FAR WEST TEXAS WATER PLAN
ERRATA SHEET

1. The highlighted sections of the following tables were changed to coincide with DB07.

   Table 3-1
   Table 3-2
   Table 4-1
   Table 4-3

2. Section 4.4.6, page 4-22, last paragraph was revised to read as follows:

   Proposed importation from Dell City would begin in 2030 (15,000 acre-feet per year), rise to 16,000 acre-feet per year in 2040, rise to 33,000 acre-feet per year in 2050, and reach 50,000 acre-feet per year in 2060.

3. Minor text changes and photos and maps were added to the following appendices.

   Appendix 8B
   Appendix 8C
   Appendix 8D
   Appendix 8E
   Appendix 8F
   Appendix 8G
   Appendix 8H

TABLE 3-1. WATER SUPPLY SOURCE AVAILABILITY (Acre-Feet/Year)

For surface water and groundwater, the largest amount of water that can be diverted or pumped from a given source without violating the most restrictive physical, regulatory, or policy conditions limiting withdrawals, under drought-of-record conditions. All sources are within the Rio Grande Basin.

Water Supply Source	County	2010	2020	2030	2040	2050	2060
Upper Rio Grande	El Paso	66,631	66,631	66,631	66,631	66,631	66,631
	Hudspeth	632	632	632	632	632	632
Upper Rio Grande Return Flows	El Paso	42,134	47,239	47,239	47,239	47,239	47,239
Upper Rio Grande Return Flows	Hudspeth	334	334	334	334	334	334
Lower Rio Grande	Brewster	8,082	8,082	8,082	8,082	8,082	8,082
	Hudspeth	518	518	518	518	518	518
	Presidio	10,853	10,853	10,853	10,853	10,853	10,853
	Terrell	152	152	152	152	152	152
Pecos River	Terrell	524	524	524	524	524	524
Direct Reuse	El Paso	7,387	10,531	13,676	16,820	19,964	23,109
Hueco Bolson	El Paso	130,000	130,000	130,000	130,000	130,000	130,000
	Hudspeth	1,000	1,000	1,000	1,000	1,000	1,000
Mesilla Bolson	El Paso	52,000	52,000	52,000	52,000	52,000	52,000
Edwards-Trinity (Plateau)	Brewster	300	300	300	300	300	300
	Culberson	55	55	55	55	55	55
	Jeff Davis	200	200	200	200	200	200
	Terrell	2,100	2,100	2,100	2,100	2,100	2,100
Bone Spring - Victorio Peak[(a)]	Hudspeth	63,000	63,000	63,000	63,000	63,000	63,000
Capitan Reef (Diablo Farms)	Brewster	50	50	50	50	50	50
	Culberson	20,000	20,000	20,000	20,000	20,000	20,000
	Hudspeth	5,100	5,100	5,100	5,100	5,100	5,100

TABLE 3-1. WATER SUPPLY SOURCE AVAILABILITY (Acre-Feet/Year)

For surface water and groundwater, the largest amount of water that can be diverted or pumped from a given source without violating the most restrictive physical, regulatory, or policy conditions limiting withdrawals, under drought-of-record conditions. All sources are within the Rio Grande Basin.

Water Supply Source	County	2010	2020	2030	2040	2050	2060
Igneous	Brewster	5,000	5,000	5,000	5,000	5,000	5,000
	Culberson	100	100	100	100	100	100
	Jeff Davis	3,000	3,000	3,000	3,000	3,000	3,000
	Presidio	6,500	6,500	6,500	6,500	6,500	6,500
Marathon	Brewster	200	200	200	200	200	200
Rustler	Culberson	1,000	1,000	1,000	1,000	1,000	1,000
West Texas Bolson Red Light Draw	Hudspeth	50	50	50	50	50	50
West Texas Bolson (Eagle Flat)	Hudspeth	50	50	50	50	50	50
West Texas Bolson (Green River Valley)	Hudspeth	75	75	75	75	75	75
	Jeff Davis	75	75	75	75	75	75
	Presidio	75	75	75	75	75	75
West Texas Bolson (Presidio-Redford)	Presidio	6,000	6,000	6,000	6,000	6,000	6,000
West Texas Bolson (Salt Basin)	Culberson	38,000	38,000	38,000	38,000	38,000	38,000
	Jeff Davis	8,000	8,000	8,000	8,000	8,000	8,000
	Presidio	10,000	10,000	10,000	10,000	10,000	10,000
Other Aquifers (Cretaceous Limestones)	Brewster	2,200	2,200	2,200	2,200	2,200	2,200
Other Aquifers (Diablo Plateau)[(b)]	Hudspeth	1,600	1,600	1,600	1,600	1,600	1,600
Other Aquifers (Rio Grande Alluvium)	Hudspeth	15,000	15,000	15,000	15,000	15,000	15,000
Other Aquifers (Balmorhea Alluvium)	Jeff Davis	500	500	500	500	500	500
Other Aquifers	Presidio	300	300	300	300	300	300
Other Aquifers (Rio Grande Alluvium)	El Paso	80,066	80,066	80,066	80,066	80,066	80,066

(a) Bone Spring-Victorio Peak aquifer is the portion of the Diablo Plateau that lies within the HCUWCD#1 management boundary.

(b) Other Aquifer (Diablo Plateau) is the portion of the Diablo Plateau that lies outside the HCUWCD#1 management

TABLE 3-2. WATER USER GROUP WATER SUPPLY CAPACITY (Acre-Feet/Year)

Water supply capacity based on current infrastructure, existing contracts, and source supply availability under drought-of-record conditions.

County	Water User Group	Supply Source Name	Infrastructure Capacity per Source	Total Infrastructure Capacity					
				2010	2020	2030	2040	2050	2060
HUDSPETH	SIERRA BLANCA	West Texas Bolson (Salt Basin)	351	351	351	351	351	351	351
	COUNTY OTHER	Hueco Bolson	241	412	412	412	412	412	412
		Bone Spring -Victorio Peak	126						
		Other Aquifer	45						
	MANUFACTURING	Other Aquifer	10	10	10	10	10	10	10
	MINING	Other Aquifer	2	2	2	2	2	2	2
	IRRIGATION	Bone Spring -Victorio Peak	62,843	83,993	83,993	83,993	83,993	83,993	83,993
		Capitan Reef	5,000						
		Other Aquifer (Rio Grande Alluvium)	15,000						
		Upper Rio Grande	298						
		Lower Rio Grande	518						
		Indirect Reuse (return flow)	334						
	LIVESTOCK	Hueco Bolson	88	626	626	626	626	626	626
		Bone Spring -Victorio Peak	31						
		Other Aquifer	438						
		Capitan Reef	12						
		West Texas Bolson (Red Light Draw, Eagle Flat and Green River Valley)	57						
JEFF DAVIS	FORT DAVIS	Igneous	912	912	912	912	912	912	912
	COUNTY OTHER	Igneous	151	162	162	162	162	162	162
		West Texas Bolson (Salt Basin)	8						
		Edwards-Trinity (Plateau)	3						
	IRRIGATION	Igneous	735	3,307	3,307	3,307	3,307	3,307	3,307
		West Texas Bolson (Salt Basin)	2,572						
	LIVESTOCK	Igneous	84	563	563	563	563	563	563
		West Texas Bolson (Salt Basin)	85						
		Edwards-Trinity (Plateau)	141						
		Other Aquifers (Balmorhea Alluvium)	253						

County/ Water Use Category	Supply / Demand	2010	2020	2030	2040	2050	2060
Hudspeth County							
Sierra Blanca	S	351	351	351	351	351	351
	D	123	130	134	132	131	131
		228	**221**	**217**	**219**	**220**	**220**
County- Other	S	412	412	412	412	412	412
	D	287	297	301	288	284	284
		125	**115**	**111**	**124**	**128**	**128**
Manufacturing	S	10	10	10	10	10	10
	D	2	2	2	2	2	2
		8	**8**	**8**	**8**	**8**	**8**
Mining	S	2	2	2	2	2	2
	D	1	1	1	1	1	1
		1	**1**	**1**	**1**	**1**	**1**
Irrigation	S	83,993	83,993	83,993	83,993	83,993	83,993
	D	182,627	178,840	175,132	171,501	167,945	164,463
		-98,634	**-94,847**	**-91,139**	**-87,508**	**-83,952**	**-80,470**
Livestock	S	626	626	626	626	626	626
	D	613	613	613	613	613	613
		13	**13**	**13**	**13**	**13**	**13**
Jeff Davis County							
Fort Davis	S	912	912	912	912	912	912
	D	366	398	433	427	425	425
		546	**514**	**479**	**485**	**487**	**487**
County- Other	S	162	162	162	162	162	162
	D	162	159	155	151	150	150
		0	**3**	**7**	**11**	**12**	**12**
Irrigation	S	3,307	3,307	3,307	3,307	3,307	3,307
	D	576	572	569	566	563	559
		2,731	**2,735**	**2,738**	**2,741**	**2,744**	**2,748**
Livestock	S	563	563	563	563	563	563
	D	508	508	508	508	508	508
		55	**55**	**55**	**55**	**55**	**55**
Presidio County							
Marfa	S	4,839	4,839	4,839	4,839	4,839	4,839
	D	886	969	1,060	1,049	1,042	1,042
		3,953	**3,870**	**3,779**	**3,790**	**3,797**	**3,797**
Presidio	S	3,419	3,419	3,419	3,419	3,419	3,419
	D	1,039	1,255	1,458	1,642	1,727	1,781
		2,380	**2,164**	**1,961**	**1,777**	**1,692**	**1,638**
County- Other	S	94	94	94	94	94	94
	D	81	66	52	42	37	34
		13	**28**	**42**	**52**	**57**	**60**
Mining	S	10	10	10	10	10	10
	D	7	7	7	7	7	7
		3	**3**	**3**	**3**	**3**	**3**
Irrigation	S	16,522	16,522	16,522	16,522	16,522	16,522
	D	20,068	19,670	19,279	18,896	18,521	18,154
		-3,546	**-3,148**	**-2,757**	**-2,374**	**-1,999**	**-1,632**
Livestock	S	646	646	646	646	646	646
	D	622	622	622	622	622	622
		24	**24**	**24**	**24**	**24**	**24**

TABLE 4-3. SUMMARY OF WATER MANAGEMENT STRATEGY COST

(Cost in US Dollars)

Water User Group	County Used	Strategy	Supply Deficit (Acre-Feet/Year)						Total Capital Cost	O&M Cost/Year						Cost per Acre-Foot/Year					
			2010	2020	2030	2040	2050	2060		2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
City of El Paso	El Paso	IWMS - Reuse	2,387	5,531	8,676	11,820	14,964	18,109	$45,842,000	$3,999,500	$3,999,500	$5,504,250	$4,660,000	$4,660,000	$4,043,000	$1,676	$723	$634	$394	$311	$223
City of El Paso	El Paso	IWMS - Conservation	29,359	29,148	26,279	24,100	22,837	23,437	NA	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$136	$137	$152	$166	$175	$171
City of El Paso	El Paso	IWMS - Conjunctive use with additional surface water		10,000	15,000	20,000	20,000	20,000	$103,494,000		$13,174,000	$13,174,000	$13,174,000	$5,655,000	$5,655,000		$1,317	$878	$659	$283	$283
City of El Paso	El Paso	IWMS - Import from Diablo Farms				10,000	10,000	10,000	$23,113,000				$3,533,000	$3,533,000	$3,533,000				$353	$353	$353
City of El Paso	El Paso	IWMS - Import from Dell Valley			16,000	16,000	33,000	50,000	$502,743,000			$31,517,000	$31,517,000	$44,370,000	$31,424,000			$1,970	$1,970	$1,345	$628
Homestead MUD****	El Paso	Purchase water from EPWU	194	421	610	775	950	1,124	$0	$73,332	$159,138	$230,580	$292,950	$359,100	$424,872	$378	$378	$378	$378	$378	$378
Horizon Regional MUD *	El Paso	Additional 2 wells					665	2,146	$1,000,000					$5,000	$10,000					$8	$5
Lower Valley WD****	El Paso	Purchase water from EPWU	631	1,236	1,792	2,235	2,709	3,182	$0	$210,123	$411,588	$596,736	$744,255	$902,097	$1,059,606	$333	$333	$333	$333	$333	$333
San Elizario****	El Paso	Purchase water from LVWD	823	1,757	2,617	3,304	4,037	4,770	$0	$274,059	$585,081	$871,461	$1,100,232	$1,344,321	$1,588,410	$333	$333	$333	$333	$333	$333
Socorro****	El Paso	Purchase water from LVWD	374	881	1,392	1,776	2,210	2,645	$0	$124,542	$293,373	$463,536	$591,408	$735,930	$880,785	$333	$333	$333	$333	$333	$333
El Paso County Tornillo WID *	El Paso	Additional 1 well				62	284	505	$500,000				$5,000	$5,000	$5,000				$81	$18	$10
Vinton****	El Paso	Purchase water from EPWU	189	404	588	752	916	1,081	$0	$335,664	$717,504	$1,044,288	$1,335,552	$1,626,816	$1,919,856	$776	$776	$776	$776	$776	$776
County Other**	El Paso	Additional Small-MUD wells	2,075	4,385	6,242	7,682	9,138	10,832	$6,750,000	$13,000	$27,500	$39,000	$48,000	$57,000	$67,500	$6	$6	$6	$6	$6	$6
County Other***	El Paso	Additional domestic wells	519	1,096	1,561	1,920	2,284	2,708	$5,416,000	$13,000	$27,400	$39,000	$48,000	$57,100	$67,700	$25	$25	$25	$25	$25	$25
Manufacturing****	El Paso	Purchase water from EPWU	1,436	2,249	2,947	3,622	4,196	5,110	$0	$1,685,864	$2,640,326	$3,459,778	$4,252,228	$4,926,104	$5,999,140	$1,174	$1,174	$1,174	$1,174	$1,174	$1,174
Steam Electric Power****	El Paso	Purchase water from EPWU	169	3,975	5,149	6,579	8,322	10,448	$0	$80,106	$1,884,150	$2,438,730	$3,118,446	$3,944,628	$4,952,352	$474	$474	$474	$474	$474	$474
Irrigation	El Paso	Agricultural irrigation BMPs	See Table 4-5																		
Irrigation	Hudspeth	Agricultural irrigation BMPs																			
Irrigation	Presidio	Agricultural irrigation BMPs																			

IWMS = Integrated Water Management Strategy

* Municipal water well cost:
- Capital cost per well = $500,000
- Annual O&M = $5,000
- Well yield = 700gpm
- Cost per ac-ft assumes no additional distribution cost

**Small MUD water well cost:
- Capital cost per well = $50,000
- Annual O&M = $500
- Well yield = 200gpm
- Cost per ac-ft assumes no additional distribution cost

***Domestic water well cost:
- Capital cost per well = $8,000
- Annual O&M = $100
- Well yield = 20gpm
- Cost per ac-ft assumes no additional distribution cost

**** EPWU contract sales price per acre-foot
- O&M included in contracted price

year proposed under the preferred strategy, about 17,900 acres of land with validation permits would be needed under a full allocation scenario, and about 23,800 acres of land with validation permits would be required under a reduced allocation.

Concentrations of iron, chloride, nitrate, sulfate, and aluminum exceed water quality standards for municipal supply. Total dissolved solids in the area range from 1,810 to 3,900 mg/l. Desalination would be required before distribution for municipal use.

Proposed importation from Dell City would begin in 2030 (15,000 acre-feet per year), rise to 16,000 acre-feet per year in 2040, rise to 33,000 acre-feet per year in 2050, and reach 50,000 acre-feet per year in 2060.

4.4.7 Environmental Impacts

Conjunctive Use of Rio Grande and Local Groundwater

Additional use from the Rio Grande would have no major environmental impact on streamflow regime or flow frequencies, as water is available through a conversion of exiting diversion. Additional local groundwater use from the Hueco and Mesilla Bolson aquifers would use existing infrastructure where possible and minimize new environmental impact. New groundwater wells are proposed to replace existing wells with declining production and to provide additional capacity.

Capitan Reef Aquifer

The drilling of new wells and trenching of pipeline routes will disturb a small percentage of the land surface, thus causing a minor amount of environmental impact. The pipeline may be routed to avoid environmentally sensitive areas. The conversion of cultivated land associated with the well field to native rangeland may benefit some species, however; the loss of a food source (grain crops, etc.) may be detrimental to other species.

Bone Spring-Victorio Peak Aquifer (Dell City Area)

As with the Capitan Reef aquifer above, the drilling of new wells and trenching of pipeline routes will disturb a small percentage of the land surface, thus causing a minor

APPENDIX 8B

RIO GRANDE

WILD AND SCENIC RIVER

APPENDIX 8B
RIO GRANDE WILD AND SCENIC RIVER

The Rio Grande/Rio Bravo in Far West Texas is truly a national treasure with unique ecological and economic features. The Far West Texas Regional Water Planning Group recognizes the significance of the 196-mile Rio Grande Wild and Scenic River segment and encourages the proper conservative management of this region. The upper 69-mile section of this corridor lies within the Big Bend National Park, however the National Park Service administers the entire 196-mile designated section. For purposes of the Far West Texas Regional Water Plan, the Planning Group officially recommends that only the part of the federally designated Rio Grande that is bordered by the Big Bend National Park be considered under the guidelines of "Ecologically Unique River and Stream Segments". The following river segment characterization is principally contained with the National Parks Service / Rio Grande Wild and Scenic River Final General Management Plan and Environmental Impact Statement (http://www.nps.gov/rigr/pphtml/documents.html) and the Big Bend National Park / Rio Grande Wild and Scenic River web site (http://www.nps.gov/bibe/rgwsr.htm).

In 1978, Congress designated a 196-mile segment of the Rio Grande a National Wild and Scenic River (Figure 8.1). The Wild and Scenic River Act of 1968 directs that the designated rivers "… be preserved in free-flowing condition, and that they and their immediate environments be protected for the benefit and enjoyment of the present and future generations." Only 2% of America's rivers are "free flowing" and qualify for this designation. The Rio Grande Wild and Scenic River was designated for the following purposes:

- *To preserve the free-flowing condition and essentially primitive character of the river (except as provided by treaty)*
- *To protect the outstanding scenic, geologic, fish and wildlife, recreational, scientific, and other similar values of the river and its immediate environment*
- *To provide opportunities for river-oriented recreation that is dependent upon the free-flowing condition of the river and consistent with the primitive character of the surroundings.*

The Rio Grande Wild and Scenic River is significant as part of a valuable and largely intact ecological system representing major riparian and aquatic habitat associated with the Chihuahuan Desert. Spectacular river canyons, the primitive character of the river, and its international flavor combine to form a stimulating environment for high quality scenic and recreational experience. Protecting and managing this outstanding natural resource extends a valuable opportunity for international cooperation between the United States and Mexico.

Location

Under the Wild and Scenic River Act (16 USC 28 §1274), the following segment is designated:

The segment on the United States side of the river from river mile 842.3 above Mariscal Canyon downstream to river mile 641.1 at the Terrell-Val Verde County line,…
The International Boundary and Water Commission later revised the beginning and ending river miles to 853.2 and 657.5 respectively. The southern side of the river is not designated because it is owned by Mexico.

The designated Wild and Scenic stretch of the Rio Grande begins in Big Bend National Park, opposite the boundary between the Mexican states of Chihuahua and Coahuila. It then flows through Mariscal and Boquillas Canyons in the national park. Downstream from the park, it extends along the state-managed Black Gap Wildlife

Management Area and several parcels of private land in the Lower Canyons. The wild and scenic river segment ends at the county line between Terrell and Val Verde Counties. There are plans to introduce legislation that will extend the Wild and Scenic designation to the western National Parks boundary, extending the total distance by approximately 65 miles.

The National Park Service's jurisdiction on the Rio Grande Wild and Scenic River downstream from the park boundary includes only the river area from the United States/Mexico international boundary in the middle of the deepest channel to the gradient boundary at the edge of the river on the United States side. The gradient boundary, as recognized by the State of Texas, is defined as located midway between the lower level of the flowing water that just reaches the cut bank and the higher level of it that just does not overtop the cut bank. The riverbed of the Wild and Scenic River downstream from the park is the property of the State of Texas.

The stretch of river is classified as either wild or scenic. Wild sections are defines as "…those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watershed or shorelines essentially primitive and water unpolluted…these represent vestiges of primitive America…" Scenic sections pertain to "…those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds largely primitive and shorelines largely undeveloped, but accessible in places by roads…"

The following sections are classified as wild: Talley to Solis, which includes Mariscal Canyon; the entrance to Boquillas Canyon to the exit of Boquillas Canyon; and Reagan Canyon to San Francisco Canyon (the bulk of the "Lower Canyons"). The remainder of the Wild and Scenic River is classified as scenic.

Natural Resources

Scenic Value

The area encompassing the designated Rio Grade Wild and Scenic River contains views of the river and surrounding canyons with outstanding visual quality. Rugged, steep-walled canyons, scenic rapids, and unspoiled views contribute to the river and its surroundings, are important values for river visitors.

Geologic Features

Rock layers exposed by the Rio Grande were deposited about 100 million years ago. Subsequent uplifting, folding, faulting, and cutting of the river have produced the present topography. Near its upstream end, the Rio Grande has sliced through the surrounding rocks to form steep-walled, sometimes narrow canyons. Downstream from Boquillas Canyon, the river flows across a relatively broad and open floodplain, or *vega*. Near Reagan Canyon, the floodplain narrows abruptly, and the river flows in a continuous deeply cut canyon for almost 40 miles. In the Lower Canyons portion of this segment, the river and its tributaries lie 500 to 1,500 feet below the surrounding plateaus.

Fish and Wildlife

The area is an outstanding example of Chihuahuan Desert wildlife in Texas. This isolated area represents a rapidly dwindling, irreplaceable natural resource. The riparian corridor, containing more vegetative growth and a reliable water supply, attracts many wildlife species.

Forty-six known species of fish inhabit the Big Bend area; 34 of these are native. Shiners and daces are the most abundant fishes in the Rio Grande. Larger fish found here are the long-nose gar, channel catfish, blue catfish, and European carp. Six native fish species have been extirpated in recent decades because of the effects of dams, habitat modification, and competition from introduced species.

Numerous wildlife species are residents of the river corridor, and many others, especially birds, use the Rio Grande as a travel corridor. Mammals include skunks, rodents, squirrels, rabbits, raccoons, and ringtails. Mountain lions (locally called panthers) occupy the area, and black bears and desert bighorn sheep occasionally can be seen.

Birds are the most frequently seen animals along the river. Common resident species seen or heard along the river include yellow-breasted chat, black phoebe, white-winged dove, canyon wren, and roadrunner. Ravens, turkey vultures, and various raptors regularly soar overhead. Peregrine falcons (*Falco peregrinus*) use high cliff faces for nesting in Santa Elena, Mariscal, and Boquillas canyons. Reptiles include lizards, snakes, and both terrestrial and aquatic turtles. Several amphibian species also are present.

Native freshwater mussels have virtually disappeared from this area. Some historic species no longer can be found, and the more persistent Texas hornshell and Salina Mucket have not been found alive in recent years. Other aquatic species may be in danger of extirpation. Reductions in water quality and quantity adversely affect these and other aquatic species.

Many exotic or nonnative species are found in the Rio Grande. Twelve nonnative fish species compete with the remaining native species. Nutria, a large nonnative rodent, is no common, and the exotic Asian clam is abundant. At present there is insufficient information about the distribution and spread of exotic species.

Special Status Species

The following federally listed species may be found in the river corridor.

Fishes. The endangered ***Big Bend gambusia*** *(Gambusia gaigeii)* is known only from spring habitats near Boquillas Crossing and Rio Grande Village in Big Bend National Park, within the management area of the river. The population of this fish species at Boquillas Spring died when the spring stopped flowing in 1954. The population near Rio Grande Village drastically declined between 1954 and 1956, after the spring flow was altered to provide a fishing pool. By 1960, the Big Bend gambusia no longer could be found at the Rio

Grande Village location. The loss of this population probably was due to competition with the western mosquitofish and predation by the introduced green sunfish. All the present populations of the Big Bend gambusia are descendants of two males and one female taken from the declining Rio Grande Village population in 1956. The only known wild population exists in a protected pond in Big Bend national Park (Texas Parks and Wildlife Department Web site). A recovery plan is in effect for this species that calls for its reintroduction (USFWS 1984).

Other fish species of concern are as follows: Chihuahua shiners are know in the United States only in the park, where they inhabit the lower reaches of Tornillo and Terlingua Creeks. The Mexican stoneroller fish, the blue sucker, and the Conchos pupfish also are found in the area.

Black-Capped Vireos. Endangered ***black-capped vireos*** *(Vireo atricapillus)* nest in Texas during April through July and spend the winter on the western coast of Mexico. Their habitat is primarily rangelands with scattered clumps of shrubs separated by open grassland. They nest in shrubs such as hennery oak or sumac. They may occasionally use the river corridor. This species' listing as endangered is due to the dwindling population numbers from nesting habitat loss and cowbird parasitism.

Cactus Species. The threatened **bunched cory cactus** *(Coryphantha ramillosa)* is found on slopes and ledges of sparsely vegetated limestone rock outcrops (most commonly of the Boquillas or Santa Elena Formations) in the lechuguilla shrublands in Big Bend national Park and on large private ranches. This species is known from about 25 sites in southern Brewster County, many in Big Bend National Park. It also can be found in northern Coahuila, Mexico.

The ***Chisos Mountains hedgehog cactus*** *(Echinocereus chisoenis* var. *chisoenis)*, also a threatened species, is known to occur in the river corridor. These cacti are found in low elevation desert grasslands or sparsely vegetated shrublands on gravelly flats and terraces in the Chihuahuan Desert. This species is known from about a dozen sites, all in Big Bend national Park. No federally designated critical habitat for this species exists in Terrell or Brewster County.

Vegetation

The Chihuahuan Desert, through which the Rio Grande Wild and Scenic River flows, exhibits a great diversity of vegetation types, which have been categorized according to topography. The vegetation adjacent to the river is adapted to flooding and wet soils. Willows, canes, reeds, seepwillows, acacias, and grasses are the major components of this association. Upslope, the vegetation becomes more desertlike, with lechugilla, blackbrush, catclaw acacia, candelilla, saltbush, mesquite, creosote bush, chino grama, and a variety of cacti predominating. Cracks in the cliff walls harbor a distinctive plan community of candelilla, rock nettle, and poison ivy.

The riparian zone varies from narrow intra-canyon banks to floodplains more than 0.5 mile wide. Early reports indicated that lance-leaf cottonwoods and willows were common, but by the early 1900s most of the trees had been harvested for use in mining operations, and their seedlings rarely survived grazing.

Tamarisk, giant river cane, Bermuda grass, and other invasive plant species have become established along the Rio Grande. In some places these exotic species have forced out native vegetation and form an impassable thicket.

Cultural Resources

The canyons and valleys of the Rio Grande have been a homeland to people for many centuries. The area contains a number of prehistoric and historic cultural resources that supply limited views into the lifestyle of various cultures over the last 10,500 years. Many sites along the wild and scenic river are undisturbed, which enhances their scientific value. Reconnaissance surveys have located a significant number of prehistoric sites on both sides of the river. These sites, which represent occupation and exploration activities by the prehistoric inhabitants, are found in caves, rock shelters, terraces, talus slopes, and canyon rims.

Throughout the prehistoric period, people found shelter and maintained open campsites throughout what is now Big Bend National Park. Archeological records reveal an Archaic-period desert culture whose inhabitants developed a nomadic hunting and gathering lifestyle that remained virtually unchanged for several thousand years. American Indian cultures represented are the Chisos, Mescalero Apache, Kickapoo, and Comanche. Sites containing ceramic artifacts suggest that some later indigenous peoples had a semisedentary lifestyle and practiced limited agriculture along the river.

The historic period began in 1535 with the explorations of Alvar Nuñez Cabeza de Vaca in the Texas Trans-Pecos region. During the late 1700s, Spanish presidios were established along the Rio Grande at San Vicente, Coahuila, and along the San Carlos River at San Carlos, Chihuahua.

Control of the area was passed to the United States after the Mexican-American War (1846-1848). A series of army posts was established along the Rio Grande in an attempt to stop Comanche and Apache raids. The first accurate maps of the Rio Grande canyon areas were completed by Army topographic engineers and the United States-Mexico Boundary Commission in the 1850s. Around that time, a wagon road was established to link San Antonio and El Paso. The road tied the region into the trade network that stretched from California to the Gulf of Mexico.

Grazing history along the Rio Grande dates back to the early Spanish missions established between 1670 and 1690. These missions had become major centers of livestock concentration by 1700.

Hispanic settlements existed near the Rio Grande in 1805. Mexicans farmed and ranched the area throughout the 1800s. Beginning in the 1880s, Anglo-Americans established ranches throughout the area and began farming in the early 20th century. Some farmers and ranchers left the area for a short hiatus during the Mexican Revolution. Cotton and food crops were grown around Castolon and what is now Rio Grande Village even after Big Bend National Park was established in 1944.

Quicksilver (mercury) was discovered in the area in the late 19th century, and later finds of silver and fluorite attracted hundreds of miners and prospectors. A unique facet of the continuing Rio Grande history is the use of the candelilla plant to produce high-quality wax. This wax has been used in the manufacture of candles, waxes, gum, and phonograph records.

Sites of historical interest in the Lower Canyons are an abandoned candelilla operation, the Asa Jones Waterworks, Dryden Crossing, and Burro Bluff, the site of an old trail built by cattlemen for access to the Texas side of the river.

A review of the National Register of Historic Places reveals that four sites that are listed in the national register are in the river corridor in Big Bend National Park: Sublett Farm, Daniels Farm, the Castolon Historic District, and the Hot Springs District

The Texas Historical Commission conducted a reconnaissance survey of the river corridor from La Linda to Dryden Crossing in the 1970s (Mallouf and Tunnel 1977). The researchers recorded 83 prehistoric sites and 5 historic sites on that survey. Some of those are on the Mexican side of the river. The sites represented human occupation and use of the river area throughout the last 12,000 years. The potential for evidence of Paleo-Indian occupation exists in some of the more protected cave and rock shelter sites. Because they are on nonfederal land, no determination has been made about the eligibility of the prehistoric or historic sites in the Lower Canyons for the National Register of Historic Places.

Resource Concerns

Diminishing flows in the Rio Grande is an international, national, and regional concern. This concern is heightened by declining water quality and the presence of invasive species.

The Rio Grande, one of the longest rivers in the United States, is no longer a naturally flowing river along its entire length. Extensive diversion networks and dams control flows on the river to provide water for a variety of human needs. The high flows and periodic floods necessary to maintain the river channels have been reduced by 75% in the Rio Grande below El Paso and by 50% on the Rio Conchos over the years. Reduced flows below Fort Quitman have resulted in a long stretch of the river with no defined channel, and the river in that area has become a tamarisk thicket. The amount of water that reaches Big Bend National Park and the Wild and Scenic River has been reduced by more than half the historic level. Spring inflows and unregulated tributaries increase the average annual streamflow in the reaches of the Wild and Scenic River.

Current water quality in the Rio Grande is mitigated and freshened by groundwater (springs) inflows from the Langford Hot Springs Complex in Big Bend National Park and the Lower Canyon Thermal Springs Complex downstream. *(See additional discussion pertaining to these spring complexes in the "Major Springs" Section of Chapter 1)* The role of these springs in controlling water quality is so important that in discussions with the Texas Commission on Water Quality, it is recognized that water quality in the entire segment would not meet standards for recreational use or fish consumption without groundwater contributions from several spring systems.

The Rio Grande Wild and Scenic River has lost five species of fish and possibly could lose mussel species and a turtle. Inadequate river flows are compromising aquatic and terrestrial species and associated habitats. The Rio Grande corridor serves as important habitat for several state and federally listed threatened and endangered species. The river corridor could provide sufficient habitat to reintroduce or strengthen critical species.

Invasive or introduced species such as tamarisk (salt cedar) and nutria have been observed along the river corridor. There is concern about ways to control these species and the impact they could have on native plants and wildlife.

Cooperative Efforts

Big Bend National Park and the Rio Grande Wild and Scenic River have undertaken several tasks to define, protect, and better manage water resources. In partnership with the Comisión Nacional de Áreas Naturales Protegida, the World Wildlife Fund, the Rio Grande Institute, and Texas Parks and Wildlife, the Park is restoring the mouth of Boquillas Canyon by eradicating invasive species and planting natives. With projects such as this, a valuable opportunity exists for binational cooperation between the United States and Mexico to protect and manage this outstanding primitive resource.

SELECTED REFERENCES

Mallouf, Robert, and Curtis Tunnel, 1977, *An Archeological Reconnaissance in the Lower Canyons of the Rio Grande.* Austin, TX: Office of the State Archeologist, Texas Historical Commission. Archeological Survey Report 22.

Maxwell, R.A., 1968 (reprinted 2001), The Big Bend of the Rio Grande, A Guide to the Rocks, Landscape, Geologic History, and Settlers of the Area of Big Bend National Park: The University of Texas at Austin, Bureau of Economic Geology, Guidebook GB0007, 138 p.

National Park Service, U.S. Department of the Interior:

N.d., "Director's Order 13: Environmental Leadership." (draft in preparation)

N.d., NPS-77: *Natural Resource management Guidelines.*

1980, *Environmental Assessment/General Development Plan: Rio Grande Wild and Scenic River, Texas.* Denver, CO.

1981, *Draft General Management Plan/Development Concept Plan: Rio Grande Wild and Scenic River, Texas.* Denver, CO.

1982, *National Wild and Scenic Rivers System: Final Revised Guidelines for Eligibility, Classification, and Management of River Areas.* Washington, D.C.: *Federal Register,* vol. 41, no. 173:39454-39461.

1984, *Final Environmental Impact Statement: Proposed Wilderness Classification, Big Bend National Park, Texas.*

1997, *Recreational River Use Management Plan: Big Bend national Park,* Big Bend, TX.

1998a, Director's Order 28, *Cultural Resource Management Guideline*, Washington, D.C.

1998b, Director's Order 2, *Park Planning.* Washington, D.C.

1988c, Director's Order 77.1, *Wetland Protection.* Washington, D.C.

2000, Director's Order 47, *Soundscape Preservation and Noise Management.* Washington, D.C.

2001a, Director's Order 12, *Conservation Planning and Environmental Impact Analysis.* Washington, D.C.

2001b, *Management Policies 2001*. Washington, D.C.

2004a, *General Management Plan, Big Bend National Park*. Denver, CO.

2004b, *Money Generation Model for Parks.* Denver, CO: NPS Public Use Statistics Office.

U.S. Environmental Protection Agency, 1998, *Environmental Justice Guidance. An Archeological Reconnaissance in the Lower Canyons of the Rio Grande*. Austin, TX: Office of the State Archeologist, Texas Historical Commission, Archeological Survey Report 22.

U.S. Fish and Wildlife Service, U.S. Department of the Interior, 1984, *Recovery plan for Big Bend Gambusia* (Gambusia gaigeii, Hubbs 1929). Prepared by Rio Grande Fishes Recovery Team.

National Park Service, U.S. Dept. of Interior, 2003

RIO GRANDE WILD AND SCENIC RIVER

LBG-GUYTON ASSOCIATES

NPS Photo

NPS Photo

Rio Grande - Mariscal Canyon
Big Bend National Park

NPS Photo

NPS Photo

Rio Grande - Santa Elena Canyon
Big Bend National Park

APPENDIX 8C

MCKITTRICK CANYON STREAM

CHOZA CREEK

(GUADALUPE MOUNTAINS NATIONAL PARK)

APPENDIX 8C

McKittrick Canyon Stream (Guadalupe Mountains National Park)

McKittrick Canyon stream consists of two headward branches in North and South McKittrick Canyon and a downstream reach formed by coalescing of the two headward branches. Both headward segments are fed by unnamed springs and the South McKittrick branch gains springwater at several points along its course. McKittrick Canyon stream is by far the largest of a very small number of perennially flowing streams in the Guadalupe Mountains in Texas and New Mexico. It supports substantial numbers and species of wildlife, as well as a riparian zone at the bottom of a steep canyon ranging up to 2000 feet deep. During the fall, scenic canyon walls are a backdrop to displays of brilliantly colored Bigtooth maples. The canyon is the only known habitat for an isolated population of a moss, *Venturiella sinensis* var. *angustiannulata,* whose closest relatives occur in China and within a small refugium in Oklahoma. Several areas in the canyon are breeding habitat for the Mexican Spotted Owl (*Strix occidentalis lucida*), officially list as a USF&WS Threatened species. There is one known nesting site for the recently de-listed Peregrine Falcon (*Falco peregrinus*) in the canyon cliffs. The headward branches flow through two areas officially designated as Research Natural Areas. The stream recharges an alluvial aquifer restricted to the canyon bottom, which supplies public drinking water at two park facilities.

North Branch - Guadalupe Peak 7 ½ min. Quadrangle

The flowing portion of the stream heads at a spring only a short distance into New Mexico and crosses into Texas three times. The state lines are also the boundaries between Guadalupe Mountains National Park and the Lincoln National Forest. The westernmost crossing into Texas occurs at:

UTM Coordinate N	3540258	Zone 13, Projection: NAD 1927 Conus
UTM Coordinate E	518792	

Continuing downstream generally southeast to the point where the northern branch joins the southern branch at:

UTM Coordinate N 3538348
UTM Coordinate E 520800

South Branch - Guadalupe Peak 7 ½ min. Quadrangle

The flowing part of the stream heads at a spring near:

UTM Coordinate N 3536021
UTM Coordinate E 518782

and continues to the junction with the north branch noted above.

Main Branch - Guadalupe Peak 7 ½ min. Quadrangle

Beginning at the junction noted above and continuing generally eastward to the point where the streambed exits the park at:

UTM Coordinate N 3537890
UTM Coordinate E 523616

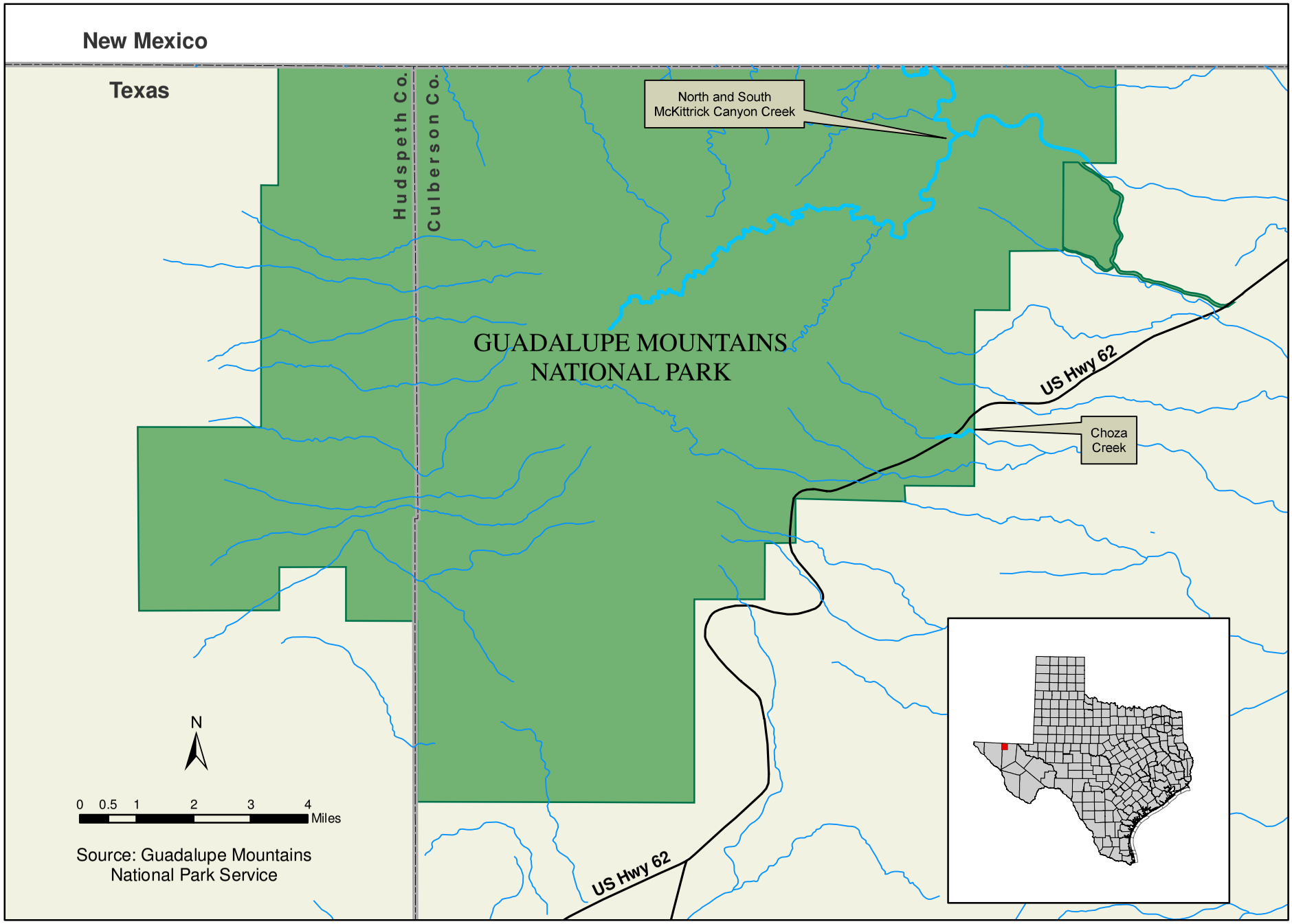
Choza Stream (Guadalupe Mountains National Park)

The Choza Stream heads at Choza Spring and supports a narrow riparian habitat that extends for almost a mile to the southeast. It gains volume at one point immediately north of Highway 62-180 and, in wet years, another diffuse or multiple point area south of that highway. The latter area supports potentially classifiable wetland habitat. The stream provides critical habitat and a vital water source for desert wildlife. The heading spring discharges at:

UTM Coordinate N 3529837 Zone 13, Projection: NAD 1927 Conus
UTM Coordinate E 520309

and the stream exits the park at:

UTM Coordinate N 3529990
UTM Coordinate E 521158



LOCATION OF McKITTRICK CANYON AND CHOZA STREAMS
GUADALUPE MOUNTAINS NATIONAL PARK

LBG-GUYTON ASSOCIATES

McKittrick Canyon – Guadalupe Mountains NPS Photo by George Hosek

Choza Stream Source

Chozas Stream Side Inflow

Choza Stream Lower Reach

Photos courtesy of G. Bell, NPS

CHOZA STREAM

APPENDIX 8D

CIENEGA CREEK

(CHINATI MOUNTAINS STATE NATURAL AREA)

APPENDIX 8D

Cienega Creek (Chinati Mountains State Natural Area)

Cienega Creek flows downstream from the spring-fed spring, La Baviza, in the 38,187-acre Chinati Mountains State Natural Area in west-central Presidio County. The spring (cienega) forms a fresh to slightly saline marsh with waters that are slightly geothermal. The habitat supports a fairly intact, diverse marsh with saline grasses, rushes, sedges, and perennials. A high diversity of desert bats also use the area for feeding and watering. The adjacent Cienega Creek has very good examples of saline marsh and cottonwood gallery woodlands. It is an important wildlife area and is located in the low Chihuahuan Desert where intact wetlands and riparian habitat are quite rare. La Baviza Spring (Cienega) is identified as a "Major Spring" in Chapter 1.

Maps and photos were not available as of the deadline for this planning period. Further detail is available from the Texas Parks and Wildlife Department.

APPENDIX 8E

ALAMITO AND CIENEGA CREEKS

(BIG BEND RANCH STATE PARK)

APPENDIX 8E

Alamito and Cienega Creeks (Big Bend Ranch State Park)

Alamito Creek extends from its confluence with the Rio Grande upstream to the FM 169 crossing in Presidio County. Cienega Creek extends from its confluence with Alamito Creek upstream to its headwaters also in Presidio County. Springs on private property north of the Big Bend Ranch Park form the headwaters of both creeks. The Far West Texas Water Planning Group recommends that only those stretches of these streams that lie within the boundaries of Big Bend State Park be considered as "Ecologically Unique River and Stream Segments".

Alamito Creek is recognized as a high quality ecoregional stream with exceptional aquatic life and high aesthetic value. The stream contains a diverse benthic community of macroinvertebrates and fishes (Bayer et al., 1992; Linam et al., 1999). Unique communities of threatened or endangered species include: Concho pupfish (Fed. SOS/St. T), Chihuahua shiner (Fed. SOC/St. T), Mexican stoneroller (Fed. SOC/St. T) (Bayer et al., 1992).

Cienega Creek is an intact desert spring ecosystem displaying overall habitat value (D. Riskind, 1999, pers. comm.). Unique communities of threatened or endangered species include: Big Bend mud turtle (St. E) and various endangered desert fishes (D. Riskind, 1999, pers. comm.).

Maps and photos were not available as of the deadline for this planning period. Further detail is available from the Texas Parks and Wildlife Department.

APPENDIX 8F

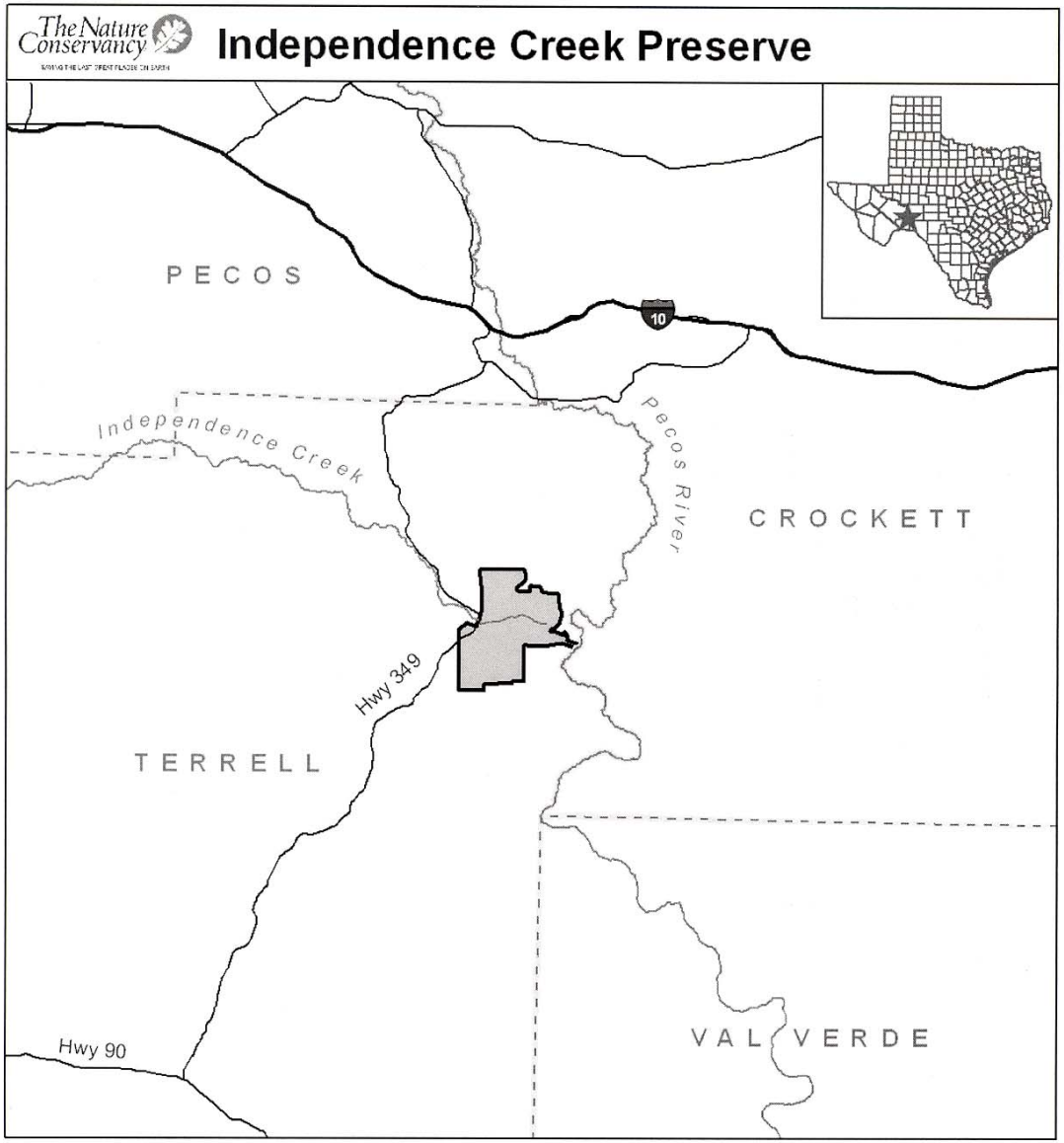
INDEPENDENCE CREEK

(TEXAS NATURE CONSERVANCY PRESERVE)

APPENDIX 8F

Independence Creek (Texas Nature Conservancy Preserve)

The Texas Nature Conservancy's Independence Creek Preserve is located near the downstream terminus of Independence Creek in northeastern Terrell County. Caroline Spring, located at the Preserve headquarters, produces 3,000 to 5,000 gallons per minute and comprises about 25 percent of the creek's flow. Downstream, Independence Creek's contribution increases the Pecos River water volume by 42 percent and reduces the total dissolved solids by 50 percent, thus improving water quantity and quality. The preserve hosts a variety of bird and fish species, some of which are extremely rare. Caroline Spring, along with the entirety of the Independence Creek Preserve (19,740 acres), is a significant piece of West Texas natural heritage. Caroline Spring is identified as a "Major Spring" in Chapter 1.


The Nature Conservancy
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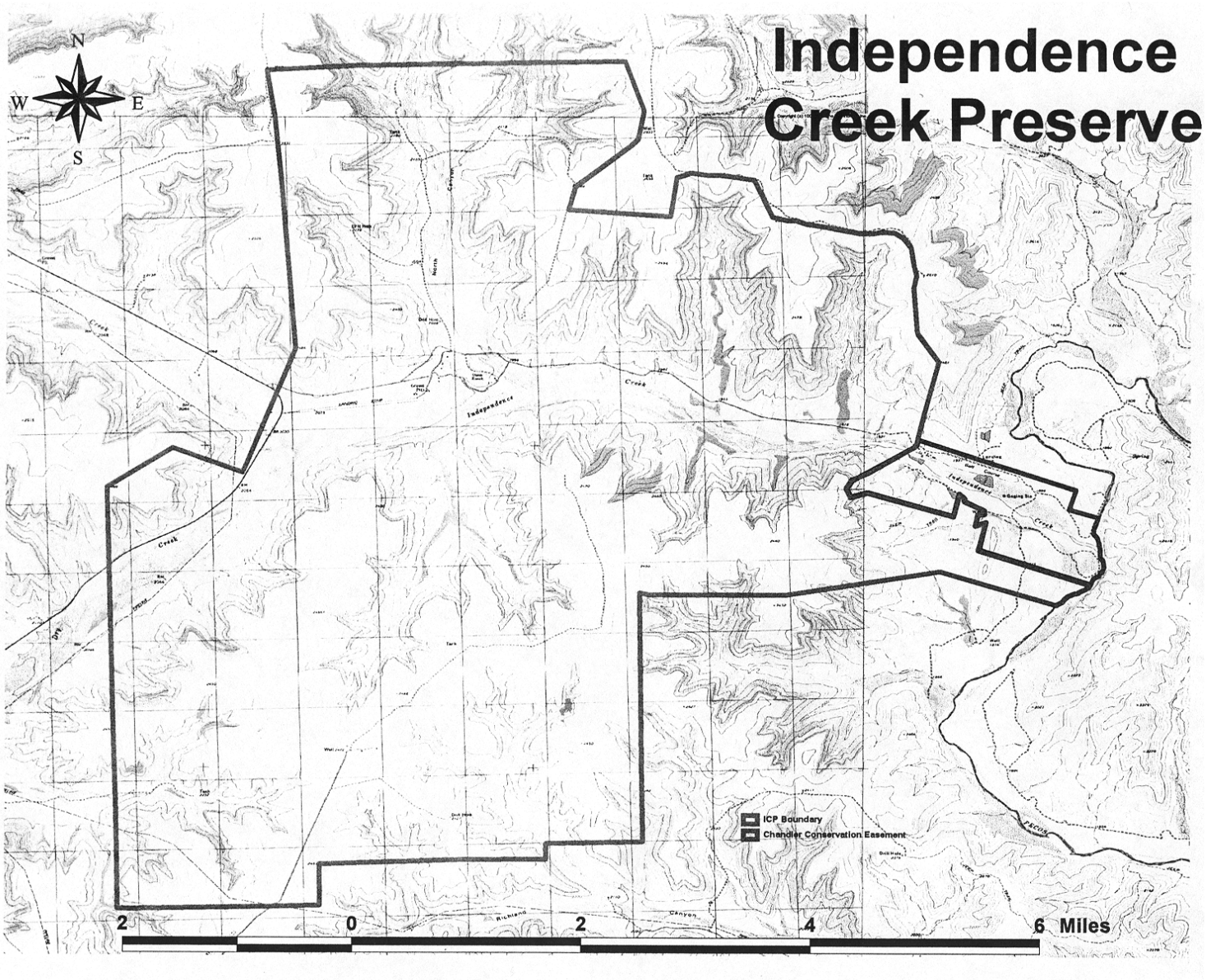
Independence Creek
Pecos River
CROCKETT
Hwy 349
TERRELL
Hwy 90
VAL VERDE



LBG-GUYTON ASSOCIATES

Independence Creek
Lynn McBride, TNC

Independence Creek
,John Karges, TNC

Independence Creek
Lynn McBride, TNC

Independence Creek Preserve
Lynn McBride, TNC

Independence Creek Preserve
Lynn McBride, TNC

Caroline Springs
Independence Creek
,John Karges, TNC

TNC INDEPENDENCE CREEK PRESERVE STREAMS

LBG-GUYTON ASSOCIATES

APPENDIX 8G

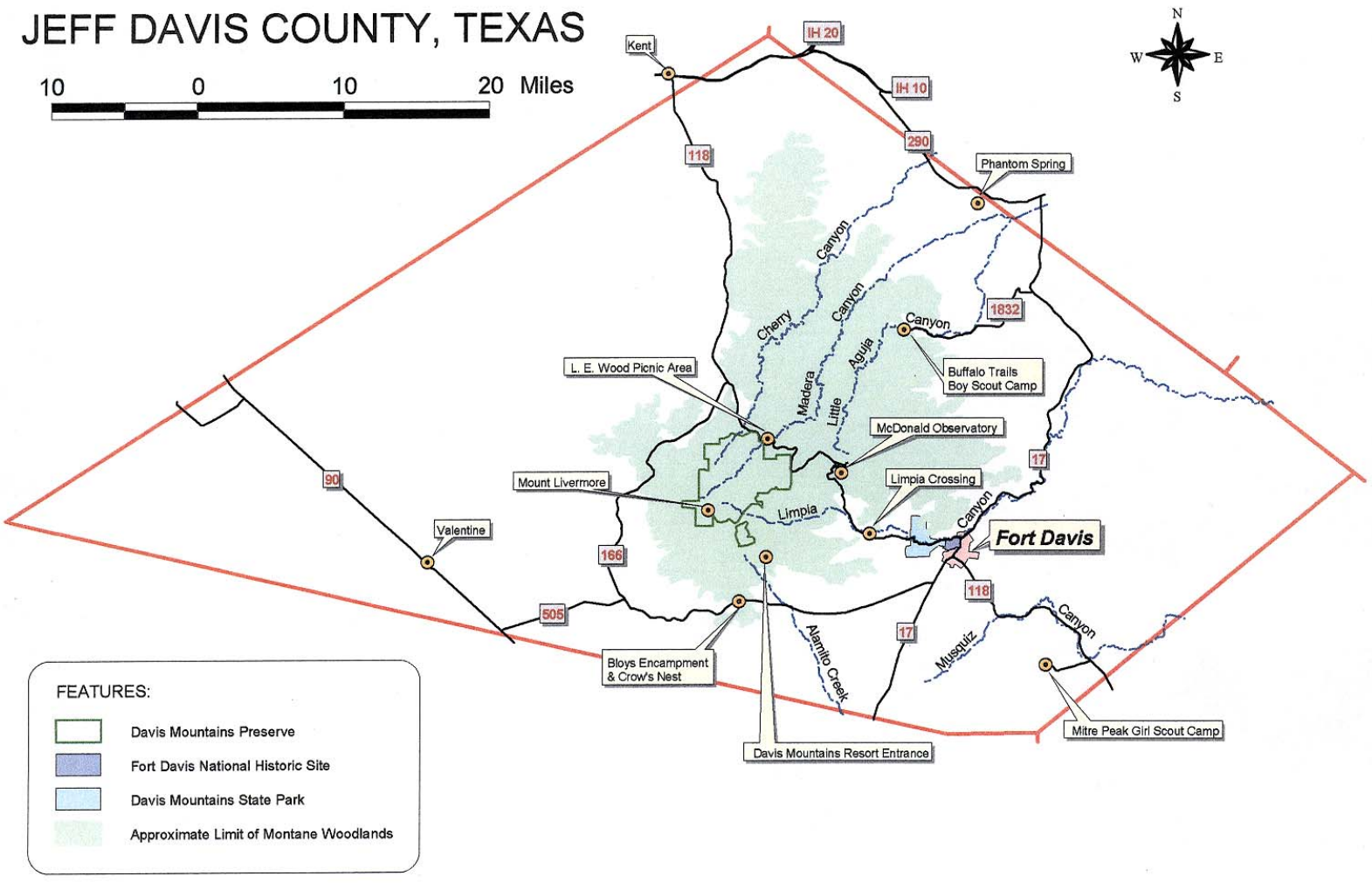
DAVIS MOUNTAINS STREAMS

(TEXAS NATURE CONSERVANCY PRESERVE)

APPENDIX 8G

Davis Mountains Streams (Texas Nature Conservancy Preserve)

The wild and remote Davis Mountains are considered one of the most scenic and biologically diverse areas in Texas. Rising above the Chihuahuan desert, the range forms a unique "sky island" surrounded by the lowland desert. Animals and plants living above 5,000 feet are isolated from other similar mountain ranges by vast distances. The Texas Nature Conservancy has established the 32,000-acre Davis Mountains Preserve (with conservation easements on 65,830 acres of adjoining property) in the heart of this region. The headwaters of Madera, Limpia, Little Aguja and Upper Cherry Creeks originate within the boundaries of the Preserve. Tobe, Bridge, Pine and Limpia Springs (identified as "Major Springs in Chapter 1) contribute to these headwaters and form critical wetland habitat and establish base flow to the downstream creeks.


JEFF DAVIS COUNTY, TEXAS
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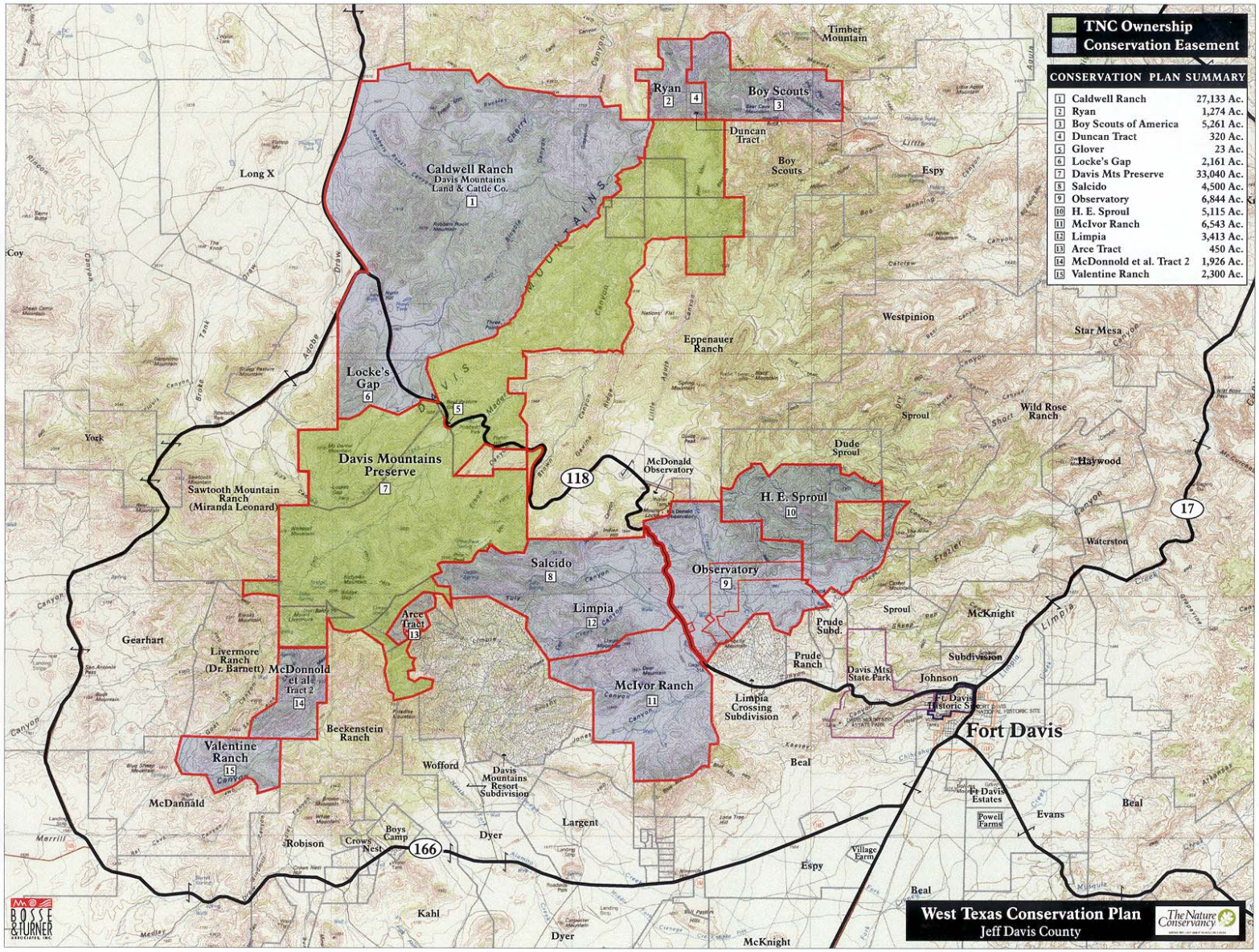
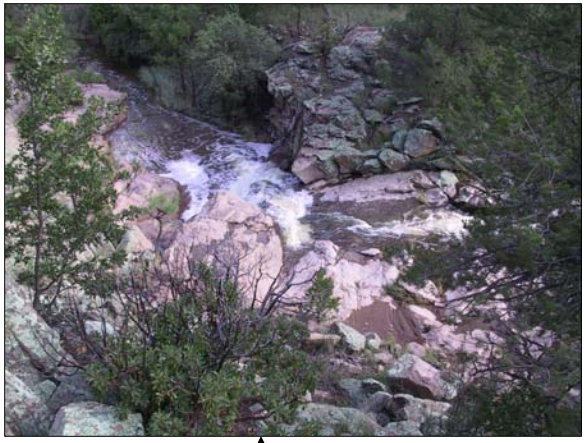
118
Phantom Spring
Canyon
Cherry
Canyon
Canyon
1832
Aguja
Madera
Little
L. E. Wood Picnic Area
Buffalo Trails
Boy Scout Camp
McDonald Observatory
17
Mount Livermore
Limpia Crossing
90
Limpia
Canyon
Fort Davis
Valentine
166
118
505
17
Canyon
Alamito Creek
Musquiz
Bloys Encampment
& Crow's Nest
Mitre Peak Girl Scout Camp
Davis Mountains Resort Entrance
FEATURES:
Davis Mountains Preserve
Fort Davis National Historic Site
Davis Mountains State Park
Approximate Limit of Montane Woodlands



LBG-GUYTON ASSOCIATES



Madera Canyon Creek

Little Aguja Creek

Madera Canyon Creek

Photos courtesy of John Karges, TNC

TNC DAVIS MOUNTAIN PRESERVE STREAMS

LBG-GUYTON ASSOCIATES

APPENDIX 8H

TEXAS PARKS AND WILDLIFE

RECOMMENDED ECOLOGICALLY

SIGNIFICANT RIVER AND STREAM SEGMENTS

APPENDIX 8H

Texas Parks and Wildlife Recommended Ecologically Significant River and Stream Segments

Alamito Creek - From the confluence with the Rio Grande in Presidio County upstream to the FM 169 crossing in Presidio County.

High water quality/exceptional aquatic life/high aesthetic value: ecoregion stream; diverse benthic macroinvertebrate and fish communities (Bayer et al., 1992; Linam et al., 1999)

Threatened or endangered species/unique communities: Conchos pupfish (Fed.SOC/St.T), Chihuahua shiner (Fed. SOC/St.T), Mexican stoneroller (Fed.SOC/St.T) (Bayer et al., 1992)

Cienega Creek - From the confluence with Alamito Creek upstream to its headwaters in Presidio County.

Biological function: intact desert spring ecosystem displays significant overall habitat value (D. Riskind, 1999, pers. comm.)

Riparian conservation area: Big Bend Ranch State Park

Threatened or endangered species/unique communities: Big Bend mud turtle (St.E) and endangered desert fishes (D. Riskind, 1999, pers. comm.)

Independence Creek - From the confluence with the Pecos River 15 miles south of Old Fort Lancaster and Sheffield in Terrell County upstream to its headwaters located 18 miles southwest of Sheffield in Terrell County.

Riparian conservation area: Chandler Ranch

High water quality/exceptional aquatic life/high aesthetic value: ecoregion stream; high water quality, diverse benthic macroinvertebrate community (Bayer et al., 1992)

Threatened or endangered species/unique communities: proserpine shiner (SOC/St.T), Rio Grande darter (SOC/St.T) (Linam and Kleinsasser, 1996; Linam et al., 1999)

Little Aguja Creek - From the confluence with Toyah Creek 2.5 miles southwest of Toyahvale at the Jeff Davis/Reeves County line upstream to its headwaters in the Davis Mountains 10 miles northwest of Fort Davis in Jeff Davis County.

Threatened or endangered species/unique communities: Rio Grande chub (SOC/St.T) (Hubbs et al., 1991); only known location of Little Aguja pondweed (D. Sullivan, 1998, pers. comm.)

Pecos River - From the Val Verde/Terrell County line upstream to the Terrell/Crockett/Pecos County line (within TNRCC classified stream segment 2311).

Biological function: Texas Natural Rivers System nominee for outstandingly remarkable fish and wildlife values (NPS, 1995)

High water quality/exceptional aquatic life/high aesthetic value: exceptional aesthetic value (NPS, 1995)
Threatened or endangered species/unique communities: proserpine shiner (SOC/St.T) (Hubbs et al., 1991; Linam and Kleinsasser, 1996)

Phantom Springs (Jeff Davis County)

Riparian conservation area: Managed by the Texas Parks and Wildlife Department through an agreement with the Bureau of Land Management

Threatened or endangered species/unique communities: Comanche Springs pupfish (Fed.E/St.E), Pecos gambusia (SOC/St.T) (Hubbs et al., 1991)

Rio Grande - From a point 1.1 miles downstream of the confluence of Ramsey Canyon in Val Verde County to the confluence of the Rio Conchos (Mexico) in Presidio County (TNRCC stream segment 2306).

Riparian conservation area: Big Bend National Park; Big Bend Ranch State Natural Area; National Wild and Scenic River

High water quality/exceptional aquatic life/high aesthetic value: diverse benthic macroinvertebrate community (J. Davis, 1998, pers. comm.)

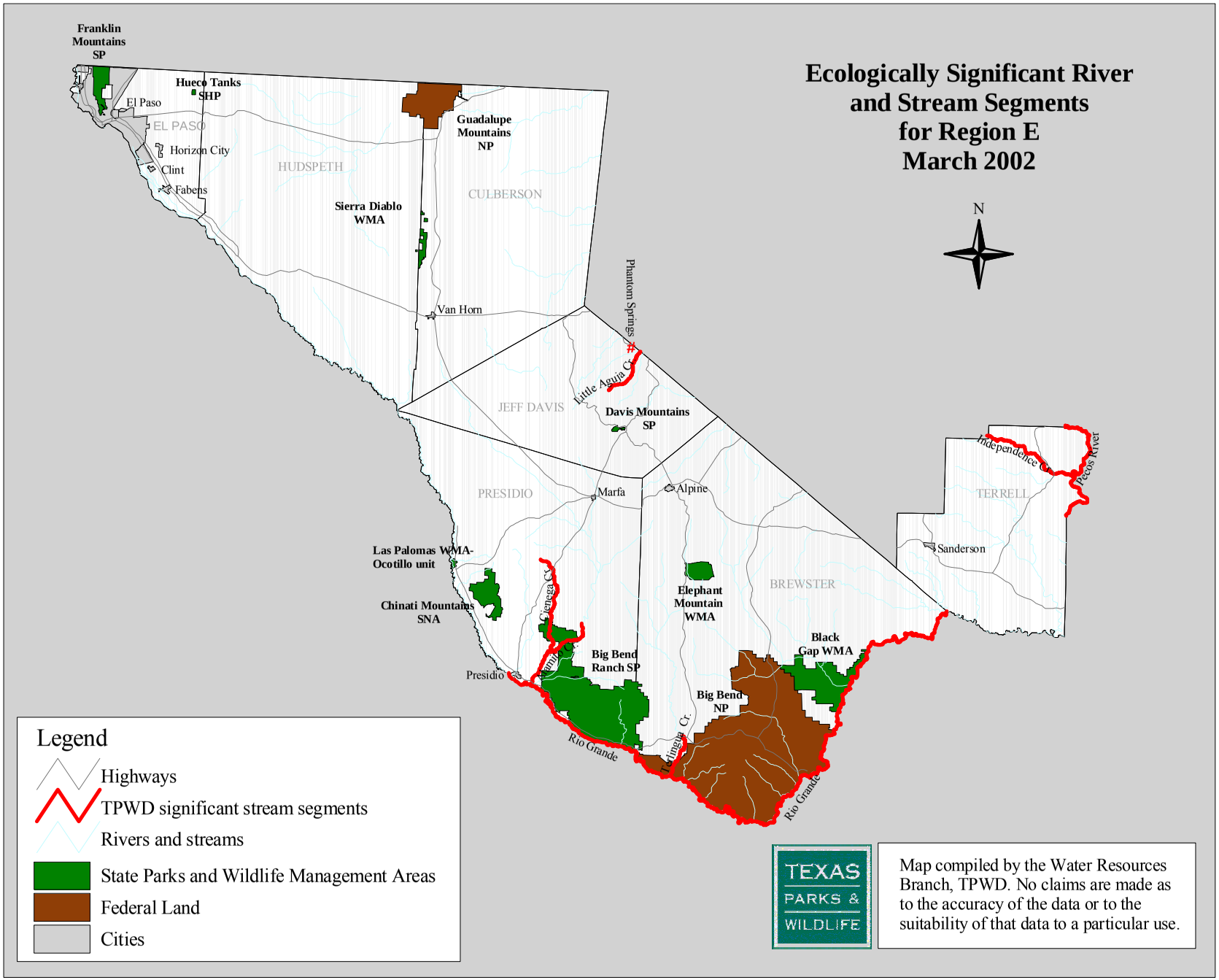
Threatened or endangered species/unique communities: Occurrence of species or habitat insufficient to merit designation.

Terlingua Creek - From the confluence with the Rio Grande two miles south of Terlingua Abaja in Brewster County upstream to the FM 170 crossing in Brewster County

Riparian conservation area: Big Bend National Park

High water quality/exceptional aquatic life/high aesthetic value: ecoregion stream (Linam et al., 1999); exceptional aesthetic value (NPS, 1995)

Threatened or endangered species/unique communities: proserpine shiner (SOC/St.T) (Linam et al., 1999)


Ecologically Significant River and Stream Segments for Region E March 2002
N
Franklin Mountains SP
Hueco Tanks SHP
El Paso
EL PASO
Horizon City
Clint
Fabens
HUDSPETH
Guadalupe Mountains NP
CULBERSON
Sierra Diablo WMA
Van Horn
Phantom Springs
Little Aguja Cr.
JEFF DAVIS
Davis Mountains SP
PRESIDIO
Marfa
Alpine
Las Palomas WMA-Ocotillo unit
Chinati Mountains SNA
Cienega Cr.
Elephant Mountain WMA
BREWSTER
Big Bend Ranch SP
Presidio
Black Gap WMA
Big Bend NP
Rio Grande
Terlingua Cr.
Rio Grande
Independence Cr.
Pecos River
TERRELL
Sanderson
Legend
Highways
TPWD significant stream segments
Rivers and streams
State Parks and Wildlife Management Areas
Federal Land
Cities
TEXAS PARKS & WILDLIFE
Map compiled by the Water Resources Branch, TPWD. No claims are made as to the accuracy of the data or to the suitability of that data to a particular use.