campground at Cottonwood, and the 100-site campground and other development at Rio Grande Village. It will protect fuel storage at the gas station and maintenance area from the 500-year flood, return the 76-acre overflow camping area to more natural conditions, enlarge the concessioner RV campground up to a total of 30 sites, and build four offices, four employee residences and a fire bay. Selective closure options described in an operational plan (campground and developed area operation plan) would lower the threat to life and property within the campgrounds and developed area. The park will develop this plan, regularly educate staff and visitors in its detail, and periodically review it with any additional relevant weather or flooding information that becomes available.

REFERENCES

National Park Service

- 1992 "Trip Report for Travel to Petroglyph National Monument and Big Bend National Park on November 12-17, 1991," by Bill Jackson, Chief, Water Resources Division, Fort Collins, Colorado.
- 1993 Floodplain Management Guideline, Washington Office, Washington, D.C.
- 1996 *Water Resources Management Plan, Big Bend National Park, Texas*, Robert D. MacNish and Laurel J. Lacher, University of Arizona, Carl M. Fleming, Big Bend National Park, and Mark D. Flora, Water Resources Division.

STATEMENTS OF FINDINGS

FOR

EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT

Panther Junction Developed Area

General Management Plan/Environmental Impact Statement

Big Bend National Park

Recommended: John A. King
Superintendent, Big Bend National Park January 14, 2004

Concurred: William G. Adams
Acting Chief, Water Resources Division Date 1-23-2004

Approved: Meredith Sefer
Director, Intermountain Region Date 1/27/04

In accordance with Executive Order 11988 – Floodplain Management and National Park Service guidelines for implementing the order, the National Park Service (NPS) has evaluated flooding hazards for the development at Panther Junction and has prepared this statement of findings (SOF). As an integral part of the effort to develop a general management plan (GMP) for the park, the SOF describes the flood hazard, alternatives, impacts, mitigation, and informed decisions for the continued use of this area. Additional detail regarding the park, flooding history, and future plans may be found in the GMP.

USE OF THE FLOODPLAIN

Panther Junction is the location of a visitor center, the principal administrative area for the park (headquarters, maintenance, resource office building, collections storage Bally building), gas station, store, post office, school and 76 housing units (22 of which are trailers). The entire development is in a flash flood prone area. Therefore, according to the NPS Floodplain Management Guideline, 1993, the regulatory floodplain is that inundated by the Maximum Estimated Flood (Qme). This is an extremely large event with a very low probability of occurrence. It is used as the regulatory floodplain here to provide a high degree of safety from runoff events that may inundate an area in a very short time (NPS WRD 1995: “Estimation of Flood and Geomorphic Hazard in the Panther Canyon Area of Big Bend National Park Texas”).

The preferred alternative in the GMP is to construct a new visitor center with 100-space parking area, construct a storage warehouse, rehabilitate the vacated visitor center area of headquarters for additional offices, and move up to 15% of park personnel and functions to gateway communities. A dormitory and three-bedroom house would be built to replace housing units removed from Chisos Basin.

ALTERNATIVES CONSIDERED

The alternative of moving all development out of Panther Junction was considered and rejected because of the very high fiscal and natural resource costs of redeveloping infrastructure at another location. In addition, Panther Junction is located at the intersection of the roads leading from the two park entrances making it the ideal location for the visitor center and administrative facilities for the park. The school and associated housing, owned by the San Vicente School District, can only be moved by that entity.

The Chisos Basin development, located in a unique montane ecosystem and experiencing even greater problems with water quantity than Panther Junction, was deemed to be a higher priority for structure removal. One employee house and the bunkhouse will be removed from Chisos Basin. The employee house and bunkhouse will be replaced at Panther Junction.

FLOOD RISK

According to a memorandum from Michael Martin, Hydrologist, Water Operations Branch, Water Resources Division, National Park Service to Superintendent, Big Bend National Park on the subject of "Summary of Panther Junction Flood Hazard," April 14, 2000:

All of the structures at PJ are located on the uppermost end of an extensive bajada, or a series of coalescing alluvial fans. There are three specific flood related hazards associated with this location: bank loss due to erosion, inundation from floodwaters, and destruction from debris flows. Additionally, an overriding hazard exists in the long periods between devastating events, which may create the illusion of inactivity. Lastly, hazardous flood events, when they do take place, may occur in a very short time period due to the relatively small and steep watershed, allowing little opportunity for warning or evacuation. Consequently, this area is considered flash flood prone, and the resulting regulatory floodplain is the Maximum Estimated Flood (Qme).

The following information is from "Estimation of Flood and Geomorphic Hazard in the Panther Canyon Area of Big Bend National Park, Texas," (NPS: 1995).

The calculated design flood discharges for Panther Canyon were 1500, 2895, and 17000 cubic feet per second (CFS), for the 100-year, 500-year, and Qme, respectively. Mouse Canyon, with its much smaller watershed, produced discharge estimates of 550, 920, and 6000 cfs, for the 100-year, 500-year, and Qme, respectively.

Because Mouse Canyon drains a much smaller watershed and the channel itself is far more entrenched than Panther Canyon, it was determined that the flood risk associated with Panther Canyon is much greater than from Mouse. In fact, the Mouse Canyon channel was capable of containing all three design floods. Consequently, Panther Canyon was judged as the source of all flood hazard and the following results are restricted to that drainage.

Estimations of flood stage indicate that the Panther Canyon channel, with its present morphology, is capable of containing the 100-year discharge. As a result, the residential structures, the school, and the administrative buildings are above the level of this design flood. The 500-year discharge is also contained by the upper channel with its [sic] present morphology. The downstream channel, however, does not contain the 500-year flood and structures on the lower fan may be subject to some inundation from this flood. This includes the area in the lower fan proposed for future development. The building that contains curatorial storage is located adjacent to the channel at an elevation that is very close to that predicted for the 500-year flood. The Qme discharge in Panther Canyon would overtop the banks and inundate the existing site between both Panther and Mouse Canyons.

The depths of these design floods in Panther drainage ranged from 3.5 feet for the 100-year flood, to 8.5 feet for the Qme (Table 1). Mean channel velocities associated with the three design floods ranged from 8 feet per second (fps) for the 100-year event to about 13 fps for the Qme. These reported depths and velocities are estimated from one-dimensional flow. Any overbank flow, especially on the lower fan, would likely resemble divergent sheetflow and have lower depths and velocities...

Careful field examination was made of Panther Canyon and no indication of previous high magnitude flooding was observed....

Quoting again from a memorandum from Michael Martin, Hydrologist, Water Operations Branch, Water Resources Division, National Park Service to Superintendent, Big Bend National Park on the subject of “Summary of Panther Junction Flood Hazard,” April 14, 2000:

Debris Flow Hazard

To substantiate whether a debris flow threat exists or not, a detailed reconnaissance of the upper watershed was conducted with the intent of identifying adverse structure (fractures parallel to slopes) and accumulation of material in potential debris flow source areas. We reconnoitered Panther Canyon for a distance of over a mile upstream of the housing area. At the confluence of Panther and Bovarc Canyons, we proceeded several hundred yards upstream. Above the mentioned confluence, we observed large amounts of alluvium and colluvium in Bovarc Canyon. However, given the low channel gradient and the relatively great distance, it is unlikely that a destructive debris flow could travel to the Panther Junction housing area. The large amount of available material, however, could be transported downstream in moderate to high magnitude floods, aggrading the incised channel and reducing flood conveyance capacity. Aggradation of the incised channel in the PJ area would increase the flood hazard.

Bank Loss Hazard

Bank loss in the housing area during times of moderate to high flows may pose a serious threat to structures located near the channel. The fan deposit where the development is located is composed of unconsolidated material underlain by bedrock at a shallow depth. Consequently, downward incision is inhibited and lateral migration of the channel is occurring. Examination of the cross-section surveyed in 1995 through the area of greatest bank loss indicates that the cross-channel gradient is towards the housing area. This general tilt of the channel, coupled with the shallow bedrock, strongly indicates that bank loss will be an ongoing problem without mitigative measures. Structures in close proximity to the incised channel have the highest degree of risk from bank collapse. Any site located farther from the channel is less likely to suffer foundation collapse due to erosion, but, for long time periods all structures located on the fan are potentially at some risk, as the primary channel may be expected to migrate.

The following information is from “Estimation of Flood and Geomorphic Hazard in the Panther Canyon Area of Big Bend National Park, Texas,” (NPS: 1995).

Summary

In general, the fan is an undesirable place because it is geomorphically unstable, flood prone, and possibly debris prone. This is not to say the residents are at extreme risk. Processes are slow in this environment and the present configuration may persist for many years, so any time afforded through protection may translate into a long, safe occupancy. Another factor that somewhat reduces the risk of catastrophic clear-water floods is the small contributing area of the watershed, which limits the amount of runoff and results in moderate, low frequency floods. Additionally, no evidence of prior high magnitude flooding, the debris of which would likely be preserved for long periods of time in this desert environment, was observed in the channel area.

When viewed in the context of long-term occupancy, the entire development is likely at some risk. The channel is actively migrating and bank loss threatens several structures. Buildings

constructed on the lower portion of the fan, including the curatorial storage building, are likely to experience inundation from high magnitude flows. Shifting of the active channel to a distributary channel through aggradation would potentially flood portions of the fan far removed from the main channel, and the most extreme floods that could be expected from this size watershed could inundate the entire area. The hazard of debris flow is not certain, but, if possible, could be extremely destructive.

All of the structures at Panther Junction are at “some risk” according to the report. However, the report also seems to indicate that the risk is not great. Nevertheless, because the long period between events leads to a false sense of security and warning time would be short, there is the possibility of human injury or loss of life in the event of a large flood. In addition, a large investment in infrastructure could be lost if the 500-year or Qme does occur.

The curatorial storage building mentioned in the report and the science and resource building that is not mentioned are scheduled for replacement to a location outside the 500-year floodplain of Panther Canyon (as described in the cumulative impact scenario) — an action outside the GMP.

PROPOSED ACTION

The National Park Service will continue to have its principal visitor center, headquarters, administrative offices, and housing at Panther Junction. It will construct a new visitor center, with 100-space parking, storage warehouse, 12-bed dormitory, and three-bedroom house to replace housing units removed from Chisos Basin, rehabilitate the headquarters building for additional offices, and move up to 15% of park personnel and functions to gateway communities. Removing 15% of park personnel and functions out of the park will mean that fewer offices and residences will be needed at Panther Junction than if the trend to provide housing and offices for most personnel at Panther Junction continued.

The National Park Service will develop a developed area plan for Panther Junction to address flooding threats. The plan would address the following points:

- A decision tree for park staff to minimize the threat to life by clear planning choices.
- Closure conditions: seasonal, watershed saturation, and storm event priorities.
- Notification protocols for park staff, visitors, and others.
- Training staff, employee families, school children, and volunteers in the implementation of the plan.
- Preparation of informational and warning signs, and brochures.
- Establishment of formal notification/warning procedures between the park and the National Weather Service.
- Monitor National Weather Service severe thunderstorm warning broadcasts as an early warning system for the park. (Water Resources Management Plan language was modified for Panther Junction.)
- Heightened awareness periods during monsoon rain months of June, July, August and September, especially when the watershed is saturated by previous rains.
- Preemptive housing area closure using the decision tree.
- Formalization of evacuation routes and mobilization sites for rescue.
- Train park personnel for flood contingency.
- Review and revision of the plan elements every two to three years.

- Determine if fuel tanks at the maintenance area are out of the 500-year floodplain or protect them from the 500-year floodplain.

Because of removal of 15% of park personnel and functions from Panther Junction, the proposed action does not represent a new impact upon natural resource, cultural resource, or park infrastructure floodplain values in the park. It does represent an informed decision concerning the continuation of risk to human life that is minimized by the mitigation contained in developed area operation plan. The risk to human life in the Panther Junction developed area cannot be eliminated entirely.

If the developed area is damaged by flooding or, as additional facilities are developed outside the park, the park staff will consider whether replacement facilities would best be sited at Panther Junction, other locations in the park, or outside the park.

SUMMARY

The National Park Service will continue to have its principal visitor center, headquarters, administrative, and housing area at Panther Junction. It will construct a new visitor center, with 100-space parking, storage warehouse, 12-bed dormitory, and three bedroom house to replace housing units removed from Chisos Basin, rehabilitate the headquarters building for additional offices, and move up to 15% of park personnel and functions to gateway communities. Removing 15% of park personnel and functions out of the park will mean that fewer offices and residences will be needed at Panther Junction than if the trend to provide housing and offices for most personnel at Panther Junction continued.

The Park Service will create a developed area warning and evacuation plan to ensure that employees, employee families, school children and visitors receive adequate warning so that they suffer no ill effects from flooding. It will protect fuel storage at the gas station and maintenance area from the 500-year flood. Preparation of the developed area warning and evacuation plan would lower the threat to life and property within Panther Junction. However, injury or loss of life from flooding could not be completely prevented. The park will develop the plan, regularly educate staff and visitors in its detail, and periodically review it with any additional relevant weather or flooding information that becomes available.

Note from floodplain guidelines:

If flood warning and evacuation are planned, both warning and evacuation times should be determined. In the event that risk to property of human life cannot be eliminated in high hazard areas, even by compliance with this guideline, a clear statement of this situation is required in the SOF.

REFERENCES

National Park Service

- 1994 Floodplain Management Guideline, Washington Office, Washington, D.C.
- 1995 "Estimation of Flood and Geomorphic Hazard in the Panther Canyon Area of Big Bend National Park, Texas," by Mike Martin, Water Resources Division, Fort Collins, Colorado.

- 1996 *Water Resources Management Plan, Big Bend National Park, Texas*, Robert D. MacNish and Laurel J. Lacher, University of Arizona, Carl M. Fleming, Big Bend National Park, and Mark D. Flora, Water Resources Division.
- 2000 Memorandum from Michael Martin, Hydrologist, Water Operations Branch, Water Resources Division, National Park Service to Superintendent, Big Bend National Park on the subject of “Summary of Panther Junction Flood Hazard,” April 14, 2000.

APPENDIX G: UNINVESTIGATED POSSIBLE CULTURAL LANDSCAPES

The following 48 landscapes or landscape-related elements were noted in the literature, but were not investigated further in the 1999 reconnaissance due to time limitations:

Sites scattered across the park:

- Cartledge's No. 4 mill with candelilla wax processing plant
- Chilicotal Spring with candelilla wax processing plant
- Croton Spring
- de la Ho's Spring with candelilla wax processing plant
- Dodson Ranch/Spring/Dodson Trail/house(s)/Outer Mountain Loop/Del
Dodson Spring with candelilla wax processing plant
- Graham Ranch
- Grapevine Spring/ranch
- Dominguez Ranch
- Ernst Basin
- Ernst Tinaja
- Fresno
- Fossil bone exhibit
- Grapevine Ranch
- Gravel Pit and La Clocha
- Harte Ranch/North Rosillos Addition
- Juniper Canyon
- Laguna Meadows Cabin
- Marufo Vega Trail
- Maverick Junction/old Maverick Road
- Mule Ear spring/ranch/Mule Ears corral
- Nine Point Draw
- Nugent Mountain
- Oak Springs Ranch
- Paint Gap Ranch
- Panther Junction: headquarters, visitors center, employee housing, school
- Rice Place/cemetery/Ranch (includes the large stock tank)
- Robbers Roost
- Ross Maxwell Scenic Drive
- San Jacinto Spring with Candelilla wax processing plant
- Telephone Canyon
- The route taken by Echols with his camel experimental expedition (ex: Dog Canyon)

Sites along Rio Grande between Castolon and Mariscal Canyon:

- Buenos Aires
- Smoky Creek
- Black Dike
- Sierra Chino
- Cemetery (unnamed)
- Reed
- Jewels
- Woodson's; also site of Paso de Chisos Crossing (see Comanche War Trail)
- Pettit's site
- Pantera site and cemetery
- Talley Ranch with nearby Candelilla wax processing plant

Sites along Rio Grande between Mariscal Canyon and Hot Springs:

Solis Landing
Grave (unnamed)
Solis Ranch
Compton Place with Candelilla wax processing plant
Rooney's Place
Casa de Piedra

APPENDIX H: SOIL TYPES AND LIMITATIONS FOR DEVELOPMENT BY ALTERNATIVE

Information in this table comes from Soil Survey staff. 1985 “Soil Survey of Big Bend National Park, Part of Brewster County, Texas.” U.S. Department of Agriculture, Soil Conservation Service.

Soils with Moderate or Severe Limitations for Actions in Alternative A

The following areas will require further geotechnical investigation to evaluate suitability and needed mitigation prior to design of the listed facilities.

Developed Area	Actions	Soil Type
Chisos Basin	<ul style="list-style-type: none"> •Upgrade water system •Place electrical lines underground 	<p>Liv-Mainstay-Rock Outcrop Complex, steep (LMF) Water erosion is a severe hazard because of steep slopes. Excavating for underground utilities is difficult.</p> <p>Limitations for shallow excavations – Liv severe: slope Mainstay, severe: depth to rock, slope Rock Outcrop, severe depth to rock, slope</p>
Rio Grande Village	<ul style="list-style-type: none"> •Retain campsites, visitor center, housing and maintenance areas, store, and gas station. 	<p>Lozier-Rock outcrop complex, steep (LRF); Glendale-Harkey association, occasionally flooded (GHA); and Tornillo loam, occasionally flooded. Lozier-rock outcrop, the hazard of water erosion is severe because of steep slopes. Glendale-Harkey soils are located in the floodplain and occasional flooding is the major limitation for campsites, picnic areas and building sites. The picnic area and sewage lagoons at Rio Grande Village are in the Tornillo soil type. During high intensity rainstorms, this soil type is flooded by sheet water as much as several inches deep. This brief flash flooding occurs about once every 3 to 8 years. Water erosion is a severe hazard.</p> <p>Limitations on Glendale Harkey – shallow excavations – moderate: flooding small commercial buildings – severe: flooding dwellings without basements – severe: flooding campsites – severe: flooding</p>
Castolon	<ul style="list-style-type: none"> •Upgrade water and fire system. 	<p>Chamberino very gravelly loam, rolling (CHD).</p> <p>Limitations for shallow excavations, moderate slope</p>
Cottonwood Campground	<ul style="list-style-type: none"> •Retain campsites. 	<p>Glendale-Harkey association, occasionally flooded (GHA); These soils are located in the floodplain and occasional flooding is the major limitation for campsites and picnic areas.</p>
North Rosillos/ Harte Ranch	No actions in alternative A.	Area not covered by 1985 soil survey.
Persimmon Gap	No actions in alternative A.	
Maverick	No actions in alternative A.	
Gateway communities	No actions in alternative A.	

Soils with Moderate or Severe Limitations for Actions in Alternative B

The following areas will require further geotechnical investigation to evaluate suitability and needed mitigation prior to design of the listed facilities.

Developed Area	Actions	Soil Type
Chisos Basin	<ul style="list-style-type: none"> •Remove one employee residence and one 12-bed bunkhouse 	<p>Liv-Mainstay-Rock Outcrop Complex, steep (LMF)—Water erosion is severe because of steep slopes. Hurds very cobbly loam (HRF) – Water erosion is a severe hazard.</p> <p>Limitations for shallow excavations – Liv severe: slope Mainstay, severe: depth to rock, slope Rock Outcrop, severe depth to rock, slope</p>
Panther Junction	<ul style="list-style-type: none"> •Construct visitor center •Construct storage warehouse •Rehabilitate headquarters for additional offices •Construct employee residence, and 12-bed bunkhouse •Move up to 15 percent of personnel and functions to gateway communities •Upgrade water system 	<p>Chilicotal-Monterosa association, rolling (CMD)</p> <p>Limitations for shallow excavations – Chilicotal: moderate: slope Monterosa: severe: cemented pan, small stones small commercial buildings – severe: slope & cemented pan</p>
Rio Grande Village	<ul style="list-style-type: none"> •Relocate some campsites to reduce impacts on <i>Gambusia</i> •Find and develop an alternative water source so that endangered fish and people do not share the same source. •Return former overflow camping area to natural conditions •Enlarge concession campground (RV) by approximately 40% in area not to exceed 30 additional sites. Add islands. •Construct 4 housing units if a water source is found •Construct one fire bay •Expand visitor center to add 4 offices or build 4-office building •Upgrade water system 	<p>Lozier-Rock outcrop complex, steep (LRF); Glendale-Harkey association, occasionally flooded; and Tornillo loam, occasionally flooded. For Lozier-rock outcrop, the hazard of water erosion is severe because of steep slopes. Glendale-Harkey soils are located in the floodplain and occasional flooding is the major limitation for campsites, picnic areas and building sites. The picnic area and sewage lagoons at Rio Grande Village are in the Tornillo soil type. During high intensity rainstorms, this soil type is flooded by sheet water as much as several inches deep. This brief flash flooding occurs about once every 3 to 8 years. Water erosion is a severe hazard.</p> <p>Limitations on Glendale-Harkey – small commercial buildings – severe: flooding dwellings without basements – severe: flooding campsites – severe: flooding</p>
Castolon	<ul style="list-style-type: none"> •Construct 2 housing units •Construct fire bay 	<p>Chamberino very gravelly loam (CHD)</p> <p>Limitations for shallow excavations and dwellings without basements – moderate, slope small commercial buildings – severe: slope</p>

APPENDIXES

Developed Area	Actions	Soil Type
Cottonwood Campground	<ul style="list-style-type: none"> •Relocate some campsites farther from the river •Construct new egress road 	<p>Glendale-Harkey association (GHA), occasionally flooded; these soils are located in the floodplain</p> <p>Limitations for campsites – severe: flooding local roads – Glendale severe: flooding, low strength; Harkey, severe: flooding</p>
North Rosillos/Harte Ranch	<ul style="list-style-type: none"> •Preserve structures around Buttrill Spring •Construct interpretive trail at Buttrill Spring •Possibly construct a Rosillos trail 	Area not covered by 1985 soil survey.
Persimmon Gap	<ul style="list-style-type: none"> •Construct duplex if a water source can be found 	<p>Pajarito-Agustin (PAA) at visitor contact station Upton-Nickel at trailer site (duplex site)</p> <p>Limitations for Dwellings without basements – Upton moderate: cemented pan; Nickel slight Septic tank absorption fields – Upton severe: cemented pan; Nickel severe: percolates slowly</p>
Maverick	<ul style="list-style-type: none"> •Construct entrance station at park boundary •Remove existing entrance station 	<p>Vieja-Badland complex, rolling (VBD).</p> <p>Limitations for Small commercial buildings – Upton, moderate: cemented pan; Nickel, moderate: slope Septic tank absorption fields – severe: depth to rock</p>
Gateway communities	Construct or lease residences and offices (Some of the 15% of employees who would be moved would rent or buy their own residences.)	

Soils with Moderate or Severe Limitations for Actions in Alternative C

The following areas will require further geotechnical investigation to evaluate suitability and needed mitigation prior to design of the listed facilities.

Developed Area	Actions	Soil Type
Chisos Basin	<ul style="list-style-type: none"> •Remove all development except main road. •Construct trailhead and parking 	<p>Liv-Mainstay-Rock Outcrop Complex (LMF), steep (Water erosion is a severe hazard because of steep slopes. Excavating for underground utilities is difficult.) Hurds very cobbly loam (Water erosion is a severe hazard.)</p> <p>Limitations for paths and trails – Liv and Mainstay – severe: slope and small stones Rock outcrop – severe: slope</p>

Appendix H: Soil Types and Limitations for Development by Alternative

Developed Area	Actions	Soil Type
Panther Junction	<ul style="list-style-type: none"> •Construct administration building and warehouse, •Rehabilitate headquarters into a visitor center •Moving up to 15 percent of personnel and functions to gateway communities; •Upgrade water system 	<p>Chilicotal-Monterosa association, rolling (Wind and water erosion are only slight hazards for Chilicotal and Monterosa soils because of gravel on the surface.)</p> <p>Limitations for shallow excavations – Chilicotal: moderate: slope Monterosa: severe: slope and cemented pan, small stones</p> <p>Limitations for small commercial buildings – Monterosa: severe: slope and cemented pan</p>
Rio Grande Village	<ul style="list-style-type: none"> •Remove all development except the main road to a day use trailhead •Extend Hot Springs trail to new trailhead, nature trail to Boquillas crossing 	<p>Lozier-Rock outcrop complex, steep; Glendale-Harkey association, occasionally flooded; and Tornillo loam, occasionally flooded. For Lozier-rock outcrop, the hazard of water erosion is severe because of steep slopes. Glendale-Harkey soils are located in the floodplain and occasional flooding is the major limitation for campsites, picnic areas and building sites. During high intensity rainstorms, this soil type is flooded by sheet water as much as several inches deep. This brief flash flooding occurs about once every 3 to 8 years. Water erosion is a severe hazard.</p> <p>Limitations for Paths and trails – Glendale-Harkey – severe: erodes easily</p>
Castolon	<ul style="list-style-type: none"> •Construct one fire bay 	<p>Chamberino very gravelly loam, rolling</p> <p>Limitations for shallow excavations – moderate, slope small commercial buildings – severe: slope</p>
Cottonwood Campground	<ul style="list-style-type: none"> •Relocate some campsites farther from the river •Construct new egress road 	<p>Glendale-Harkey association, occasionally flooded; These soils are located in the floodplain and occasional flooding is the major limitation for campsites, picnic areas and building sites.</p> <p>Limitations for – campsites – severe: flooding local roads – Glendale severe: flooding, low strength Harkey, severe: flooding</p>
North Rosillos/ Harte Ranch	<ul style="list-style-type: none"> •Construct interpretive trail at Buttrill Spring •Possibly construct a Rosillos trail 	<p>Area not covered by 1985 soil survey.</p>
Persimmon Gap	None	
Maverick	<ul style="list-style-type: none"> •Construct entrance station at park boundary •Remove existing entrance station 	<p>Vieja-Badland complex, rolling</p> <p>Limitations for Small commercial buildings – Upton, moderate: cemented pan; Nickel, moderate: slope Septic tank absorption fields – severe: depth to rock</p>
Gateway communities	Construct or lease residences and offices (some of the 15% of employees who would be moved would rent or buy their own residences.)	

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